```
264 display r(r)
   36

265 tab strata48, nofreq

266 display r(r)
   48

267 tab strata96, nofreq /* HAS 92 STRATA */

268 display r(r)
   92

269
270
271
272 ********************************************************************
273 ******
  >                            ******
274 ******          Fit models using Bayesian MCMC in MLwiN          ******
275 ******
  >                            ******
276 ********************************************************************
277
278
279
280 ********************************************************************************
281 ********************************************************************************
282 ********************************************************************************
283 *
284 *
285 * MODEL 1 - BMI, MAIN EFFECTS MODEL
286 *
287 *
288 ********************************************************************************
289 ********************************************************************************
290 ********************************************************************************
291
292 ********************************************************************************
293 * MODEL 1A_S6 - BMI, Null MODEL
294 ********************************************************************************
295
296 * Load the data
297 use "analysisready2.dta", clear

298 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

299 sort scid strata6 aid

300
301 * delete if missing dependent variable (so can record number)
302 drop if bmi_w1 == .
  (347 observations deleted)

303
304 * Fit model using PQL2
305 runmlwin bmi_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                    Number of obs      =      13694
  Normal response model
  Estimation algorithm: RIGLS
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata6	673	1	20.3	343

```
Run time (seconds)          =        1.83
Number of iterations        =           4
Log restricted-likelihood = -39846.506
Restricted-deviance         =   79693.011
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	22.41586	.0887467	252.58	0.000	22.24192	22.5898

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.6793726	.1329672	.4187618	.9399835
Level 2: strata6				
var(cons)	.4247553	.0946174	.2393086	.6102019
Level 1: aid				
var(cons)	19.22433	.2361514	18.76148	19.68718

```
306
307 * Fit model using MCMC
308 runmlwin bmi_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons, residuals(u, savechains("m1A_s6_u.dta", replace))) ///
  >   level1(aid: cons) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m1A_s6_beta.dta", replace)) initsprevious ///
  >   nopause
```

```
MLwiN 3.2 multilevel model                  Number of obs     =     13694
Normal response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata6	6	1142	2282.3	4165

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =        38.6
Deviance (dbar)             =    79381.79
Deviance (thetabar)         =    79275.71
Effective no. of pars (pd) =      106.08
Bayesian DIC                =    79487.86
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.64479	.3405683	319	0.000	21.90892	23.26211

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.715381	.1228114	1069	.5015028	.9969824
Level 2: strata6						
	var(cons)	.6238328	.725116	632	.1411011	2.316381
Level 1: aid						
	var(cons)	19.27944	.2344656	1081	18.86285	19.73878

309 rename u0 m1u

310 drop u0se

311
312
313 * Calculate the ICC from the chains
314 use "m1A_s6_beta.dta", clear

315 rename RP3_var_cons_ sigma2uscid

316 rename RP2_var_cons_ sigma2u

317 rename RP1_var_cons_ sigma2e

318 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

319 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

320 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0295374	.0284158	619	0.000	.0069359	.1042368
icc_scid	.0348689	.0060308	1035	0.000	.0244442	.0486677

321
322 **
323 * MODEL 1B_S6 - BMI, MAIN EFFECTS MODEL
324 **
325
326 * Load the data
327 use "analysisready2.dta", clear

328 recast float bmi_w1
  bmi_w1: **13694** values would be changed; not changed

329 sort scid strata6 aid

330
331 * delete if missing dependent variable (so can record number)
332 drop if bmi_w1 == .
  (347 observations deleted)

333
334 * Fit model using PQL2

```
335 runmlwin bmi_w1 cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons) ///
>    level1(aid: cons) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata6	**673**	**1**	**20.3**	**343**

```
Run time (seconds)          =         1.90
Number of iterations        =            4
Log restricted-likelihood = -39805.839
Restricted-deviance         =    79611.678
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**22.18678**	**.1056562**	**209.99**	**0.000**	**21.9797**	**22.39386**
female	**-.2978382**	**.0921282**	**-3.23**	**0.001**	**-.4784062**	**-.1172703**
latinx_race	**.8576017**	**.1464304**	**5.86**	**0.000**	**.5706034**	**1.1446**
black_race	**1.037009**	**.1271299**	**8.16**	**0.000**	**.7878388**	**1.286179**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.629229**	**.1170803**	**.3997559**	**.8587021**
Level 2: strata6				
var(cons)	**.2122245**	**.0722122**	**.0706912**	**.3537578**
Level 1: aid				
var(cons)	**19.22313**	**.235807**	**18.76095**	**19.6853**

```
336
337 * Fit model using MCMC
338 runmlwin bmi_w1 cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m1B_s6_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m1B_s6_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata6	**6**	**1142**	**2282.3**	**4165**

```
Burnin                       =          5000
Chain                        =         50000
Thinning                     =            50
Run time (seconds)           =          46.4
Deviance (dbar)              =      79383.49
Deviance (thetabar)          =      79275.96
Effective no. of pars (pd)   =        107.53
Bayesian DIC                 =      79491.02
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.30336	.7198882	187	0.000	20.89685	23.93501
female	-.2893375	.6931779	228	0.282	-1.707465	1.260368
latinx_race	.7653032	.9607605	166	0.151	-1.710349	2.579893
black_race	.8526297	.9907357	171	0.145	-1.420228	2.681329

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.7126453	.1218224	1025	.4959636	.9568531
Level 2: strata6					
var(cons)	1.059602	2.109065	259	.0760436	6.442601
Level 1: aid					
var(cons)	19.28111	.2351784	927	18.82733	19.75435

339 rename u0 m1u

340 drop u0se

341
342 * Calculate the ICC from the chains
343 use "m1B_s6_beta.dta", clear

344 rename RP3_var_cons_ sigma2uscid

345 rename RP2_var_cons_ sigma2u

346 rename RP1_var_cons_ sigma2e

347 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

348 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

349 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.044271	.0632373	235	0.000	.003838	.2437405
icc_scid	.0337561	.0058465	726	0.000	.022913	.0452686

350
351
352 *--*
353 * PREPARE FIXED-PART PAREMETER CHAINS

```
354 *------------------------------------------------------------------------------*
355
356 use "m1B_s6_beta.dta", clear

357 drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

358 rename FP1_* b_*

359 format %9.2f b_*

360 compress
    variable iteration was double now long
    (4,000 bytes saved)

361 save "m1B_s6_beta_prepped.dta", replace
  (note: file m1B_s6_beta_prepped.dta not found)
  file m1B_s6_beta_prepped.dta saved

362 isid iteration

363 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
364
365
366 *------------------------------------------------------------------------------*
367 * PREPARE STRATUM RANDOM EFFECTS CHAINS
368 *------------------------------------------------------------------------------*
369
370 use "m1B_s6_u.dta", clear

371 drop residual idnum

372 rename value u

373 format %9.2f u

374 sort strata6 iteration

375 order strata6 iteration

376 compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)

377 save "m1B_s6_u_prepped.dta", replace
  (note: file m1B_s6_u_prepped.dta not found)
  file m1B_s6_u_prepped.dta saved

378 isid strata6 iteration

379 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	6000	1000	24976	1	49951	Iteration

```
380
381
382 *------------------------------------------------------------------------------*
383 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
384 *------------------------------------------------------------------------------*
385
386 use "data6.dta", clear

387 isid strata6

388 cross using "m1B_s6_beta_prepped.dta"

389 isid strata6 iteration

390 sort strata6 iteration

391 merge 1:1 strata6 iteration using "m1B_s6_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	6,000

```
392 isid strata6 iteration

393 compress
    variable strata6 was double now byte
    (42,000 bytes saved)

394 save "m1B_s6data_prepped.dta", replace
  (note: file m1B_s6data_prepped.dta not found)
  file m1B_s6data_prepped.dta saved

395
396
397 *------------------------------------------------------------------------------*
398 * CALCULATE VALUES OF INTEREST
399 *------------------------------------------------------------------------------*
400
401 * Expected value based on fixed and random part
402 use "m1B_s6data_prepped.dta", clear

403 gen cons = 1

404 generate expectedvalue = (b_cons*cons ///
  >                                             + b_female*female ///
  >                                             + b_latinx_race*latinx_race ///
  >                                             + b_black_race*black_race ///
  >                                             + u )

405 label var expectedvalue "Expected value based on main effects and interactions"

406 format %9.3f expectedvalue

407
408 * Expected value based only on the fixed-part
409 generate fixedeffect = (b_cons*cons ///
  >                                             + b_female*female ///
  >                                             + b_latinx_race*latinx_race ///
  >                                             + b_black_race*black_race ///
  >                                             )
```

```
410 label var fixedeffect "Expected value based only on main effects"

411 format %9.3f fixedeffect

412
413 * Expected value based only on the random-part
414 generate randomeffect = u

415 label var randomeffect "Random Effect"

416 format %9.3f randomeffect

417
418 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
419 bysort strata6 (iteration): egen expmn = mean(expectedvalue)

420 bysort strata6 (iteration): egen explo = pctile(expectedvalue), p(2.5)

421 bysort strata6 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

422 format %9.3f expmn explo exphi

423
424 bysort strata6 (iteration): egen FEmn = mean(fixedeffect)

425 bysort strata6 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

426 bysort strata6 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

427 format %9.3f FEmn FElo FEhi

428
429 bysort strata6 (iteration): egen REmn = mean(randomeffect)

430 bysort strata6 (iteration): egen RElo = pctile(randomeffect), p(2.5)

431 bysort strata6 (iteration): egen REhi = pctile(randomeffect), p(97.5)

432 format %9.3f REmn RElo REhi

433
434 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
435 drop iteration b* u* expectedvalue fixedeffect randomeffect

436 duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)

437 isid strata6

438
439 * Ranks
440 sort expmn

441 generate exprank = _n

442 order exprank, after(exphi)
```

```
443 sort FEmn

444 generate FErank = _n

445 order FErank, after(FEhi)

446 sort REmn

447 generate RErank = _n

448 order RErank, after(REhi)

449
450 * Sort the data
451 sort strata6

452 isid strata6

453
454 * Compress and save the data
455 compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (72 bytes saved)

456 save "m1B_s6results.dta", replace
  (note: file m1B_s6results.dta not found)
  file m1B_s6results.dta saved

457
458 * List strata with statistically significant interaction effects
459 use "m1B_s6results.dta", clear

460 list strata6  REmn RElo REhi if REhi<0, noobs

461 list strata6  REmn RElo REhi if RElo>0, noobs

462
463
464
465 *********************************************************************************
466 * MODEL 1A_S12 - BMI, Null MODEL
467 *********************************************************************************
468
469 * Load the data
470 use "analysisready2.dta", clear

471 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

472 sort scid strata12 aid

473
474 * delete if missing dependent variable (so can record number)
475 drop if bmi_w1 == .
  (347 observations deleted)

476
```

```
477 * Fit model using PQL2
478 runmlwin bmi_w1 cons , ///
 >    level3(scid: cons) ///
 >    level2(strata12: cons) ///
 >    level1(aid: cons) ///
 >    rigls maxiterations(100) ///
 >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata12	**1159**	**1**	**11.8**	**217**

```
Run time (seconds)          =        1.82
Number of iterations        =           3
Log restricted-likelihood = -39836.592
Restricted-deviance         =   79673.185
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**22.42874**	**.0885473**	**253.30**	**0.000**	**22.25519**	**22.60229**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.7047109**	**.1305716**	**.4487953**	**.9606264**
Level 2: strata12				
var(cons)	**.5580009**	**.1015186**	**.3590281**	**.7569737**
Level 1: aid				
var(cons)	**19.06378**	**.2367091**	**18.59984**	**19.52772**

```
479
480 * Fit model using MCMC
481 runmlwin bmi_w1 cons , ///
 >    level3(scid: cons) ///
 >    level2(strata12: cons, residuals(u, savechains("m1A_s12_u.dta", replace))) ///
 >    level1(aid: cons) ///
 >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
 >      savechains("m1A_s12_beta.dta", replace)) initsprevious ///
 >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata12	**12**	**467**	**1141.2**	**2828**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =         38.9
Deviance (dbar)                =     79343.25
Deviance (thetabar)            =     79234.98
Effective no. of pars (pd)     =       108.26
Bayesian DIC                   =     79451.51
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.69957	.2193659	654	0.000	22.25959	23.11039

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.622698	.1119815	1153	.4266099	.858782
Level 2: strata12					
var(cons)	.4597744	.2582723	1231	.1736227	1.085903
Level 1: aid					
var(cons)	19.22474	.234354	1174	18.77898	19.66833

482 rename u0 m1u

483 drop u0se

484
485 * Calculate the ICC from the chains
486 use "m1A_s12_beta.dta", clear

487 rename RP3_var_cons_ sigma2uscid

488 rename RP2_var_cons_ sigma2u

489 rename RP1_var_cons_ sigma2e

490 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

491 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

492 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0225312	.0117321	1246	0.000	.0086044	.0526376
icc_scid	.0304992	.0052547	1194	0.000	.0211248	.0417836

493
494
495 ***
496 * MODEL 1B_S12 - BMI, MAIN EFFECTS MODEL
497 ***
498
499 * Load the data

```
500 use "analysisready2.dta", clear

501 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

502 sort scid strata12 aid

503
504 * delete if missing dependent variable (so can record number)
505 drop if bmi_w1 == .
  (347 observations deleted)

506
507 * Fit model using PQL2
508 runmlwin bmi_w1 cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

```
MLwiN 3.2 multilevel model                       Number of obs     =     13694
Normal response model
Estimation algorithm: RIGLS
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	93.8	814
strata12	1159	1	11.8	217

```
Run time (seconds)           =         1.90
Number of iterations         =            4
Log restricted-likelihood = -39783.065
Restricted-deviance          =    79566.131
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	22.05417	.1070174	206.08	0.000	21.84442	22.26392
female	-.3264841	.0893736	-3.65	0.000	-.5016531	-.1513152
latinx_race	.7449512	.1442913	5.16	0.000	.4621454	1.027757
black_race	.9822492	.1242548	7.91	0.000	.7387143	1.225784
lowparentedu	.5090974	.0951303	5.35	0.000	.3226455	.6955494

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.5786744	.107615	.3677528	.789596
Level 2: strata12				
var(cons)	.2880982	.0793488	.1325774	.443619
Level 1: aid				
var(cons)	19.09554	.2364286	18.63214	19.55893

```
509
510 * Fit model using MCMC
511 runmlwin bmi_w1 cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons, residuals(u, savechains("m1B_s12_u.dta", replace))) ///
  >    level1(aid: cons) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m1B_s12_beta.dta", replace)) initsprevious ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata12	**12**	**467**	**1141.2**	**2828**

```
Burnin                       =         5000
Chain                        =        50000
Thinning                     =           50
Run time (seconds)           =         50.9
Deviance (dbar)              =     79344.02
Deviance (thetabar)          =     79235.86
Effective no. of pars (pd)   =       108.16
Bayesian DIC                 =     79452.17
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**22.05916**	.4003055	569	0.000	21.21024	22.85828
female	**−.2571467**	.3337011	761	0.201	−.9318829	.4173246
latinx_race	**.7634516**	.4210307	724	0.031	−.0518405	1.589126
black_race	**.8999331**	.4079013	774	0.011	.11614	1.701781
lowparentedu	**.4589949**	.3372172	705	0.075	−.1989249	1.11897

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.6189841	.1114782	1078	.4260106	.8642165
Level 2: strata12					
var(cons)	.3150643	.2524971	942	.0828027	.9735604
Level 1: aid					
var(cons)	19.22695	.2342609	1149	18.77126	19.69941

```
512 rename u0 m1u

513 drop u0se

514
515 * Calculate the ICC from the chains
516 use "m1B_s12_beta.dta", clear
```

517 rename RP3_var_cons_ sigma2uscid

518 rename RP2_var_cons_ sigma2u

519 rename RP1_var_cons_ sigma2e

520 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

521 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

522 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0154627	.0118881	936	0.000	.0041842	.0470511
icc_scid	.0308629	.0054228	1131	0.000	.0214687	.0426399

523
524
525 *---*
526 * PREPARE FIXED-PART PAREMETER CHAINS
527 *---*
528
529 use "m1B_s12_beta.dta", clear

530 drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

531 rename FP1_* b_*

532 format %9.2f b_*

533 compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

534 save "m1B_s12_beta_prepped.dta", replace
  (note: file m1B_s12_beta_prepped.dta not found)
  file m1B_s12_beta_prepped.dta saved

535 isid iteration

536 codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

537
538
539 *---*
540 * PREPARE STRATUM RANDOM EFFECTS CHAINS
541 *---*
542
543 use "m1B_s12_u.dta", clear

544 drop residual idnum

```
545 rename value u

546 format %9.2f u

547 sort strata12 iteration

548 order strata12 iteration

549 compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

550 save "m1B_s12_u_prepped.dta", replace
  (note: file m1B_s12_u_prepped.dta not found)
  file m1B_s12_u_prepped.dta saved

551 isid strata12 iteration

552 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	12000	1000	24976	1	49951	Iteration

```
553
554
555 *-------------------------------------------------------------------------------*
556 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
557 *-------------------------------------------------------------------------------*
558
559 use "data12.dta", clear

560 isid strata12

561 cross using "m1B_s12_beta_prepped.dta"

562 isid strata12 iteration

563 sort strata12 iteration

564 merge 1:1 strata12 iteration using "m1B_s12_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	12,000

```
565 isid strata12 iteration

566 compress
    variable strata12 was double now int
    (72,000 bytes saved)

567 save "m1B_s12data_prepped.dta", replace
  (note: file m1B_s12data_prepped.dta not found)
  file m1B_s12data_prepped.dta saved
```

```
568
569
570 *-------------------------------------------------------------------------------*
571 * CALCULATE VALUES OF INTEREST
572 *-------------------------------------------------------------------------------*
573
574 * Expected value based on fixed and random part
575 use "m1B_s12data_prepped.dta", clear

576 gen cons = 1

577 generate expectedvalue = (b_cons*cons ///
  >                                                 + b_female*female ///
  >                                                 + b_latinx_race*latinx_race ///
  >                                                 + b_black_race*black_race ///
  >                                                 + b_lowparentedu*lowparentedu ///
  >                                                 + u )

578 label var expectedvalue "Expected value based on main effects and interactions"

579 format %9.3f expectedvalue

580
581 * Expected value based only on the fixed-part
582 generate fixedeffect = (b_cons*cons ///
  >                                                 + b_female*female ///
  >                                                 + b_latinx_race*latinx_race ///
  >                                                 + b_black_race*black_race ///
  >                                                 + b_lowparentedu*lowparentedu ///
  >                                                 )

583 label var fixedeffect "Expected value based only on main effects"

584 format %9.3f fixedeffect

585
586 * Expected value based only on the random-part
587 generate randomeffect = u

588 label var randomeffect "Random Effect"

589 format %9.3f randomeffect

590
591 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
592 bysort strata12 (iteration): egen expmn = mean(expectedvalue)

593 bysort strata12 (iteration): egen explo = pctile(expectedvalue), p(2.5)

594 bysort strata12 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

595 format %9.3f expmn explo exphi

596
597 bysort strata12 (iteration): egen FEmn = mean(fixedeffect)

598 bysort strata12 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

599 bysort strata12 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)
```

```
600 format %9.3f FEmn FElo FEhi

601
602 bysort strata12 (iteration): egen REmn = mean(randomeffect)

603 bysort strata12 (iteration): egen RElo = pctile(randomeffect), p(2.5)

604 bysort strata12 (iteration): egen REhi = pctile(randomeffect), p(97.5)

605 format %9.3f REmn RElo REhi

606
607 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
608 drop iteration b* u* expectedvalue fixedeffect randomeffect

609 duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

610 isid strata12

611
612 * Ranks
613 sort expmn

614 generate exprank = _n

615 order exprank, after(exphi)

616 sort FEmn

617 generate FErank = _n

618 order FErank, after(FEhi)

619 sort REmn

620 generate RErank = _n

621 order RErank, after(REhi)

622
623 * Sort the data
624 sort strata12

625 isid strata12

626
627 * Compress and save the data
628 compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (144 bytes saved)

629 save "m1B_s12results.dta", replace
  (note: file m1B_s12results.dta not found)
  file m1B_s12results.dta saved
```

```
630
631 * List strata with statistically significant interaction effects
632 use "m1B_s12results.dta", clear

633 list strata12  REmn RElo REhi if REhi<0, noobs

634 list strata12  REmn RElo REhi if RElo>0, noobs

635
636
637 *******************************************************************************
638 * MODEL 1A_S18 - BMI, Null MODEL
639 *******************************************************************************
640
641 * Load the data
642 use "analysisready2.dta", clear

643 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

644 sort scid strata18 aid

645
646 * delete if missing dependent variable (so can record number)
647 drop if bmi_w1 == .
  (347 observations deleted)

648
649 * Fit model using PQL2
650 runmlwin bmi_w1 cons , ///
 >   level3(scid: cons) ///
 >   level2(strata18: cons) ///
 >   level1(aid: cons) ///
 >   rigls maxiterations(100) ///
 >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata18	**1609**	**1**	**8.5**	**186**

```
Run time (seconds)        =        1.87
Number of iterations      =           3
Log restricted-likelihood = -39847.311
Restricted-deviance       =  79694.622
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**22.39976**	**.0878801**	**254.89**	**0.000**	**22.22752**	**22.57201**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.7287176	.1273911	.4790357	.9783995
Level 2: strata18				
var(cons)	.5122466	.099034	.3181434	.7063497
Level 1: aid				
var(cons)	19.07304	.2390938	18.60443	19.54166

```
651
652 * Fit model using MCMC
653 runmlwin bmi_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m1A_s18_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m1A_s18_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata18	**18**	**209**	**760.8**	**1537**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =         39.8
Deviance (dbar)                =     79323.34
Deviance (thetabar)            =     79210.76
Effective no. of pars (pd)     =       112.59
Bayesian DIC                   =     79435.93
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**22.63043**	**.1826141**	**920**	**0.000**	**22.27619**	**22.97253**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.5995422**	**.1092417**	**1016**	**.4189332**	**.8247416**
Level 2: strata18					
var(cons)	**.480752**	**.2039584**	**1025**	**.2168846**	**.9521005**
Level 1: aid					
var(cons)	**19.19589**	**.2336857**	**1032**	**18.73217**	**19.63611**

```
654 rename u0 m1u

655 drop u0se

656
657 * Calculate the ICC from the chains
658 use "m1A_s18_beta.dta", clear

659 rename RP3_var_cons_ sigma2uscid

660 rename RP2_var_cons_ sigma2u
```

661 rename RP1_var_cons_ sigma2e

662 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

663 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

664 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0239457	.0099439	1015	0.000	.0108231	.045576
icc_scid	.0294053	.005157	995	0.000	.0207372	.0404254

665
666
667 ***
668 * MODEL 1B_S18 - BMI, MAIN EFFECTS MODEL
669 ***
670
671 * Load the data
672 use "analysisready2.dta", clear

673 recast float bmi_w1
  bmi_w1: **13694** values would be changed; not changed

674 sort scid strata18 aid

675
676 * delete if missing dependent variable (so can record number)
677 drop if bmi_w1 == .
  (347 observations deleted)

678
679 * Fit model using PQL2
680 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege, ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model   Number of obs   =   **13694**
  Normal response model
  Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	93.8	814
strata18	1609	1	8.5	186

  Run time (seconds)   =   1.98
  Number of iterations   =   5
  Log restricted-likelihood = -39781.02
  Restricted-deviance   =   79562.039

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	21.88645	.1145528	191.06	0.000	21.66193	22.11097
female	-.3564204	.0842295	-4.23	0.000	-.5215073	-.1913336
latinx_race	.7315266	.1405833	5.20	0.000	.4559883	1.007065
black_race	.9800078	.119824	8.18	0.000	.7451571	1.214858
hsless	.7058806	.1064283	6.63	0.000	.497285	.9144763
somecollege	.3888989	.1068739	3.64	0.000	.1794299	.5983679

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid					
	var(cons)	.5749074	.1036805	.3716974	.7781174
Level 2: strata18					
	var(cons)	.2338814	.0779386	.0811245	.3866383
Level 1: aid					
	var(cons)	19.10996	.2383862	18.64273	19.57719

```
681
682 * Fit model using MCMC
683 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege, ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m1B_s18_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m1B_s18_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata18	**18**	**209**	**760.8**	**1537**

```
Burnin                       =          5000
Chain                        =         50000
Thinning                     =            50
Run time (seconds)           =          52.1
Deviance (dbar)              =      79324.86
Deviance (thetabar)         =      79212.42
Effective no. of pars (pd) =        112.43
Bayesian DIC                 =      79437.29
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.95065	.3291553	739	0.000	21.32809	22.61224
female	-.3323609	.2642468	1036	0.097	-.8950166	.205093
latinx_race	.7430916	.3373372	977	0.011	.1053127	1.38706
black_race	.9220325	.3332904	938	0.005	.3047127	1.620022
hsless	.6095642	.3324132	1237	0.035	-.0548551	1.217249
somecollege	.3082526	.3367836	943	0.155	-.3896129	.9419035

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.5935192	.1089357	881	.399883	.8427675
Level 2: strata18						
	var(cons)	.2849117	.1654552	967	.0943728	.7493083
Level 1: aid						
	var(cons)	19.19844	.2338313	910	18.74603	19.67859

684 rename u0 m1u

685 drop u0se

686
687 * Calculate the ICC from the chains
688 use "m1B_s18_beta.dta", clear

689 rename RP3_var_cons_ sigma2uscid

690 rename RP2_var_cons_ sigma2u

691 rename RP1_var_cons_ sigma2e

692 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

693 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

694 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0146691	.0090393	964	0.000	.0047138	.0362836
icc_scid	.0293699	.0054792	870	0.000	.019891	.041566

695
696
697 *---*
698 * PREPARE FIXED-PART PAREMETER CHAINS
699 *---*
700
701 use "m1B_s18_beta.dta", clear

702 drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

703 rename FP1_* b_*

704 format %9.2f b_*

705 compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

706 save "m1B_s18_beta_prepped.dta", replace
  (note: file m1B_s18_beta_prepped.dta not found)
  file m1B_s18_beta_prepped.dta saved

707 isid iteration

708 codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

709

```
710
711 *-------------------------------------------------------------------------------*
712 * PREPARE STRATUM RANDOM EFFECTS CHAINS
713 *-------------------------------------------------------------------------------*
714
715 use "m1B_s18_u.dta", clear

716 drop residual idnum

717 rename value u

718 format %9.2f u

719 sort strata18 iteration

720 order strata18 iteration

721 compress
    variable strata18 was double now int
    variable iteration was double now long
    (180,000 bytes saved)

722 save "m1B_s18_u_prepped.dta", replace
  (note: file m1B_s18_u_prepped.dta not found)
  file m1B_s18_u_prepped.dta saved

723 isid strata18 iteration

724 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	18000	1000	24976	1	49951	Iteration

```
725
726
727 *-------------------------------------------------------------------------------*
728 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
729 *-------------------------------------------------------------------------------*
730
731 use "data18.dta", clear

732 isid strata18

733 cross using "m1B_s18_beta_prepped.dta"

734 isid strata18 iteration

735 sort strata18 iteration

736 merge 1:1 strata18 iteration using "m1B_s18_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	18,000

```
737 isid strata18 iteration

738 compress
    variable strata18 was double now int
    (108,000 bytes saved)

739 save "m1B_s18data_prepped.dta", replace
  (note: file m1B_s18data_prepped.dta not found)
  file m1B_s18data_prepped.dta saved

740
741
742 *-------------------------------------------------------------------------------*
743 * CALCULATE VALUES OF INTEREST
744 *-------------------------------------------------------------------------------*
745
746 * Expected value based on fixed and random part
747 use "m1B_s18data_prepped.dta", clear

748 gen cons = 1

749 generate expectedvalue = (b_cons*cons ///
  >                                                   + b_female*female ///
  >                                                   + b_latinx_race*latinx_race ///
  >                                                   + b_black_race*black_race ///
  >                                                   + b_hsless*hsless ///
  >                                                   + b_somecollege*somecollege ///
  >                                                   + u )

750 label var expectedvalue "Expected value based on main effects and interactions"

751 format %9.3f expectedvalue

752
753 * Expected value based only on the fixed-part
754 generate fixedeffect = (b_cons*cons ///
  >                                                   + b_female*female ///
  >                                                   + b_latinx_race*latinx_race ///
  >                                                   + b_black_race*black_race ///
  >                                                   + b_hsless*hsless ///
  >                                                   + b_somecollege*somecollege  ///
  >                                                   )

755 label var fixedeffect "Expected value based only on main effects"

756 format %9.3f fixedeffect

757
758 * Expected value based only on the random-part
759 generate randomeffect = u

760 label var randomeffect "Random Effect"

761 format %9.3f randomeffect

762
763 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
764 bysort strata18 (iteration): egen expmn = mean(expectedvalue)

765 bysort strata18 (iteration): egen explo = pctile(expectedvalue), p(2.5)
```

```
766 bysort strata18 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

767 format %9.3f expmn explo exphi

768
769 bysort strata18 (iteration): egen FEmn = mean(fixedeffect)

770 bysort strata18 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

771 bysort strata18 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

772 format %9.3f FEmn FElo FEhi

773
774 bysort strata18 (iteration): egen REmn = mean(randomeffect)

775 bysort strata18 (iteration): egen RElo = pctile(randomeffect), p(2.5)

776 bysort strata18 (iteration): egen REhi = pctile(randomeffect), p(97.5)

777 format %9.3f REmn RElo REhi

778
779 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
780 drop iteration b* u* expectedvalue fixedeffect randomeffect

781 duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

782 isid strata18

783
784 * Ranks
785 sort expmn

786 generate exprank = _n

787 order exprank, after(exphi)

788 sort FEmn

789 generate FErank = _n

790 order FErank, after(FEhi)

791 sort REmn

792 generate RErank = _n

793 order RErank, after(REhi)

794
795 * Sort the data
796 sort strata18

797 isid strata18
```

```
798
799 * Compress and save the data
800 compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (216 bytes saved)

801 save "m1B_s18results.dta", replace
  (note: file m1B_s18results.dta not found)
  file m1B_s18results.dta saved

802
803 * List strata with statistically significant interaction effects
804 use "m1B_s18results.dta", clear

805 list strata18  REmn RElo REhi if REhi<0, noobs
```

strata18	REmn	RElo	REhi
121	-0.694	-1.406	-0.029
122	-0.705	-1.437	-0.056

```
806 list strata18  REmn RElo REhi if RElo>0, noobs

807
808
809 ********************************************************************************
810 * MODEL 1A_S36 - BMI, Null MODEL
811 ********************************************************************************
812
813 * Load the data
814 use "analysisready2.dta", clear

815 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

816 sort scid strata36 aid

817
818 * delete if missing dependent variable (so can record number)
819 drop if bmi_w1 == .
  (347 observations deleted)

820
821 * Fit model using PQL2
822 runmlwin bmi_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                     Number of obs     =     13694
  Normal response model
  Estimation algorithm: RIGLS
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	93.8	814
strata36	2567	1	5.3	165

```
Run time (seconds)          =        1.94
Number of iterations        =           3
Log restricted-likelihood = -39850.291
Restricted-deviance         =   79700.581
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	22.3909	.0879789	254.50	0.000	22.21847	22.56334

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.7526315	.1272124	.5032999	1.001963
Level 2: strata36				
var(cons)	.5621396	.1094586	.3476047	.7766746
Level 1: aid				
var(cons)	18.99972	.242968	18.52351	19.47593

```
823
824 * Fit model using MCMC
825 runmlwin bmi_w1 cons , ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons, residuals(u, savechains("m1A_s36_u.dta", replace))) ///
  >    level1(aid: cons) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m1A_s36_beta.dta", replace)) initsprevious ///
  >    nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs     =      13694
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	93.8	814
strata36	36	47	380.4	1052

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =        41.1
Deviance (dbar)              =    79318.37
Deviance (thetabar)         =    79191.84
Effective no. of pars (pd)  =      126.53
Bayesian DIC                 =    79444.90
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.59964	.1442447	1104	0.000	22.32886	22.87162

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.5869131	.1084951	860	.401674	.8293827
Level 2: strata36					
var(cons)	.46314	.1420233	1003	.2586576	.7817131
Level 1: aid					
var(cons)	19.19004	.2326359	1212	18.78215	19.6579

```
826 rename u0 m1u

827 drop u0se

828
829 * Calculate the ICC from the chains
830 use "m1A_s36_beta.dta", clear

831 rename RP3_var_cons_ sigma2uscid

832 rename RP2_var_cons_ sigma2u

833 rename RP1_var_cons_ sigma2e

834 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

835 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

836 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
icc_strata	.0226877	.0064512	1005	0.000	.0129075 .0382145
icc_scid	.0289393	.0050252	874	0.000	.0200705 .0402692

```
837
838
839 *******************************************************************************
840 * MODEL 1B_S36 - BMI, MAIN EFFECTS MODEL
841 *******************************************************************************
842
843 * Load the data
844 use "analysisready2.dta", clear

845 recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

846 sort scid strata36 aid

847
848 * delete if missing dependent variable (so can record number)
849 drop if bmi_w1 == .
  (347 observations deleted)

850
851 * Fit model using PQL2
852 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs     =      13694
  Normal response model
  Estimation algorithm: RIGLS
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata36	2567	1	5.3	165

```
Run time (seconds)            =        2.02
Number of iterations          =           4
Log restricted-likelihood  = -39776.919
Restricted-deviance           =   79553.838
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	21.81873	.1172248	186.13	0.000	21.58897	22.04849
female	-.3750313	.0823577	-4.55	0.000	-.5364493	-.2136132
latinx_race	.7016595	.1397891	5.02	0.000	.4276778	.9756411
black_race	.9353548	.1197936	7.81	0.000	.7005637	1.170146
hsless	.6423513	.1076566	5.97	0.000	.4313482	.8533544
somecollege	.3551516	.1049171	3.39	0.001	.149518	.5607853
lowinc	.2216375	.090214	2.46	0.014	.0448214	.3984536

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.5686742	.1013457	.3700403	.7673081
Level 2: strata36				
var(cons)	.2856277	.0908769	.1075123	.4637431
Level 1: aid				
var(cons)	19.04443	.2417641	18.57058	19.51828

```
853
854 * Fit model using MCMC
855 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m1B_s36_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m1B_s36_beta.dta", replace)) initsprevious ///
>    nopause

MLwiN 3.2 multilevel model                    Number of obs      =      13694
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	93.8	814
strata36	36	47	380.4	1052

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =        55.6
Deviance (dbar)               =    79321.92
Deviance (thetabar)           =    79199.07
Effective no. of pars (pd)  =      122.85
Bayesian DIC                  =    79444.77
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.8712	.2348377	1038	0.000	21.41952	22.33636
female	-.3485671	.1767733	1318	0.020	-.6988447	-.0180843
latinx_race	.73252	.2321818	1138	0.002	.3056045	1.210989
black_race	.9276446	.2207138	1285	0.000	.4949405	1.365456
hsless	.616359	.2189998	722	0.004	.1625408	1.046289
somecollege	.2768864	.2166752	945	0.097	-.1328197	.7047174
lowinc	.1883871	.1797225	1219	0.151	-.1662782	.5607785

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.5776583	.1072018	1013	.3993006	.797434
Level 2: strata36						
	var(cons)	.2013805	.0855599	1123	.0827497	.4077574
Level 1: aid						
	var(cons)	19.19679	.2319798	1129	18.75681	19.64272

856 rename u0 m1u

857 drop u0se

858
859 * Calculate the ICC from the chains
860 use "m1B_s36_beta.dta", clear

861 rename RP3_var_cons_ sigma2uscid

862 rename RP2_var_cons_ sigma2u

863 rename RP1_var_cons_ sigma2e

864 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

865 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

866 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0101371	.0042483	1126	0.000	.0041822	.0198082
icc_scid	.0287698	.0049543	1016	0.000	.0201837	.039725

867
868
869 *--*
870 * PREPARE FIXED-PART PAREMETER CHAINS
871 *--*
872
873 use "m1B_s36_beta.dta", clear

874 drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

875 rename FP1_* b_*

876 format %9.2f b_*

877 compress
   variable **iteration** was **double** now **long**
   (4,000 bytes saved)

878 save "m1B_s36_beta_prepped.dta", replace
  (note: file m1B_s36_beta_prepped.dta not found)
  file m1B_s36_beta_prepped.dta saved

879 isid iteration

880 codebook iteration, compact

     Variable   Obs Unique   Mean   Min   Max Label
     ──
     iteration **1000**   **1000** **24976**   **1** **49951** Iteration
     ──

881
882
883 *--*
884 * PREPARE STRATUM RANDOM EFFECTS CHAINS
885 *--*
886
887 use "m1B_s36_u.dta", clear

888 drop residual idnum

889 rename value u

890 format %9.2f u

891 sort strata36 iteration

892 order strata36 iteration

893 compress
     variable **strata36** was **double** now **int**
     variable **iteration** was **double** now **long**
     (360,000 bytes saved)

894 save "m1B_s36_u_prepped.dta", replace
   (note: file m1B_s36_u_prepped.dta not found)
   file m1B_s36_u_prepped.dta saved

895 isid strata36 iteration

896 codebook iteration, compact

     Variable   Obs Unique   Mean   Min   Max Label
     ──
     iteration **36000**   **1000** **24976**   **1** **49951** Iteration
     ──

897
898
899 *--*
900 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
901 *--*
902
903 use "data36.dta", clear

904 isid strata36

905 cross using "m1B_s36_beta_prepped.dta"

```
906 isid strata36 iteration

907 sort strata36 iteration

908 merge 1:1 strata36 iteration using "m1B_s36_u_prepped.dta", nogenerate assert(match)

        Result                          # of obs.

        not matched                             0
        matched                            36,000


909 isid strata36 iteration

910 compress
    variable strata36 was double now int
    (216,000 bytes saved)

911 save "m1B_s36data_prepped.dta", replace
  (note: file m1B_s36data_prepped.dta not found)
  file m1B_s36data_prepped.dta saved

912
913
914 *------------------------------------------------------------------------------*
915 * CALCULATE VALUES OF INTEREST
916 *------------------------------------------------------------------------------*
917
918 * Expected value based on fixed and random part
919 use "m1B_s36data_prepped.dta", clear

920 gen cons = 1

921 generate expectedvalue = (b_cons*cons ///
  >                                               + b_female*female ///
  >                                               + b_latinx_race*latinx_race ///
  >                                               + b_black_race*black_race ///
  >                                               + b_hsless*hsless ///
  >                                               + b_somecollege*somecollege ///
  >                                               + b_lowinc*lowinc ///
  >                                               + u )

922 label var expectedvalue "Expected value based on main effects and interactions"

923 format %9.3f expectedvalue

924
925 * Expected value based only on the fixed-part
926 generate fixedeffect = (b_cons*cons ///
  >                                               + b_female*female ///
  >                                               + b_latinx_race*latinx_race ///
  >                                               + b_black_race*black_race ///
  >                                               + b_hsless*hsless ///
  >                                               + b_somecollege*somecollege  ///
  >                                               + b_lowinc*lowinc ///
  >                                               )

927 label var fixedeffect "Expected value based only on main effects"

928 format %9.3f fixedeffect
```

```
929
930 * Expected value based only on the random-part
931 generate randomeffect = u

932 label var randomeffect "Random Effect"

933 format %9.3f randomeffect

934
935 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
936 bysort strata36 (iteration): egen expmn = mean(expectedvalue)

937 bysort strata36 (iteration): egen explo = pctile(expectedvalue), p(2.5)

938 bysort strata36 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

939 format %9.3f expmn explo exphi

940
941 bysort strata36 (iteration): egen FEmn = mean(fixedeffect)

942 bysort strata36 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

943 bysort strata36 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

944 format %9.3f FEmn FElo FEhi

945
946 bysort strata36 (iteration): egen REmn = mean(randomeffect)

947 bysort strata36 (iteration): egen RElo = pctile(randomeffect), p(2.5)

948 bysort strata36 (iteration): egen REhi = pctile(randomeffect), p(97.5)

949 format %9.3f REmn RElo REhi

950
951 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
952 drop iteration b* u* expectedvalue fixedeffect randomeffect

953 duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

954 isid strata36

955
956 * Ranks
957 sort expmn

958 generate exprank = _n

959 order exprank, after(exphi)

960 sort FEmn

961 generate FErank = _n
```

```
962 order FErank, after(FEhi)

963 sort REmn

964 generate RErank = _n

965 order RErank, after(REhi)

966
967 * Sort the data
968 sort strata36

969 isid strata36

970
971 * Compress and save the data
972 compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (432 bytes saved)

973 save "m1B_s36results.dta", replace
  (note: file m1B_s36results.dta not found)
  file m1B_s36results.dta saved

974
975 * List strata with statistically significant interaction effects
976 use "m1B_s36results.dta", clear

977 list strata36  REmn RElo REhi if REhi<0, noobs
```

strata36	REmn	RElo	REhi
1211	-0.673	-1.278	-0.119
1221	-0.618	-1.193	-0.095

```
978 list strata36  REmn RElo REhi if RElo>0, noobs
```

strata36	REmn	RElo	REhi
2220	0.610	0.004	1.319

```
979
980
981 *******************************************************************************
982 * MODEL 1A_S48 - BMI, Null MODEL
983 *******************************************************************************
984
985 * Load the data
986 use "analysisready2.dta", clear

987 recast float bmi_w1
  bmi_w1: 13694 values would be changed; not changed
```

988 sort scid strata48 aid

989
990 * delete if missing dependent variable (so can record number)
991 drop if bmi_w1 == .
  (347 observations deleted)

992
993 * Fit model using PQL2
994 runmlwin bmi_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model   Number of obs   =   13694
  Normal response model
  Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata48	**2674**	**1**	**5.1**	**136**

  Run time (seconds)   =   1.89
  Number of iterations   =   3
  Log restricted-likelihood = -39851.246
  Restricted-deviance   =   79702.491

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**22.39187**	**.0877638**	**255.14**	**0.000**	**22.21986**	**22.56389**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.7490179**	**.1263718**	**.5013338**	**.996702**
Level 2: strata48				
var(cons)	**.5665135**	**.1100001**	**.3509172**	**.7821098**
Level 1: aid				
var(cons)	**18.99405**	**.2433898**	**18.51702**	**19.47109**

995
996 * Fit model using MCMC
997 runmlwin bmi_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons, residuals(u, savechains("m1A_s48_u.dta", replace))) ///
  >   level1(aid: cons) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >   savechains("m1A_s48_beta.dta", replace)) initsprevious ///
  >   nopause

  MLwiN 3.2 multilevel model   Number of obs   =   13694
  Normal response model
  Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	93.8	814
strata48	48	3	285.3	1052

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =        40.3
Deviance (dbar)               =    79304.33
Deviance (thetabar)           =    79174.05
Effective no. of pars (pd)    =      130.28
Bayesian DIC                  =    79434.61
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.59751	.137422	1054	0.000	22.33388	22.87395

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.5900263	.1088974	1000	.4058712	.8425035
Level 2: strata48					
var(cons)	.4834628	.1434064	931	.2672238	.792864
Level 1: aid					
var(cons)	19.16918	.2333377	857	18.73191	19.60475

```
998 rename u0 m1u

999 drop u0se

1000
1001* Calculate the ICC from the chains
1002use "m1A_s48_beta.dta", clear

1003rename RP3_var_cons_ sigma2uscid

1004rename RP2_var_cons_ sigma2u

1005rename RP1_var_cons_ sigma2e

1006generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1007generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1008mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0236702	.0068118	932	0.000	.013422	.0383763
icc_scid	.0293876	.0055432	1002	0.000	.0200776	.0414307

```
1009
1010
1011*******************************************************************************
1012* MODEL 1B_S48 - BMI, MAIN EFFECTS MODEL
1013*******************************************************************************
1014
1015* Load the data
1016use "analysisready2.dta", clear

1017recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

1018sort scid strata48 aid

1019
1020* delete if missing dependent variable (so can record number)
1021drop if bmi_w1 == .
  (347 observations deleted)

1022
1023* Fit model using PQL2
1024runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc, /
  > //
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                         Number of obs      =      13694
  Normal response model
  Estimation algorithm: RIGLS
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata48	2674	1	5.1	136

```
Run time (seconds)         =        2.15
Number of iterations       =           5
Log restricted-likelihood = -39773.805
Restricted-deviance        =    79547.61
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	21.81748	.1167054	186.94	0.000	21.58874	22.04622
female	-.3807364	.0813006	-4.68	0.000	-.5400827	-.2213902
latinx_imm	.0939649	.2588757	0.36	0.717	-.4134222	.6013519
latinx_non	.7991062	.1435347	5.57	0.000	.5177834	1.080429
black	.9294515	.1192333	7.80	0.000	.6957585	1.163145
hsless	.6422265	.1066217	6.02	0.000	.4332518	.8512012
somecollege	.3508273	.1041186	3.37	0.001	.1467585	.5548961
lowinc	.236786	.0897506	2.64	0.008	.0608781	.4126939

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.5737501	.1018082	.3742097	.7732904
Level 2: strata48				
var(cons)	.2534027	.0893561	.078268	.4285375
Level 1: aid				
var(cons)	19.05927	.2421437	18.58468	19.53386

```
1025
1026* Fit model using MCMC
1027runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc, /
> //
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m1B_s48_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m1B_s48_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13694**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**93.8**	**814**
strata48	**48**	**3**	**285.3**	**1052**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =        60.2
Deviance (dbar)               =    79309.16
Deviance (thetabar)           =    79183.01
Effective no. of pars (pd)    =      126.15
Bayesian DIC                  =    79435.32
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**21.88974**	.2353424	1204	0.000	21.44657	22.39003
female	**-.3822695**	.1747866	924	0.004	-.745704	-.0593172
latinx_imm	.1708634	.3452167	912	0.332	-.4848537	.889369
latinx_non	.8131152	.236366	1266	0.000	.3309482	1.276676
black	.9346484	.2231428	1273	0.000	.4699637	1.427936
hsless	.6127635	.2138243	1050	0.005	.1920186	1.015732
somecollege	.2711962	.2178911	982	0.116	-.178249	.6600459
lowinc	.1913823	.1801023	988	0.135	-.1759828	.574604

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.5814817	.1073452	1097	.3994061	.8132146
Level 2: strata48					
var(cons)	.2104611	.0891064	1062	.0870339	.4096807
Level 1: aid					
var(cons)	19.17889	.2336511	1053	18.7354	19.62192

```
1028rename u0 m1u

1029drop u0se
```

```
1030
1031* Calculate the ICC from the chains
1032use "m1B_s48_beta.dta", clear

1033rename RP3_var_cons_ sigma2uscid

1034rename RP2_var_cons_ sigma2u

1035rename RP1_var_cons_ sigma2e

1036generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1037generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1038mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.010485	.004306	1067	0.000	.0042982	.020765
icc_scid	.0290129	.0053565	1111	0.000	.020211	.0405246

```
1039
1040
1041*-------------------------------------------------------------------------------*
1042* PREPARE FIXED-PART PAREMETER CHAINS
1043*-------------------------------------------------------------------------------*
1044
1045use "m1B_s48_beta.dta", clear

1046drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1047rename FP1_* b_*

1048format %9.2f b_*

1049compress
    variable iteration was double now long
    (4,000 bytes saved)

1050save "m1B_s48_beta_prepped.dta", replace
  (note: file m1B_s48_beta_prepped.dta not found)
  file m1B_s48_beta_prepped.dta saved

1051isid iteration

1052codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
1053
1054
1055*-------------------------------------------------------------------------------*
1056* PREPARE STRATUM RANDOM EFFECTS CHAINS
1057*-------------------------------------------------------------------------------*
```

```
1058
1059use "m1B_s48_u.dta", clear

1060drop residual idnum

1061rename value u

1062format %9.2f u

1063sort strata48 iteration

1064order strata48 iteration

1065compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

1066save "m1B_s48_u_prepped.dta", replace
  (note: file m1B_s48_u_prepped.dta not found)
  file m1B_s48_u_prepped.dta saved

1067isid strata48 iteration

1068codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	48000	1000	24976	1	49951	Iteration

```
1069
1070
1071*-------------------------------------------------------------------------------*
1072* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1073*-------------------------------------------------------------------------------*
1074
1075use "data48.dta", clear

1076isid strata48

1077cross using "m1B_s48_beta_prepped.dta"

1078isid strata48 iteration

1079sort strata48 iteration

1080merge 1:1 strata48 iteration using "m1B_s48_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	48,000

```
1081isid strata48 iteration

1082compress
    variable strata48 was double now int
    (288,000 bytes saved)
```

```
1083save "m1B_s48data_prepped.dta", replace
  (note: file m1B_s48data_prepped.dta not found)
  file m1B_s48data_prepped.dta saved

1084
1085
1086*-------------------------------------------------------------------------------*
1087* CALCULATE VALUES OF INTEREST
1088*-------------------------------------------------------------------------------*
1089
1090* Expected value based on fixed and random part
1091use "m1B_s48data_prepped.dta", clear

1092gen cons = 1

1093generate expectedvalue = (b_cons*cons ///
  >                                       + b_female*female ///
  >                                       + b_latinx_imm*latinx_imm ///
  >                                       + b_latinx_non*latinx_non ///
  >                                       + b_black*black ///
  >                                       + b_hsless*hsless ///
  >                                       + b_somecollege*somecollege ///
  >                                       + b_lowinc*lowinc ///
  >                                       + u )

1094label var expectedvalue "Expected value based on main effects and interactions"

1095format %9.3f expectedvalue

1096
1097* Expected value based only on the fixed-part
1098generate fixedeffect = (b_cons*cons ///
  >                                       + b_female*female ///
  >                                       + b_latinx_imm*latinx_imm ///
  >                                       + b_latinx_non*latinx_non ///
  >                                       + b_black*black ///
  >                                       + b_hsless*hsless ///
  >                                       + b_somecollege*somecollege  ///
  >                                       + b_lowinc*lowinc ///
  >                                       )

1099label var fixedeffect "Expected value based only on main effects"

1100format %9.3f fixedeffect

1101
1102* Expected value based only on the random-part
1103generate randomeffect = u

1104label var randomeffect "Random Effect"

1105format %9.3f randomeffect

1106
1107* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1108bysort strata48 (iteration): egen expmn = mean(expectedvalue)

1109bysort strata48 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1110bysort strata48 (iteration): egen exphi = pctile(expectedvalue), p(97.5)
```

```
1111format %9.3f expmn explo exphi

1112
1113bysort strata48 (iteration): egen FEmn = mean(fixedeffect)

1114bysort strata48 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1115bysort strata48 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1116format %9.3f FEmn FElo FEhi

1117
1118bysort strata48 (iteration): egen REmn = mean(randomeffect)

1119bysort strata48 (iteration): egen RElo = pctile(randomeffect), p(2.5)

1120bysort strata48 (iteration): egen REhi = pctile(randomeffect), p(97.5)

1121format %9.3f REmn RElo REhi

1122
1123* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1124drop iteration b* u* expectedvalue fixedeffect randomeffect

1125duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

1126isid strata48

1127
1128* Ranks
1129sort expmn

1130generate exprank = _n

1131order exprank, after(exphi)

1132sort FEmn

1133generate FErank = _n

1134order FErank, after(FEhi)

1135sort REmn

1136generate RErank = _n

1137order RErank, after(REhi)

1138
1139* Sort the data
1140sort strata48

1141isid strata48

1142
1143* Compress and save the data
```

```
1144compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (576 bytes saved)

1145save "m1B_s48results.dta", replace
  (note: file m1B_s48results.dta not found)
  file m1B_s48results.dta saved

1146
1147* List strata with statistically significant interaction effects
1148use "m1B_s48results.dta", clear

1149list strata48  REmn RElo REhi if REhi<0, noobs
```

strata48	REmn	RElo	REhi
1311	-0.726	-1.325	-0.224
1321	-0.657	-1.218	-0.112

```
1150list strata48  REmn RElo REhi if RElo>0, noobs
```

strata48	REmn	RElo	REhi
2320	0.628	0.028	1.333

```
1151
1152
1153********************************************************************************
1154* MODEL 1A_S96 - BMI, Null MODEL
1155********************************************************************************
1156
1157* Load the data
1158use "analysisready2.dta", clear

1159recast float bmi_w1
  bmi_w1:  13694 values would be changed; not changed

1160sort scid strata96 aid

1161
1162* delete if missing dependent variable (so can record number)
1163drop if bmi_w1 == .
  (347 observations deleted)

1164
1165* Fit model using PQL2
1166runmlwin bmi_w1 cons , ///
  >    level3(scid: cons) ///
  >    level2(strata96: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs      =      13694
  Normal response model
  Estimation algorithm: RIGLS
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata96	3561	1	3.8	126

```
Run time (seconds)           =        1.96
Number of iterations         =           3
Log restricted-likelihood = -39852.352
Restricted-deviance          =   79704.703
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	22.39278	.0887769	252.24	0.000	22.21879	22.56678

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.7796885	.1297191	.5254437	1.033933
Level 2: strata96				
var(cons)	.6431507	.1208298	.4063287	.8799726
Level 1: aid				
var(cons)	18.91263	.2467109	18.42909	19.39618

```
1167
1168* Fit model using MCMC
1169runmlwin bmi_w1 cons , ///
   >    level3(scid: cons) ///
   >    level2(strata96: cons, residuals(u, savechains("m1A_s96_u.dta", replace))) ///
   >    level1(aid: cons) ///
   >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
   >      savechains("m1A_s96_beta.dta", replace)) initsprevious ///
   >    nopause
```

```
MLwiN 3.2 multilevel model                 Number of obs      =      13694
Normal response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	93.8	814
strata96	92	1	148.8	896

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =        42.6
Deviance (dbar)               =    79282.00
Deviance (thetabar)           =    79132.01
Effective no. of pars (pd)    =      149.99
Bayesian DIC                  =    79431.99
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.65636	.1328242	1073	0.000	22.40688	22.9178

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.594831	.1083797	891	.4100117	.8087503
Level 2: strata96					
var(cons)	.623212	.1599671	1117	.3755536	.9829011
Level 1: aid					
var(cons)	19.13954	.2335262	1004	18.69357	19.59868

1170rename u0 m1u

1171drop u0se

1172
1173* Calculate the ICC from the chains
1174use "m1A_s96_beta.dta", clear

1175rename RP3_var_cons_ sigma2uscid

1176rename RP2_var_cons_ sigma2u

1177rename RP1_var_cons_ sigma2e

1178generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1179generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1180mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0306634	.0076039	1115	0.000	.0188837	.0476004
icc_scid	.0288873	.0051776	897	0.000	.0201584	.0397752

1181
1182
1183**
1184* MODEL 1B_S96 - BMI, MAIN EFFECTS MODEL
1185**
1186
1187* Load the data
1188use "analysisready2.dta", clear

1189recast float bmi_w1
  bmi_w1: 13694 values would be changed; not changed

1190sort scid strata96 aid

1191
1192* delete if missing dependent variable (so can record number)
1193drop if bmi_w1 == .
  (347 observations deleted)

1194
1195* Fit model using PQL2
1196runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc st
  > raight_no, ///
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model   Number of obs   =   **13694**
  Normal response model
  Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	93.8	814
strata96	3561	1	3.8	126

```
Run time (seconds)           =        2.22
Number of iterations         =           5
Log restricted-likelihood    = -39767.709
Restricted-deviance          =   79535.417
```

bmi_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	21.77601	.1176651	185.07	0.000	21.54539	22.00663
female	-.4226962	.082895	-5.10	0.000	-.5851674	-.2602251
latinx_imm	.0994406	.2599434	0.38	0.702	-.4100391	.6089203
latinx_non	.7955877	.1436876	5.54	0.000	.5139651	1.07721
black	.9486149	.1194476	7.94	0.000	.7145019	1.182728
hsless	.6520447	.1067349	6.11	0.000	.4428482	.8612412
somecollege	.3589143	.1042273	3.44	0.001	.1546325	.5631962
lowinc	.2428972	.089793	2.71	0.007	.0669061	.4188883
straight_no	.3531648	.11527	3.06	0.002	.1272397	.5790899

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.5829586	.1029026	.3812733	.7846439
Level 2: strata96				
var(cons)	.341173	.1027688	.1397498	.5425962
Level 1: aid				
var(cons)	18.96102	.2449169	18.48099	19.44105

```
1197
1198* Fit model using MCMC
1199runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc st
> raight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m1B_s96_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m1B_s96_beta.dta", replace)) initsprevious ///
>   nopause
```

```
MLwiN 3.2 multilevel model                 Number of obs      =     13694
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	93.8	814
strata96	92	1	148.8	896

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =         64.4
Deviance (dbar)               =     79291.06
Deviance (thetabar)           =     79152.08
Effective no. of pars (pd)    =       138.98
Bayesian DIC                  =     79430.03
```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.69791	.2122127	848	0.000	21.26776	22.10147
female	-.3752473	.1557388	999	0.007	-.6559164	-.0732543
latinx_imm	.2578549	.3312466	952	0.214	-.3854105	.8995609
latinx_non	.8961571	.2148024	785	0.000	.4886743	1.322574
black	1.099252	.2005383	962	0.000	.7254184	1.505345
hsless	.616851	.1903114	1023	0.001	.2552724	.9983982
somecollege	.3178793	.1896528	729	0.051	-.050603	.6903094

lowinc	.2207466	.1609229	1298	0.071	-.0811271	.5292031
straight_no	.4667962	.1732135	1337	0.003	.1349841	.8325732

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.5872215	.1075133	1229	.4039589	.8102545
Level 2: strata96					
var(cons)	.2273637	.0886691	867	.0923604	.4280104
Level 1: aid					
var(cons)	19.15201	.2335971	1014	18.73682	19.61274

1200rename u0 m1u

1201drop u0se

1202
1203* Calculate the ICC from the chains
1204use "m1B_s96_beta.dta", clear

1205rename RP3_var_cons_ sigma2uscid

1206rename RP2_var_cons_ sigma2u

1207rename RP1_var_cons_ sigma2e

1208generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1209generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1210mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0114292	.0043145	861	0.000	.0046445	.021185
icc_scid	.0293321	.005172	1234	0.000	.0202716	.0402923

1211
1212
1213*--*
1214* PREPARE FIXED-PART PAREMETER CHAINS
1215*--*
1216
1217use "m1B_s96_beta.dta", clear

1218drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1219rename FP1_* b_*

1220format %9.2f b_*

1221compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

```
1222save "m1B_s96_beta_prepped.dta", replace
  (note: file m1B_s96_beta_prepped.dta not found)
  file m1B_s96_beta_prepped.dta saved

1223isid iteration

1224codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
1225
1226
1227*--------------------------------------------------------------------------------*
1228* PREPARE STRATUM RANDOM EFFECTS CHAINS
1229*--------------------------------------------------------------------------------*
1230
1231use "m1B_s96_u.dta", clear

1232drop residual idnum

1233rename value u

1234format %9.2f u

1235sort strata96 iteration

1236order strata96 iteration

1237compress
    variable strata96 was double now int
    variable iteration was double now long
    (920,000 bytes saved)

1238save "m1B_s96_u_prepped.dta", replace
  (note: file m1B_s96_u_prepped.dta not found)
  file m1B_s96_u_prepped.dta saved

1239isid strata96 iteration

1240codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**92000**	**1000**	**24976**	**1**	**49951**	Iteration

```
1241
1242
1243*--------------------------------------------------------------------------------*
1244* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1245*--------------------------------------------------------------------------------*
1246
1247use "data96_bmi.dta", clear
```

```
1248isid strata96

1249cross using "m1B_s96_beta_prepped.dta"

1250isid strata96 iteration

1251sort strata96 iteration

1252merge 1:1 strata96 iteration using "m1B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	**0**
matched	**92,000**

```
1253isid strata96 iteration

1254compress
    variable strata96 was double now int
    (552,000 bytes saved)

1255save "m1B_s96data_prepped.dta", replace
  (note: file m1B_s96data_prepped.dta not found)
  file m1B_s96data_prepped.dta saved

1256
1257
1258*-------------------------------------------------------------------------------*
1259* CALCULATE VALUES OF INTEREST
1260*-------------------------------------------------------------------------------*
1261
1262* Expected value based on fixed and random part
1263use "m1B_s96data_prepped.dta", clear

1264gen cons = 1

1265generate expectedvalue = (b_cons*cons ///
  >                                                 + b_female*female ///
  >                                                 + b_latinx_imm*latinx_imm ///
  >                                                 + b_latinx_non*latinx_non ///
  >                                                 + b_black*black ///
  >                                                 + b_hsless*hsless ///
  >                                                 + b_somecollege*somecollege ///
  >                                                 + b_lowinc*lowinc ///
  >                                                 + b_straight_no*straight_no ///
  >                                                 + u )

1266label var expectedvalue "Expected value based on main effects and interactions"

1267format %9.3f expectedvalue

1268
1269* Expected value based only on the fixed-part
1270generate fixedeffect = (b_cons*cons ///
  >                                                 + b_female*female ///
  >                                                 + b_latinx_imm*latinx_imm ///
  >                                                 + b_latinx_non*latinx_non ///
  >                                                 + b_black*black ///
  >                                                 + b_hsless*hsless ///
  >                                                 + b_somecollege*somecollege  ///
  >                                                 + b_lowinc*lowinc ///
  >                                                 + b_straight_no*straight_no ///
  >                                                 )
```

```
1271label var fixedeffect "Expected value based only on main effects"

1272format %9.3f fixedeffect

1273
1274* Expected value based only on the random-part
1275generate randomeffect = u

1276label var randomeffect "Random Effect"

1277format %9.3f randomeffect

1278
1279* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1280bysort strata96 (iteration): egen expmn = mean(expectedvalue)

1281bysort strata96 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1282bysort strata96 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

1283format %9.3f expmn explo exphi

1284
1285bysort strata96 (iteration): egen FEmn = mean(fixedeffect)

1286bysort strata96 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1287bysort strata96 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1288format %9.3f FEmn FElo FEhi

1289
1290bysort strata96 (iteration): egen REmn = mean(randomeffect)

1291bysort strata96 (iteration): egen RElo = pctile(randomeffect), p(2.5)

1292bysort strata96 (iteration): egen REhi = pctile(randomeffect), p(97.5)

1293format %9.3f REmn RElo REhi

1294
1295* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1296drop iteration b* u* expectedvalue fixedeffect randomeffect

1297duplicates drop

  Duplicates in terms of all variables

  (91,908 observations deleted)

1298isid strata96

1299
1300* Ranks
1301sort expmn

1302generate exprank = _n

1303order exprank, after(exphi)
```

```
1304sort FEmn

1305generate FErank = _n

1306order FErank, after(FEhi)

1307sort REmn

1308generate RErank = _n

1309order RErank, after(REhi)

1310
1311* Sort the data
1312sort strata96

1313isid strata96

1314
1315* Compress and save the data
1316compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (1,104 bytes saved)

1317save "m1B_s96results.dta", replace
  (note: file m1B_s96results.dta not found)
  file m1B_s96results.dta saved

1318
1319* List strata with statistically significant interaction effects
1320use "m1B_s96results.dta", clear

1321list strata96  REmn RElo REhi if REhi<0, noobs


    +------------------------------------+
    | strata96     REmn     RElo     REhi |
    |------------------------------------|
    |    13111   -0.676   -1.203   -0.161 |
    |    13211   -0.643   -1.224   -0.101 |
    |    28300   -0.595   -1.231   -0.047 |
    +------------------------------------+


1322list strata96  REmn RElo REhi if RElo>0, noobs


    +----------------------------------+
    | strata96    REmn    RElo    REhi |
    |----------------------------------|
    |    18201   0.492   0.068   0.955 |
    |    23310   1.011   0.131   1.970 |
    +----------------------------------+


1323
1324
1325****************************************************************************
1326****************************************************************************
1327****************************************************************************
1328*
```

```
1329*
1330* MODEL 2 - CESD, MAIN EFFECTS MODEL
1331*
1332*
1333*********************************************************************************
1334*********************************************************************************
1335*********************************************************************************
1336
1337
1338*********************************************************************************
1339* MODEL AB_S6 - CESD, Null MODEL
1340*********************************************************************************
1341
1342* Load the data
1343use "analysisready2.dta", clear

1344recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1345sort scid strata6 aid

1346
1347* delete if missing dependent variable (so can record number)
1348drop if cesd_w1 == .
  (19 observations deleted)

1349
1350* Fit model using PQL2
1351runmlwin cesd_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   14022
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.0	828
strata6	680	1	20.6	343

```
Run time (seconds)          =        1.84
Number of iterations        =           4
Log restricted-likelihood = -48681.256
Restricted-deviance         =   97362.512
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	11.53185	.1441661	79.99	0.000	11.24929	11.81441

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.214348	.3590559	.5106115	1.918085
Level 2: strata6				
var(cons)	2.799282	.4170113	1.981955	3.616609
Level 1: aid				
var(cons)	58.77716	.7143692	57.37703	60.1773

```
1352
1353* Fit model using MCMC
1354runmlwin cesd_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m2A_s6_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2A_s6_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata6	**6**	**1164**	**2337.0**	**4295**

```
Burnin                       =         5000
Chain                        =        50000
Thinning                     =           50
Run time (seconds)           =         39.8
Deviance (dbar)              =     97063.51
Deviance (thetabar)          =     96964.13
Effective no. of pars (pd)   =        99.39
Bayesian DIC                 =     97162.90
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**11.7933**	**.8152483**	**205**	**0.000**	**9.906674**	**13.24849**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	**1.621032**	**.3150415**	**1191**	**1.078087**	**2.352851**
Level 2: strata6						
	var(cons)	**3.987735**	**4.338881**	**545**	**.9196063**	**14.02845**
Level 1: aid						
	var(cons)	**59.40631**	**.7142935**	**1291**	**57.99178**	**60.75281**

```
1355rename u0 m1u

1356drop u0se

1357
1358* Calculate the ICC from the chains
1359use "m2A_s6_beta.dta", clear

1360rename RP3_var_cons_ sigma2uscid

1361rename RP2_var_cons_ sigma2u
```

1362rename RP1_var_cons_ sigma2e

1363generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1364generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1365mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0584724	.0483734	573	0.000	.0147895	.186712
icc_scid	.0250144	.0051252	1085	0.000	.0163622	.0361323

1366
1367
1368***
1369* MODEL 2B_S6 – CESD, MAIN EFFECTS MODEL
1370***
1371
1372* Load the data
1373use "analysisready2.dta", clear

1374recast float cesd_w1
  cesd_w1: **13375** values would be changed; not changed

1375sort scid strata6 aid

1376
1377* delete if missing dependent variable (so can record number)
1378drop if cesd_w1 == .
  (19 observations deleted)

1379
1380* Fit model using PQL2
1381runmlwin cesd_w1 cons female latinx_race black_race , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

 MLwiN 3.2 multilevel model   Number of obs   =   **14022**
 Normal response model
 Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	1	96.0	828
strata6	**680**	1	20.6	343

 Run time (seconds)   =   1.95
 Number of iterations   =   4
 Log restricted-likelihood = -48595.265
 Restricted-deviance   =   97190.53

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	9.780687	.1773863	55.14	0.000	9.433016	10.12836
female	2.028721	.1721362	11.79	0.000	1.69134	2.366102
latinx_race	1.797382	.2600374	6.91	0.000	1.287718	2.307046
black_race	1.423461	.2261258	6.29	0.000	.9802624	1.866659

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.239087	.2896498	.6713836	1.80679
Level 2: strata6				
var(cons)	1.053486	.258779	.5462887	1.560684
Level 1: aid				
var(cons)	58.73723	.7124283	57.34089	60.13356

```
1382
1383* Fit model using MCMC
1384runmlwin cesd_w1 cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m2B_s6_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2B_s6_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata6	**6**	**1164**	**2337.0**	**4295**

```
Burnin                          =        5000
Chain                           =       50000
Thinning                        =          50
Run time (seconds)              =        47.2
Deviance (dbar)                 =    97065.25
Deviance (thetabar)             =    96965.14
Effective no. of pars (pd)      =      100.10
Bayesian DIC                    =    97165.35
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	9.712789	.5941155	414	0.000	8.539597	11.08375
female	2.300955	.6404691	379	0.007	1.120706	3.568145
latinx_race	1.83849	.7519198	476	0.020	.2041136	3.21696
black_race	1.153854	.8154533	328	0.059	-.5033607	2.639565

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.612644	.3109243	1203	1.079258	2.273207
Level 2: strata6					
var(cons)	.6838371	2.606459	291	.0057163	3.88288
Level 1: aid					
var(cons)	59.41488	.7162922	921	58.10506	60.92587

1385rename u0 m1u

1386drop u0se

1387
1388* Calculate the ICC from the chains
1389use "m2B_s6_beta.dta", clear

1390rename RP3_var_cons_ sigma2uscid

1391rename RP2_var_cons_ sigma2u

1392rename RP1_var_cons_ sigma2e

1393generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1394generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1395mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0094554	.0235701	270	0.000	.0000941	.0596515
icc_scid	.0260191	.0049578	1257	0.000	.0175767	.0364076

1396
1397
1398
1399*---*
1400* PREPARE FIXED-PART PAREMETER CHAINS
1401*---*
1402
1403use "m2B_s6_beta.dta", clear

1404drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1405rename FP1_* b_*

1406format %9.2f b_*

1407compress
   variable **iteration** was **double** now **long**
   (4,000 bytes saved)

1408save "m2B_s6_beta_prepped.dta", replace
  (note: file m2B_s6_beta_prepped.dta not found)
  file m2B_s6_beta_prepped.dta saved

1409isid iteration

1410codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
1411
1412
1413*-----------------------------------------------------------------------------*
1414* PREPARE STRATUM RANDOM EFFECTS CHAINS
1415*-----------------------------------------------------------------------------*
1416
1417use "m2B_s6_u.dta", clear

1418drop residual idnum

1419rename value u

1420format %9.2f u

1421sort strata6 iteration

1422order strata6 iteration

1423compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)

1424save "m2B_s6_u_prepped.dta", replace
  (note: file m2B_s6_u_prepped.dta not found)
  file m2B_s6_u_prepped.dta saved

1425isid strata6 iteration

1426codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	6000	1000	24976	1	49951	Iteration

```
1427
1428
1429*-----------------------------------------------------------------------------*
1430* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1431*-----------------------------------------------------------------------------*
1432
1433use "data6.dta", clear

1434isid strata6

1435cross using "m2B_s6_beta_prepped.dta"

1436isid strata6 iteration

1437sort strata6 iteration

1438merge 1:1 strata6 iteration using "m2B_s6_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	6,000

```
1439isid strata6 iteration

1440compress
    variable strata6 was double now byte
    (42,000 bytes saved)

1441save "m2B_s6data_prepped.dta", replace
  (note: file m2B_s6data_prepped.dta not found)
  file m2B_s6data_prepped.dta saved

1442
1443
1444*------------------------------------------------------------------------------*
1445* CALCULATE VALUES OF INTEREST
1446*------------------------------------------------------------------------------*
1447
1448* Expected value based on fixed and random part
1449use "m2B_s6data_prepped.dta", clear

1450gen cons = 1

1451generate expectedvalue = (b_cons*cons ///
  >                                                + b_female*female ///
  >                                                + b_latinx_race*latinx_race ///
  >                                                + b_black_race*black_race ///
  >                                                + u )

1452label var expectedvalue "Expected value based on main effects and interactions"

1453format %9.3f expectedvalue

1454
1455* Expected value based only on the fixed-part
1456generate fixedeffect = (b_cons*cons ///
  >                                                + b_female*female ///
  >                                                + b_latinx_race*latinx_race ///
  >                                                + b_black_race*black_race ///
  >                                                )

1457label var fixedeffect "Expected value based only on main effects"

1458format %9.3f fixedeffect

1459
1460* Expected value based only on the random-part
1461generate randomeffect = u

1462label var randomeffect "Random Effect"

1463format %9.3f randomeffect

1464
1465* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1466bysort strata6 (iteration): egen expmn = mean(expectedvalue)

1467bysort strata6 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1468bysort strata6 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

1469format %9.3f expmn explo exphi
```

```
1470
1471bysort strata6 (iteration): egen FEmn = mean(fixedeffect)

1472bysort strata6 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1473bysort strata6 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1474format %9.3f FEmn FElo FEhi

1475
1476bysort strata6 (iteration): egen REmn = mean(randomeffect)

1477bysort strata6 (iteration): egen RElo = pctile(randomeffect), p(2.5)

1478bysort strata6 (iteration): egen REhi = pctile(randomeffect), p(97.5)

1479format %9.3f REmn RElo REhi

1480
1481* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1482drop iteration b* u* expectedvalue fixedeffect randomeffect

1483duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)

1484isid strata6

1485
1486* Ranks
1487sort expmn

1488generate exprank = _n

1489order exprank, after(exphi)

1490sort FEmn

1491generate FErank = _n

1492order FErank, after(FEhi)

1493sort REmn

1494generate RErank = _n

1495order RErank, after(REhi)

1496
1497* Sort the data
1498sort strata6

1499isid strata6

1500
1501* Compress and save the data
1502compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (72 bytes saved)
```

```
1503save "m2B_s6results.dta", replace
  (note: file m2B_s6results.dta not found)
  file m2B_s6results.dta saved

1504
1505* List strata with statistically significant interaction effects
1506use "m2B_s6results.dta", clear

1507list strata6  REmn RElo REhi if REhi<0, noobs

1508list strata6  REmn RElo REhi if RElo>0, noobs

1509
1510
1511
1512*******************************************************************************
1513* MODEL 2A_S12 - CESD, Null MODEL
1514*******************************************************************************
1515
1516* Load the data
1517use "analysisready2.dta", clear

1518recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1519sort scid strata12 aid

1520
1521* delete if missing dependent variable (so can record number)
1522drop if cesd_w1 == .
  (19 observations deleted)

1523
1524* Fit model using PQL2
1525runmlwin cesd_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata12: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata12	1169	1	12.0	217

```
Run time (seconds)        =        1.89
Number of iterations      =           4
Log restricted-likelihood = -48678.778
Restricted-deviance       =   97357.556
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**11.5747**	**.1413983**	**81.86**	**0.000**	**11.29757**	**11.85184**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.37712	.3338132	.7228584	2.031382
Level 2: strata12				
var(cons)	3.230672	.4082727	2.430473	4.030872
Level 1: aid				
var(cons)	58.18738	.7157437	56.78455	59.59021

```
1526
1527* Fit model using MCMC
1528runmlwin cesd_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata12: cons, residuals(u, savechains("m2A_s12_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2A_s12_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata12	12	472	1168.5	2903

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =        39.8
Deviance (dbar)              =    96910.69
Deviance (thetabar)          =    96811.46
Effective no. of pars (pd)   =       99.23
Bayesian DIC                 =    97009.92
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.99974	.5878843	359	0.000	10.79737	13.08695

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.30362	.2693579	1393	.8239192	1.920613
Level 2: strata12					
var(cons)	3.575337	1.966895	1000	1.415558	8.325179
Level 1: aid					
var(cons)	58.76112	.7079962	1180	57.4307	60.09886

```
1529rename u0 m1u

1530drop u0se

1531
1532* Calculate the ICC from the chains
1533use "m2A_s12_beta.dta", clear

1534rename RP3_var_cons_ sigma2uscid

1535rename RP2_var_cons_ sigma2u

1536rename RP1_var_cons_ sigma2e

1537generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1538generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1539mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0554443	.0275764	1044	0.000	.0229688	.1215733
icc_scid	.0204128	.0042966	1497	0.000	.01269	.0300899

```
1540
1541
1542
1543***************************************************************************
1544* MODEL 2B_S12 - CESD, MAIN EFFECTS MODEL
1545***************************************************************************
1546
1547* Load the data
1548use "analysisready2.dta", clear

1549recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1550sort scid strata12 aid

1551
1552* delete if missing dependent variable (so can record number)
1553drop if cesd_w1 == .
  (19 observations deleted)

1554
1555* Fit model using PQL2
1556runmlwin cesd_w1 cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

```
  MLwiN 3.2 multilevel model                    Number of obs      =      14022
  Normal response model
  Estimation algorithm: RIGLS
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	96.0	828
strata12	1169	1	12.0	217

```
Run time (seconds)        =         1.93
Number of iterations      =            4
Log restricted-likelihood =   -48520.22
Restricted-deviance       =    97040.439
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	9.198501	.1700589	54.09	0.000	8.865192	9.531811
female	2.004826	.1517392	13.21	0.000	1.707423	2.30223
latinx_race	1.398814	.2415171	5.79	0.000	.9254494	1.872179
black_race	1.229714	.206407	5.96	0.000	.8251639	1.634265
lowparentedu	1.911952	.1609307	11.88	0.000	1.596533	2.22737

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.131092	.2436137	.6536181	1.608566
Level 2: strata12				
var(cons)	.7565478	.2260733	.3134524	1.199643
Level 1: aid				
var(cons)	58.19518	.7112452	56.80116	59.58919

```
1557
1558* Fit model using MCMC
1559runmlwin cesd_w1 cons female latinx_race black_race lowparentedu, ///
  >   level3(scid: cons) ///
  >   level2(strata12: cons, residuals(u, savechains("m2B_s12_u.dta", replace))) ///
  >   level1(aid: cons) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m2B_s12_beta.dta", replace)) initsprevious ///
  >   nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs      =      14022
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata12	12	472	1168.5	2903

```
Burnin                       =         5000
Chain                        =        50000
Thinning                     =           50
Run time (seconds)           =         49.7
Deviance (dbar)              =     96912.47
Deviance (thetabar)          =     96815.74
Effective no. of pars (pd)   =        96.73
Bayesian DIC                 =     97009.20
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	9.093975	.2806176	907	0.000	8.477929	9.591316
female	2.212108	.2414688	1279	0.000	1.772695	2.710636
latinx_race	1.460362	.3243208	1028	0.000	.8133394	2.09192
black_race	1.13012	.3055037	1015	0.001	.540392	1.73743
lowparentedu	1.89721	.2415919	894	0.000	1.372516	2.457718

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	1.292993	.2684998	911	.8132735	1.883313
Level 2: strata12						
	var(cons)	.1070517	.1348025	1125	.0030223	.4156223
Level 1: aid						
	var(cons)	58.77124	.707243	1172	57.42878	60.18135

1560rename u0 m1u

1561drop u0se

1562
1563* Calculate the ICC from the chains
1564use "m2B_s12_beta.dta", clear

1565rename RP3_var_cons_ sigma2uscid

1566rename RP2_var_cons_ sigma2u

1567rename RP1_var_cons_ sigma2e

1568generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1569generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1570mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0017975	.002266	1129	0.000	.0000503	.0069008
icc_scid	.0214831	.0044422	932	0.000	.0136616	.0313879

1571
1572
1573
1574*--*
1575* PREPARE FIXED-PART PAREMETER CHAINS
1576*--*
1577
1578use "m2B_s12_beta.dta", clear

1579drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1580rename FP1_* b_*

1581format %9.2f b_*

1582compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

1583save "m2B_s12_beta_prepped.dta", replace
  (note: file m2B_s12_beta_prepped.dta not found)
  file m2B_s12_beta_prepped.dta saved

```
1584isid iteration

1585codebook iteration, compact

  Variable    Obs Unique   Mean   Min    Max  Label
  ─────────────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────────────
  iteration  1000    1000  24976    1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────────────

1586
1587
1588*------------------------------------------------------------------------------*
1589* PREPARE STRATUM RANDOM EFFECTS CHAINS
1590*------------------------------------------------------------------------------*
1591
1592use "m2B_s12_u.dta", clear

1593drop residual idnum

1594rename value u

1595format %9.2f u

1596sort strata12 iteration

1597order strata12 iteration

1598compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

1599save "m2B_s12_u_prepped.dta", replace
  (note: file m2B_s12_u_prepped.dta not found)
  file m2B_s12_u_prepped.dta saved

1600isid strata12 iteration

1601codebook iteration, compact

  Variable    Obs Unique   Mean   Min    Max  Label
  ─────────────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────────────
  iteration  12000    1000  24976    1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────────────

1602
1603
1604*------------------------------------------------------------------------------*
1605* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1606*------------------------------------------------------------------------------*
1607
1608use "data12.dta", clear

1609isid strata12

1610cross using "m2B_s12_beta_prepped.dta"
```

```
1611isid strata12 iteration

1612sort strata12 iteration

1613merge 1:1 strata12 iteration using "m2B_s12_u_prepped.dta", nogenerate assert(match)

        Result                           # of obs.
        ─────────────────────────────────────────
        not matched                              0
        matched                             12,000
        ─────────────────────────────────────────


1614isid strata12 iteration

1615compress
    variable strata12 was double now int
    (72,000 bytes saved)

1616save "m2B_s12data_prepped.dta", replace
  (note: file m2B_s12data_prepped.dta not found)
  file m2B_s12data_prepped.dta saved

1617
1618
1619*------------------------------------------------------------------------------*
1620* CALCULATE VALUES OF INTEREST
1621*------------------------------------------------------------------------------*
1622
1623* Expected value based on fixed and random part
1624use "m2B_s12data_prepped.dta", clear

1625gen cons = 1

1626generate expectedvalue = (b_cons*cons ///
  >                                                  + b_female*female ///
  >                                                  + b_latinx_race*latinx_race ///
  >                                                  + b_black_race*black_race ///
  >                                                  + b_lowparentedu*lowparentedu ///
  >                                                  + u )

1627label var expectedvalue "Expected value based on main effects and interactions"

1628format %9.3f expectedvalue

1629
1630* Expected value based only on the fixed-part
1631generate fixedeffect = (b_cons*cons ///
  >                                                  + b_female*female ///
  >                                                  + b_latinx_race*latinx_race ///
  >                                                  + b_black_race*black_race ///
  >                                                  + b_lowparentedu*lowparentedu ///
  >                                                  )

1632label var fixedeffect "Expected value based only on main effects"

1633format %9.3f fixedeffect

1634
1635* Expected value based only on the random-part
1636generate randomeffect = u
```

```
1637label var randomeffect "Random Effect"

1638format %9.3f randomeffect

1639
1640* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1641bysort strata12 (iteration): egen expmn = mean(expectedvalue)

1642bysort strata12 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1643bysort strata12 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

1644format %9.3f expmn explo exphi

1645
1646bysort strata12 (iteration): egen FEmn = mean(fixedeffect)

1647bysort strata12 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1648bysort strata12 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1649format %9.3f FEmn FElo FEhi

1650
1651bysort strata12 (iteration): egen REmn = mean(randomeffect)

1652bysort strata12 (iteration): egen RElo = pctile(randomeffect), p(2.5)

1653bysort strata12 (iteration): egen REhi = pctile(randomeffect), p(97.5)

1654format %9.3f REmn RElo REhi

1655
1656* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1657drop iteration b* u* expectedvalue fixedeffect randomeffect

1658duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

1659isid strata12

1660
1661* Ranks
1662sort expmn

1663generate exprank = _n

1664order exprank, after(exphi)

1665sort FEmn

1666generate FErank = _n

1667order FErank, after(FEhi)

1668sort REmn
```

```
1669generate RErank = _n

1670order RErank, after(REhi)

1671
1672* Sort the data
1673sort strata12

1674isid strata12

1675
1676* Compress and save the data
1677compress
     variable cons was float now byte
     variable exprank was float now byte
     variable FErank was float now byte
     variable RErank was float now byte
     (144 bytes saved)

1678save "m2B_s12results.dta", replace
  (note: file m2B_s12results.dta not found)
  file m2B_s12results.dta saved

1679
1680* List strata with statistically significant interaction effects
1681use "m2B_s12results.dta", clear

1682list strata12  REmn RElo REhi if REhi<0, noobs

1683list strata12  REmn RElo REhi if RElo>0, noobs

1684
1685
1686********************************************************************************
1687* MODEL 2A_S18 - CESD, Null MODEL
1688********************************************************************************
1689
1690* Load the data
1691use "analysisready2.dta", clear

1692recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1693sort scid strata18 aid

1694
1695* delete if missing dependent variable (so can record number)
1696drop if cesd_w1 == .
  (19 observations deleted)

1697
1698* Fit model using PQL2
1699runmlwin cesd_w1 cons , ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs    =    14022
  Normal response model
  Estimation algorithm: RIGLS
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata18	1621	1	8.7	193

```
Run time (seconds)         =         1.92
Number of iterations       =            4
Log restricted-likelihood =  -48691.82
Restricted-deviance        =  97383.639
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	11.44784	.138668	82.56	0.000	11.17605	11.71962

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid					
	var(cons)	1.458951	.3182835	.835127	2.082775
Level 2: strata18					
	var(cons)	3.197946	.3951378	2.42349	3.972402
Level 1: aid					
	var(cons)	58.0341	.7218926	56.61922	59.44899

```
1700
1701* Fit model using MCMC
1702runmlwin cesd_w1 cons , ///
   >    level3(scid: cons) ///
   >    level2(strata18: cons, residuals(u, savechains("m2A_s18_u.dta", replace))) ///
   >    level1(aid: cons) ///
   >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
   >       savechains("m2A_s18_beta.dta", replace)) initsprevious ///
   >    nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs    =      14022
Normal response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata18	**18**	**212**	**779.0**	**1582**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =         40.1
Deviance (dbar)                =     96875.93
Deviance (thetabar)            =     96772.66
Effective no. of pars (pd)     =       103.27
Bayesian DIC                   =     96979.21
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.72246	.4326657	544	0.000	10.89029	12.5336

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	1.234717	.2617079	1018	.8013073	1.756155
Level 2: strata18						
	var(cons)	3.107172	1.260101	985	1.496602	6.276266
Level 1: aid						
	var(cons)	58.61311	.7051861	1038	57.21273	59.93023

```
1703rename u0 m1u

1704drop u0se

1705
1706* Calculate the ICC from the chains
1707use "m2A_s18_beta.dta", clear

1708rename RP3_var_cons_ sigma2uscid

1709rename RP2_var_cons_ sigma2u

1710rename RP1_var_cons_ sigma2e

1711generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1712generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1713mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0497766	.0184797	972	0.000	.0242889	.0952302
icc_scid	.0194867	.0039482	1013	0.000	.0126985	.0276073

```
1714
1715
1716
1717****************************************************************************
1718* MODEL 2B_S18 - CESD, MAIN EFFECTS MODEL
1719****************************************************************************
1720
1721* Load the data
1722use "analysisready2.dta", clear

1723recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1724sort scid strata18 aid

1725
1726* delete if missing dependent variable (so can record number)
1727drop if cesd_w1 == .
  (19 observations deleted)

1728
1729* Fit model using PQL2
1730runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege, ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs    =    14022
  Normal response model
  Estimation algorithm: RIGLS
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	96.0	828
strata18	1621	1	8.7	193

```
Run time (seconds)            =        1.99
Number of iterations          =           4
Log restricted-likelihood =  -48506.096
Restricted-deviance           =   97012.191
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	8.731386	.1847894	47.25	0.000	8.369205	9.093566
female	1.999963	.1438838	13.90	0.000	1.717956	2.281971
latinx_race	1.364376	.2360554	5.78	0.000	.9017162	1.827037
black_race	1.141963	.1997794	5.72	0.000	.7504021	1.533523
hsless	2.42472	.1808028	13.41	0.000	2.070353	2.779087
somecollege	1.03345	.1826748	5.66	0.000	.6754142	1.391486

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.13732	.2339244	.6788364	1.595803
Level 2: strata18				
var(cons)	.6302094	.2255177	.1882028	1.072216
Level 1: aid				
var(cons)	58.12206	.7155926	56.71952	59.52459

```
1731
1732* Fit model using MCMC
1733runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege, ///
 >    level3(scid: cons) ///
 >    level2(strata18: cons, residuals(u, savechains("m2B_s18_u.dta", replace))) ///
 >    level1(aid: cons) ///
 >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
 >      savechains("m2B_s18_beta.dta", replace)) initsprevious ///
 >    nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs      =      14022
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.0	828
strata18	18	212	779.0	1582

```
Burnin                         =        5000
Chain                          =       50000
Thinning                       =          50
Run time (seconds)             =        52.9
Deviance (dbar)                =    96877.16
Deviance (thetabar)            =    96779.49
Effective no. of pars (pd)  =       97.67
Bayesian DIC                   =    96974.83
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.703702	.2561405	884	0.000	8.189422	9.198122
female	2.148738	.2088827	1153	0.000	1.739276	2.547364
latinx_race	1.387682	.2901319	1101	0.000	.8223056	1.951046
black_race	1.06074	.2655182	1011	0.001	.5211535	1.596518
hsless	2.384544	.2558993	1163	0.000	1.875978	2.851396
somecollege	.9637142	.2650546	907	0.000	.4340822	1.449436

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	1.230853	.2605134	976	.769991	1.802157
Level 2: strata18						
	var(cons)	.1006623	.096523	914	.0034424	.3629972
Level 1: aid						
	var(cons)	58.62108	.7052871	934	57.22621	60.04505

```
1734rename u0 m1u

1735drop u0se

1736
1737* Calculate the ICC from the chains
1738use "m2B_s18_beta.dta", clear

1739rename RP3_var_cons_ sigma2uscid

1740rename RP2_var_cons_ sigma2u

1741rename RP1_var_cons_ sigma2e

1742generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1743generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1744mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0017077	.0016375	918	0.000	.0000582	.0060219
icc_scid	.0203012	.0042461	977	0.000	.01291	.0297526

```
1745
1746
1747
1748*-------------------------------------------------------------------------------*
1749* PREPARE FIXED-PART PAREMETER CHAINS
1750*-------------------------------------------------------------------------------*
1751
1752use "m2B_s18_beta.dta", clear

1753drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1754rename FP1_* b_*

1755format %9.2f b_*

1756compress
    variable iteration was double now long
    (4,000 bytes saved)

1757save "m2B_s18_beta_prepped.dta", replace
  (note: file m2B_s18_beta_prepped.dta not found)
  file m2B_s18_beta_prepped.dta saved
```

1758isid iteration

1759codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

1760
1761
1762*--*
1763* PREPARE STRATUM RANDOM EFFECTS CHAINS
1764*--*
1765
1766use "m2B_s18_u.dta", clear

1767drop residual idnum

1768rename value u

1769format %9.2f u

1770sort strata18 iteration

1771order strata18 iteration

1772compress
    variable **strata18** was **double** now **int**
    variable **iteration** was **double** now **long**
    (180,000 bytes saved)

1773save "m2B_s18_u_prepped.dta", replace
  (note: file m2B_s18_u_prepped.dta not found)
  file m2B_s18_u_prepped.dta saved

1774isid strata18 iteration

1775codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**18000**	**1000**	**24976**	**1**	**49951**	Iteration

1776
1777
1778*--*
1779* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1780*--*
1781
1782use "data18.dta", clear

1783isid strata18

1784cross using "m2B_s18_beta_prepped.dta"

```
1785isid strata18 iteration

1786sort strata18 iteration

1787merge 1:1 strata18 iteration using "m2B_s18_u_prepped.dta", nogenerate assert(match)

        Result                           # of obs.
        ─────────────────────────────────────────────
        not matched                              0
        matched                             18,000
        ─────────────────────────────────────────────


1788isid strata18 iteration

1789compress
    variable strata18 was double now int
    (108,000 bytes saved)

1790save "m2B_s18data_prepped.dta", replace
  (note: file m2B_s18data_prepped.dta not found)
  file m2B_s18data_prepped.dta saved

1791
1792
1793*------------------------------------------------------------------------------*
1794* CALCULATE VALUES OF INTEREST
1795*------------------------------------------------------------------------------*
1796
1797* Expected value based on fixed and random part
1798use "m2B_s18data_prepped.dta", clear

1799gen cons = 1

1800generate expectedvalue = (b_cons*cons ///
  >                                                   + b_female*female ///
  >                                                   + b_latinx_race*latinx_race ///
  >                                                   + b_black_race*black_race ///
  >                                                   + b_hsless*hsless ///
  >                                                   + b_somecollege*somecollege ///
  >                                                   + u )

1801label var expectedvalue "Expected value based on main effects and interactions"

1802format %9.3f expectedvalue

1803
1804* Expected value based only on the fixed-part
1805generate fixedeffect = (b_cons*cons ///
  >                                                   + b_female*female ///
  >                                                   + b_latinx_race*latinx_race ///
  >                                                   + b_black_race*black_race ///
  >                                                   + b_hsless*hsless ///
  >                                                   + b_somecollege*somecollege  ///
  >                                                   )

1806label var fixedeffect "Expected value based only on main effects"

1807format %9.3f fixedeffect

1808
```

```
1809* Expected value based only on the random-part
1810generate randomeffect = u

1811label var randomeffect "Random Effect"

1812format %9.3f randomeffect

1813
1814* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1815bysort strata18 (iteration): egen expmn = mean(expectedvalue)

1816bysort strata18 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1817bysort strata18 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

1818format %9.3f expmn explo exphi

1819
1820bysort strata18 (iteration): egen FEmn = mean(fixedeffect)

1821bysort strata18 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1822bysort strata18 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1823format %9.3f FEmn FElo FEhi

1824
1825bysort strata18 (iteration): egen REmn = mean(randomeffect)

1826bysort strata18 (iteration): egen RElo = pctile(randomeffect), p(2.5)

1827bysort strata18 (iteration): egen REhi = pctile(randomeffect), p(97.5)

1828format %9.3f REmn RElo REhi

1829
1830* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1831drop iteration b* u* expectedvalue fixedeffect randomeffect

1832duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

1833isid strata18

1834
1835* Ranks
1836sort expmn

1837generate exprank = _n

1838order exprank, after(exphi)

1839sort FEmn

1840generate FErank = _n

1841order FErank, after(FEhi)
```

```
1842sort REmn

1843generate RErank = _n

1844order RErank, after(REhi)

1845
1846* Sort the data
1847sort strata18

1848isid strata18

1849
1850* Compress and save the data
1851compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (216 bytes saved)

1852save "m2B_s18results.dta", replace
  (note: file m2B_s18results.dta not found)
  file m2B_s18results.dta saved

1853
1854* List strata with statistically significant interaction effects
1855use "m2B_s18results.dta", clear

1856list strata18  REmn RElo REhi if REhi<0, noobs

1857list strata18  REmn RElo REhi if RElo>0, noobs

1858
1859
1860*******************************************************************************
1861* MODEL 2A_S36 - CESD, Null MODEL
1862*******************************************************************************
1863
1864* Load the data
1865use "analysisready2.dta", clear

1866recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

1867sort scid strata36 aid

1868
1869* delete if missing dependent variable (so can record number)
1870drop if cesd_w1 == .
  (19 observations deleted)

1871
1872* Fit model using PQL2
1873runmlwin cesd_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                   Number of obs      =      14022
  Normal response model
  Estimation algorithm: RIGLS
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.0	828
strata36	2596	1	5.4	172

```
Run time (seconds)         =        2.05
Number of iterations       =           4
Log restricted-likelihood = -48700.004
Restricted-deviance       =   97400.008
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	11.39582	.1365381	83.46	0.000	11.12821 11.66343

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	1.513957	.3068496	.9125429 2.115371
Level 2: strata36			
var(cons)	3.442075	.4176153	2.623564 4.260586
Level 1: aid			
var(cons)	57.64642	.7339954	56.20782 59.08502

```
1874
1875* Fit model using MCMC
1876runmlwin cesd_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m2A_s36_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2A_s36_beta.dta", replace)) initsprevious ///
>    nopause
```

```
MLwiN 3.2 multilevel model                  Number of obs      =       14022
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.0	828
strata36	36	47	389.5	1083

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =        42.8
Deviance (dbar)               =    96834.77
Deviance (thetabar)           =    96716.53
Effective no. of pars (pd)    =      118.25
Bayesian DIC                  =    96953.02
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	11.48812	.2992262	972	0.000	10.90303 12.05422

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.183949	.2531936	951	.7281696	1.705379
Level 2: strata36					
var(cons)	2.600385	.7207648	1072	1.509937	4.154197
Level 1: aid					
var(cons)	58.44448	.6998102	1176	57.2467	59.84344

1877rename u0 m1u

1878drop u0se

1879
1880* Calculate the ICC from the chains
1881use "m2A_s36_beta.dta", clear

1882rename RP3_var_cons_ sigma2uscid

1883rename RP2_var_cons_ sigma2u

1884rename RP1_var_cons_ sigma2e

1885generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1886generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1887mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.041348	.0106853	1065	0.000	.0247194	.065443
icc_scid	.0189949	.0039764	958	0.000	.011804	.0274701

1888
1889
1890
1891***
1892* MODEL 2B_S36 - CESD, MAIN EFFECTS MODEL
1893***
1894
1895* Load the data
1896use "analysisready2.dta", clear

1897recast float cesd_w1
  cesd_w1: 13375 values would be changed; not changed

1898sort scid strata36 aid

1899
1900* delete if missing dependent variable (so can record number)
1901drop if cesd_w1 == .
  (19 observations deleted)

1902

```
1903* Fit model using PQL2
1904runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
>    level3(scid: cons) ///
>    level2(strata36: cons) ///
>    level1(aid: cons) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata36	**2596**	**1**	**5.4**	**172**

```
Run time (seconds)         =         2.12
Number of iterations       =            4
Log restricted-likelihood = -48484.737
Restricted-deviance        =    96969.474
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**8.388904**	**.1879758**	**44.63**	**0.000**	**8.020478**	**8.757329**
female	**1.99494**	**.1392397**	**14.33**	**0.000**	**1.722035**	**2.267844**
latinx_race	**1.206672**	**.2332464**	**5.17**	**0.000**	**.7495176**	**1.663827**
black_race	**.8964794**	**.1985036**	**4.52**	**0.000**	**.5074195**	**1.285539**
hsless	**2.083928**	**.1815691**	**11.48**	**0.000**	**1.728059**	**2.439797**
somecollege	**.9064583**	**.177868**	**5.10**	**0.000**	**.5578434**	**1.255073**
lowinc	**1.011428**	**.1529624**	**6.61**	**0.000**	**.7116271**	**1.311229**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**1.112044**	**.2256547**	**.669769**	**1.554319**
Level 2: strata36				
var(cons)	**.6335077**	**.2532249**	**.1371961**	**1.129819**
Level 1: aid				
var(cons)	**57.91415**	**.7238271**	**56.49548**	**59.33283**

```
1905
1906* Fit model using MCMC
1907runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m2B_s36_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2B_s36_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata36	**36**	**47**	**389.5**	**1083**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =        59.3
Deviance (dbar)             =    96833.63
Deviance (thetabar)         =    96733.20
Effective no. of pars (pd)  =      100.43
Bayesian DIC                =    96934.06
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.35321	.2303584	1149	0.000	7.868865	8.789773
female	2.091178	.1734868	914	0.000	1.764868	2.433726
latinx_race	1.235138	.2620964	1098	0.000	.7580748	1.751612
black_race	.8404032	.2321789	1086	0.000	.3910168	1.317877
hsless	2.023789	.2222609	716	0.000	1.571152	2.450677
somecollege	.8558273	.2183248	949	0.000	.3999643	1.282347
lowinc	1.027336	.1840366	1529	0.000	.682414	1.406304

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.173755	.2511193	924	.772618	1.706201
Level 2: strata36					
var(cons)	.0843727	.0682746	708	.0033609	.2528491
Level 1: aid					
var(cons)	58.44776	.6978574	1155	57.07869	59.80658

1908rename u0 m1u

1909drop u0se

1910
1911* Calculate the ICC from the chains
1912use "m2B_s36_beta.dta", clear

1913rename RP3_var_cons_ sigma2uscid

1914rename RP2_var_cons_ sigma2u

1915rename RP1_var_cons_ sigma2e

1916generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1917generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1918mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0014215	.0011318	708	0.000	.0000558	.0042576
icc_scid	.0195829	.0039595	934	0.000	.0129734	.028486

1919

```
1920
1921
1922*-------------------------------------------------------------------------------*
1923* PREPARE FIXED-PART PAREMETER CHAINS
1924*-------------------------------------------------------------------------------*
1925
1926use "m2B_s36_beta.dta", clear

1927drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

1928rename FP1_* b_*

1929format %9.2f b_*

1930compress
    variable iteration was double now long
    (4,000 bytes saved)

1931save "m2B_s36_beta_prepped.dta", replace
  (note: file m2B_s36_beta_prepped.dta not found)
  file m2B_s36_beta_prepped.dta saved

1932isid iteration

1933codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
1934
1935
1936*-------------------------------------------------------------------------------*
1937* PREPARE STRATUM RANDOM EFFECTS CHAINS
1938*-------------------------------------------------------------------------------*
1939
1940use "m2B_s36_u.dta", clear

1941drop residual idnum

1942rename value u

1943format %9.2f u

1944sort strata36 iteration

1945order strata36 iteration

1946compress
    variable strata36 was double now int
    variable iteration was double now long
    (360,000 bytes saved)

1947save "m2B_s36_u_prepped.dta", replace
  (note: file m2B_s36_u_prepped.dta not found)
  file m2B_s36_u_prepped.dta saved
```

```
1948isid strata36 iteration

1949codebook iteration, compact

  Variable      Obs Unique   Mean  Min    Max  Label
  ────────────────────────────────────────────────────────────────────────────

  iteration  36000   1000  24976    1  49951  Iteration
  ────────────────────────────────────────────────────────────────────────────


1950
1951
1952*------------------------------------------------------------------------------*
1953* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1954*------------------------------------------------------------------------------*
1955
1956use "data36.dta", clear

1957isid strata36

1958cross using "m2B_s36_beta_prepped.dta"

1959isid strata36 iteration

1960sort strata36 iteration

1961merge 1:1 strata36 iteration using "m2B_s36_u_prepped.dta", nogenerate assert(match)

      Result                          # of obs.
      ─────────────────────────────────────────
      not matched                             0
      matched                            36,000
      ─────────────────────────────────────────


1962isid strata36 iteration

1963compress
    variable strata36 was double now int
    (216,000 bytes saved)

1964save "m2B_s36data_prepped.dta", replace
  (note: file m2B_s36data_prepped.dta not found)
  file m2B_s36data_prepped.dta saved

1965
1966
1967*------------------------------------------------------------------------------*
1968* CALCULATE VALUES OF INTEREST
1969*------------------------------------------------------------------------------*
1970
1971* Expected value based on fixed and random part
1972use "m2B_s36data_prepped.dta", clear

1973gen cons = 1

1974generate expectedvalue = (b_cons*cons ///
  >                                                + b_female*female ///
  >                                                + b_latinx_race*latinx_race ///
  >                                                + b_black_race*black_race ///
  >                                                + b_hsless*hsless ///
  >                                                + b_somecollege*somecollege ///
  >                                                + b_lowinc*lowinc ///
  >                                                + u )
```

```
1975label var expectedvalue "Expected value based on main effects and interactions"

1976format %9.3f expectedvalue

1977
1978* Expected value based only on the fixed-part
1979generate fixedeffect = (b_cons*cons ///
  >                                                      + b_female*female ///
  >                                                      + b_latinx_race*latinx_race ///
  >                                                      + b_black_race*black_race ///
  >                                                      + b_hsless*hsless ///
  >                                                      + b_somecollege*somecollege  ///
  >                                                      + b_lowinc*lowinc ///
  >                                                      )

1980label var fixedeffect "Expected value based only on main effects"

1981format %9.3f fixedeffect

1982
1983* Expected value based only on the random-part
1984generate randomeffect = u

1985label var randomeffect "Random Effect"

1986format %9.3f randomeffect

1987
1988* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1989bysort strata36 (iteration): egen expmn = mean(expectedvalue)

1990bysort strata36 (iteration): egen explo = pctile(expectedvalue), p(2.5)

1991bysort strata36 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

1992format %9.3f expmn explo exphi

1993
1994bysort strata36 (iteration): egen FEmn = mean(fixedeffect)

1995bysort strata36 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

1996bysort strata36 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

1997format %9.3f FEmn FElo FEhi

1998
1999bysort strata36 (iteration): egen REmn = mean(randomeffect)

2000bysort strata36 (iteration): egen RElo = pctile(randomeffect), p(2.5)

2001bysort strata36 (iteration): egen REhi = pctile(randomeffect), p(97.5)

2002format %9.3f REmn RElo REhi

2003
2004* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2005drop iteration b* u* expectedvalue fixedeffect randomeffect

2006duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)
```

```
2007isid strata36

2008
2009* Ranks
2010sort expmn

2011generate exprank = _n

2012order exprank, after(exphi)

2013sort FEmn

2014generate FErank = _n

2015order FErank, after(FEhi)

2016sort REmn

2017generate RErank = _n

2018order RErank, after(REhi)

2019
2020* Sort the data
2021sort strata36

2022isid strata36

2023
2024* Compress and save the data
2025compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (432 bytes saved)

2026save "m2B_s36results.dta", replace
  (note: file m2B_s36results.dta not found)
  file m2B_s36results.dta saved

2027
2028* List strata with statistically significant interaction effects
2029use "m2B_s36results.dta", clear

2030list strata36  REmn RElo REhi if REhi<0, noobs

2031list strata36  REmn RElo REhi if RElo>0, noobs

2032
2033
2034***************************************************************************
2035* MODEL 2A_S48 - CESD, Null MODEL
2036***************************************************************************
2037
2038* Load the data
2039use "analysisready2.dta", clear

2040recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed
```

```
2041sort scid strata48 aid

2042
2043* delete if missing dependent variable (so can record number)
2044drop if cesd_w1 == .
  (19 observations deleted)

2045
2046* Fit model using PQL2
2047runmlwin cesd_w1 cons , ///
  >    level3(scid: cons) ///
  >    level2(strata48: cons) ///
  >    level1(aid: cons) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata48	**2703**	**1**	**5.2**	**143**

```
Run time (seconds)          =        2.05
Number of iterations        =           4
Log restricted-likelihood = -48704.384
Restricted-deviance         =   97408.768
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**11.41075**	**.1374824**	**83.00**	**0.000**	**11.14129**	**11.68021**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**1.556341**	**.311162**	**.9464745**	**2.166207**
Level 2: strata48				
var(cons)	**3.471284**	**.4183191**	**2.651393**	**4.291174**
Level 1: aid				
var(cons)	**57.61819**	**.7353637**	**56.1769**	**59.05947**

```
2048
2049* Fit model using MCMC
2050runmlwin cesd_w1 cons , ///
  >    level3(scid: cons) ///
  >    level2(strata48: cons, residuals(u, savechains("m2A_s48_u.dta", replace))) ///
  >    level1(aid: cons) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m2A_s48_beta.dta", replace)) initsprevious ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata48	**48**	**3**	**292.1**	**1083**

```
Burnin                         =        5000
Chain                          =       50000
Thinning                       =          50
Run time (seconds)             =        41.3
Deviance (dbar)                =    96835.65
Deviance (thetabar)            =    96712.77
Effective no. of pars (pd)     =      122.88
Bayesian DIC                   =    96958.53
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**11.55452**	**.2812909**	**961**	**0.000**	**11.00239**	**12.10388**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**1.190939**	**.253635**	**1270**	**.7745537**	**1.794649**
Level 2: strata48					
var(cons)	**2.645302**	**.6733064**	**964**	**1.613132**	**4.089441**
Level 1: aid					
var(cons)	**58.44626**	**.7021199**	**850**	**57.07633**	**59.75869**

2051 rename u0 m1u

2052 drop u0se

2053
2054 * Calculate the ICC from the chains
2055 use "m2A_s48_beta.dta", clear

2056 rename RP3_var_cons_ sigma2uscid

2057 rename RP2_var_cons_ sigma2u

2058 rename RP1_var_cons_ sigma2e

2059 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2060 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2061 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0421863	.0099967	954	0.000	.0264683	.0644187
icc_scid	.0192306	.004216	1264	0.000	.0124563	.0286344

```
2062
2063
2064
2065******************************************************************************
2066* MODEL 2B_S48 - CESD, MAIN EFFECTS MODEL
2067******************************************************************************
2068
2069* Load the data
2070use "analysisready2.dta", clear

2071recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

2072sort scid strata48 aid

2073
2074* delete if missing dependent variable (so can record number)
2075drop if cesd_w1 == .
  (19 observations deleted)

2076
2077* Fit model using PQL2
2078runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
 > ///
 >   level3(scid: cons) ///
 >   level2(strata48: cons) ///
 >   level1(aid: cons) ///
 >   rigls maxiterations(100) ///
 >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata48	**2703**	**1**	**5.2**	**143**

```
Run time (seconds)         =         2.09
Number of iterations       =            4
Log restricted-likelihood = -48484.01
Restricted-deviance        =    96968.019
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	8.37729	.1883017	44.49	0.000	8.008225	8.746355
female	2.003813	.1392109	14.39	0.000	1.730965	2.276662
latinx_imm	.8573115	.4377433	1.96	0.050	-.0006496	1.715273
latinx_non	1.279081	.2417238	5.29	0.000	.8053112	1.752851
black	.8899623	.1989398	4.47	0.000	.5000475	1.279877
hsless	2.091043	.1817152	11.51	0.000	1.734888	2.447198
somecollege	.9033535	.1783168	5.07	0.000	.553859	1.252848
lowinc	1.023296	.1536703	6.66	0.000	.7221075	1.324484

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.110406	.2255938	.6682503	1.552562
Level 2: strata48				
var(cons)	.6929724	.2603535	.1826888	1.203256
Level 1: aid				
var(cons)	57.85783	.7250982	56.43666	59.27899

```
2079
2080* Fit model using MCMC
2081runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
> ///
>   level3(scid: cons) ///
>   level2(strata48: cons, residuals(u, savechains("m2B_s48_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m2B_s48_beta.dta", replace)) initsprevious ///
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14022**
Normal response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata48	**48**	**3**	**292.1**	**1083**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =        61.9
Deviance (dbar)              =    96835.67
Deviance (thetabar)         =    96734.27
Effective no. of pars (pd)  =      101.40
Bayesian DIC                 =    96937.06
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**8.336435**	**.2275481**	**1114**	**0.000**	**7.902401**	**8.786218**
female	**2.109441**	**.1726668**	**895**	**0.000**	**1.786231**	**2.456049**
latinx_imm	**.9071373**	**.4475286**	**986**	**0.023**	**.02093**	**1.729667**
latinx_non	**1.293589**	**.2665693**	**1227**	**0.000**	**.7478254**	**1.806613**
black	**.8392531**	**.2281424**	**1175**	**0.000**	**.3748666**	**1.328506**
hsless	**2.030421**	**.2175705**	**1118**	**0.000**	**1.604776**	**2.43784**
somecollege	**.8535488**	**.2180519**	**996**	**0.000**	**.4077802**	**1.282094**
lowinc	**1.043001**	**.1823803**	**1081**	**0.000**	**.7050215**	**1.403464**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	**1.171616**	**.253064**	**1161**	**.7318265**	**1.715884**
Level 2: strata48						
	var(cons)	**.0794292**	**.0665305**	**578**	**.001974**	**.231203**
Level 1: aid						
	var(cons)	**58.45472**	**.7030795**	**983**	**57.11367**	**59.83277**

```
2082rename u0 m1u

2083drop u0se
```

```
2084
2085* Calculate the ICC from the chains
2086use "m2B_s48_beta.dta", clear

2087rename RP3_var_cons_ sigma2uscid

2088rename RP2_var_cons_ sigma2u

2089rename RP1_var_cons_ sigma2e

2090generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2091generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2092mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0013393	.001064	576	0.000	.0000334	.0038364
icc_scid	.0195127	.0042016	1155	0.000	.0123896	.028694

```
2093
2094
2095
2096*------------------------------------------------------------------------------*
2097* PREPARE FIXED-PART PAREMETER CHAINS
2098*------------------------------------------------------------------------------*
2099
2100use "m2B_s48_beta.dta", clear

2101drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

2102rename FP1_* b_*

2103format %9.2f b_*

2104compress
    variable iteration was double now long
    (4,000 bytes saved)

2105save "m2B_s48_beta_prepped.dta", replace
  (note: file m2B_s48_beta_prepped.dta not found)
  file m2B_s48_beta_prepped.dta saved

2106isid iteration

2107codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
2108
2109
2110*------------------------------------------------------------------------------*
2111* PREPARE STRATUM RANDOM EFFECTS CHAINS
```

```
2112*-------------------------------------------------------------------------*
2113
2114use "m2B_s48_u.dta", clear

2115drop residual idnum

2116rename value u

2117format %9.2f u

2118sort strata48 iteration

2119order strata48 iteration

2120compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

2121save "m2B_s48_u_prepped.dta", replace
  (note: file m2B_s48_u_prepped.dta not found)
  file m2B_s48_u_prepped.dta saved

2122isid strata48 iteration

2123codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	48000	1000	24976	1	49951	Iteration

```
2124
2125
2126*-------------------------------------------------------------------------*
2127* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2128*-------------------------------------------------------------------------*
2129
2130use "data48.dta", clear

2131isid strata48

2132cross using "m2B_s48_beta_prepped.dta"

2133isid strata48 iteration

2134sort strata48 iteration

2135merge 1:1 strata48 iteration using "m2B_s48_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	48,000

```
2136isid strata48 iteration
```

```
2137compress
    variable strata48 was double now int
    (288,000 bytes saved)

2138save "m2B_s48data_prepped.dta", replace
  (note: file m2B_s48data_prepped.dta not found)
  file m2B_s48data_prepped.dta saved

2139
2140
2141*-------------------------------------------------------------------------------*
2142* CALCULATE VALUES OF INTEREST
2143*-------------------------------------------------------------------------------*
2144
2145* Expected value based on fixed and random part
2146use "m2B_s48data_prepped.dta", clear

2147gen cons = 1

2148generate expectedvalue = (b_cons*cons ///
  >                                              + b_female*female ///
  >                                              + b_latinx_imm*latinx_imm ///
  >                                              + b_latinx_non*latinx_non ///
  >                                              + b_black*black ///
  >                                              + b_hsless*hsless ///
  >                                              + b_somecollege*somecollege ///
  >                                              + b_lowinc*lowinc ///
  >                                              + u )

2149label var expectedvalue "Expected value based on main effects and interactions"

2150format %9.3f expectedvalue

2151
2152* Expected value based only on the fixed-part
2153generate fixedeffect = (b_cons*cons ///
  >                                              + b_female*female ///
  >                                              + b_latinx_imm*latinx_imm ///
  >                                              + b_latinx_non*latinx_non ///
  >                                              + b_black*black ///
  >                                              + b_hsless*hsless ///
  >                                              + b_somecollege*somecollege  ///
  >                                              + b_lowinc*lowinc ///
  >                                              )

2154label var fixedeffect "Expected value based only on main effects"

2155format %9.3f fixedeffect

2156
2157* Expected value based only on the random-part
2158generate randomeffect = u

2159label var randomeffect "Random Effect"

2160format %9.3f randomeffect

2161
2162* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2163bysort strata48 (iteration): egen expmn = mean(expectedvalue)
```

```
2164bysort strata48 (iteration): egen explo = pctile(expectedvalue), p(2.5)

2165bysort strata48 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

2166format %9.3f expmn explo exphi

2167
2168bysort strata48 (iteration): egen FEmn = mean(fixedeffect)

2169bysort strata48 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

2170bysort strata48 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

2171format %9.3f FEmn FElo FEhi

2172
2173bysort strata48 (iteration): egen REmn = mean(randomeffect)

2174bysort strata48 (iteration): egen RElo = pctile(randomeffect), p(2.5)

2175bysort strata48 (iteration): egen REhi = pctile(randomeffect), p(97.5)

2176format %9.3f REmn RElo REhi

2177
2178* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2179drop iteration b* u* expectedvalue fixedeffect randomeffect

2180duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

2181isid strata48

2182
2183* Ranks
2184sort expmn

2185generate exprank = _n

2186order exprank, after(exphi)

2187sort FEmn

2188generate FErank = _n

2189order FErank, after(FEhi)

2190sort REmn

2191generate RErank = _n

2192order RErank, after(REhi)

2193
2194* Sort the data
2195sort strata48
```

```
2196isid strata48

2197
2198* Compress and save the data
2199compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (576 bytes saved)

2200save "m2B_s48results.dta", replace
  (note: file m2B_s48results.dta not found)
  file m2B_s48results.dta saved

2201
2202* List strata with statistically significant interaction effects
2203use "m2B_s48results.dta", clear

2204list strata48  REmn RElo REhi if REhi<0, noobs

2205list strata48  REmn RElo REhi if RElo>0, noobs

2206
2207
2208********************************************************************************
2209* MODEL 2A_S96 - CESD, Null MODEL
2210********************************************************************************
2211
2212* Load the data
2213use "analysisready2.dta", clear

2214recast float cesd_w1
  cesd_w1:  13375 values would be changed; not changed

2215sort scid strata96 aid

2216
2217* delete if missing dependent variable (so can record number)
2218drop if cesd_w1 == .
  (19 observations deleted)

2219
2220* Fit model using PQL2
2221runmlwin cesd_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons) ///
>    level1(aid: cons) ///
>    rigls maxiterations(100) ///
>    nopause

  MLwiN 3.2 multilevel model                    Number of obs    =    14022
  Normal response model
  Estimation algorithm: RIGLS
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	96.0	828
strata96	3622	1	3.9	131

```
Run time (seconds)          =       2.11
Number of iterations        =          4
Log restricted-likelihood = -48711.423
Restricted-deviance         =   97422.846
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	11.4859	.1398163	82.15	0.000	11.21186	11.75993

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.683015	.3217275	1.05244	2.313589
Level 2: strata96				
var(cons)	3.927248	.4558077	3.033881	4.820615
Level 1: aid				
var(cons)	57.18764	.7461445	55.72523	58.65006

```
2222
2223* Fit model using MCMC
2224runmlwin cesd_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons, residuals(u, savechains("m2A_s96_u.dta", replace))) ///
>    level1(aid: cons) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m2A_s96_beta.dta", replace)) initsprevious ///
>    nopause

MLwiN 3.2 multilevel model                    Number of obs     =      14022
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.0**	**828**
strata96	**91**	**1**	**154.1**	**900**

```
Burnin                      =       5000
Chain                       =      50000
Thinning                    =         50
Run time (seconds)          =       43.2
Deviance (dbar)             =   96702.42
Deviance (thetabar)         =   96553.21
Effective no. of pars (pd) =     149.20
Bayesian DIC                =   96851.62
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	12.04953	.2736288	942	0.000	11.51425	12.5801

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.191292	.2521207	1020	.7547938	1.731178
Level 2: strata96					
var(cons)	4.075235	.828468	826	2.772972	5.935596
Level 1: aid					
var(cons)	57.89861	.6984179	940	56.44622	59.22427

2225 rename u0 m1u

2226 drop u0se

2227
2228 * Calculate the ICC from the chains
2229 use "m2A_s96_beta.dta", clear

2230 rename RP3_var_cons_ sigma2uscid

2231 rename RP2_var_cons_ sigma2u

2232 rename RP1_var_cons_ sigma2e

2233 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2234 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2235 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0645293	.0120279	821	0.000	.0448588	.0914119
icc_scid	.0187841	.0038888	1018	0.000	.0119861	.0269643

2236
2237
2238
2239 ***
2240 * MODEL 2B_S96 - CESD, MAIN EFFECTS MODEL
2241 ***
2242
2243 * Load the data
2244 use "analysisready2.dta", clear

2245 recast float cesd_w1
  cesd_w1: 13375 values would be changed; not changed

2246 sort scid strata96 aid

2247
2248 * delete if missing dependent variable (so can record number)
2249 drop if cesd_w1 == .
  (19 observations deleted)

2250
2251 * Fit model using PQL2
2252 runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc s
  > traight_no, ///
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid: cons) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model   Number of obs   =   14022
  Normal response model
  Estimation algorithm: **RIGLS**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata96	3622	1	3.9	131

```
Run time (seconds)         =        2.34
Number of iterations       =           5
Log restricted-likelihood = -48434.021
Restricted-deviance        =   96868.042
```

cesd_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	8.203709	.1876622	43.72	0.000	7.835898	8.57152
female	1.759866	.1393481	12.63	0.000	1.486749	2.032984
latinx_imm	.914934	.4324985	2.12	0.034	.0672526	1.762615
latinx_non	1.271509	.2393419	5.31	0.000	.8024077	1.740611
black	.9364133	.1970875	4.75	0.000	.5501288	1.322698
hsless	2.127424	.1791658	11.87	0.000	1.776266	2.478583
somecollege	.930994	.175807	5.30	0.000	.5864185	1.275569
lowinc	1.012057	.1515095	6.68	0.000	.7151042	1.309011
straight_no	1.923839	.194374	9.90	0.000	1.542872	2.304805

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	1.13821	.2268134	.6936639	1.582756
Level 2: strata96				
var(cons)	.6834475	.2811961	.1323132	1.234582
Level 1: aid				
var(cons)	57.42684	.7287727	55.99848	58.85521

```
2253
2254* Fit model using MCMC
2255runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc s
> traight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m2B_s96_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m2B_s96_beta.dta", replace)) initsprevious ///
>   nopause
```

```
MLwiN 3.2 multilevel model          Number of obs     =     14022
Normal response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.0	828
strata96	91	1	154.1	900

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =          65
Deviance (dbar)               =    96733.74
Deviance (thetabar)           =    96629.96
Effective no. of pars (pd)    =      103.79
Bayesian DIC                  =    96837.53
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.158317	.216745	1068	0.000	7.742844	8.570854
female	1.846572	.1654185	922	0.000	1.565475	2.182654
latinx_imm	.9614175	.4410577	863	0.015	.1306543	1.837802
latinx_non	1.305718	.2570586	831	0.000	.769395	1.807634
black	.9101737	.2173667	1101	0.000	.4917835	1.353762
hsless	2.104586	.2036242	760	0.000	1.676915	2.501164
somecollege	.8926639	.2040604	1006	0.000	.4534202	1.291056

lowinc	1.017424	.1712761	949	0.000	.7015763	1.356331
straight_no	1.939314	.2083053	923	0.000	1.514562	2.34005

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	1.181641	.2518399	1034	.7601221	1.732757
Level 2: strata96					
var(cons)	.0771838	.084934	404	.001185	.2969513
Level 1: aid					
var(cons)	58.02722	.6995672	1262	56.64644	59.39467

2256 rename u0 m1u

2257 drop u0se

2258
2259 * Calculate the ICC from the chains
2260 use "m2B_s96_beta.dta", clear

2261 rename RP3_var_cons_ sigma2uscid

2262 rename RP2_var_cons_ sigma2u

2263 rename RP1_var_cons_ sigma2e

2264 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2265 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2266 mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0013158	.0014499	404	0.000	.0000199	.004938
icc_scid	.0199474	.0041328	1039	0.000	.0129062	.0290804

2267
2268
2269
2270 *---*
2271 * PREPARE FIXED-PART PAREMETER CHAINS
2272 *---*
2273
2274 use "m2B_s96_beta.dta", clear

2275 drop deviance RP3_var_cons_ RP2_var_cons_ RP1_var_cons_

2276 rename FP1_* b_*

2277 format %9.2f b_*

2278 compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

```
2279save "m2B_s96_beta_prepped.dta", replace
  (note: file m2B_s96_beta_prepped.dta not found)
  file m2B_s96_beta_prepped.dta saved

2280isid iteration

2281codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
2282
2283
2284*------------------------------------------------------------------------------*
2285* PREPARE STRATUM RANDOM EFFECTS CHAINS
2286*------------------------------------------------------------------------------*
2287
2288use "m2B_s96_u.dta", clear

2289drop residual idnum

2290rename value u

2291format %9.2f u

2292sort strata96 iteration

2293order strata96 iteration

2294compress
    variable strata96 was double now int
    variable iteration was double now long
    (910,000 bytes saved)

2295save "m2B_s96_u_prepped.dta", replace
  (note: file m2B_s96_u_prepped.dta not found)
  file m2B_s96_u_prepped.dta saved

2296isid strata96 iteration

2297codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**91000**	**1000**	**24976**	**1**	**49951**	Iteration

```
2298
2299
2300*------------------------------------------------------------------------------*
2301* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2302*------------------------------------------------------------------------------*
2303
2304use "data96_cesd.dta", clear
```

```
2305isid strata96

2306cross using "m2B_s96_beta_prepped.dta"

2307isid strata96 iteration

2308sort strata96 iteration

2309merge 1:1 strata96 iteration using "m2B_s96_u_prepped.dta", nogenerate assert(match)

    Result                          # of obs.
    ─────────────────────────────────────────
    not matched                             0
    matched                            91,000
    ─────────────────────────────────────────

2310isid strata96 iteration

2311compress
    variable strata96 was double now int
    (546,000 bytes saved)

2312save "m2B_s96data_prepped.dta", replace
  (note: file m2B_s96data_prepped.dta not found)
  file m2B_s96data_prepped.dta saved

2313
2314
2315*-------------------------------------------------------------------------------*
2316* CALCULATE VALUES OF INTEREST
2317*-------------------------------------------------------------------------------*
2318
2319* Expected value based on fixed and random part
2320use "m2B_s96data_prepped.dta", clear

2321gen cons = 1

2322generate expectedvalue = (b_cons*cons ///
  >                                            + b_female*female ///
  >                                            + b_latinx_imm*latinx_imm ///
  >                                            + b_latinx_non*latinx_non ///
  >                                            + b_black*black ///
  >                                            + b_hsless*hsless ///
  >                                            + b_somecollege*somecollege ///
  >                                            + b_lowinc*lowinc ///
  >                                            + b_straight_no*straight_no ///
  >                                            + u )

2323label var expectedvalue "Expected value based on main effects and interactions"

2324format %9.3f expectedvalue

2325
2326* Expected value based only on the fixed-part
2327generate fixedeffect = (b_cons*cons ///
  >                                            + b_female*female ///
  >                                            + b_latinx_imm*latinx_imm ///
  >                                            + b_latinx_non*latinx_non ///
  >                                            + b_black*black ///
  >                                            + b_hsless*hsless ///
  >                                            + b_somecollege*somecollege  ///
  >                                            + b_lowinc*lowinc ///
  >                                            + b_straight_no*straight_no ///
  >                                            )
```

```
2328label var fixedeffect "Expected value based only on main effects"

2329format %9.3f fixedeffect

2330
2331* Expected value based only on the random-part
2332generate randomeffect = u

2333label var randomeffect "Random Effect"

2334format %9.3f randomeffect

2335
2336* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2337bysort strata96 (iteration): egen expmn = mean(expectedvalue)

2338bysort strata96 (iteration): egen explo = pctile(expectedvalue), p(2.5)

2339bysort strata96 (iteration): egen exphi = pctile(expectedvalue), p(97.5)

2340format %9.3f expmn explo exphi

2341
2342bysort strata96 (iteration): egen FEmn = mean(fixedeffect)

2343bysort strata96 (iteration): egen FElo = pctile(fixedeffect), p(2.5)

2344bysort strata96 (iteration): egen FEhi = pctile(fixedeffect), p(97.5)

2345format %9.3f FEmn FElo FEhi

2346
2347bysort strata96 (iteration): egen REmn = mean(randomeffect)

2348bysort strata96 (iteration): egen RElo = pctile(randomeffect), p(2.5)

2349bysort strata96 (iteration): egen REhi = pctile(randomeffect), p(97.5)

2350format %9.3f REmn RElo REhi

2351
2352* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2353drop iteration b* u* expectedvalue fixedeffect randomeffect

2354duplicates drop

  Duplicates in terms of all variables

  (90,909 observations deleted)

2355isid strata96

2356
2357* Ranks
2358sort expmn

2359generate exprank = _n

2360order exprank, after(exphi)
```

```
2361sort FEmn

2362generate FErank = _n

2363order FErank, after(FEhi)

2364sort REmn

2365generate RErank = _n

2366order RErank, after(REhi)

2367
2368* Sort the data
2369sort strata96

2370isid strata96

2371
2372* Compress and save the data
2373compress
    variable cons was float now byte
    variable exprank was float now byte
    variable FErank was float now byte
    variable RErank was float now byte
    (1,092 bytes saved)

2374save "m2B_s96results.dta", replace
  (note: file m2B_s96results.dta not found)
  file m2B_s96results.dta saved

2375
2376* List strata with statistically significant interaction effects
2377use "m2B_s96results.dta", clear

2378list strata96  REmn RElo REhi if REhi<0, noobs

2379list strata96  REmn RElo REhi if RElo>0, noobs

2380
2381
2382
2383********************************************************************************
2384********************************************************************************
2385********************************************************************************
2386*
2387*
2388* MODEL 3 - BINGE DRINKING, MAIN EFFECTS MODEL
2389*
2390*
2391********************************************************************************
2392********************************************************************************
2393********************************************************************************
2394
2395********************************************************************************
2396* MODEL 3A_S6 - BINGE DRINKING, Null MODEL
2397********************************************************************************
2398
2399*------------------------------------------------------------------------------*
2400* FIT THE MODEL
```

```
2401*-------------------------------------------------------------------------------*
2402
2403* Load the data
2404use "analysisready2.dta", clear

2405sort scid strata6 aid

2406
2407* delete if missing dependent variable (so can record number)
2408drop if binge_12mo == .
  (157 observations deleted)

2409
2410* Fit model using PQL2
2411runmlwin binge_12mo cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata6	**678**	**1**	**20.5**	**341**

Run time (seconds)   =   **2.34**
Number of iterations =   **7**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**−1.364656**	**.0678575**	**−20.11**	**0.000**	**−1.497654**	**−1.231657**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	.4475077	.077018	.2965551	.5984602
Level 2: strata6			
var(cons)	.2587591	.0416354	.1771552	.340363

```
2412
2413* Fit model using MCMC
2414runmlwin binge_12mo cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons, residuals(u, savechains("m3A_s6_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m3A_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
  > ance parameter estimates for the models
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata6	6	1145	2314.0	4267

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          204
Deviance (dbar)               =     14835.55
Deviance (thetabar)           =     14716.40
Effective no. of pars (pd)    =       119.15
Bayesian DIC                  =     14954.69
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.392928	.2211579	58	0.000	-1.839287	-.9155388

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4526533	.0738715	898	.3228438	.630127
Level 2: strata6					
var(cons)	.4051804	.4533281	663	.1004224	1.253179

2415 rename u0 m1u

2416 drop u0se

2417
2418 * Present the regression coefficients as odds ratios
2419 runmlwin, or

```
MLwiN 3.2 multilevel model                    Number of obs      =      13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata6	6	1145	2314.0	4267

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          204
Deviance (dbar)               =     14835.55
Deviance (thetabar)           =     14716.40
Effective no. of pars (pd)    =       119.15
Bayesian DIC                  =     14954.69
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2543403	.0568897	58	0.000	.1589307	.400301

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4526533	.0738715	898	.3228438	.630127
Level 2: strata6					
var(cons)	.4051804	.4533281	663	.1004224	1.253179

```
2420
2421* Calculate the ICC from the parameter point estimates
2422scalar m1sigma2u = [RP2]var(cons)

2423scalar m1sigma2e = _pi^2/3

2424display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.110

2425
2426* Calculate the ICC from the chains
2427use "m3A_s6_beta.dta", clear

2428rename RP3_var_cons_ sigma2uscid

2429rename RP2_var_cons_ sigma2u

2430generate sigma2e =  _pi^2/3

2431generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2432generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2433mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0901123	.0621252	611	0.000	.0263968	.2517917
icc_scid	.10924	.0187835	750	0.000	.0767675	.1497168

```
2434
2435
2436*****************************************************************************
2437* MODEL 3B_S6 - BINGE DRINKING, MAIN EFFECTS MODEL
2438*****************************************************************************
2439
2440*---------------------------------------------------------------------------*
2441* FIT THE MODEL
2442*---------------------------------------------------------------------------*
2443
2444* Load the data
2445use "analysisready2.dta", clear

2446sort scid strata6 aid

2447
2448* delete if missing dependent variable (so can record number)
2449drop if binge_12mo == .
  (157 observations deleted)
```

```
2450
2451* Fit model using PQL2
2452runmlwin binge_12mo cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata6	**678**	**1**	**20.5**	**341**

Run time (seconds)   =   **2.24**
Number of iterations =   **6**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-.9742482	.0718023	-13.57	0.000	-1.114978	-.8335182
female	-.281748	.0514615	-5.47	0.000	-.3826107	-.1808853
latinx_race	.0591875	.0800334	0.74	0.460	-.0976752	.2160501
black_race	-.91927	.079153	-11.61	0.000	-1.074407	-.7641329

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4262687	.0658809	.2971445	.555393
Level 2: strata6				
var(cons)	.0660767	.0216244	.0236937	.1084597

```
2453
2454* Fit model using MCMC
2455runmlwin binge_12mo cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m3B_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m3B_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata6	**6**	**1145**	**2314.0**	**4267**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         296
Deviance (dbar)               =    14835.28
Deviance (thetabar)           =    14716.87
Effective no. of pars (pd)    =      118.41
Bayesian DIC                  =    14953.69
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.019419	.2868715	12	0.000	-1.930578	-.7307953
female	-.2527978	.2283892	23	0.074	-.4820102	.5884894
latinx_race	.1044023	.2230389	25	0.262	-.1827834	.7545896
black_race	-1.126165	.6533165	14	0.000	-3.577139	-.6985656

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.4503483	.074154	1000	.3147362	.6062248
Level 2: strata6						
	var(cons)	.4135822	2.013715	22	.0004297	4.918441

2456 rename u0 m1u

2457 drop u0se

2458
2459 * Present the regression coefficients as odds ratios
2460 runmlwin, or

```
MLwiN 3.2 multilevel model              Number of obs     =      13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata6	6	1145	2314.0	4267

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         296
Deviance (dbar)               =    14835.28
Deviance (thetabar)           =    14716.87
Effective no. of pars (pd)    =      118.41
Bayesian DIC                  =    14953.69
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3732221	.0806479	14	0.000	.1450644	.4815261
female	.8043428	.2767752	23	0.074	.6175408	1.801271
latinx_race	1.145338	.3698595	26	0.262	.8329491	2.12675
black_race	.3653669	.1075487	15	0.000	.0279556	.4972982

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4503483	.074154	1000	.3147362	.6062248
Level 2: strata6					
var(cons)	.4135822	2.013715	22	.0004297	4.918441

```
2461
2462* Calculate the ICC from the parameter point estimates
2463scalar m1sigma2u = [RP2]var(cons)

2464scalar m1sigma2e = _pi^2/3

2465display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.112

2466
2467* Calculate the ICC from the chains
2468use "m3B_s6_beta.dta", clear

2469rename RP3_var_cons_ sigma2uscid

2470rename RP2_var_cons_ sigma2u

2471generate sigma2e = _pi^2/3

2472generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2473generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2474mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0459397	.1442241	13	0.000	.0001146	.5731085
icc_scid	.1142789	.0240689	26	0.000	.0501614	.1537662

```
2475
2476
2477*-------------------------------------------------------------------------------*
2478* PREPARE FIXED-PART PAREMETER CHAINS
2479*-------------------------------------------------------------------------------*
2480
2481use "m3B_s6_beta.dta", clear

2482drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

2483rename FP1_* b_*

2484format %9.2f b_*

2485compress
    variable iteration was double now long
    (4,000 bytes saved)

2486save "m3B_s6_beta_prepped.dta", replace
  (note: file m3B_s6_beta_prepped.dta not found)
  file m3B_s6_beta_prepped.dta saved
```

2487isid iteration

2488codebook iteration, compact

  Variable   Obs Unique   Mean   Min   Max Label
  ──

  iteration **1000**   **1000** **24976**   **1** **49951** Iteration
  ──

  ──

2489
2490
2491*--*
2492* PREPARE STRATUM RANDOM EFFECTS CHAINS
2493*--*
2494
2495use "m3B_s6_u.dta", clear

2496drop residual idnum

2497rename value u

2498format %9.2f u

2499sort strata6 iteration

2500order strata6 iteration

2501compress
    variable **strata6** was **double** now **byte**
    variable **iteration** was **double** now **long**
    (66,000 bytes saved)

2502save "m3B_s6_u_prepped.dta", replace
  (note: file m3B_s6_u_prepped.dta not found)
  file m3B_s6_u_prepped.dta saved

2503isid strata6 iteration

2504codebook iteration, compact

  Variable   Obs Unique   Mean   Min   Max Label
  ──

  iteration **6000**   **1000** **24976**   **1** **49951** Iteration
  ──

  ──

2505
2506
2507*--*
2508* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2509*--*
2510
2511use "data6.dta", clear

2512isid strata6

2513cross using "m3B_s6_beta_prepped.dta"

```
2514isid strata6 iteration

2515sort strata6 iteration

2516merge 1:1 strata6 iteration using "m3B_s6_u_prepped.dta", nogenerate assert(match)

       Result                            # of obs.

       not matched                              0
       matched                              6,000


2517isid strata6 iteration

2518compress
    variable strata6 was double now byte
    (42,000 bytes saved)

2519save "m3B_s6data_prepped.dta", replace
  (note: file m3B_s6data_prepped.dta not found)
  file m3B_s6data_prepped.dta saved

2520
2521
2522*-----------------------------------------------------------------------------*
2523* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
2524*-----------------------------------------------------------------------------*
2525
2526* Percentage p based on fixed and random part
2527use "m3B_s6data_prepped.dta", clear

2528gen cons = 1

2529generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         + u ///
  >    )

2530label var p "Percentage based on main effects and interactions"

2531format %9.3f p

2532
2533* Percentage p based only on the fixed-part
2534generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >    )

2535label var pA "Percentage based only on main effects"

2536format %9.3f pA

2537
2538* Percentage pB calculated as the difference between p and pA
```

```
2539generate pB = p - pA

2540label var pB "Percentage point difference based on interaction effects"

2541format %9.3f pB

2542
2543* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2544bysort strata6 (iteration): egen pmn = mean(p)

2545bysort strata6 (iteration): egen plo = pctile(p), p(2.5)

2546bysort strata6 (iteration): egen phi = pctile(p), p(97.5)

2547format %9.3f pmn plo phi

2548label var pmn "Percentage based on main effects and interactions"

2549label var plo "Percentage based on main effects and interactions"

2550label var phi "Percentage based on main effects and interactions"

2551
2552
2553bysort strata6 (iteration): egen pAmn = mean(pA)

2554bysort strata6 (iteration): egen pAlo = pctile(pA), p(2.5)

2555bysort strata6 (iteration): egen pAhi = pctile(pA), p(97.5)

2556format %9.3f pAmn pAlo pAhi

2557label var pAmn "Percentage based on main effects"

2558label var pAlo "Percentage based on main effects"

2559label var pAhi "Percentage based on main effects"

2560
2561bysort strata6 (iteration): egen pBmn = mean(pB)

2562bysort strata6 (iteration): egen pBlo = pctile(pB), p(2.5)

2563bysort strata6 (iteration): egen pBhi = pctile(pB), p(97.5)

2564format %9.3f pBmn pBlo pBhi

2565label var pBmn "Percentage point difference based on interaction effects"

2566label var pBlo "Percentage point difference based on interaction effects"

2567label var pBhi "Percentage point difference based on interaction effects"

2568
2569* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2570drop iteration b* u* p pA pB

2571duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)
```

```
2572isid strata6

2573
2574* Ranks
2575sort pmn

2576generate pmnrank = _n

2577order pmnrank, after(phi)

2578sort pAmn

2579generate pAmnrank = _n

2580order pAmnrank, after(pAhi)

2581sort pBmn

2582generate pBmnrank = _n

2583order pBmnrank, after(pBhi)

2584
2585* Sort the data
2586sort strata6

2587isid strata6

2588
2589* Compress and save the data
2590compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (72 bytes saved)

2591save "m3B_s6results.dta", replace
  (note: file m3B_s6results.dta not found)
  file m3B_s6results.dta saved

2592
2593* List strata with statistically significant interaction effects on the predicted in
  > cidence
2594use "m3B_s6results.dta", clear

2595list strata6  pBmn pBlo pBhi if pBhi<0, noobs

2596list strata6  pBmn pBlo pBhi if pBlo>0, noobs

2597
2598
2599
2600*******************************************************************************
2601* MODEL 3A_S12 - BINGE DRINKING, Null MODEL
2602*******************************************************************************
2603
2604*------------------------------------------------------------------------*
2605* FIT THE MODEL
2606*------------------------------------------------------------------------*
```

```
2607
2608* Load the data
2609use "analysisready2.dta", clear

2610sort scid strata12 aid

2611
2612* delete if missing dependent variable (so can record number)
2613drop if binge_12mo == .
  (157 observations deleted)

2614
2615* Fit model using PQL2
2616runmlwin binge_12mo cons , ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata12	**1166**	**1**	**11.9**	**217**

Run time (seconds)   =   **2.45**
Number of iterations =   **7**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-1.354769**	**.0686477**	**-19.74**	**0.000**	**-1.489316 -1.220222**

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid				
	var(cons)	**.5012312**	**.0781186**	**.3481215 .6543409**
Level 2: strata12				
	var(cons)	**.2276782**	**.0349072**	**.1592613 .296095**

```
2617
2618* Fit model using MCMC
2619runmlwin binge_12mo cons , ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons, residuals(u, savechains("m3A_s12_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >       savechains("m3A_s12_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata12	**12**	**465**	**1157.0**	**2886**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         205
Deviance (dbar)               =    14833.62
Deviance (thetabar)           =    14708.88
Effective no. of pars (pd)    =      124.74
Bayesian DIC                  =    14958.36
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.38009**	**.1771957**	**92**	**0.000**	**-1.761341**	**-1.018226**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.4474945**	**.0736171**	**1163**	**.3188824**	**.6113659**
Level 2: strata12					
var(cons)	**.2951052**	**.1651847**	**810**	**.1137612**	**.6263257**

2620 rename u0 m1u

2621 drop u0se

2622
2623 * Present the regression coefficients as odds ratios
2624 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata12	**12**	**465**	**1157.0**	**2886**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         205
Deviance (dbar)               =    14833.62
Deviance (thetabar)           =    14708.88
Effective no. of pars (pd)    =      124.74
Bayesian DIC                  =    14958.36
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**.2552964**	**.045448**	**92**	**0.000**	**.1718144**	**.3612353**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.4474945	.0736171	1163	.3188824	.6113659
Level 2: strata12				
var(cons)	.2951052	.1651847	810	.1137612	.6263257

```
2625
2626* Calculate the ICC from the parameter point estimates
2627scalar m1sigma2u = [RP2]var(cons)

2628scalar m1sigma2e = _pi^2/3

2629display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.082

2630
2631* Calculate the ICC from the chains
2632use "m3A_s12_beta.dta", clear

2633rename RP3_var_cons_ sigma2uscid

2634rename RP2_var_cons_ sigma2u

2635generate sigma2e =  _pi^2/3

2636generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2637generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2638mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
icc_strata	.0718167	.0331427	797	0.000	.0292898	.144045
icc_scid	.110298	.0165874	1091	0.000	.0819081	.1470136

```
2639
2640
2641*********************************************************************************
2642* MODEL 3B_S12 - BINGE DRINKING, MAIN EFFECTS MODEL
2643*********************************************************************************
2644
2645*------------------------------------------------------------------------------*
2646* FIT THE MODEL
2647*------------------------------------------------------------------------------*
2648
2649* Load the data
2650use "analysisready2.dta", clear

2651sort scid strata12 aid

2652
2653* delete if missing dependent variable (so can record number)
2654drop if binge_12mo == .
  (157 observations deleted)
```

```
2655
2656* Fit model using PQL2
2657runmlwin binge_12mo cons female latinx_race black_race lowparentedu, ///
>    level3(scid: cons) ///
>    level2(strata12: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata12	**1166**	**1**	**11.9**	**217**

Run time (seconds)   =   **2.60**
Number of iterations =   **7**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.001589**	.0733536	-13.65	0.000	-1.145359	-.8578187
female	**-.2968178**	.0492758	-6.02	0.000	-.3933966	-.2002389
latinx_race	**.0303215**	.0787715	0.38	0.700	-.1240678	.1847107
black_race	**-.9291238**	.077458	-12.00	0.000	-1.080939	-.7773089
lowparentedu	**.1062329**	.0526355	2.02	0.044	.0030692	.2093965

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.4302977**	.0655616	.3017993	.5587961
Level 2: strata12				
var(cons)	**.0816296**	.0227247	.0370901	.1261692

```
2658
2659* Fit model using MCMC
2660runmlwin binge_12mo cons female latinx_race black_race lowparentedu, ///
>    level3(scid: cons) ///
>    level2(strata12: cons, residuals(u, savechains("m3B_s12_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m3B_s12_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata12	**12**	**465**	**1157.0**	**2886**

```
Burnin                          =         5000
Chain                           =        50000
Thinning                        =           50
Run time (seconds)              =          332
Deviance (dbar)                 =     14830.39
Deviance (thetabar)             =     14710.00
Effective no. of pars (pd)      =       120.39
Bayesian DIC                    =     14950.78
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.9613047	.0853329	473	0.000	-1.127418	-.7872753
female	-.3011952	.0568572	678	0.000	-.4093597	-.1964183
latinx_race	.0287608	.0864305	684	0.342	-.1442862	.1946654
black_race	-.94807	.0868846	907	0.000	-1.12598	-.7717994
lowparentedu	.0820092	.0617355	818	0.096	-.042017	.205321

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4488583	.0744546	1046	.3198736	.597517
Level 2: strata12					
var(cons)	.0041757	.0054974	613	.0004686	.0159474

```
2661rename u0 m1u

2662drop u0se

2663
2664* Present the regression coefficients as odds ratios
2665runmlwin, or
```

```
MLwiN 3.2 multilevel model                      Number of obs      =      13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata12	12	465	1157.0	2886

```
Burnin                          =         5000
Chain                           =        50000
Thinning                        =           50
Run time (seconds)              =          332
Deviance (dbar)                 =     14830.39
Deviance (thetabar)             =     14710.00
Effective no. of pars (pd)      =       120.39
Bayesian DIC                    =     14950.78
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3841646	.0334115	470	0.000	.3238686	.4550831
female	.739722	.0403773	678	0.000	.6640753	.8216685
latinx_race	1.034413	.0907061	690	0.342	.86564	1.214905
black_race	.3908827	.0345359	887	0.000	.3243344	.4621807
lowparentedu	1.086897	.0684104	803	0.096	.9588535	1.227919

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.4488583	.0744546	1046	.3198736	.597517
Level 2: strata12						
	var(cons)	.0041757	.0054974	613	.0004686	.0159474

```
2666
2667* Calculate the ICC from the parameter point estimates
2668scalar m1sigma2u = [RP2]var(cons)

2669scalar m1sigma2e = _pi^2/3

2670display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.001

2671
2672* Calculate the ICC from the chains
2673use "m3B_s12_beta.dta", clear

2674rename RP3_var_cons_ sigma2uscid

2675rename RP2_var_cons_ sigma2u

2676generate sigma2e =  _pi^2/3

2677generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2678generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2679mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0011052	.0013862	614	0.000	.0001234	.0042266
icc_scid	.1190727	.0167282	1045	0.000	.088504	.1534325

```
2680
2681
2682*------------------------------------------------------------------------------*
2683* PREPARE FIXED-PART PAREMETER CHAINS
2684*------------------------------------------------------------------------------*
2685
2686use "m3B_s12_beta.dta", clear

2687drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

2688rename FP1_* b_*

2689format %9.2f b_*

2690compress
    variable iteration was double now long
    (4,000 bytes saved)

2691save "m3B_s12_beta_prepped.dta", replace
  (note: file m3B_s12_beta_prepped.dta not found)
  file m3B_s12_beta_prepped.dta saved
```

2692isid iteration

2693codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

2694
2695
2696*---*
2697* PREPARE STRATUM RANDOM EFFECTS CHAINS
2698*---*
2699
2700use "m3B_s12_u.dta", clear

2701drop residual idnum

2702rename value u

2703format %9.2f u

2704sort strata12 iteration

2705order strata12 iteration

2706compress
    variable **strata12** was **double** now **int**
    variable **iteration** was **double** now **long**
    (120,000 bytes saved)

2707save "m3B_s12_u_prepped.dta", replace
  (note: file m3B_s12_u_prepped.dta not found)
  file m3B_s12_u_prepped.dta saved

2708isid strata12 iteration

2709codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**12000**	**1000**	**24976**	**1**	**49951**	Iteration

2710
2711
2712*---*
2713* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2714*---*
2715
2716use "data12.dta", clear

2717isid strata12

2718cross using "m3B_s12_beta_prepped.dta"

```
2719isid strata12 iteration

2720sort strata12 iteration

2721merge 1:1 strata12 iteration using "m3B_s12_u_prepped.dta", nogenerate assert(match)

        Result                           # of obs.
        ─────────────────────────────────────────
        not matched                              0
        matched                             12,000
        ─────────────────────────────────────────


2722isid strata12 iteration

2723compress
    variable strata12 was double now int
    (72,000 bytes saved)

2724save "m3B_s12data_prepped.dta", replace
  (note: file m3B_s12data_prepped.dta not found)
  file m3B_s12data_prepped.dta saved

2725
2726
2727*-----------------------------------------------------------------------------*
2728* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
2729*-----------------------------------------------------------------------------*
2730
2731* Percentage p based on fixed and random part
2732use "m3B_s12data_prepped.dta", clear

2733gen cons = 1

2734generate p = 100*invlogit( ///
 >           b_cons*cons ///
 >          +b_female*female ///
 >          +b_latinx_race*latinx_race ///
 >          +b_black_race*black_race ///
 >          +b_lowparentedu*lowparentedu ///
 >          + u ///
 >    )

2735label var p "Percentage based on main effects and interactions"

2736format %9.3f p

2737
2738* Percentage p based only on the fixed-part
2739generate pA = 100*invlogit( ///
 >           b_cons*cons ///
 >          +b_female*female ///
 >          +b_latinx_race*latinx_race ///
 >          +b_black_race*black_race ///
 >          +b_lowparentedu*lowparentedu ///
 >    )

2740label var pA "Percentage based only on main effects"

2741format %9.3f pA
```

```
2742
2743* Percentage pB calculated as the difference between p and pA
2744generate pB = p - pA

2745label var pB "Percentage point difference based on interaction effects"

2746format %9.3f pB

2747
2748* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2749bysort strata12 (iteration): egen pmn = mean(p)

2750bysort strata12 (iteration): egen plo = pctile(p), p(2.5)

2751bysort strata12 (iteration): egen phi = pctile(p), p(97.5)

2752format %9.3f pmn plo phi

2753label var pmn "Percentage based on main effects and interactions"

2754label var plo "Percentage based on main effects and interactions"

2755label var phi "Percentage based on main effects and interactions"

2756
2757
2758bysort strata12 (iteration): egen pAmn = mean(pA)

2759bysort strata12 (iteration): egen pAlo = pctile(pA), p(2.5)

2760bysort strata12 (iteration): egen pAhi = pctile(pA), p(97.5)

2761format %9.3f pAmn pAlo pAhi

2762label var pAmn "Percentage based on main effects"

2763label var pAlo "Percentage based on main effects"

2764label var pAhi "Percentage based on main effects"

2765
2766bysort strata12 (iteration): egen pBmn = mean(pB)

2767bysort strata12 (iteration): egen pBlo = pctile(pB), p(2.5)

2768bysort strata12 (iteration): egen pBhi = pctile(pB), p(97.5)

2769format %9.3f pBmn pBlo pBhi

2770label var pBmn "Percentage point difference based on interaction effects"

2771label var pBlo "Percentage point difference based on interaction effects"

2772label var pBhi "Percentage point difference based on interaction effects"

2773
2774* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2775drop iteration b* u* p pA pB

2776duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)
```

```
2777isid strata12

2778
2779* Ranks
2780sort pmn

2781generate pmnrank = _n

2782order pmnrank, after(phi)

2783sort pAmn

2784generate pAmnrank = _n

2785order pAmnrank, after(pAhi)

2786sort pBmn

2787generate pBmnrank = _n

2788order pBmnrank, after(pBhi)

2789
2790* Sort the data
2791sort strata12

2792isid strata12

2793
2794* Compress and save the data
2795compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (144 bytes saved)

2796save "m3B_s12results.dta", replace
  (note: file m3B_s12results.dta not found)
  file m3B_s12results.dta saved

2797
2798* List strata with statistically significant interaction effects on the predicted in
  > cidence
2799use "m3B_s12results.dta", clear

2800list strata12  pBmn pBlo pBhi if pBhi<0, noobs

2801list strata12  pBmn pBlo pBhi if pBlo>0, noobs

2802
2803
2804
2805********************************************************************************
2806* MODEL 3A_S18 - BINGE DRINKING, Null MODEL
2807********************************************************************************
2808
2809*------------------------------------------------------------------------------*
2810* FIT THE MODEL
2811*------------------------------------------------------------------------------*
```

```
2812
2813* Load the data
2814use "analysisready2.dta", clear

2815sort scid strata18 aid

2816
2817* delete if missing dependent variable (so can record number)
2818drop if binge_12mo == .
  (157 observations deleted)

2819
2820* Fit model using PQL2
2821runmlwin binge_12mo cons , ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13884
Binomial logit response model
Estimation algorithm: RIGLS, PQL2
```

| | | No. of | Observations per Group | | |
Level Variable		Groups	Minimum	Average	Maximum
scid		146	1	95.1	817
strata18		1618	1	8.6	192

```
Run time (seconds)   =        2.77
Number of iterations =           8
```

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.360003	.069318	-19.62	0.000	-1.495864	-1.224142

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.5255059	.0797015	.3692939	.6817179
Level 2: strata18				
var(cons)	.2398522	.0347957	.1716538	.3080505

```
2822
2823* Fit model using MCMC
2824runmlwin binge_12mo cons , ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons, residuals(u, savechains("m3A_s18_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m3A_s18_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >   nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata18	**18**	**211**	**771.3**	**1572**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         211
Deviance (dbar)               =    14819.88
Deviance (thetabar)           =    14688.52
Effective no. of pars (pd)    =      131.36
Bayesian DIC                  =    14951.24
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.397258**	**.1453057**	**157**	**0.000**	**-1.685541**	**-1.126013**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	**.4510443**	**.0742242**	**1146**	**.3273094**	**.6031489**
Level 2: strata18						
	var(cons)	**.268571**	**.1128878**	**818**	**.1258747**	**.5524521**

2825 rename u0 m1u

2826 drop u0se

2827
2828 * Present the regression coefficients as odds ratios
2829 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata18	**18**	**211**	**771.3**	**1572**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         211
Deviance (dbar)               =    14819.88
Deviance (thetabar)           =    14688.52
Effective no. of pars (pd)    =      131.36
Bayesian DIC                  =    14951.24
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**.2496595**	**.0366257**	**156**	**0.000**	**.1853441**	**.3243244**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.4510443	.0742242	1146	.3273094	.6031489
Level 2: strata18						
	var(cons)	.268571	.1128878	818	.1258747	.5524521

```
2830
2831* Calculate the ICC from the parameter point estimates
2832scalar m1sigma2u = [RP2]var(cons)

2833scalar m1sigma2e = _pi^2/3

2834display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.075

2835
2836* Calculate the ICC from the chains
2837use "m3A_s18_beta.dta", clear

2838rename RP3_var_cons_ sigma2uscid

2839rename RP2_var_cons_ sigma2u

2840generate sigma2e = _pi^2/3

2841generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2842generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2843mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0668598	.0246531	810	0.000	.0323457	.1308979
icc_scid	.1113174	.0160816	1117	0.000	.0833235	.1456621

```
2844
2845
2846********************************************************************************
2847* MODEL 3B_S18 - BINGE DRINKING, MAIN EFFECTS MODEL
2848********************************************************************************
2849
2850*-----------------------------------------------------------------------------*
2851* FIT THE MODEL
2852*-----------------------------------------------------------------------------*
2853
2854* Load the data
2855use "analysisready2.dta", clear

2856sort scid strata18 aid

2857
2858* delete if missing dependent variable (so can record number)
2859drop if binge_12mo == .
  (157 observations deleted)
```

```
2860
2861* Fit model using PQL2
2862runmlwin binge_12mo cons female latinx_race black_race hsless somecollege, ///
>    level3(scid: cons) ///
>    level2(strata18: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata18	**1618**	**1**	**8.6**	**192**

Run time (seconds)   =   **2.89**
Number of iterations =   **8**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.112461	.0788286	-14.11	0.000	-1.266963	-.9579601
female	-.3029522	.047522	-6.37	0.000	-.3960936	-.2098109
latinx_race	.0174464	.0778577	0.22	0.823	-.135152	.1700447
black_race	-.9416109	.0761574	-12.36	0.000	-1.090877	-.792345
hsless	.2259982	.0611385	3.70	0.000	.1061689	.3458275
somecollege	.2380894	.0609034	3.91	0.000	.1187209	.3574578

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.443235	.0665718	.3127567	.5737133
Level 2: strata18				
var(cons)	.0860681	.0235339	.0399426	.1321936

```
2863
2864* Fit model using MCMC
2865runmlwin binge_12mo cons female latinx_race black_race hsless somecollege, ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m3B_s18_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m3B_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata18	**18**	**211**	**771.3**	**1572**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          356
Deviance (dbar)               =     14812.21
Deviance (thetabar)           =     14690.86
Effective no. of pars (pd) =       121.36
Bayesian DIC                  =     14933.57
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.076199	.0845086	415	0.000	-1.24438	-.9109811
female	-.3091898	.0507482	1032	0.000	-.4147058	-.2098598
latinx_race	.0268373	.0779275	1277	0.369	-.1180566	.1721835
black_race	-.9443572	.0774221	988	0.000	-1.095542	-.7919128
hsless	.2095044	.0640774	671	0.000	.0803186	.3283529
somecollege	.2286577	.0642415	803	0.000	.1015477	.3497428

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4520989	.0742677	807	.3176243	.6113354
Level 2: strata18					
var(cons)	.0027967	.002953	883	.000358	.0107876

2866 rename u0 m1u

2867 drop u0se

2868
2869 * Present the regression coefficients as odds ratios
2870 runmlwin, or

```
MLwiN 3.2 multilevel model                    Number of obs      =      13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata18	18	211	771.3	1572

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          356
Deviance (dbar)               =     14812.21
Deviance (thetabar)           =     14690.86
Effective no. of pars (pd) =       121.36
Bayesian DIC                  =     14933.57
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3419045	.028736	413	0.000	.2881196	.4021295
female	.7350775	.0383186	1022	0.000	.6605346	.8106979
latinx_race	1.026994	.0767585	1280	0.369	.8886458	1.187896
black_race	.3906384	.0302314	987	0.000	.3343583	.4529775
hsless	1.235812	.0786904	673	0.000	1.083632	1.388679
somecollege	1.25681	.0795829	799	0.000	1.106883	1.418703

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.4520989	.0742677	807	.3176243 .6113354
Level 2: strata18				
var(cons)	.0027967	.002953	883	.000358 .0107876

```
2871
2872* Calculate the ICC from the parameter point estimates
2873scalar m1sigma2u = [RP2]var(cons)

2874scalar m1sigma2e = _pi^2/3

2875display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
   ICC =      0.001

2876
2877* Calculate the ICC from the chains
2878use "m3B_s18_beta.dta", clear

2879rename RP3_var_cons_ sigma2uscid

2880rename RP2_var_cons_ sigma2u

2881generate sigma2e = _pi^2/3

2882generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

2883generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

2884mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
icc_strata	.0007553	.0007946	879	0.000	.0000941 .0028902
icc_scid	.1201403	.0171244	803	0.000	.0880044 .156324

```
2885
2886
2887*------------------------------------------------------------------------------*
2888* PREPARE FIXED-PART PAREMETER CHAINS
2889*------------------------------------------------------------------------------*
2890
2891use "m3B_s18_beta.dta", clear

2892drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

2893rename FP1_* b_*

2894format %9.2f b_*

2895compress
   variable iteration was double now long
   (4,000 bytes saved)

2896save "m3B_s18_beta_prepped.dta", replace
  (note: file m3B_s18_beta_prepped.dta not found)
  file m3B_s18_beta_prepped.dta saved
```

2897isid iteration

2898codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

2899
2900
2901*--*
2902* PREPARE STRATUM RANDOM EFFECTS CHAINS
2903*--*
2904
2905use "m3B_s18_u.dta", clear

2906drop residual idnum

2907rename value u

2908format %9.2f u

2909sort strata18 iteration

2910order strata18 iteration

2911compress
    variable **strata18** was **double** now **int**
    variable **iteration** was **double** now **long**
    (180,000 bytes saved)

2912save "m3B_s18_u_prepped.dta", replace
  (note: file m3B_s18_u_prepped.dta not found)
  file m3B_s18_u_prepped.dta saved

2913isid strata18 iteration

2914codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**18000**	**1000**	**24976**	**1**	**49951**	Iteration

2915
2916
2917*--*
2918* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2919*--*
2920
2921use "data18.dta", clear

2922isid strata18

2923cross using "m3B_s18_beta_prepped.dta"

```
2924isid strata18 iteration

2925sort strata18 iteration

2926merge 1:1 strata18 iteration using "m3B_s18_u_prepped.dta", nogenerate assert(match)

        Result                          # of obs.
        ─────────────────────────────────────────
        not matched                             0
        matched                            18,000
        ─────────────────────────────────────────

2927isid strata18 iteration

2928compress
    variable strata18 was double now int
    (108,000 bytes saved)

2929save "m3B_s18data_prepped.dta", replace
  (note: file m3B_s18data_prepped.dta not found)
  file m3B_s18data_prepped.dta saved

2930
2931
2932*------------------------------------------------------------------------------*
2933* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
2934*------------------------------------------------------------------------------*
2935
2936* Percentage p based on fixed and random part
2937use "m3B_s18data_prepped.dta", clear

2938gen cons = 1

2939generate p = 100*invlogit( ///
   >           b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >          + u ///
   >     )

2940label var p "Percentage based on main effects and interactions"

2941format %9.3f p

2942
2943* Percentage p based only on the fixed-part
2944generate pA = 100*invlogit( ///
   >           b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >     )

2945label var pA "Percentage based only on main effects"
```

```
2946format %9.3f pA

2947
2948* Percentage pB calculated as the difference between p and pA
2949generate pB = p - pA

2950label var pB "Percentage point difference based on interaction effects"

2951format %9.3f pB

2952
2953* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2954bysort strata18 (iteration): egen pmn = mean(p)

2955bysort strata18 (iteration): egen plo = pctile(p), p(2.5)

2956bysort strata18 (iteration): egen phi = pctile(p), p(97.5)

2957format %9.3f pmn plo phi

2958label var pmn "Percentage based on main effects and interactions"

2959label var plo "Percentage based on main effects and interactions"

2960label var phi "Percentage based on main effects and interactions"

2961
2962
2963bysort strata18 (iteration): egen pAmn = mean(pA)

2964bysort strata18 (iteration): egen pAlo = pctile(pA), p(2.5)

2965bysort strata18 (iteration): egen pAhi = pctile(pA), p(97.5)

2966format %9.3f pAmn pAlo pAhi

2967label var pAmn "Percentage based on main effects"

2968label var pAlo "Percentage based on main effects"

2969label var pAhi "Percentage based on main effects"

2970
2971bysort strata18 (iteration): egen pBmn = mean(pB)

2972bysort strata18 (iteration): egen pBlo = pctile(pB), p(2.5)

2973bysort strata18 (iteration): egen pBhi = pctile(pB), p(97.5)

2974format %9.3f pBmn pBlo pBhi

2975label var pBmn "Percentage point difference based on interaction effects"

2976label var pBlo "Percentage point difference based on interaction effects"

2977label var pBhi "Percentage point difference based on interaction effects"

2978
2979* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2980drop iteration b* u* p pA pB
```

```
2981duplicates drop

   Duplicates in terms of all variables

   (17,982 observations deleted)

2982isid strata18

2983
2984* Ranks
2985sort pmn

2986generate pmnrank = _n

2987order pmnrank, after(phi)

2988sort pAmn

2989generate pAmnrank = _n

2990order pAmnrank, after(pAhi)

2991sort pBmn

2992generate pBmnrank = _n

2993order pBmnrank, after(pBhi)

2994
2995* Sort the data
2996sort strata18

2997isid strata18

2998
2999* Compress and save the data
3000compress
     variable cons was float now byte
     variable pmnrank was float now byte
     variable pAmnrank was float now byte
     variable pBmnrank was float now byte
     (216 bytes saved)

3001save "m3B_s18results.dta", replace
   (note: file m3B_s18results.dta not found)
   file m3B_s18results.dta saved

3002
3003* List strata with statistically significant interaction effects on the predicted in
   > cidence
3004use "m3B_s18results.dta", clear

3005list strata18  pBmn pBlo pBhi if pBhi<0, noobs

3006list strata18  pBmn pBlo pBhi if pBlo>0, noobs

3007
3008
3009*****************************************************************************
3010* MODEL 3A_S36 - BINGE DRINKING, Null MODEL
```

```
3011*****************************************************************************
3012
3013*------------------------------------------------------------------------*
3014* FIT THE MODEL
3015*------------------------------------------------------------------------*
3016
3017* Load the data
3018use "analysisready2.dta", clear

3019sort scid strata36 aid

3020
3021* delete if missing dependent variable (so can record number)
3022drop if binge_12mo == .
  (157 observations deleted)

3023
3024* Fit model using PQL2
3025runmlwin binge_12mo cons , ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

  MLwiN 3.2 multilevel model   Number of obs   =   **13884**
  Binomial logit response model
  Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata36	**2589**	**1**	**5.4**	**171**

  Run time (seconds)   =   **3.13**
  Number of iterations =   **8**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.35534**	**.0695783**	**-19.48**	**0.000**	**-1.491711**	**-1.218969**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.5431733**	**.0802283**	**.3859287**	**.700418**
Level 2: strata36				
var(cons)	**.2315758**	**.0348156**	**.1633384**	**.2998131**

```
3026
3027* Fit model using MCMC
3028runmlwin binge_12mo cons , ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons, residuals(u, savechains("m3A_s36_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m3A_s36_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >    nopause
```

  MLwiN 3.2 multilevel model   Number of obs   =   **13884**
  Binomial logit response model
  Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata36	36	46	385.7	1079

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        205
Deviance (dbar)               =   14818.82
Deviance (thetabar)           =   14673.83
Effective no. of pars (pd)    =     144.98
Bayesian DIC                  =   14963.80
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.364312	.1008094	226	0.000	-1.565487	-1.168072

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4535528	.0743755	862	.3231553	.6243096
Level 2: strata36					
var(cons)	.2159956	.0644788	992	.1202318	.3600122

3029 rename u0 m1u

3030 drop u0se

3031
3032 * Present the regression coefficients as odds ratios
3033 runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs      =      13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata36	36	46	385.7	1079

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        205
Deviance (dbar)               =   14818.82
Deviance (thetabar)           =   14673.83
Effective no. of pars (pd)    =     144.98
Bayesian DIC                  =   14963.80
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2564946	.0258732	227	0.000	.2089863	.3109659

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4535528	.0743755	862	.3231553	.6243096
Level 2: strata36					
var(cons)	.2159956	.0644788	992	.1202318	.3600122

```
3034
3035* Calculate the ICC from the parameter point estimates
3036scalar m1sigma2u = [RP2]var(cons)

3037scalar m1sigma2e = _pi^2/3

3038display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.062

3039
3040* Calculate the ICC from the chains
3041use "m3A_s36_beta.dta", clear

3042rename RP3_var_cons_ sigma2uscid

3043rename RP2_var_cons_ sigma2u

3044generate sigma2e =  _pi^2/3

3045generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3046generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3047mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0540593	.0148199	983	0.000	.0307528	.0873349
icc_scid	.1140843	.0170173	852	0.000	.0848372	.1495565

```
3048
3049
3050*******************************************************************************
3051* MODEL 3B_S36 - BINGE DRINKING, MAIN EFFECTS MODEL
3052*******************************************************************************
3053
3054*----------------------------------------------------------------------------*
3055* FIT THE MODEL
3056*----------------------------------------------------------------------------*
3057
3058* Load the data
3059use "analysisready2.dta", clear

3060sort scid strata36 aid

3061
3062* delete if missing dependent variable (so can record number)
3063drop if binge_12mo == .
  (157 observations deleted)
```

```
3064
3065* Fit model using PQL2
3066runmlwin binge_12mo cons female latinx_race black_race hsless somecollege lowinc, //
  > /
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata36	**2589**	**1**	**5.4**	**171**

Run time (seconds)   =   **3.54**
Number of iterations =   **9**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.149766	.080222	-14.33	0.000	-1.306998	-.9925338
female	-.3057731	.0457188	-6.69	0.000	-.3953804	-.2161658
latinx_race	.0024502	.0769525	0.03	0.975	-.1483738	.1532742
black_race	-.9681204	.0756632	-12.80	0.000	-1.116418	-.8198233
hsless	.1914759	.0606949	3.15	0.002	.0725162	.3104357
somecollege	.2205758	.0589081	3.74	0.000	.105118	.3360335
lowinc	.1075193	.0498479	2.16	0.031	.0098192	.2052195

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4504719	.0670167	.3191217	.5818222
Level 2: strata36				
var(cons)	.0931318	.0259088	.0423515	.1439121

```
3067
3068* Fit model using MCMC
3069runmlwin binge_12mo cons female latinx_race black_race hsless somecollege lowinc, //
  > /
  >    level3(scid: cons) ///
  >    level2(strata36: cons, residuals(u, savechains("m3B_s36_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m3B_s36_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata36	**36**	**46**	**385.7**	**1079**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         384
Deviance (dbar)               =    14807.72
Deviance (thetabar)           =    14683.88
Effective no. of pars (pd)    =      123.84
Bayesian DIC                  =    14931.56
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.112463	.0826391	513	0.000	-1.271594	-.9558679
female	-.3124744	.0459367	852	0.000	-.4080759	-.2226352
latinx_race	.0092465	.0757032	891	0.446	-.1416374	.1585262
black_race	-.9643614	.075168	1001	0.000	-1.121248	-.8131629
hsless	.1861923	.0606001	849	0.004	.0636508	.3001358
somecollege	.2182589	.0607805	958	0.000	.1015623	.3292384
lowinc	.0940819	.0505667	954	0.033	-.0042983	.1895665

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.45393	.074339	1231	.3272922	.6139766
Level 2: strata36					
var(cons)	.0026124	.0023855	715	.0004042	.0093669

3070 rename u0 m1u

3071 drop u0se

3072
3073* Present the regression coefficients as odds ratios
3074 runmlwin, or

```
MLwiN 3.2 multilevel model              Number of obs      =     13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata36	36	46	385.7	1079

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         384
Deviance (dbar)               =    14807.72
Deviance (thetabar)           =    14683.88
Effective no. of pars (pd)    =      123.84
Bayesian DIC                  =    14931.56
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3305458	.0275012	514	0.000	.2803844	.3844783
female	.7324325	.0343934	867	0.000	.6649284	.8004067
latinx_race	1.012581	.0771772	887	0.446	.867936	1.171783
black_race	.3817162	.0299036	987	0.000	.3258728	.4434533
hsless	1.205921	.0746161	858	0.004	1.06572	1.350042
somecollege	1.246801	.075765	960	0.000	1.106899	1.389909
lowinc	1.099559	.0543808	959	0.033	.995711	1.208725

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.45393	.074339	1231	.3272922	.6139766
Level 2: strata36						
	var(cons)	.0026124	.0023855	715	.0004042	.0093669

```
3075
3076* Calculate the ICC from the parameter point estimates
3077scalar m1sigma2u = [RP2]var(cons)

3078scalar m1sigma2e = _pi^2/3

3079display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.001

3080
3081* Calculate the ICC from the chains
3082use "m3B_s36_beta.dta", clear

3083rename RP3_var_cons_ sigma2uscid

3084rename RP2_var_cons_ sigma2u

3085generate sigma2e =  _pi^2/3

3086generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3087generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3088mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.00071	.000685	716	0.000	.0001078	.0025288
icc_scid	.1209918	.0172308	1232	0.000	.0904079	.1572232

```
3089
3090
3091*------------------------------------------------------------------------------*
3092* PREPARE FIXED-PART PAREMETER CHAINS
3093*------------------------------------------------------------------------------*
3094
3095use "m3B_s36_beta.dta", clear

3096drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

3097rename FP1_* b_*

3098format %9.2f b_*

3099compress
    variable iteration was double now long
    (4,000 bytes saved)

3100save "m3B_s36_beta_prepped.dta", replace
  (note: file m3B_s36_beta_prepped.dta not found)
  file m3B_s36_beta_prepped.dta saved
```

3101isid iteration

3102codebook iteration, compact

```
  Variable    Obs Unique   Mean  Min    Max  Label
  ─────────────────────────────────────────────────────────────────────

   iteration  1000   1000  24976   1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────
```

3103
3104
3105*---*
3106* PREPARE STRATUM RANDOM EFFECTS CHAINS
3107*---*
3108
3109use "m3B_s36_u.dta", clear

3110drop residual idnum

3111rename value u

3112format %9.2f u

3113sort strata36 iteration

3114order strata36 iteration

3115compress
    variable **strata36** was **double** now **int**
    variable **iteration** was **double** now **long**
    (360,000 bytes saved)

3116save "m3B_s36_u_prepped.dta", replace
  (note: file m3B_s36_u_prepped.dta not found)
  file m3B_s36_u_prepped.dta saved

3117isid strata36 iteration

3118codebook iteration, compact

```
  Variable     Obs Unique   Mean  Min    Max  Label
  ─────────────────────────────────────────────────────────────────────

   iteration  36000   1000  24976   1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────
```

3119
3120
3121*---*
3122* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3123*---*
3124
3125use "data36.dta", clear

3126isid strata36

3127cross using "m3B_s36_beta_prepped.dta"

```
3128isid strata36 iteration

3129sort strata36 iteration

3130merge 1:1 strata36 iteration using "m3B_s36_u_prepped.dta", nogenerate assert(match)

      Result                           # of obs.
      ─────────────────────────────────────────
      not matched                              0
      matched                             36,000
      ─────────────────────────────────────────


3131isid strata36 iteration

3132compress
    variable strata36 was double now int
    (216,000 bytes saved)

3133save "m3B_s36data_prepped.dta", replace
  (note: file m3B_s36data_prepped.dta not found)
  file m3B_s36data_prepped.dta saved

3134
3135
3136*------------------------------------------------------------------------------*
3137* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3138*------------------------------------------------------------------------------*
3139
3140* Percentage p based on fixed and random part
3141use "m3B_s36data_prepped.dta", clear

3142gen cons = 1

3143generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         + u ///
  >    )

3144label var p "Percentage based on main effects and interactions"

3145format %9.3f p

3146
3147* Percentage p based only on the fixed-part
3148generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >    )
```

```
3149label var pA "Percentage based only on main effects"

3150format %9.3f pA

3151
3152* Percentage pB calculated as the difference between p and pA
3153generate pB = p - pA

3154label var pB "Percentage point difference based on interaction effects"

3155format %9.3f pB

3156
3157* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3158bysort strata36 (iteration): egen pmn = mean(p)

3159bysort strata36 (iteration): egen plo = pctile(p), p(2.5)

3160bysort strata36 (iteration): egen phi = pctile(p), p(97.5)

3161format %9.3f pmn plo phi

3162label var pmn "Percentage based on main effects and interactions"

3163label var plo "Percentage based on main effects and interactions"

3164label var phi "Percentage based on main effects and interactions"

3165
3166
3167bysort strata36 (iteration): egen pAmn = mean(pA)

3168bysort strata36 (iteration): egen pAlo = pctile(pA), p(2.5)

3169bysort strata36 (iteration): egen pAhi = pctile(pA), p(97.5)

3170format %9.3f pAmn pAlo pAhi

3171label var pAmn "Percentage based on main effects"

3172label var pAlo "Percentage based on main effects"

3173label var pAhi "Percentage based on main effects"

3174
3175bysort strata36 (iteration): egen pBmn = mean(pB)

3176bysort strata36 (iteration): egen pBlo = pctile(pB), p(2.5)

3177bysort strata36 (iteration): egen pBhi = pctile(pB), p(97.5)

3178format %9.3f pBmn pBlo pBhi

3179label var pBmn "Percentage point difference based on interaction effects"

3180label var pBlo "Percentage point difference based on interaction effects"

3181label var pBhi "Percentage point difference based on interaction effects"

3182
```

```
3183* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3184drop iteration b* u* p pA pB

3185duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

3186isid strata36

3187
3188* Ranks
3189sort pmn

3190generate pmnrank = _n

3191order pmnrank, after(phi)

3192sort pAmn

3193generate pAmnrank = _n

3194order pAmnrank, after(pAhi)

3195sort pBmn

3196generate pBmnrank = _n

3197order pBmnrank, after(pBhi)

3198
3199* Sort the data
3200sort strata36

3201isid strata36

3202
3203* Compress and save the data
3204compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (432 bytes saved)

3205save "m3B_s36results.dta", replace
  (note: file m3B_s36results.dta not found)
  file m3B_s36results.dta saved

3206
3207* List strata with statistically significant interaction effects on the predicted in
 > cidence
3208use "m3B_s36results.dta", clear

3209list strata36  pBmn pBlo pBhi if pBhi<0, noobs

3210list strata36  pBmn pBlo pBhi if pBlo>0, noobs

3211
```

```
3212
3213***************************************************************************
3214* MODEL 3A_S48 - BINGE DRINKING, Null MODEL
3215***************************************************************************
3216
3217*-------------------------------------------------------------------------*
3218* FIT THE MODEL
3219*-------------------------------------------------------------------------*
3220
3221* Load the data
3222use "analysisready2.dta", clear

3223sort scid strata48 aid

3224
3225* delete if missing dependent variable (so can record number)
3226drop if binge_12mo == .
  (157 observations deleted)

3227
3228* Fit model using PQL2
3229runmlwin binge_12mo cons , ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata48	**2696**	**1**	**5.1**	**143**

Run time (seconds)   =   **3.19**
Number of iterations =   **8**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.355652**	**.069466**	**-19.52**	**0.000**	**-1.491803**	**-1.219501**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.5411618**	**.0799584**	**.3844463**	**.6978773**
Level 2: strata48				
var(cons)	**.2378487**	**.0351418**	**.1689721**	**.3067253**

```
3230
```

```
3231* Fit model using MCMC
3232runmlwin binge_12mo cons , ///
>   level3(scid: cons) ///
>   level2(strata48: cons, residuals(u, savechains("m3A_s48_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m3A_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata48	**48**	**3**	**289.3**	**1079**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         206
Deviance (dbar)              =    14781.33
Deviance (thetabar)         =    14631.10
Effective no. of pars (pd)  =      150.23
Bayesian DIC                 =    14931.56
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.372385**	**.1048766**	**264**	**0.000**	**-1.579882**	**-1.189725**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.4531768**	**.0742396**	**849**	**.3371243**	**.6087426**
Level 2: strata48					
var(cons)	**.2419819**	**.0680438**	**1107**	**.1435939**	**.4050459**

```
3233rename u0 m1u

3234drop u0se

3235
3236* Present the regression coefficients as odds ratios
3237runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata48	**48**	**3**	**289.3**	**1079**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         206
Deviance (dbar)               =    14781.33
Deviance (thetabar)           =    14631.10
Effective no. of pars (pd)    =      150.23
Bayesian DIC                  =    14931.56
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2543781	.0261716	267	0.000	.2059994	.304305

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4531768	.0742396	849	.3371243	.6087426
Level 2: strata48					
var(cons)	.2419819	.0680438	1107	.1435939	.4050459

```
3238
3239* Calculate the ICC from the parameter point estimates
3240scalar m1sigma2u = [RP2]var(cons)

3241scalar m1sigma2e = _pi^2/3

3242display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.069

3243
3244* Calculate the ICC from the chains
3245use "m3A_s48_beta.dta", clear

3246rename RP3_var_cons_ sigma2uscid

3247rename RP2_var_cons_ sigma2u

3248generate sigma2e =  _pi^2/3

3249generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3250generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3251mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0604607	.0162372	1065	0.000	.0368799	.0962537
icc_scid	.1140061	.0161091	806	0.000	.0870218	.1482268

```
3252
3253
3254*****************************************************************************
3255* MODEL 3B_S48 - BINGE DRINKING, MAIN EFFECTS MODEL
3256*****************************************************************************
```

```
3257
3258*------------------------------------------------------------------------------*
3259* FIT THE MODEL
3260*------------------------------------------------------------------------------*
3261
3262* Load the data
3263use "analysisready2.dta", clear

3264sort scid strata48 aid

3265
3266* delete if missing dependent variable (so can record number)
3267drop if binge_12mo == .
  (157 observations deleted)

3268
3269* Fit model using PQL2
3270runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c, ///
>   level3(scid: cons) ///
>   level2(strata48: cons) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>   rigls maxiterations(100) ///
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata48	**2696**	**1**	**5.1**	**143**

Run time (seconds)   =   **3.36**
Number of iterations =   **8**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.147589	.0798224	-14.38	0.000	-1.304038	-.9911399
female	-.3129726	.0451528	-6.93	0.000	-.4014705	-.2244746
latinx_imm	-.528127	.1495371	-3.53	0.000	-.8212144	-.2350396
latinx_non	.0748213	.0780926	0.96	0.338	-.0782374	.22788
black	-.9725193	.0752497	-12.92	0.000	-1.120006	-.8250327
hsless	.1909564	.0601374	3.18	0.001	.0730892	.3088236
somecollege	.2189861	.0584807	3.74	0.000	.1043661	.3336061
lowinc	.1200012	.0495641	2.42	0.015	.0228574	.217145

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4486602	.0665795	.3181668	.5791535
Level 2: strata48				
var(cons)	.0856407	.0254368	.0357854	.135496

```
3271
3272* Fit model using MCMC
3273runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c, ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m3B_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m3B_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata48	**48**	**3**	**289.3**	**1079**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         423
Deviance (dbar)              =    14784.01
Deviance (thetabar)          =    14658.69
Effective no. of pars (pd)  =      125.32
Bayesian DIC                 =    14909.32
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.118952	.0792231	517	0.000	-1.278412	-.9578602
female	-.3159862	.0466406	851	0.000	-.4097049	-.2260597
latinx_imm	-.537308	.1423081	964	0.000	-.8277296	-.2723622
latinx_non	.0833586	.0790305	1546	0.145	-.0687673	.2377774
black	-.9661646	.0769737	1135	0.000	-1.119628	-.8093766
hsless	.1849357	.0623815	924	0.003	.064528	.3066536
somecollege	.2163173	.0607065	936	0.000	.0987944	.3389562
lowinc	.1080574	.0514834	835	0.011	.0093928	.2051375

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4536262	.0752671	996	.3263461	.6216538
Level 2: strata48					
var(cons)	.003165	.0028883	411	.0004551	.0098194

```
3274rename u0 m1u

3275drop u0se
```

```
3276
3277* Present the regression coefficients as odds ratios
3278runmlwin, or
```

```
  MLwiN 3.2 multilevel model                    Number of obs     =     13884
  Binomial logit response model
  Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.1	817
strata48	48	3	289.3	1079

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         423
Deviance (dbar)               =    14784.01
Deviance (thetabar)           =    14658.69
Effective no. of pars (pd)    =      125.32
Bayesian DIC                  =    14909.32
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3279279	.0265707	523	0.000	.2784791	.3837131
female	.7300836	.0338009	854	0.000	.6638461	.7976705
latinx_imm	.5897636	.0828298	971	0.000	.4370408	.7615784
latinx_non	1.090647	.0867468	1542	0.145	.9335439	1.268427
black	.3817262	.0300063	1145	0.000	.3264013	.4451355
hsless	1.20551	.0761652	936	0.003	1.066655	1.35887
somecollege	1.244216	.0765631	935	0.000	1.103839	1.403482
lowinc	1.113833	.05603	838	0.011	1.009437	1.227694

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4536262	.0752671	996	.3263461	.6216538
Level 2: strata48					
var(cons)	.003165	.0028883	411	.0004551	.0098194

```
3279
3280* Calculate the ICC from the parameter point estimates
3281scalar m1sigma2u = [RP2]var(cons)

3282scalar m1sigma2e = _pi^2/3

3283display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.001

3284
3285* Calculate the ICC from the chains
3286use "m3B_s48_beta.dta", clear
```

3287rename RP3_var_cons_ sigma2uscid

3288rename RP2_var_cons_ sigma2u

3289generate sigma2e = _pi^2/3

3290generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3291generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3292mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0008234	.0007151	410	0.000	.0001219	.0025768
icc_scid	.120982	.0176421	995	0.000	.0901268	.1587915

3293
3294*--*
3295* PREPARE FIXED-PART PAREMETER CHAINS
3296*--*
3297
3298use "m3B_s48_beta.dta", clear

3299drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

3300rename FP1_* b_*

3301format %9.2f b_*

3302compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

3303save "m3B_s48_beta_prepped.dta", replace
  (note: file m3B_s48_beta_prepped.dta not found)
  file m3B_s48_beta_prepped.dta saved

3304isid iteration

3305codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

3306
3307
3308*--*
3309* PREPARE STRATUM RANDOM EFFECTS CHAINS
3310*--*
3311
3312use "m3B_s48_u.dta", clear

3313drop residual idnum

3314 rename value u

3315 format %9.2f u

3316 sort strata48 iteration

3317 order strata48 iteration

3318 compress
    variable **strata48** was **double** now **int**
    variable **iteration** was **double** now **long**
    (480,000 bytes saved)

3319 save "m3B_s48_u_prepped.dta", replace
  (note: file m3B_s48_u_prepped.dta not found)
  file m3B_s48_u_prepped.dta saved

3320 isid strata48 iteration

3321 codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**48000**	**1000**	**24976**	**1**	**49951**	Iteration

3322
3323
3324 *--*
3325 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3326 *--*
3327
3328 use "data48.dta", clear

3329 isid strata48

3330 cross using "m3B_s48_beta_prepped.dta"

3331 isid strata48 iteration

3332 sort strata48 iteration

3333 merge 1:1 strata48 iteration using "m3B_s48_u_prepped.dta", nogenerate assert(match)

Result	# of obs.
not matched	**0**
matched	**48,000**

3334 isid strata48 iteration

3335 compress
    variable **strata48** was **double** now **int**
    (288,000 bytes saved)

3336 save "m3B_s48data_prepped.dta", replace
  (note: file m3B_s48data_prepped.dta not found)
  file m3B_s48data_prepped.dta saved

```
3337
3338
3339*------------------------------------------------------------------------------*
3340* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3341*------------------------------------------------------------------------------*
3342
3343* Percentage p based on fixed and random part
3344use "m3B_s48data_prepped.dta", clear

3345gen cons = 1

3346generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         + u ///
  >    )

3347label var p "Percentage based on main effects and interactions"

3348format %9.3f p

3349
3350* Percentage p based only on the fixed-part
3351generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >    )

3352label var pA "Percentage based only on main effects"

3353format %9.3f pA

3354
3355* Percentage pB calculated as the difference between p and pA
3356generate pB = p - pA

3357label var pB "Percentage point difference based on interaction effects"

3358format %9.3f pB

3359
3360* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3361bysort strata48 (iteration): egen pmn = mean(p)

3362bysort strata48 (iteration): egen plo = pctile(p), p(2.5)

3363bysort strata48 (iteration): egen phi = pctile(p), p(97.5)
```

```
3364format %9.3f pmn plo phi

3365label var pmn "Percentage based on main effects and interactions"

3366label var plo "Percentage based on main effects and interactions"

3367label var phi "Percentage based on main effects and interactions"

3368
3369
3370bysort strata48 (iteration): egen pAmn = mean(pA)

3371bysort strata48 (iteration): egen pAlo = pctile(pA), p(2.5)

3372bysort strata48 (iteration): egen pAhi = pctile(pA), p(97.5)

3373format %9.3f pAmn pAlo pAhi

3374label var pAmn "Percentage based on main effects"

3375label var pAlo "Percentage based on main effects"

3376label var pAhi "Percentage based on main effects"

3377
3378bysort strata48 (iteration): egen pBmn = mean(pB)

3379bysort strata48 (iteration): egen pBlo = pctile(pB), p(2.5)

3380bysort strata48 (iteration): egen pBhi = pctile(pB), p(97.5)

3381format %9.3f pBmn pBlo pBhi

3382label var pBmn "Percentage point difference based on interaction effects"

3383label var pBlo "Percentage point difference based on interaction effects"

3384label var pBhi "Percentage point difference based on interaction effects"

3385
3386* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3387drop iteration b* u* p pA pB

3388duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

3389isid strata48

3390
3391* Ranks
3392sort pmn

3393generate pmnrank = _n

3394order pmnrank, after(phi)

3395sort pAmn
```

3396generate pAmnrank = _n

3397order pAmnrank, after(pAhi)

3398sort pBmn

3399generate pBmnrank = _n

3400order pBmnrank, after(pBhi)

3401
3402* Sort the data
3403sort strata48

3404isid strata48

3405
3406* Compress and save the data
3407compress
    variable **cons** was **float** now **byte**
    variable **pmnrank** was **float** now **byte**
    variable **pAmnrank** was **float** now **byte**
    variable **pBmnrank** was **float** now **byte**
    (576 bytes saved)

3408save "m3B_s48results.dta", replace
  (note: file m3B_s48results.dta not found)
  file m3B_s48results.dta saved

3409
3410* List strata with statistically significant interaction effects on the predicted in
 > cidence
3411use "m3B_s48results.dta", clear

3412list strata48 pBmn pBlo pBhi if pBhi<0, noobs

3413list strata48 pBmn pBlo pBhi if pBlo>0, noobs

3414
3415
3416**
3417* MODEL 3A_S96 - BINGE DRINKING, Null MODEL
3418**
3419
3420*--*
3421* FIT THE MODEL
3422*--*
3423
3424* Load the data
3425use "analysisready2.dta", clear

3426sort scid strata96 aid

3427
3428* delete if missing dependent variable (so can record number)
3429drop if binge_12mo == .
  (157 observations deleted)

3430
3431* Fit model using PQL2

```
3432runmlwin binge_12mo cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata96	**3608**	**1**	**3.8**	**131**

Run time (seconds)   =   **3.48**
Number of iterations =   **8**

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-1.357147**	**.0695117**	**-19.52**	**0.000**	**-1.493387**	**-1.220906**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.5463155**	**.0800672**	**.3893867**	**.7032443**
Level 2: strata96			
var(cons)	**.2425579**	**.0366658**	**.1706942**	**.3144216**

```
3433
3434* Fit model using MCMC
3435runmlwin binge_12mo cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons, residuals(u, savechains("m3A_s96_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m3A_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata96	**91**	**1**	**152.6**	**898**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          208
Deviance (dbar)               =     14747.42
Deviance (thetabar)           =     14577.68
Effective no. of pars (pd)    =       169.74
Bayesian DIC                  =     14917.16
```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.367398	.0895845	409	0.000	-1.54821	-1.192657

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4603592	.0755464	1102	.3228157	.6338111
Level 2: strata96					
var(cons)	.223193	.0518488	1091	.1382168	.3389687

3436 rename u0 m1u

3437 drop u0se

3438
3439 * Present the regression coefficients as odds ratios
3440 runmlwin, or

```
MLwiN 3.2 multilevel model                    Number of obs     =       13884
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.1	817
strata96	91	1	152.6	898

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          208
Deviance (dbar)               =     14747.42
Deviance (thetabar)           =     14577.68
Effective no. of pars (pd)    =       169.74
Bayesian DIC                  =     14917.16
```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2561885	.0227417	407	0.000	.2126283	.3034139

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4603592	.0755464	1102	.3228157	.6338111
Level 2: strata96					
var(cons)	.223193	.0518488	1091	.1382168	.3389687

```
3441
3442* Calculate the ICC from the parameter point estimates
3443scalar m1sigma2u = [RP2]var(cons)

3444scalar m1sigma2e = _pi^2/3

3445display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.064

3446
3447* Calculate the ICC from the chains
3448use "m3A_s96_beta.dta", clear

3449rename RP3_var_cons_ sigma2uscid

3450rename RP2_var_cons_ sigma2u

3451generate sigma2e =  _pi^2/3

3452generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3453generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3454mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0561851	.0120424	1097	0.000	.0355842	.0833712
icc_scid	.1152752	.0174463	1108	0.000	.0843341	.1529286

```
3455
3456
3457****************************************************************************************
3458* MODEL 3B_S96 - BINGE DRINKING, MAIN EFFECTS MODEL
3459****************************************************************************************
3460
3461*----------------------------------------------------------------------------*
3462* FIT THE MODEL
3463*----------------------------------------------------------------------------*
3464
3465* Load the data
3466use "analysisready2.dta", clear

3467sort scid strata96 aid

3468
3469* delete if missing dependent variable (so can record number)
3470drop if binge_12mo == .
  (157 observations deleted)

3471
3472* Fit model using PQL2
3473runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
  > c straight_no, ///
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                    Number of obs     =      13884
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	95.1	817
strata96	3608	1	3.8	131

Run time (seconds)   =   3.66
Number of iterations =   8

binge_12mo	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.168896	.0796076	-14.68	0.000	-1.324924	-1.012867
female	-.3255956	.0453055	-7.19	0.000	-.4143926	-.2367985
latinx_imm	-.5292575	.1481585	-3.57	0.000	-.8196429	-.2388722
latinx_non	.0735831	.0774494	0.95	0.342	-.078215	.2253811
black	-.9673057	.0746994	-12.95	0.000	-1.113714	-.8208975
hsless	.1928016	.0594004	3.25	0.001	.076379	.3092243
somecollege	.2241261	.0577355	3.88	0.000	.1109665	.3372856
lowinc	.1157111	.0489121	2.37	0.018	.0198452	.211577
straight_no	.1790632	.0614966	2.91	0.004	.058532	.2995944

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4492536	.066454	.3190062	.579501
Level 2: strata96				
var(cons)	.0880325	.0273161	.0344938	.1415711

```
3474
3475* Fit model using MCMC
3476runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c straight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m3B_s96_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m3B_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	95.1	817
strata96	91	1	152.6	898

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   444
Deviance (dbar)   =   14764.47
Deviance (thetabar)   =   14631.10
Effective no. of pars (pd) =   133.36
Bayesian DIC   =   14897.83

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.160749	.0918774	329	0.000	-1.348397	-.9755052
female	-.3072874	.0556187	630	0.000	-.4059397	-.1922796

latinx_imm	-.5292695	.1477631	1242	0.000	-.8167965	-.2272472
latinx_non	.0867794	.0831301	1029	0.144	-.0724408	.2547393
black	-.9521741	.0802906	933	0.000	-1.10335	-.7879797
hsless	.1981777	.0679881	609	0.002	.068333	.3302129
somecollege	.2359516	.0685315	637	0.001	.1022166	.3750286
lowinc	.1009747	.0565865	796	0.031	-.0059823	.2155909
straight_no	.1557877	.0681429	742	0.019	.0107193	.27859

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4548292	.0745788	799	.3313884	.6100034
Level 2: strata96					
var(cons)	.0093312	.0079676	228	.0008936	.0298747

3477 rename u0 m1u

3478 drop u0se

3479
3480* Present the regression coefficients as odds ratios
3481 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13884**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**95.1**	**817**
strata96	**91**	**1**	**152.6**	**898**

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   444
Deviance (dbar)   =   14764.47
Deviance (thetabar)   =   14631.10
Effective no. of pars (pd) =   133.36
Bayesian DIC   =   14897.83

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3146135	.0288819	333	0.000	.2596563	.3770018
female	.7369449	.0411793	619	0.000	.6663503	.8250769
latinx_imm	.5976706	.0897841	1269	0.000	.4418449	.7967239
latinx_non	1.097086	.0927531	1008	0.144	.9301208	1.290125
black	.3875527	.0311751	936	0.000	.3317579	.4547626
hsless	1.219916	.0834155	611	0.002	1.070722	1.391264
somecollege	1.267178	.0888423	640	0.001	1.107623	1.455033
lowinc	1.110074	.0622741	797	0.031	.9940356	1.240595
straight_no	1.166014	.0792387	743	0.019	1.010777	1.321266

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4548292	.0745788	799	.3313884	.6100034
Level 2: strata96					
var(cons)	.0093312	.0079676	228	.0008936	.0298747

```
3482
3483* Calculate the ICC from the parameter point estimates
3484scalar m1sigma2u = [RP2]var(cons)

3485scalar m1sigma2e = _pi^2/3

3486display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.003

3487
3488* Calculate the ICC from the chains
3489use "m3B_s96_beta.dta", clear

3490rename RP3_var_cons_ sigma2uscid

3491rename RP2_var_cons_ sigma2u

3492generate sigma2e =  _pi^2/3

3493generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3494generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3495mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0025001	.0021316	228	0.000	.0002374	.0078302
icc_scid	.120354	.0169156	801	0.000	.0913595	.1562862

```
3496
3497
3498*------------------------------------------------------------------------------*
3499* PREPARE FIXED-PART PAREMETER CHAINS
3500*------------------------------------------------------------------------------*
3501
3502use "m3B_s96_beta.dta", clear

3503drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

3504rename FP1_* b_*

3505format %9.2f b_*

3506compress
    variable iteration was double now long
    (4,000 bytes saved)

3507save "m3B_s96_beta_prepped.dta", replace
  (note: file m3B_s96_beta_prepped.dta not found)
  file m3B_s96_beta_prepped.dta saved

3508isid iteration

3509codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
3510
3511
3512*-------------------------------------------------------------------------------*
3513* PREPARE STRATUM RANDOM EFFECTS CHAINS
3514*-------------------------------------------------------------------------------*
3515
3516use "m3B_s96_u.dta", clear

3517drop residual idnum

3518rename value u

3519format %9.2f u

3520sort strata96 iteration

3521order strata96 iteration

3522compress
    variable strata96 was double now int
    variable iteration was double now long
    (910,000 bytes saved)

3523save "m3B_s96_u_prepped.dta", replace
  (note: file m3B_s96_u_prepped.dta not found)
  file m3B_s96_u_prepped.dta saved

3524isid strata96 iteration

3525codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```
3526
3527
3528*-------------------------------------------------------------------------------*
3529* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3530*-------------------------------------------------------------------------------*
3531
3532use "data96_binge.dta", clear

3533isid strata96

3534cross using "m3B_s96_beta_prepped.dta"

3535isid strata96 iteration

3536sort strata96 iteration

3537merge 1:1 strata96 iteration using "m3B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	91,000

```
3538isid strata96 iteration

3539compress
    variable strata96 was double now int
    (546,000 bytes saved)

3540save "m3B_s96data_prepped.dta", replace
  (note: file m3B_s96data_prepped.dta not found)
  file m3B_s96data_prepped.dta saved

3541
3542
3543*------------------------------------------------------------------------------*
3544* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3545*------------------------------------------------------------------------------*
3546
3547* Percentage p based on fixed and random part
3548use "m3B_s96data_prepped.dta", clear

3549gen cons = 1

3550generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >         + u ///
  >    )

3551label var p "Percentage based on main effects and interactions"

3552format %9.3f p

3553
3554* Percentage p based only on the fixed-part
3555generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >    )

3556label var pA "Percentage based only on main effects"

3557format %9.3f pA

3558
3559* Percentage pB calculated as the difference between p and pA
3560generate pB = p - pA
```

```
3561label var pB "Percentage point difference based on interaction effects"

3562format %9.3f pB

3563
3564* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3565bysort strata96 (iteration): egen pmn = mean(p)

3566bysort strata96 (iteration): egen plo = pctile(p), p(2.5)

3567bysort strata96 (iteration): egen phi = pctile(p), p(97.5)

3568format %9.3f pmn plo phi

3569label var pmn "Percentage based on main effects and interactions"

3570label var plo "Percentage based on main effects and interactions"

3571label var phi "Percentage based on main effects and interactions"

3572
3573
3574bysort strata96 (iteration): egen pAmn = mean(pA)

3575bysort strata96 (iteration): egen pAlo = pctile(pA), p(2.5)

3576bysort strata96 (iteration): egen pAhi = pctile(pA), p(97.5)

3577format %9.3f pAmn pAlo pAhi

3578label var pAmn "Percentage based on main effects"

3579label var pAlo "Percentage based on main effects"

3580label var pAhi "Percentage based on main effects"

3581
3582bysort strata96 (iteration): egen pBmn = mean(pB)

3583bysort strata96 (iteration): egen pBlo = pctile(pB), p(2.5)

3584bysort strata96 (iteration): egen pBhi = pctile(pB), p(97.5)

3585format %9.3f pBmn pBlo pBhi

3586label var pBmn "Percentage point difference based on interaction effects"

3587label var pBlo "Percentage point difference based on interaction effects"

3588label var pBhi "Percentage point difference based on interaction effects"

3589
3590* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3591drop iteration b* u* p pA pB

3592duplicates drop

  Duplicates in terms of all variables

  (90,909 observations deleted)
```

```
3593isid strata96

3594
3595* Ranks
3596sort pmn

3597generate pmnrank = _n

3598order pmnrank, after(phi)

3599sort pAmn

3600generate pAmnrank = _n

3601order pAmnrank, after(pAhi)

3602sort pBmn

3603generate pBmnrank = _n

3604order pBmnrank, after(pBhi)

3605
3606* Sort the data
3607sort strata96

3608isid strata96

3609
3610* Compress and save the data
3611compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (1,092 bytes saved)

3612save "m3B_s96results.dta", replace
  (note: file m3B_s96results.dta not found)
  file m3B_s96results.dta saved

3613
3614* List strata with statistically significant interaction effects on the predicted in
  > cidence
3615use "m3B_s96results.dta", clear

3616list strata96  pBmn pBlo pBhi if pBhi<0, noobs

3617list strata96  pBmn pBlo pBhi if pBlo>0, noobs

3618
3619
3620*******************************************************************************
3621*******************************************************************************
3622*******************************************************************************
3623*
3624*
3625* MODEL 4 - CIGARETTE USE, MAIN EFFECTS MODEL
3626*
3627*
```

```
3628****************************************************************************
3629****************************************************************************
3630****************************************************************************
3631
3632****************************************************************************
3633* MODEL 4A_S6 - CIGARETTE USE, Null MODEL
3634****************************************************************************
3635
3636*------------------------------------------------------------------------*
3637* FIT THE MODEL
3638*------------------------------------------------------------------------*
3639
3640* Load the data
3641use "analysisready2.dta", clear

3642sort scid strata6 aid

3643
3644* delete if missing dependent variable (so can record number)
3645drop if use_cig_30days == .
  (174 observations deleted)

3646
3647* Fit model using by PQL2
3648runmlwin use_cig_30days cons , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata6	**678**	**1**	**20.5**	**338**

Run time (seconds)   =   **2.37**
Number of iterations =   **8**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.299211**	.0569007	-22.83	0.000	-1.410734	-1.187688

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2624768	.0546688	.155328	.3696256
Level 2: strata6				
var(cons)	.2877446	.0436543	.2021837	.3733054

```
3649
3650* Fit model using by MCMC
3651runmlwin use_cig_30days cons , ///
>   level3(scid: cons) ///
>   level2(strata6: cons, residuals(u, savechains("m4A_s6_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m4A_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata6	**6**	**1144**	**2311.2**	**4266**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         205
Deviance (dbar)             =    14822.28
Deviance (thetabar)         =    14712.64
Effective no. of pars (pd)  =      109.64
Bayesian DIC                =    14931.92
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	**-1.218465**	**.4737732**	**13**	**0.056**	**-1.784124** **.2185971**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	**.271383**	**.0482935**	**1156**	**.1896224** **.3682698**
Level 2: strata6				
var(cons)	**.7182873**	**1.460125**	**27**	**.1087543** **3.909942**

```
3652rename u0 m1u

3653drop u0se

3654
3655* Present the regression coefficients as odds ratios
3656runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata6	**6**	**1144**	**2311.2**	**4266**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         205
Deviance (dbar)             =    14822.28
Deviance (thetabar)         =    14712.64
Effective no. of pars (pd)  =      109.64
Bayesian DIC                =    14931.92
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3433973	.2568274	13	0.056	.1679441	1.24433

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.271383	.0482935	1156	.1896224	.3682698
Level 2: strata6					
var(cons)	.7182873	1.460125	27	.1087543	3.909942

```
3657
3658* Calculate the ICC from the parameter point estimates
3659scalar m1sigma2u = [RP2]var(cons)

3660scalar m1sigma2e = _pi^2/3

3661display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.179

3662
3663* Calculate the ICC from the chains
3664use "m4A_s6_beta.dta", clear

3665rename RP3_var_cons_ sigma2uscid

3666rename RP2_var_cons_ sigma2u

3667generate sigma2e =  _pi^2/3

3668generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3669generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3670mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1326964	.127198	20	0.000	.0293538	.5267873
icc_scid	.0658696	.0143219	44	0.000	.0351898	.0917

```
3671
3672
3673*******************************************************************************
3674* MODEL 4B_S6 - CIGARETTE USE, MAIN EFFECTS MODEL
3675*******************************************************************************
```

```
3676
3677*------------------------------------------------------------------------------*
3678* FIT THE MODEL
3679*------------------------------------------------------------------------------*
3680
3681* Load the data
3682use "analysisready2.dta", clear

3683sort scid strata6 aid

3684
3685* delete if missing dependent variable (so can record number)
3686drop if use_cig_30days == .
  (174 observations deleted)

3687
3688* Fit model using by PQL2
3689runmlwin use_cig_30days cons female latinx_race black_race , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata6	**678**	**1**	**20.5**	**338**

```
Run time (seconds)   =        2.39
Number of iterations =         7
```

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-.9711235	.0612649	-15.85	0.000	-1.0912	-.8510465
female	.0586926	.0511135	1.15	0.251	-.0414881	.1588732
latinx_race	-.2983511	.0804709	-3.71	0.000	-.4560711	-.1406311
black_race	-1.141705	.0779339	-14.65	0.000	-1.294453	-.9889575

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2454941	.0428714	.1614676	.3295205
Level 2: strata6				
var(cons)	.0654365	.0215542	.0231909	.107682

```
3690
3691* Fit model using by MCMC
```

```
3692runmlwin use_cig_30days cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m4B_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4B_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
>    nopause
```

```
MLwiN 3.2 multilevel model                        Number of obs     =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.0	817
strata6	6	1144	2311.2	4266

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         289
Deviance (dbar)             =    14823.21
Deviance (thetabar)         =    14713.32
Effective no. of pars (pd)  =      109.88
Bayesian DIC                =    14933.09
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.9313802	.1681391	106	0.000	-1.342613	-.6343135
female	-.0228351	.2107243	95	0.422	-.4832107	.4253754
latinx_race	-.2872823	.1967925	222	0.061	-.6911454	.1527575
black_race	-1.122127	.1981536	237	0.000	-1.499358	-.6829009

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.270632	.0483539	1143	.1833021	.3774845
Level 2: strata6					
var(cons)	.0566541	.1441955	433	.0025656	.2910144

```
3693rename u0 m1u

3694drop u0se

3695
3696* Present the regression coefficients as odds ratios
3697runmlwin, or
```

```
MLwiN 3.2 multilevel model                        Number of obs     =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.0	817
strata6	6	1144	2311.2	4266

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          289
Deviance (dbar)               =     14823.21
Deviance (thetabar)           =     14713.32
Effective no. of pars (pd)    =       109.88
Bayesian DIC                  =     14933.09
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.399192	.0651619	128	0.000	.2611624	.5302995
female	.9974607	.2312197	85	0.422	.6167999	1.530173
latinx_race	.7641373	.1620005	210	0.061	.5010025	1.165043
black_race	.331878	.0688311	214	0.000	.2232734	.5051495

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.270632	.0483539	1143	.1833021	.3774845
Level 2: strata6					
var(cons)	.0566541	.1441955	433	.0025656	.2910144

```
3698
3699* Calculate the ICC from the parameter point estimates
3700scalar m1sigma2u = [RP2]var(cons)

3701scalar m1sigma2e = _pi^2/3

3702display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.017

3703
3704* Calculate the ICC from the chains
3705use "m4B_s6_beta.dta", clear

3706rename RP3_var_cons_ sigma2uscid

3707rename RP2_var_cons_ sigma2u

3708generate sigma2e = _pi^2/3

3709generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3710generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3711mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0135838	.0280312	206	0.000	.0007092	.0755776
icc_scid	.0743979	.0126592	1042	0.000	.0524236	.1013122

```
3712
3713
```

```
3714*-------------------------------------------------------------------------------*
3715* PREPARE FIXED-PART PAREMETER CHAINS
3716*-------------------------------------------------------------------------------*
3717
3718use "m4B_s6_beta.dta", clear

3719drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

3720rename FP1_* b_*

3721format %9.2f b_*

3722compress
    variable iteration was double now long
    (4,000 bytes saved)

3723save "m4B_s6_beta_prepped.dta", replace
  (note: file m4B_s6_beta_prepped.dta not found)
   file m4B_s6_beta_prepped.dta saved

3724isid iteration

3725codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
3726
3727
3728*-------------------------------------------------------------------------------*
3729* PREPARE STRATUM RANDOM EFFECTS CHAINS
3730*-------------------------------------------------------------------------------*
3731
3732use "m4B_s6_u.dta", clear

3733drop residual idnum

3734rename value u

3735format %9.2f u

3736sort strata6 iteration

3737order strata6 iteration

3738compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)

3739save "m4B_s6_u_prepped.dta", replace
  (note: file m4B_s6_u_prepped.dta not found)
   file m4B_s6_u_prepped.dta saved

3740isid strata6 iteration
```

3741codebook iteration, compact

```
  Variable    Obs Unique   Mean   Min    Max   Label
─────────────────────────────────────────────────────────────────────

  iteration  6000   1000  24976     1  49951   Iteration
─────────────────────────────────────────────────────────────────────
```

3742
3743
3744*---*
3745* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3746*---*
3747
3748use "data6.dta", clear

3749isid strata6

3750cross using "m4B_s6_beta_prepped.dta"

3751isid strata6 iteration

3752sort strata6 iteration

3753merge 1:1 strata6 iteration using "m4B_s6_u_prepped.dta", nogenerate assert(match)

```
      Result                          # of obs.
      ───────────────────────────────────────────
      not matched                             0
      matched                             6,000
      ───────────────────────────────────────────
```

3754isid strata6 iteration

3755compress
    variable **strata6** was **double** now **byte**
    (42,000 bytes saved)

3756save "m4B_s6data_prepped.dta", replace
  (note: file m4B_s6data_prepped.dta not found)
  file m4B_s6data_prepped.dta saved

3757
3758
3759*---*
3760* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3761*---*
3762
3763* Percentage p based on fixed and random part
3764use "m4B_s6data_prepped.dta", clear

3765gen cons = 1

3766generate p = 100*invlogit(///
  >   b_cons*cons ///
  >   +b_female*female ///
  >   +b_latinx_race*latinx_race ///
  >   +b_black_race*black_race ///
  >   + u ///
  >   )

```
3767label var p "Percentage based on main effects and interactions"

3768format %9.3f p

3769
3770* Percentage p based only on the fixed-part
3771generate pA = 100*invlogit( ///
  >           b_cons*cons ///
  >          +b_female*female ///
  >          +b_latinx_race*latinx_race ///
  >          +b_black_race*black_race ///
  >     )

3772label var pA "Percentage based only on main effects"

3773format %9.3f pA

3774
3775* Percentage pB calculated as the difference between p and pA
3776generate pB = p - pA

3777label var pB "Percentage point difference based on interaction effects"

3778format %9.3f pB

3779
3780* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3781bysort strata6 (iteration): egen pmn = mean(p)

3782bysort strata6 (iteration): egen plo = pctile(p), p(2.5)

3783bysort strata6 (iteration): egen phi = pctile(p), p(97.5)

3784format %9.3f pmn plo phi

3785label var pmn "Percentage based on main effects and interactions"

3786label var plo "Percentage based on main effects and interactions"

3787label var phi "Percentage based on main effects and interactions"

3788
3789
3790bysort strata6 (iteration): egen pAmn = mean(pA)

3791bysort strata6 (iteration): egen pAlo = pctile(pA), p(2.5)

3792bysort strata6 (iteration): egen pAhi = pctile(pA), p(97.5)

3793format %9.3f pAmn pAlo pAhi

3794label var pAmn "Percentage based on main effects"

3795label var pAlo "Percentage based on main effects"

3796label var pAhi "Percentage based on main effects"

3797
3798bysort strata6 (iteration): egen pBmn = mean(pB)
```

```
3799bysort strata6 (iteration): egen pBlo = pctile(pB), p(2.5)

3800bysort strata6 (iteration): egen pBhi = pctile(pB), p(97.5)

3801format %9.3f pBmn pBlo pBhi

3802label var pBmn "Percentage point difference based on interaction effects"

3803label var pBlo "Percentage point difference based on interaction effects"

3804label var pBhi "Percentage point difference based on interaction effects"

3805
3806* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3807drop iteration b* u* p pA pB

3808duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)

3809isid strata6

3810
3811* Ranks
3812sort pmn

3813generate pmnrank = _n

3814order pmnrank, after(phi)

3815sort pAmn

3816generate pAmnrank = _n

3817order pAmnrank, after(pAhi)

3818sort pBmn

3819generate pBmnrank = _n

3820order pBmnrank, after(pBhi)

3821
3822* Sort the data
3823sort strata6

3824isid strata6

3825
3826* Compress and save the data
3827compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (72 bytes saved)

3828save "m4B_s6results.dta", replace
  (note: file m4B_s6results.dta not found)
  file m4B_s6results.dta saved
```

```
3829
3830* List strata with statistically significant interaction effects on the predicted in
 > cidence
3831use "m4B_s6results.dta", clear

3832list strata6  pBmn pBlo pBhi if pBhi<0, noobs

3833list strata6  pBmn pBlo pBhi if pBlo>0, noobs

3834
3835
3836
3837*******************************************************************************
3838* MODEL 4A_S12 - CIGARETTE USE, Null MODEL
3839*******************************************************************************
3840
3841*------------------------------------------------------------------------------*
3842* FIT THE MODEL
3843*------------------------------------------------------------------------------*
3844
3845* Load the data
3846use "analysisready2.dta", clear

3847sort scid strata12 aid

3848
3849* delete if missing dependent variable (so can record number)
3850drop if use_cig_30days == .
 (174 observations deleted)

3851
3852* Fit model using by PQL2
3853runmlwin use_cig_30days cons , ///
 >   level3(scid: cons) ///
 >   level2(strata12: cons) ///
 >   level1(aid:) ///
 >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
 >   rigls maxiterations(100) ///
 >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata12	**1166**	**1**	**11.9**	**216**

Run time (seconds) =   **2.57**
Number of iterations =   **8**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.27232**	**.0582016**	**-21.86**	**0.000**	**-1.386393**	**-1.158247**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.3303538**	**.0561398**	**.2203217**	**.4403859**
Level 2: strata12				
var(cons)	**.2283608**	**.0345711**	**.1606026**	**.296119**

```
3854
3855* Fit model using by MCMC
3856runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata12: cons, residuals(u, savechains("m4A_s12_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4A_s12_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata12	**12**	**466**	**1155.6**	**2888**

```
Burnin                      =       5000
Chain                       =      50000
Thinning                    =         50
Run time (seconds)          =        204
Deviance (dbar)             =   14795.91
Deviance (thetabar)         =   14680.00
Effective no. of pars (pd)  =     115.91
Bayesian DIC                =   14911.82
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.347741**	**.176622**	**80**	**0.000**	**-1.664252**	**-.9913479**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2564477	.0462358	931	.1822974	.3684614
Level 2: strata12					
var(cons)	.3227666	.182819	598	.131489	.7746986

```
3857rename u0 m1u

3858drop u0se

3859
3860* Present the regression coefficients as odds ratios
3861runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata12	**12**	**466**	**1155.6**	**2888**

```
Burnin                       =          5000
Chain                        =         50000
Thinning                     =            50
Run time (seconds)           =           204
Deviance (dbar)              =      14795.91
Deviance (thetabar)          =      14680.00
Effective no. of pars (pd)   =        115.91
Bayesian DIC                 =      14911.82
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2638587	.0488206	80	0.000	.1893324	.3710763

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2564477	.0462358	931	.1822974	.3684614
Level 2: strata12					
var(cons)	.3227666	.182819	598	.131489	.7746986

```
3862
3863* Calculate the ICC from the parameter point estimates
3864scalar m1sigma2u = [RP2]var(cons)

3865scalar m1sigma2e = _pi^2/3

3866display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.089

3867
3868* Calculate the ICC from the chains
3869use "m4A_s12_beta.dta", clear

3870rename RP3_var_cons_ sigma2uscid

3871rename RP2_var_cons_ sigma2u

3872generate sigma2e =  _pi^2/3

3873generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3874generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3875mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0823182	.0388653	594	0.000	.0361392	.1784378
icc_scid	.0660466	.0116027	901	0.000	.0475742	.091838

```
3876
3877
3878****************************************************************************
3879* MODEL 4B_S12 - CIGARETTE USE, MAIN EFFECTS MODEL
3880****************************************************************************
```

```
3881
3882*------------------------------------------------------------------------------*
3883* FIT THE MODEL
3884*------------------------------------------------------------------------------*
3885
3886* Load the data
3887use "analysisready2.dta", clear

3888sort scid strata12 aid

3889
3890* delete if missing dependent variable (so can record number)
3891drop if use_cig_30days == .
  (174 observations deleted)

3892
3893* Fit model using by PQL2
3894runmlwin use_cig_30days cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata12	**1166**	**1**	**11.9**	**216**

Run time (seconds)   =   **2.53**
Number of iterations =   **7**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.043137**	**.0620775**	**-16.80**	**0.000**	**-1.164806**	**-.9214669**
female	**.0527099**	**.0480351**	**1.10**	**0.273**	**-.0414372**	**.1468569**
latinx_race	**-.3519926**	**.0785939**	**-4.48**	**0.000**	**-.5060339**	**-.1979513**
black_race	**-1.167067**	**.0754474**	**-15.47**	**0.000**	**-1.314941**	**-1.019193**
lowparentedu	**.2456132**	**.0508964**	**4.83**	**0.000**	**.145858**	**.3453684**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.2421089**	**.0410225**	**.1617062**	**.3225116**
Level 2: strata12				
var(cons)	**.0693154**	**.0214922**	**.0271915**	**.1114393**

```
3895
```

```
3896* Fit model using by MCMC
3897runmlwin use_cig_30days cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons, residuals(u, savechains("m4B_s12_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m4B_s12_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >    nopause
```

```
MLwiN 3.2 multilevel model                      Number of obs      =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata12	12	466	1155.6	2888

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         317
Deviance (dbar)             =    14795.71
Deviance (thetabar)         =    14682.08
Effective no. of pars (pd)  =      113.63
Bayesian DIC                =    14909.34
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.9515247	.1258635	175	0.000	-1.19272	-.6570649
female	-.0405156	.1166694	279	0.365	-.3110666	.1680598
latinx_race	-.3544669	.1376477	362	0.008	-.6028392	-.072331
black_race	-1.141973	.1391047	331	0.000	-1.399344	-.8667956
lowparentedu	.1887702	.1203989	252	0.044	-.0287861	.4512234

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2559558	.0461732	977	.1790001	.3534874
Level 2: strata12					
var(cons)	.0283342	.0344661	216	.003747	.1083156

```
3898rename u0 m1u

3899drop u0se

3900
3901* Present the regression coefficients as odds ratios
3902runmlwin, or
```

```
MLwiN 3.2 multilevel model                      Number of obs      =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata12	12	466	1155.6	2888

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         317
Deviance (dbar)             =    14795.71
Deviance (thetabar)         =    14682.08
Effective no. of pars (pd)  =      113.63
Bayesian DIC                =    14909.34
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3890433	.0505287	176	0.000	.3033951	.5183706
female	.966078	.1091118	307	0.365	.7326651	1.183007
latinx_race	.7087932	.0964616	351	0.008	.5472561	.9302229
black_race	.3217764	.0457935	325	0.000	.2467588	.4202962
lowparentedu	1.215073	.1518748	215	0.044	.9716246	1.570232

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2559558	.0461732	977	.1790001	.3534874
Level 2: strata12					
var(cons)	.0283342	.0344661	216	.003747	.1083156

```
3903
3904* Calculate the ICC from the parameter point estimates
3905scalar m1sigma2u = [RP2]var(cons)

3906scalar m1sigma2e = _pi^2/3

3907display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.009

3908
3909* Calculate the ICC from the chains
3910use "m4B_s12_beta.dta", clear

3911rename RP3_var_cons_ sigma2uscid

3912rename RP2_var_cons_ sigma2u

3913generate sigma2e =  _pi^2/3

3914generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

3915generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

3916mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0076768	.0089832	203	0.000	.001063	.0294985
icc_scid	.0714687	.0118393	953	0.000	.0510365	.0965154

```
3917
```

```
3918
3919*------------------------------------------------------------------------------*
3920* PREPARE FIXED-PART PAREMETER CHAINS
3921*------------------------------------------------------------------------------*
3922
3923use "m4B_s12_beta.dta", clear

3924drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

3925rename FP1_* b_*

3926format %9.2f b_*

3927compress
    variable iteration was double now long
    (4,000 bytes saved)

3928save "m4B_s12_beta_prepped.dta", replace
  (note: file m4B_s12_beta_prepped.dta not found)
  file m4B_s12_beta_prepped.dta saved

3929isid iteration

3930codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
3931
3932
3933*------------------------------------------------------------------------------*
3934* PREPARE STRATUM RANDOM EFFECTS CHAINS
3935*------------------------------------------------------------------------------*
3936
3937use "m4B_s12_u.dta", clear

3938drop residual idnum

3939rename value u

3940format %9.2f u

3941sort strata12 iteration

3942order strata12 iteration

3943compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

3944save "m4B_s12_u_prepped.dta", replace
  (note: file m4B_s12_u_prepped.dta not found)
  file m4B_s12_u_prepped.dta saved

3945isid strata12 iteration
```

3946codebook iteration, compact

```
  Variable     Obs Unique  Mean  Min   Max  Label
  ────────────────────────────────────────────────────────────────

  iteration  12000   1000  24976    1  49951  Iteration
  ────────────────────────────────────────────────────────────────
```

3947
3948
3949*--*
3950* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3951*--*
3952
3953use "data12.dta", clear

3954isid strata12

3955cross using "m4B_s12_beta_prepped.dta"

3956isid strata12 iteration

3957sort strata12 iteration

3958merge 1:1 strata12 iteration using "m4B_s12_u_prepped.dta", nogenerate assert(match)

```
      Result                         # of obs.
      ─────────────────────────────────────────
      not matched                            0
      matched                           12,000
      ─────────────────────────────────────────
```

3959isid strata12 iteration

3960compress
    variable **strata12** was **double** now **int**
    (72,000 bytes saved)

3961save "m4B_s12data_prepped.dta", replace
  (note: file m4B_s12data_prepped.dta not found)
  file m4B_s12data_prepped.dta saved

3962
3963
3964*--*
3965* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3966*--*
3967
3968* Percentage p based on fixed and random part
3969use "m4B_s12data_prepped.dta", clear

3970gen cons = 1

3971generate p = 100*invlogit(///
  >   b_cons*cons ///
  >   +b_female*female ///
  >   +b_latinx_race*latinx_race ///
  >   +b_black_race*black_race ///
  >   +b_lowparentedu*lowparentedu ///
  >   + u ///
  >   )

```
3972label var p "Percentage based on main effects and interactions"

3973format %9.3f p

3974
3975* Percentage p based only on the fixed-part
3976generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_lowparentedu*lowparentedu ///
   >     )

3977label var pA "Percentage based only on main effects"

3978format %9.3f pA

3979
3980* Percentage pB calculated as the difference between p and pA
3981generate pB = p - pA

3982label var pB "Percentage point difference based on interaction effects"

3983format %9.3f pB

3984
3985* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3986bysort strata12 (iteration): egen pmn = mean(p)

3987bysort strata12 (iteration): egen plo = pctile(p), p(2.5)

3988bysort strata12 (iteration): egen phi = pctile(p), p(97.5)

3989format %9.3f pmn plo phi

3990label var pmn "Percentage based on main effects and interactions"

3991label var plo "Percentage based on main effects and interactions"

3992label var phi "Percentage based on main effects and interactions"

3993
3994
3995bysort strata12 (iteration): egen pAmn = mean(pA)

3996bysort strata12 (iteration): egen pAlo = pctile(pA), p(2.5)

3997bysort strata12 (iteration): egen pAhi = pctile(pA), p(97.5)

3998format %9.3f pAmn pAlo pAhi

3999label var pAmn "Percentage based on main effects"

4000label var pAlo "Percentage based on main effects"

4001label var pAhi "Percentage based on main effects"

4002
4003bysort strata12 (iteration): egen pBmn = mean(pB)
```

```
4004bysort strata12 (iteration): egen pBlo = pctile(pB), p(2.5)

4005bysort strata12 (iteration): egen pBhi = pctile(pB), p(97.5)

4006format %9.3f pBmn pBlo pBhi

4007label var pBmn "Percentage point difference based on interaction effects"

4008label var pBlo "Percentage point difference based on interaction effects"

4009label var pBhi "Percentage point difference based on interaction effects"

4010
4011* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4012drop iteration b* u* p pA pB

4013duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

4014isid strata12

4015
4016* Ranks
4017sort pmn

4018generate pmnrank = _n

4019order pmnrank, after(phi)

4020sort pAmn

4021generate pAmnrank = _n

4022order pAmnrank, after(pAhi)

4023sort pBmn

4024generate pBmnrank = _n

4025order pBmnrank, after(pBhi)

4026
4027* Sort the data
4028sort strata12

4029isid strata12

4030
4031* Compress and save the data
4032compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (144 bytes saved)

4033save "m4B_s12results.dta", replace
  (note: file m4B_s12results.dta not found)
  file m4B_s12results.dta saved
```

```
4034
4035* List strata with statistically significant interaction effects on the predicted in
  > cidence
4036use "m4B_s12results.dta", clear

4037list strata12  pBmn pBlo pBhi if pBhi<0, noobs

4038list strata12  pBmn pBlo pBhi if pBlo>0, noobs

4039
4040
4041
4042
4043*******************************************************************************
4044* MODEL 4A_S18 - CIGARETTE USE, Null MODEL
4045*******************************************************************************
4046
4047*-----------------------------------------------------------------------------*
4048* FIT THE MODEL
4049*-----------------------------------------------------------------------------*
4050
4051* Load the data
4052use "analysisready2.dta", clear

4053sort scid strata18 aid

4054
4055* delete if missing dependent variable (so can record number)
4056drop if use_cig_30days == .
  (174 observations deleted)

4057
4058* Fit model using PQL2
4059runmlwin use_cig_30days cons , ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**1618**	**1**	**8.6**	**193**

Run time (seconds)   =   **2.75**
Number of iterations =   **8**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-1.273048**	**.0585562**	**-21.74**	**0.000**	**-1.387816**	**-1.15828**

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid					
	var(cons)	**.3530946**	**.0566533**	**.2420562**	**.464133**
Level 2: strata18					
	var(cons)	**.2046094**	**.0321146**	**.141666**	**.2675529**

```
4060
4061* Fit model using MCMC
4062runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m4A_s18_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4A_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Minimum	Observations per Group Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**18**	**213**	**770.4**	**1574**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         207
Deviance (dbar)               =    14766.79
Deviance (thetabar)           =    14647.67
Effective no. of pars (pd)    =      119.12
Bayesian DIC                  =    14885.91
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.375582**	**.1453086**	**134**	**0.000**	**-1.655024**	**-1.097586**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.2542212	.0455905	1251	.1767793	.3656706
Level 2: strata18						
	var(cons)	.3063259	.1265409	827	.1430362	.5961557

4063rename u0 m1u

4064drop u0se

```
4065
4066* Present the regression coefficients as odds ratios
4067runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Minimum	Observations per Group Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**18**	**213**	**770.4**	**1574**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         207
Deviance (dbar)             =    14766.79
Deviance (thetabar)         =    14647.67
Effective no. of pars (pd) =      119.12
Bayesian DIC                =    14885.91
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2553268	.0373219	137	0.000	.1910875	.3336756

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2542212	.0455905	1251	.1767793	.3656706
Level 2: strata18					
var(cons)	.3063259	.1265409	827	.1430362	.5961557

```
4068
4069* Calculate the ICC from the parameter point estimates
4070scalar m1sigma2u = [RP2]var(cons)

4071scalar m1sigma2e = _pi^2/3

4072display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.085

4073
4074* Calculate the ICC from the chains
4075use "m4A_s18_beta.dta", clear

4076rename RP3_var_cons_ sigma2uscid

4077rename RP2_var_cons_ sigma2u

4078generate sigma2e =  _pi^2/3

4079generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4080generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4081mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0788963	.0281359	826	0.000	.0389985	.1443693
icc_scid	.0662536	.0114682	1238	0.000	.0461418	.0931793

```
4082
4083
4084****************************************************************************
4085* MODEL 4B_S18 - CIGARETTE USE, MAIN EFFECTS MODEL
4086****************************************************************************
```

```
4087
4088*------------------------------------------------------------------------------*
4089* FIT THE MODEL
4090*------------------------------------------------------------------------------*
4091
4092* Load the data
4093use "analysisready2.dta", clear

4094sort scid strata18 aid

4095
4096* delete if missing dependent variable (so can record number)
4097drop if use_cig_30days == .
  (174 observations deleted)

4098
4099* Fit model using PQL2
4100runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege, ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**1618**	**1**	**8.6**	**193**

Run time (seconds)   =   **2.81**
Number of iterations =   **8**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.163903	.067504	-17.24	0.000	-1.296208	-1.031597
female	.0503581	.0454668	1.11	0.268	-.0387552	.1394714
latinx_race	-.3625892	.077128	-4.70	0.000	-.5137573	-.2114212
black_race	-1.178965	.0736205	-16.01	0.000	-1.323259	-1.034672
hsless	.3763577	.0583231	6.45	0.000	.2620466	.4906688
somecollege	.2581374	.0587426	4.39	0.000	.1430041	.3732707

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2506941	.0411501	.1700413	.3313468
Level 2: strata18				
var(cons)	.0566778	.0209469	.0156226	.097733

```
4101
4102* Fit model using MCMC
4103runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege, ///
>     level3(scid: cons) ///
>     level2(strata18: cons, residuals(u, savechains("m4B_s18_u.dta", replace))) ///
>     level1(aid:) ///
>     discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>     mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>       savechains("m4B_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>     nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**18**	**213**	**770.4**	**1574**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         347
Deviance (dbar)              =    14770.06
Deviance (thetabar)          =    14652.07
Effective no. of pars (pd)   =      117.98
Bayesian DIC                 =    14888.04
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.057039**	.1153171	247	0.000	-1.282363	-.8153948
female	-.0321495	.0890614	506	0.357	-.2302034	.1321666
latinx_race	-.3330723	.117144	541	0.004	-.5529303	-.0887158
black_race	-1.148087	.1131161	650	0.000	-1.371483	-.9187006
hsless	.2864752	.1157147	390	0.009	.0339578	.5030573
somecollege	.1913689	.1142338	368	0.052	-.0429523	.4149211

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2550174	.0461593	1058	.1717972	.353959
Level 2: strata18					
var(cons)	.0253059	.0185535	546	.0040255	.0747997

```
4104rename u0 m1u

4105drop u0se

4106
4107* Present the regression coefficients as odds ratios
4108runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata18	**18**	**213**	**770.4**	**1574**

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        347
Deviance (dbar)               =   14770.06
Deviance (thetabar)           =   14652.07
Effective no. of pars (pd)    =     117.98
Bayesian DIC                  =   14888.04
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3493709	.041367	245	0.000	.277381	.4424646
female	.9708094	.0880198	516	0.357	.7943722	1.141299
latinx_race	.7226404	.0851633	537	0.004	.5752617	.9151058
black_race	.3203357	.0366069	635	0.000	.2537305	.3990373
hsless	1.341512	.1536646	404	0.009	1.034541	1.65377
somecollege	1.218104	.1383071	373	0.052	.9579572	1.514252

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2550174	.0461593	1058	.1717972	.353959
Level 2: strata18					
var(cons)	.0253059	.0185535	546	.0040255	.0747997

```
4109
4110* Calculate the ICC from the parameter point estimates
4111scalar m1sigma2u = [RP2]var(cons)

4112scalar m1sigma2e = _pi^2/3

4113display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.008

4114
4115* Calculate the ICC from the chains
4116use "m4B_s18_beta.dta", clear

4117rename RP3_var_cons_ sigma2uscid

4118rename RP2_var_cons_ sigma2u

4119generate sigma2e =  _pi^2/3

4120generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4121generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)
```

4122mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.007285	.0052853	546	0.000	.0011231	.0204364
icc_scid	.0702693	.0118769	1057	0.000	.0493385	.096993

4123
4124
4125*--*
4126* PREPARE FIXED-PART PAREMETER CHAINS
4127*--*
4128
4129use "m4B_s18_beta.dta", clear

4130drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

4131rename FP1_* b_*

4132format %9.2f b_*

4133compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

4134save "m4B_s18_beta_prepped.dta", replace
  (note: file m4B_s18_beta_prepped.dta not found)
  file m4B_s18_beta_prepped.dta saved

4135isid iteration

4136codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

4137
4138
4139*--*
4140* PREPARE STRATUM RANDOM EFFECTS CHAINS
4141*--*
4142
4143use "m4B_s18_u.dta", clear

4144drop residual idnum

4145rename value u

4146format %9.2f u

4147sort strata18 iteration

4148order strata18 iteration

4149compress
    variable **strata18** was **double** now **int**
    variable **iteration** was **double** now **long**
    (180,000 bytes saved)

4150save "m4B_s18_u_prepped.dta", replace
  (note: file m4B_s18_u_prepped.dta not found)
  file m4B_s18_u_prepped.dta saved

4151isid strata18 iteration

4152codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**18000**	**1000**	**24976**	**1**	**49951**	Iteration

4153
4154
4155*--*
4156* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4157*--*
4158
4159use "data18.dta", clear

4160isid strata18

4161cross using "m4B_s18_beta_prepped.dta"

4162isid strata18 iteration

4163sort strata18 iteration

4164merge 1:1 strata18 iteration using "m4B_s18_u_prepped.dta", nogenerate assert(match)

Result	# of obs.
not matched	**0**
matched	**18,000**

4165isid strata18 iteration

4166compress
    variable **strata18** was **double** now **int**
    (108,000 bytes saved)

4167save "m4B_s18data_prepped.dta", replace
  (note: file m4B_s18data_prepped.dta not found)
  file m4B_s18data_prepped.dta saved

4168
4169
4170*--*
4171* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4172*--*
4173
4174* Percentage p based on fixed and random part
4175use "m4B_s18data_prepped.dta", clear

4176gen cons = 1

```
4177generate p = 100*invlogit( ///
   >          b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >          + u ///
   >    )

4178label var p "Percentage based on main effects and interactions"

4179format %9.3f p

4180
4181* Percentage p based only on the fixed-part
4182generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >    )

4183label var pA "Percentage based only on main effects"

4184format %9.3f pA

4185
4186* Percentage pB calculated as the difference between p and pA
4187generate pB = p - pA

4188label var pB "Percentage point difference based on interaction effects"

4189format %9.3f pB

4190
4191* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4192bysort strata18 (iteration): egen pmn = mean(p)

4193bysort strata18 (iteration): egen plo = pctile(p), p(2.5)

4194bysort strata18 (iteration): egen phi = pctile(p), p(97.5)

4195format %9.3f pmn plo phi

4196label var pmn "Percentage based on main effects and interactions"

4197label var plo "Percentage based on main effects and interactions"

4198label var phi "Percentage based on main effects and interactions"

4199
4200
4201bysort strata18 (iteration): egen pAmn = mean(pA)

4202bysort strata18 (iteration): egen pAlo = pctile(pA), p(2.5)

4203bysort strata18 (iteration): egen pAhi = pctile(pA), p(97.5)
```

```
4204format %9.3f pAmn pAlo pAhi

4205label var pAmn "Percentage based on main effects"

4206label var pAlo "Percentage based on main effects"

4207label var pAhi "Percentage based on main effects"

4208
4209bysort strata18 (iteration): egen pBmn = mean(pB)

4210bysort strata18 (iteration): egen pBlo = pctile(pB), p(2.5)

4211bysort strata18 (iteration): egen pBhi = pctile(pB), p(97.5)

4212format %9.3f pBmn pBlo pBhi

4213label var pBmn "Percentage point difference based on interaction effects"

4214label var pBlo "Percentage point difference based on interaction effects"

4215label var pBhi "Percentage point difference based on interaction effects"

4216
4217* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4218drop iteration b* u* p pA pB

4219duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

4220isid strata18

4221
4222* Ranks
4223sort pmn

4224generate pmnrank = _n

4225order pmnrank, after(phi)

4226sort pAmn

4227generate pAmnrank = _n

4228order pAmnrank, after(pAhi)

4229sort pBmn

4230generate pBmnrank = _n

4231order pBmnrank, after(pBhi)

4232
4233* Sort the data
4234sort strata18

4235isid strata18
```

```
4236
4237* Compress and save the data
4238compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (216 bytes saved)

4239save "m4B_s18results.dta", replace
  (note: file m4B_s18results.dta not found)
  file m4B_s18results.dta saved

4240
4241* List strata with statistically significant interaction effects on the predicted in
  > cidence
4242use "m4B_s18results.dta", clear

4243list strata18  pBmn pBlo pBhi if pBhi<0, noobs

4244list strata18  pBmn pBlo pBhi if pBlo>0, noobs

4245
4246
4247*********************************************************************************
4248* MODEL 4A_S36 - CIGARETTE USE, Null MODEL
4249*********************************************************************************
4250
4251*------------------------------------------------------------------------------*
4252* FIT THE MODEL
4253*------------------------------------------------------------------------------*
4254
4255* Load the data
4256use "analysisready2.dta", clear

4257sort scid strata36 aid

4258
4259* delete if missing dependent variable (so can record number)
4260drop if use_cig_30days == .
  (174 observations deleted)

4261
4262* Fit model using PQL2
4263runmlwin use_cig_30days cons , ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

```
  MLwiN 3.2 multilevel model                     Number of obs    =      13867
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.0	817
strata36	2590	1	5.4	172

```
  Run time (seconds)    =        3.15
  Number of iterations =          8
```

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.268037	.058965	-21.50	0.000	-1.383607	-1.152468

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.3699108	.0573667	.2574742	.4823475
Level 2: strata36				
var(cons)	.2033327	.0330792	.1384986	.2681667

```
4264
4265* Fit model using MCMC
4266runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m4A_s36_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4A_s36_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata36	**36**	**46**	**385.2**	**1078**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         205
Deviance (dbar)              =    14752.97
Deviance (thetabar)          =    14616.74
Effective no. of pars (pd)   =      136.24
Bayesian DIC                 =    14889.21
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-1.401392**	**.1075898**	**245**	**0.000**	**-1.603265**	**-1.190985**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2576862	.0461917	905	.1783164	.3547667
Level 2: strata36					
var(cons)	.2963033	.0877849	771	.1653484	.5133233

```
4267rename u0 m1u
```

4268drop u0se

4269
4270* Present the regression coefficients as odds ratios
4271runmlwin, or

```
  MLwiN 3.2 multilevel model                    Number of obs      =      13867
  Binomial logit response model
  Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	95.0	817
strata36	36	46	385.2	1078

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         205
Deviance (dbar)              =    14752.97
Deviance (thetabar)          =    14616.74
Effective no. of pars (pd)   =      136.24
Bayesian DIC                 =    14889.21
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2475467	.0271135	247	0.000	.2012385	.3039217

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2576862	.0461917	905	.1783164	.3547667
Level 2: strata36					
var(cons)	.2963033	.0877849	771	.1653484	.5133233

4272
4273* Calculate the ICC from the parameter point estimates
4274scalar m1sigma2u = [RP2]var(cons)

4275scalar m1sigma2e = _pi^2/3

4276display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =   0.083

4277
4278* Calculate the ICC from the chains
4279use "m4A_s36_beta.dta", clear

4280rename RP3_var_cons_ sigma2uscid

4281rename RP2_var_cons_ sigma2u

4282generate sigma2e = _pi^2/3

```
4283generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4284generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4285mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0775556	.0210292	774	0.000	.0442435	.1262926
icc_scid	.0663612	.010974	912	0.000	.0472558	.0896564

```
4286
4287
4288*****************************************************************************
4289* MODEL 4B_S36 - CIGARETTE USE, MAIN EFFECTS MODEL
4290*****************************************************************************
4291
4292*---------------------------------------------------------------------------*
4293* FIT THE MODEL
4294*---------------------------------------------------------------------------*
4295
4296* Load the data
4297use "analysisready2.dta", clear

4298sort scid strata36 aid

4299
4300* delete if missing dependent variable (so can record number)
4301drop if use_cig_30days == .
  (174 observations deleted)

4302
4303* Fit model using PQL2
4304runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege lowinc
  > , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                   Number of obs      =     13867
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata36	2590	1	5.4	172

```
  Run time (seconds)   =       3.34
  Number of iterations =          8
```

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.231794	.0696875	-17.68	0.000	-1.368379	-1.095209
female	.0514644	.0448167	1.15	0.251	-.0363747	.1393036
latinx_race	-.3863152	.0773262	-5.00	0.000	-.5378718	-.2347586
black_race	-1.220706	.0742526	-16.44	0.000	-1.366238	-1.075173
hsless	.3189182	.0591838	5.39	0.000	.20292	.4349164
somecollege	.2325538	.0580997	4.00	0.000	.1186806	.346427
lowinc	.179486	.0489133	3.67	0.000	.0836178	.2753543

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid					
	var(cons)	.253651	.0413351	.1726356	.3346663
Level 2: strata36					
	var(cons)	.0750091	.0246666	.0266636	.1233547

```
4305
4306* Fit model using MCMC
4307runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege lowinc
  > , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons, residuals(u, savechains("m4B_s36_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m4B_s36_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata36	**36**	**46**	**385.2**	**1078**

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        374
Deviance (dbar)               =   14752.60
Deviance (thetabar)           =   14629.28
Effective no. of pars (pd)    =     123.32
Bayesian DIC                  =   14875.93
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.132858	.100684	297	0.000	-1.314459	-.9260135
female	.0005362	.0677685	730	0.492	-.1332883	.1320911
latinx_race	-.33758	.0971147	971	0.001	-.5196874	-.1411249
black_race	-1.196079	.0941292	867	0.000	-1.385332	-1.013544
hsless	.2608561	.0867213	603	0.004	.088356	.4182169
somecollege	.1879687	.0889489	619	0.022	.0045966	.3634437
lowinc	.1339516	.0712534	577	0.038	-.0186856	.2595377

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.2569081	.0459617	1020	.1790812	.3649692
Level 2: strata36						
	var(cons)	.0192952	.0122131	650	.0033874	.0476468

4308rename u0 m1u

4309drop u0se

4310
4311* Present the regression coefficients as odds ratios
4312runmlwin, or

```
  MLwiN 3.2 multilevel model                    Number of obs      =      13867
  Binomial logit response model
  Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata36	36	46	385.2	1078

```
  Burnin                        =        5000
  Chain                         =       50000
  Thinning                      =          50
  Run time (seconds)            =         374
  Deviance (dbar)               =    14752.60
  Deviance (thetabar)           =    14629.28
  Effective no. of pars (pd)    =      123.32
  Bayesian DIC                  =    14875.93
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3238641	.0323005	296	0.000	.2686197	.3961298
female	1.001566	.068285	742	0.492	.8752127	1.141212
latinx_race	.7183706	.0719089	983	0.001	.5947064	.8683808
black_race	.3040769	.0285088	872	0.000	.2502408	.3629303
hsless	1.300206	.1099784	623	0.004	1.092377	1.51925
somecollege	1.214595	.1067639	632	0.022	1.004607	1.438274
lowinc	1.148466	.0798827	591	0.038	.9814879	1.296331

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2569081	.0459617	1020	.1790812	.3649692
Level 2: strata36					
var(cons)	.0192952	.0122131	650	.0033874	.0476468

4313
4314* Calculate the ICC from the parameter point estimates
4315scalar m1sigma2u = [RP2]var(cons)

4316scalar m1sigma2e = _pi^2/3

4317display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =   0.006

4318

```
4319* Calculate the ICC from the chains
4320use "m4B_s36_beta.dta", clear

4321rename RP3_var_cons_ sigma2uscid

4322rename RP2_var_cons_ sigma2u

4323generate sigma2e =  _pi^2/3

4324generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4325generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4326mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0053543	.0033401	645	0.000	.0009395	.0133363
icc_scid	.0723049	.0120975	1013	0.000	.0513846	.0991319

```
4327
4328
4329*------------------------------------------------------------------------------*
4330* PREPARE FIXED-PART PAREMETER CHAINS
4331*------------------------------------------------------------------------------*
4332
4333use "m4B_s36_beta.dta", clear

4334drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

4335rename FP1_* b_*

4336format %9.2f b_*

4337compress
    variable iteration was double now long
    (4,000 bytes saved)

4338save "m4B_s36_beta_prepped.dta", replace
  (note: file m4B_s36_beta_prepped.dta not found)
  file m4B_s36_beta_prepped.dta saved

4339isid iteration

4340codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
4341
4342
4343*------------------------------------------------------------------------------*
4344* PREPARE STRATUM RANDOM EFFECTS CHAINS
4345*------------------------------------------------------------------------------*
4346
```

```
4347use "m4B_s36_u.dta", clear

4348drop residual idnum

4349rename value u

4350format %9.2f u

4351sort strata36 iteration

4352order strata36 iteration

4353compress
    variable strata36 was double now int
    variable iteration was double now long
    (360,000 bytes saved)

4354save "m4B_s36_u_prepped.dta", replace
  (note: file m4B_s36_u_prepped.dta not found)
  file m4B_s36_u_prepped.dta saved

4355isid strata36 iteration

4356codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	36000	1000	24976	1	49951	Iteration

```
4357
4358
4359*------------------------------------------------------------------------------*
4360* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4361*------------------------------------------------------------------------------*
4362
4363use "data36.dta", clear

4364isid strata36

4365cross using "m4B_s36_beta_prepped.dta"

4366isid strata36 iteration

4367sort strata36 iteration

4368merge 1:1 strata36 iteration using "m4B_s36_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	36,000

```
4369isid strata36 iteration

4370compress
    variable strata36 was double now int
    (216,000 bytes saved)
```

```
4371save "m4B_s36data_prepped.dta", replace
   (note: file m4B_s36data_prepped.dta not found)
   file m4B_s36data_prepped.dta saved

4372
4373
4374*------------------------------------------------------------------------------*
4375* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4376*------------------------------------------------------------------------------*
4377
4378* Percentage p based on fixed and random part
4379use "m4B_s36data_prepped.dta", clear

4380gen cons = 1

4381generate p = 100*invlogit( ///
   >         b_cons*cons ///
   >        +b_female*female ///
   >        +b_latinx_race*latinx_race ///
   >        +b_black_race*black_race ///
   >        +b_hsless*hsless ///
   >        +b_somecollege*somecollege ///
   >        +b_lowinc*lowinc ///
   >        + u ///
   >    )

4382label var p "Percentage based on main effects and interactions"

4383format %9.3f p

4384
4385* Percentage p based only on the fixed-part
4386generate pA = 100*invlogit( ///
   >         b_cons*cons ///
   >        +b_female*female ///
   >        +b_latinx_race*latinx_race ///
   >        +b_black_race*black_race ///
   >        +b_hsless*hsless ///
   >        +b_somecollege*somecollege ///
   >        +b_lowinc*lowinc ///
   >    )

4387label var pA "Percentage based only on main effects"

4388format %9.3f pA

4389
4390* Percentage pB calculated as the difference between p and pA
4391generate pB = p - pA

4392label var pB "Percentage point difference based on interaction effects"

4393format %9.3f pB

4394
4395* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4396bysort strata36 (iteration): egen pmn = mean(p)

4397bysort strata36 (iteration): egen plo = pctile(p), p(2.5)
```

```
4398bysort strata36 (iteration): egen phi = pctile(p), p(97.5)

4399format %9.3f pmn plo phi

4400label var pmn "Percentage based on main effects and interactions"

4401label var plo "Percentage based on main effects and interactions"

4402label var phi "Percentage based on main effects and interactions"

4403
4404
4405bysort strata36 (iteration): egen pAmn = mean(pA)

4406bysort strata36 (iteration): egen pAlo = pctile(pA), p(2.5)

4407bysort strata36 (iteration): egen pAhi = pctile(pA), p(97.5)

4408format %9.3f pAmn pAlo pAhi

4409label var pAmn "Percentage based on main effects"

4410label var pAlo "Percentage based on main effects"

4411label var pAhi "Percentage based on main effects"

4412
4413bysort strata36 (iteration): egen pBmn = mean(pB)

4414bysort strata36 (iteration): egen pBlo = pctile(pB), p(2.5)

4415bysort strata36 (iteration): egen pBhi = pctile(pB), p(97.5)

4416format %9.3f pBmn pBlo pBhi

4417label var pBmn "Percentage point difference based on interaction effects"

4418label var pBlo "Percentage point difference based on interaction effects"

4419label var pBhi "Percentage point difference based on interaction effects"

4420
4421* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4422drop iteration b* u* p pA pB

4423duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

4424isid strata36

4425
4426* Ranks
4427sort pmn

4428generate pmnrank = _n

4429order pmnrank, after(phi)
```

```
4430sort pAmn

4431generate pAmnrank = _n

4432order pAmnrank, after(pAhi)

4433sort pBmn

4434generate pBmnrank = _n

4435order pBmnrank, after(pBhi)

4436
4437* Sort the data
4438sort strata36

4439isid strata36

4440
4441* Compress and save the data
4442compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (432 bytes saved)

4443save "m4B_s36results.dta", replace
  (note: file m4B_s36results.dta not found)
  file m4B_s36results.dta saved

4444
4445* List strata with statistically significant interaction effects on the predicted in
  > cidence
4446use "m4B_s36results.dta", clear

4447list strata36  pBmn pBlo pBhi if pBhi<0, noobs

4448list strata36  pBmn pBlo pBhi if pBlo>0, noobs

4449
4450
4451****************************************************************************************
4452* MODEL 4A_S48 - CIGARETTE USE, Null MODEL
4453****************************************************************************************
4454
4455*------------------------------------------------------------------------------*
4456* FIT THE MODEL
4457*------------------------------------------------------------------------------*
4458
4459* Load the data
4460use "analysisready2.dta", clear

4461sort scid strata48 aid

4462
4463* delete if missing dependent variable (so can record number)
4464drop if use_cig_30days == .
  (174 observations deleted)
```

```
4465
4466* Fit model using PQL2
4467runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata48	**2697**	**1**	**5.1**	**143**

Run time (seconds)   =   **3.18**
Number of iterations =   **8**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.27403**	**.059144**	**-21.54**	**0.000**	**-1.38995**	**-1.15811**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.3717755**	**.0577073**	**.2586711**	**.4848798**
Level 2: strata48				
var(cons)	**.2184055**	**.0340544**	**.1516602**	**.2851509**

```
4468
4469* Fit model using MCMC
4470runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m4A_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4A_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata48	**48**	**3**	**288.9**	**1078**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          209
Deviance (dbar)               =     14718.86
Deviance (thetabar)           =     14579.08
Effective no. of pars (pd)    =       139.78
Bayesian DIC                  =     14858.64
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	−1.458293	.1070426	258	0.000	−1.675237 −1.251621

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.2543155	.0455871	1001	.1798938 .351893
Level 2: strata48				
var(cons)	.324648	.0907562	955	.1838114 .5243859

4471 rename u0 m1u

4472 drop u0se

4473
4474 * Present the regression coefficients as odds ratios
4475 runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs      =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata48	48	3	288.9	1078

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          209
Deviance (dbar)               =     14718.86
Deviance (thetabar)           =     14579.08
Effective no. of pars (pd)    =       139.78
Bayesian DIC                  =     14858.64
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	.2340443	.0251076	261	0.000	.1872638 .2860407

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.2543155	.0455871	1001	.1798938 .351893
Level 2: strata48				
var(cons)	.324648	.0907562	955	.1838114 .5243859

```
4476
4477* Calculate the ICC from the parameter point estimates
4478scalar m1sigma2u = [RP2]var(cons)

4479scalar m1sigma2e = _pi^2/3

4480display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.090

4481
4482* Calculate the ICC from the chains
4483use "m4A_s48_beta.dta", clear

4484rename RP3_var_cons_ sigma2uscid

4485rename RP2_var_cons_ sigma2u

4486generate sigma2e =  _pi^2/3

4487generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4488generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4489mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0827996	.020287	977	0.000	.0492241	.1288486
icc_scid	.0655013	.0108525	1048	0.000	.0468948	.0891563

```
4490
4491
4492******************************************************************************
4493* MODEL 4B_S48 - CIGARETTE USE, MAIN EFFECTS MODEL
4494******************************************************************************
4495
4496*----------------------------------------------------------------------------*
4497* FIT THE MODEL
4498*----------------------------------------------------------------------------*
4499
4500* Load the data
4501use "analysisready2.dta", clear

4502sort scid strata48 aid

4503
4504* delete if missing dependent variable (so can record number)
4505drop if use_cig_30days == .
  (174 observations deleted)

4506
4507* Fit model using PQL2
4508runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege l
  > owinc, ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                    Number of obs     =      13867
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata48	2697	1	5.1	143

Run time (seconds)   =   3.35
Number of iterations =   8

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.231078	.0690133	-17.84	0.000	-1.366342	-1.095815
female	.047663	.0443399	1.07	0.282	-.0392415	.1345675
latinx_imm	-1.283148	.1780963	-7.20	0.000	-1.63221	-.9340857
latinx_non	-.2831633	.0781325	-3.62	0.000	-.4363002	-.1300264
black	-1.223735	.0737682	-16.59	0.000	-1.368318	-1.079152
hsless	.3189467	.0587239	5.43	0.000	.20385	.4340434
somecollege	.2313896	.0576728	4.01	0.000	.1183531	.3444261
lowinc	.1938079	.0485583	3.99	0.000	.0986354	.2889804

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2478835	.0404666	.1685705	.3271965
Level 2: strata48				
var(cons)	.0667616	.0241804	.0193688	.1141543

```
4509
4510* Fit model using MCMC
4511runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege l
> owinc, ///
>   level3(scid: cons) ///
>   level2(strata48: cons, residuals(u, savechains("m4B_s48_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m4B_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   13867
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata48	48	3	288.9	1078

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   408
Deviance (dbar)   =   14719.07
Deviance (thetabar)   =   14598.17
Effective no. of pars (pd)   =   120.90
Bayesian DIC   =   14839.96

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.159756	.0896439	434	0.000	-1.331035	-.9720339
female	.0039142	.0637223	875	0.461	-.1269386	.1182529
latinx_imm	-1.282197	.1846528	982	0.000	-1.668761	-.9418941

latinx_non	-.2546618	.093637	847	0.008	-.4382063	-.0594122
black	-1.198048	.0888018	932	0.000	-1.355951	-1.0346
hsless	.273012	.0816085	571	0.001	.113513	.4247554
somecollege	.1991058	.0795724	753	0.008	.0368404	.3494205
lowinc	.1666754	.0648838	688	0.008	.0369787	.2976044

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.2530116	.0458588	1052	.1739427	.3518123
Level 2: strata48						
	var(cons)	.0140457	.010359	497	.0012923	.0431791

4512 rename u0 m1u

4513 drop u0se

4514
4515 * Present the regression coefficients as odds ratios
4516 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata48	**48**	**3**	**288.9**	**1078**

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   408
Deviance (dbar)   =   14719.07
Deviance (thetabar)   =   14598.17
Effective no. of pars (pd)   =   120.90
Bayesian DIC   =   14839.96

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3148224	.0279814	431	0.000	.2642038	.3783128
female	1.006009	.0632805	873	0.461	.8807878	1.125529
latinx_imm	.2807009	.0525159	1008	0.000	.1884806	.3898886
latinx_non	.7779076	.0759151	847	0.008	.6451927	.9423184
black	.3024239	.0265615	920	0.000	.2577022	.3553686
hsless	1.319291	.1065169	575	0.001	1.120207	1.529216
somecollege	1.224461	.0962652	754	0.008	1.037527	1.418246
lowinc	1.18454	.0777819	705	0.008	1.037671	1.346629

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.2530116	.0458588	1052	.1739427	.3518123
Level 2: strata48						
	var(cons)	.0140457	.010359	497	.0012923	.0431791

```
4517
4518* Calculate the ICC from the parameter point estimates
4519scalar m1sigma2u = [RP2]var(cons)

4520scalar m1sigma2e = _pi^2/3

4521display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.004

4522
4523* Calculate the ICC from the chains
4524use "m4B_s48_beta.dta", clear

4525rename RP3_var_cons_ sigma2uscid

4526rename RP2_var_cons_ sigma2u

4527generate sigma2e =  _pi^2/3

4528generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4529generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4530mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0039991	.0030929	495	0.000	.0003443	.0118904
icc_scid	.0712468	.01181	1053	0.000	.0499633	.0961871

```
4531
4532
4533*--------------------------------------------------------------------------------*
4534* PREPARE FIXED-PART PAREMETER CHAINS
4535*--------------------------------------------------------------------------------*
4536
4537use "m4B_s48_beta.dta", clear

4538drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

4539rename FP1_* b_*

4540format %9.2f b_*

4541compress
    variable iteration was double now long
    (4,000 bytes saved)

4542save "m4B_s48_beta_prepped.dta", replace
  (note: file m4B_s48_beta_prepped.dta not found)
  file m4B_s48_beta_prepped.dta saved

4543isid iteration

4544codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
4545
4546
4547*-------------------------------------------------------------------------------*
4548* PREPARE STRATUM RANDOM EFFECTS CHAINS
4549*-------------------------------------------------------------------------------*
4550
4551use "m4B_s48_u.dta", clear

4552drop residual idnum

4553rename value u

4554format %9.2f u

4555sort strata48 iteration

4556order strata48 iteration

4557compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

4558save "m4B_s48_u_prepped.dta", replace
  (note: file m4B_s48_u_prepped.dta not found)
  file m4B_s48_u_prepped.dta saved

4559isid strata48 iteration

4560codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	48000	1000	24976	1	49951	Iteration

```
4561
4562
4563*-------------------------------------------------------------------------------*
4564* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4565*-------------------------------------------------------------------------------*
4566
4567use "data48.dta", clear

4568isid strata48

4569cross using "m4B_s48_beta_prepped.dta"

4570isid strata48 iteration

4571sort strata48 iteration

4572merge 1:1 strata48 iteration using "m4B_s48_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	48,000

```
4573isid strata48 iteration

4574compress
     variable strata48 was double now int
     (288,000 bytes saved)

4575save "m4B_s48data_prepped.dta", replace
  (note: file m4B_s48data_prepped.dta not found)
  file m4B_s48data_prepped.dta saved

4576
4577
4578*------------------------------------------------------------------------------*
4579* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4580*------------------------------------------------------------------------------*
4581
4582* Percentage p based on fixed and random part
4583use "m4B_s48data_prepped.dta", clear

4584gen cons = 1

4585generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >          +b_female*female ///
  >          +b_latinx_imm*latinx_imm ///
  >          +b_latinx_non*latinx_non ///
  >          +b_black*black ///
  >          +b_hsless*hsless ///
  >          +b_somecollege*somecollege ///
  >          +b_lowinc*lowinc ///
  >          + u ///
  >    )

4586label var p "Percentage based on main effects and interactions"

4587format %9.3f p

4588
4589* Percentage p based only on the fixed-part
4590generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >          +b_female*female ///
  >          +b_latinx_imm*latinx_imm ///
  >          +b_latinx_non*latinx_non ///
  >          +b_black*black ///
  >          +b_hsless*hsless ///
  >          +b_somecollege*somecollege ///
  >          +b_lowinc*lowinc ///
  >    )

4591label var pA "Percentage based only on main effects"

4592format %9.3f pA

4593
4594* Percentage pB calculated as the difference between p and pA
4595generate pB = p - pA

4596label var pB "Percentage point difference based on interaction effects"
```

```
4597format %9.3f pB

4598
4599* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4600bysort strata48 (iteration): egen pmn = mean(p)

4601bysort strata48 (iteration): egen plo = pctile(p), p(2.5)

4602bysort strata48 (iteration): egen phi = pctile(p), p(97.5)

4603format %9.3f pmn plo phi

4604label var pmn "Percentage based on main effects and interactions"

4605label var plo "Percentage based on main effects and interactions"

4606label var phi "Percentage based on main effects and interactions"

4607
4608
4609bysort strata48 (iteration): egen pAmn = mean(pA)

4610bysort strata48 (iteration): egen pAlo = pctile(pA), p(2.5)

4611bysort strata48 (iteration): egen pAhi = pctile(pA), p(97.5)

4612format %9.3f pAmn pAlo pAhi

4613label var pAmn "Percentage based on main effects"

4614label var pAlo "Percentage based on main effects"

4615label var pAhi "Percentage based on main effects"

4616
4617bysort strata48 (iteration): egen pBmn = mean(pB)

4618bysort strata48 (iteration): egen pBlo = pctile(pB), p(2.5)

4619bysort strata48 (iteration): egen pBhi = pctile(pB), p(97.5)

4620format %9.3f pBmn pBlo pBhi

4621label var pBmn "Percentage point difference based on interaction effects"

4622label var pBlo "Percentage point difference based on interaction effects"

4623label var pBhi "Percentage point difference based on interaction effects"

4624
4625* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4626drop iteration b* u* p pA pB

4627duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

4628isid strata48
```

```
4629
4630* Ranks
4631sort pmn

4632generate pmnrank = _n

4633order pmnrank, after(phi)

4634sort pAmn

4635generate pAmnrank = _n

4636order pAmnrank, after(pAhi)

4637sort pBmn

4638generate pBmnrank = _n

4639order pBmnrank, after(pBhi)

4640
4641* Sort the data
4642sort strata48

4643isid strata48

4644
4645* Compress and save the data
4646compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (576 bytes saved)

4647save "m4B_s48results.dta", replace
  (note: file m4B_s48results.dta not found)
  file m4B_s48results.dta saved

4648
4649* List strata with statistically significant interaction effects on the predicted in
  > cidence
4650use "m4B_s48results.dta", clear

4651list strata48  pBmn pBlo pBhi if pBhi<0, noobs

4652list strata48  pBmn pBlo pBhi if pBlo>0, noobs

4653
4654
4655***************************************************************************************
4656* MODEL 4A_S96 - CIGARETTE USE, Null MODEL
4657***************************************************************************************
4658
4659*-----------------------------------------------------------------------------------*
4660* FIT THE MODEL
4661*-----------------------------------------------------------------------------------*
4662
4663* Load the data
4664use "analysisready2.dta", clear
```

```
4665sort scid strata96 aid

4666
4667* delete if missing dependent variable (so can record number)
4668drop if use_cig_30days == .
  (174 observations deleted)

4669
4670* Fit model using PQL2
4671runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata96	**3611**	**1**	**3.8**	**131**

Run time (seconds)   =   **3.71**
Number of iterations =   **9**

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-1.274087**	**.0595757**	**-21.39**	**0.000**	**-1.390853**	**-1.157321**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid				
var(cons)	**.3809967**	**.0585904**	**.2661616**	**.4958317**
Level 2: strata96				
var(cons)	**.242166**	**.0367732**	**.1700919**	**.31424**

```
4672
4673* Fit model using MCMC
4674runmlwin use_cig_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons, residuals(u, savechains("m4A_s96_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m4A_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata96	**91**	**1**	**152.4**	**896**

```
Burnin                          =          5000
Chain                           =         50000
Thinning                        =            50
Run time (seconds)              =           206
Deviance (dbar)                 =      14641.18
Deviance (thetabar)             =      14478.70
Effective no. of pars (pd) =           162.48
Bayesian DIC                    =      14803.66
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	-1.368079	.0867292	373	0.000	-1.540962 -1.199294

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.260145	.046597	1084	.173244 .3571331
Level 2: strata96				
var(cons)	.3444328	.0751521	834	.2233312 .5127321

4675 rename u0 m1u

4676 drop u0se

4677
4678 * Present the regression coefficients as odds ratios
4679 runmlwin, or

```
MLwiN 3.2 multilevel model               Number of obs      =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.0	817
strata96	91	1	152.4	896

```
Burnin                          =          5000
Chain                           =         50000
Thinning                        =            50
Run time (seconds)              =           206
Deviance (dbar)                 =      14641.18
Deviance (thetabar)             =      14478.70
Effective no. of pars (pd) =           162.48
Bayesian DIC                    =      14803.66
```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	.2551862	.0219066	370	0.000	.2141749 .3014069

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.260145	.046597	1084	.173244 .3571331
Level 2: strata96				
var(cons)	.3444328	.0751521	834	.2233312 .5127321

```
4680
4681* Calculate the ICC from the parameter point estimates
4682scalar m1sigma2u = [RP2]var(cons)

4683scalar m1sigma2e = _pi^2/3

4684display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.095

4685
4686* Calculate the ICC from the chains
4687use "m4A_s96_beta.dta", clear

4688rename RP3_var_cons_ sigma2uscid

4689rename RP2_var_cons_ sigma2u

4690generate sigma2e =  _pi^2/3

4691generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4692generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4693mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0882411	.0173277	841	0.000	.0588704	.1268118
icc_scid	.0662549	.0109869	1100	0.000	.0458764	.0897745

```
4694
4695
4696***************************************************************************
4697* MODEL 4B_S96 - CIGARETTE USE, MAIN EFFECTS MODEL
4698***************************************************************************
4699
4700*-----------------------------------------------------------------------*
4701* FIT THE MODEL
4702*-----------------------------------------------------------------------*
4703
4704* Load the data
4705use "analysisready2.dta", clear

4706sort scid strata96 aid

4707
4708* delete if missing dependent variable (so can record number)
4709drop if use_cig_30days == .
  (174 observations deleted)

4710
4711* Fit model using PQL2
4712runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege l
  > owinc straight_no, ///
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                  Number of obs     =     13867
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.0	817
strata96	3611	1	3.8	131

```
Run time (seconds)    =         3.73
Number of iterations =         8
```

use_cig_30~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.268355	.0689062	-18.41	0.000	-1.403408	-1.133301
female	.0067862	.0446049	0.15	0.879	-.0806377	.0942102
latinx_imm	-1.274401	.1770163	-7.20	0.000	-1.621346	-.9274549
latinx_non	-.288341	.0776427	-3.71	0.000	-.4405179	-.1361642
black	-1.211393	.0732436	-16.54	0.000	-1.354948	-1.067838
hsless	.3270348	.0581115	5.63	0.000	.2131384	.4409313
somecollege	.2408484	.0570403	4.22	0.000	.1290515	.3526453
lowinc	.190917	.0480213	3.98	0.000	.0967971	.285037
straight_no	.3352466	.0591087	5.67	0.000	.2193957	.4510975

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2496368	.0404753	.1703067	.328967
Level 2: strata96				
var(cons)	.0668295	.0260911	.0156919	.1179671

```
4713
4714* Fit model using MCMC
4715runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege l
> owinc straight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m4B_s96_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m4B_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause

MLwiN 3.2 multilevel model                      Number of obs      =      13867
Binomial logit response model
Estimation algorithm: MCMC
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.0	817
strata96	91	1	152.4	896

```
Burnin                   =         5000
Chain                    =        50000
Thinning                 =           50
Run time (seconds)       =          441
Deviance (dbar)          =     14649.20
Deviance (thetabar)      =     14511.75
Effective no. of pars (pd) =      137.45
Bayesian DIC             =     14786.65
```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.198273	.1084905	279	0.000	-1.401798	-.9609156
female	.0203446	.0758453	643	0.399	-.127709	.1842494

latinx_imm	-1.238532	.1975508	818	0.000	-1.621073	-.8808039
latinx_non	-.2183437	.1022832	871	0.016	-.4060031	-.0170283
black	-1.164679	.1005648	740	0.000	-1.353543	-.9707
hsless	.2455445	.0954762	544	0.008	.0636469	.4131184
somecollege	.1950732	.0949194	595	0.025	.0032095	.3807775
lowinc	.109975	.078619	580	0.097	-.0566466	.2572687
straight_no	.3219933	.0833342	975	0.000	.1548856	.488006

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2529814	.0458752	1012	.1743762	.3574483
Level 2: strata96					
var(cons)	.0420647	.0198778	671	.0119921	.0857511

4716 rename u0 m1u

4717 drop u0se

4718
4719* Present the regression coefficients as odds ratios
4720 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13867**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**95.0**	**817**
strata96	**91**	**1**	**152.4**	**896**

Burnin	=	5000	
Chain	=	50000	
Thinning	=	50	
Run time (seconds)	=	441	
Deviance (dbar)	=	14649.20	
Deviance (thetabar)	=	14511.75	
Effective no. of pars (pd)	=	137.45	
Bayesian DIC	=	14786.65	

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3038892	.0341528	280	0.000	.246154	.3825425
female	1.02249	.0799869	635	0.399	.8801095	1.202316
latinx_imm	.2962118	.0570684	803	0.000	.1976864	.4144499
latinx_non	.8112851	.082791	865	0.016	.6663081	.9831159
black	.3142707	.030831	725	0.000	.2583234	.3788178
hsless	1.281131	.1207505	553	0.008	1.065716	1.511524
somecollege	1.220351	.1162898	597	0.025	1.003215	1.463422
lowinc	1.117007	.088203	584	0.097	.9449279	1.293393
straight_no	1.387898	.1156292	986	0.000	1.167525	1.629065

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.2529814	.0458752	1012	.1743762	.3574483
Level 2: strata96					
var(cons)	.0420647	.0198778	671	.0119921	.0857511

```
4721
4722* Calculate the ICC from the parameter point estimates
4723scalar m1sigma2u = [RP2]var(cons)

4724scalar m1sigma2e = _pi^2/3

4725display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.013

4726
4727* Calculate the ICC from the chains
4728use "m4B_s96_beta.dta", clear

4729rename RP3_var_cons_ sigma2uscid

4730rename RP2_var_cons_ sigma2u

4731generate sigma2e =  _pi^2/3

4732generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4733generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4734mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0116614	.0052173	672	0.000	.0033807	.0235078
icc_scid	.070318	.0119294	1028	0.000	.0498671	.0972174

```
4735
4736
4737*-------------------------------------------------------------------------------*
4738* PREPARE FIXED-PART PAREMETER CHAINS
4739*-------------------------------------------------------------------------------*
4740
4741use "m4B_s96_beta.dta", clear

4742drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

4743rename FP1_* b_*

4744format %9.2f b_*

4745compress
    variable iteration was double now long
    (4,000 bytes saved)

4746save "m4B_s96_beta_prepped.dta", replace
  (note: file m4B_s96_beta_prepped.dta not found)
  file m4B_s96_beta_prepped.dta saved

4747isid iteration

4748codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
4749
4750
4751*-------------------------------------------------------------------------------*
4752* PREPARE STRATUM RANDOM EFFECTS CHAINS
4753*-------------------------------------------------------------------------------*
4754
4755use "m4B_s96_u.dta", clear

4756drop residual idnum

4757rename value u

4758format %9.2f u

4759sort strata96 iteration

4760order strata96 iteration

4761compress
    variable strata96 was double now int
    variable iteration was double now long
    (910,000 bytes saved)

4762save "m4B_s96_u_prepped.dta", replace
  (note: file m4B_s96_u_prepped.dta not found)
  file m4B_s96_u_prepped.dta saved

4763isid strata96 iteration

4764codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```
4765
4766
4767*-------------------------------------------------------------------------------*
4768* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4769*-------------------------------------------------------------------------------*
4770
4771use "data96_cig.dta", clear

4772isid strata96

4773cross using "m4B_s96_beta_prepped.dta"

4774isid strata96 iteration

4775sort strata96 iteration

4776merge 1:1 strata96 iteration using "m4B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	91,000

```
4777isid strata96 iteration

4778compress
    variable strata96 was double now int
    (546,000 bytes saved)

4779save "m4B_s96data_prepped.dta", replace
  (note: file m4B_s96data_prepped.dta not found)
  file m4B_s96data_prepped.dta saved

4780
4781
4782*------------------------------------------------------------------------------*
4783* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4784*------------------------------------------------------------------------------*
4785
4786* Percentage p based on fixed and random part
4787use "m4B_s96data_prepped.dta", clear

4788gen cons = 1

4789generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >         + u ///
  >     )

4790label var p "Percentage based on main effects and interactions"

4791format %9.3f p

4792
4793* Percentage p based only on the fixed-part
4794generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >     )

4795label var pA "Percentage based only on main effects"

4796format %9.3f pA

4797
4798* Percentage pB calculated as the difference between p and pA
4799generate pB = p - pA
```

```
4800label var pB "Percentage point difference based on interaction effects"

4801format %9.3f pB

4802
4803* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4804bysort strata96 (iteration): egen pmn = mean(p)

4805bysort strata96 (iteration): egen plo = pctile(p), p(2.5)

4806bysort strata96 (iteration): egen phi = pctile(p), p(97.5)

4807format %9.3f pmn plo phi

4808label var pmn "Percentage based on main effects and interactions"

4809label var plo "Percentage based on main effects and interactions"

4810label var phi "Percentage based on main effects and interactions"

4811
4812
4813bysort strata96 (iteration): egen pAmn = mean(pA)

4814bysort strata96 (iteration): egen pAlo = pctile(pA), p(2.5)

4815bysort strata96 (iteration): egen pAhi = pctile(pA), p(97.5)

4816format %9.3f pAmn pAlo pAhi

4817label var pAmn "Percentage based on main effects"

4818label var pAlo "Percentage based on main effects"

4819label var pAhi "Percentage based on main effects"

4820
4821bysort strata96 (iteration): egen pBmn = mean(pB)

4822bysort strata96 (iteration): egen pBlo = pctile(pB), p(2.5)

4823bysort strata96 (iteration): egen pBhi = pctile(pB), p(97.5)

4824format %9.3f pBmn pBlo pBhi

4825label var pBmn "Percentage point difference based on interaction effects"

4826label var pBlo "Percentage point difference based on interaction effects"

4827label var pBhi "Percentage point difference based on interaction effects"

4828
4829* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4830drop iteration b* u* p pA pB

4831duplicates drop

  Duplicates in terms of all variables

  (90,909 observations deleted)
```

```
4832isid strata96

4833
4834* Ranks
4835sort pmn

4836generate pmnrank = _n

4837order pmnrank, after(phi)

4838sort pAmn

4839generate pAmnrank = _n

4840order pAmnrank, after(pAhi)

4841sort pBmn

4842generate pBmnrank = _n

4843order pBmnrank, after(pBhi)

4844
4845* Sort the data
4846sort strata96

4847isid strata96

4848
4849* Compress and save the data
4850compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (1,092 bytes saved)

4851save "m4B_s96results.dta", replace
  (note: file m4B_s96results.dta not found)
  file m4B_s96results.dta saved

4852
4853* List strata with statistically significant interaction effects on the predicted in
  > cidence
4854use "m4B_s96results.dta", clear

4855list strata96  pBmn pBlo pBhi if pBhi<0, noobs

4856list strata96  pBmn pBlo pBhi if pBlo>0, noobs
```

strata96	pBmn	pBlo	pBhi
28111	5.210	0.783	9.957

```
4857
4858
4859
4860**************************************************************************
```

```
4861****************************************************************************
4862****************************************************************************
4863*
4864*
4865* MODEL 5 - MARIJUANA USE, MAIN EFFECTS MODEL
4866*
4867*
4868****************************************************************************
4869****************************************************************************
4870****************************************************************************
4871
4872****************************************************************************
4873* MODEL 5A_S6 - MARIJUANA USE, Null MODEL
4874****************************************************************************
4875
4876*--------------------------------------------------------------------------*
4877* FIT THE MODEL
4878*--------------------------------------------------------------------------*
4879
4880* Load the data
4881use "analysisready2.dta", clear

4882sort scid strata6 aid

4883
4884* delete if missing dependent variable (so can record number)
4885drop if use_mj_30days == .
  (232 observations deleted)

4886
4887* Fit model using by PQL2
4888runmlwin use_mj_30days cons , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs    =      13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata6	676	1	20.4	340

```
  Run time (seconds)   =        2.59
  Number of iterations =          10
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.128209	.0676201	-31.47	0.000	-2.260742	-1.995675

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4237694	.0756139	.2755689	.5719699
Level 2: strata6				
var(cons)	.1259227	.0373598	.0526989	.1991466

```
4889
4890* Fit model using by MCMC
4891runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m5A_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5A_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata6	**6**	**1136**	**2301.5**	**4253**

```
Burnin                    =        5000
Chain                     =       50000
Thinning                  =          50
Run time (seconds)        =         198
Deviance (dbar)           =    10541.08
Deviance (thetabar)       =    10434.39
Effective no. of pars (pd) =      106.69
Bayesian DIC              =    10647.77
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-2.099276**	**.1137817**	**286**	**0.000**	**-2.305729**	**-1.855602**

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	**.4477552**	**.0786443**	**1294**	**.3134832**	**.6146943**
Level 2: strata6						
	var(cons)	**.0574262**	**.078633**	**732**	**.0095338**	**.203842**

```
4892rename u0 m1u

4893drop u0se

4894
4895* Present the regression coefficients as odds ratios
4896runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata6	**6**	**1136**	**2301.5**	**4253**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         198
Deviance (dbar)               =    10541.08
Deviance (thetabar)           =    10434.39
Effective no. of pars (pd)    =      106.69
Bayesian DIC                  =    10647.77
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1231857	.0146142	274	0.000	.0996861	.1563588

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4477552	.0786443	1294	.3134832	.6146943
Level 2: strata6					
var(cons)	.0574262	.078633	732	.0095338	.203842

```
4897
4898* Calculate the ICC from the parameter point estimates
4899scalar m1sigma2u = [RP2]var(cons)

4900scalar m1sigma2e = _pi^2/3

4901display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.017

4902
4903* Calculate the ICC from the chains
4904use "m5A_s6_beta.dta", clear

4905rename RP3_var_cons_ sigma2uscid

4906rename RP2_var_cons_ sigma2u

4907generate sigma2e = _pi^2/3

4908generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4909generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4910mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0149572	.0140361	733	0.000	.0024999	.0533144
icc_scid	.1173466	.0182689	1254	0.000	.0859739	.1560677

```
4911
4912
4913*******************************************************************************
4914* MODEL 5B_S6 - MARIJUANA USE, MAIN EFFECTS MODEL
4915*******************************************************************************
```

```
4916
4917*------------------------------------------------------------------------------*
4918* FIT THE MODEL
4919*------------------------------------------------------------------------------*
4920
4921* Load the data
4922use "analysisready2.dta", clear

4923sort scid strata6 aid

4924
4925* delete if missing dependent variable (so can record number)
4926drop if use_mj_30days == .
  (232 observations deleted)

4927
4928* Fit model using by PQL2
4929runmlwin use_mj_30days cons female latinx_race black_race , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                  Number of obs     =      13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata6	**676**	**1**	**20.4**	**340**

```
Run time (seconds)   =        2.72
Number of iterations =          10
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-1.943621**	**.0799124**	**-24.32**	**0.000**	**-2.100246**	**-1.786995**
female	**-.2607237**	**.0649865**	**-4.01**	**0.000**	**-.388095**	**-.1333524**
latinx_race	**.0207682**	**.100716**	**0.21**	**0.837**	**-.1766315**	**.218168**
black_race	**-.1905388**	**.0918773**	**-2.07**	**0.038**	**-.3706151**	**-.0104625**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.4216592**	**.0738575**	**.2769013**	**.5664172**
Level 2: strata6				
var(cons)	**.0980319**	**.0337211**	**.0319397**	**.1641241**

```
4930
4931* Fit model using by MCMC
```

```
4932runmlwin use_mj_30days cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m5B_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5B_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata6	**6**	**1136**	**2301.5**	**4253**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         284
Deviance (dbar)             =    10542.27
Deviance (thetabar)         =    10434.03
Effective no. of pars (pd) =      108.24
Bayesian DIC                =    10650.51
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.883281	.1785417	134	0.000	-2.268787	-1.51555
female	-.3044129	.2165432	80	0.042	-.8910948	.0749953
latinx_race	-.0532632	.2440403	173	0.393	-.5561577	.4847588
black_race	-.142145	.2649096	117	0.174	-.6483647	.5376049

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4489949	.0789348	897	.3039719	.6225674
Level 2: strata6					
var(cons)	.0702005	.2231169	119	.0013788	.4446008

```
4933rename u0 m1u

4934drop u0se

4935
4936* Present the regression coefficients as odds ratios
4937runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata6	**6**	**1136**	**2301.5**	**4253**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          284
Deviance (dbar)               =     10542.27
Deviance (thetabar)           =     10434.03
Effective no. of pars (pd)    =       108.24
Bayesian DIC                  =     10650.51
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1546503	.0277192	139	0.000	.1034376	.2196873
female	.7534994	.1521473	101	0.042	.4102065	1.077879
latinx_race	.9750185	.2462542	180	0.393	.5734081	1.623784
black_race	.9084221	.3743269	102	0.174	.5229011	1.711903

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4489949	.0789348	897	.3039719	.6225674
Level 2: strata6					
var(cons)	.0702005	.2231169	119	.0013788	.4446008

```
4938
4939* Calculate the ICC from the parameter point estimates
4940scalar m1sigma2u = [RP2]var(cons)

4941scalar m1sigma2e = _pi^2/3

4942display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.021

4943
4944* Calculate the ICC from the chains
4945use "m5B_s6_beta.dta", clear

4946rename RP3_var_cons_ sigma2uscid

4947rename RP2_var_cons_ sigma2u

4948generate sigma2e =  _pi^2/3

4949generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

4950generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

4951mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0157149	.0326135	108	0.000	.0003682	.1071777
icc_scid	.1178873	.019126	686	0.000	.0821138	.1576052

```
4952
4953
```

```
4954*------------------------------------------------------------------------------*
4955* PREPARE FIXED-PART PAREMETER CHAINS
4956*------------------------------------------------------------------------------*
4957
4958use "m5B_s6_beta.dta", clear

4959drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

4960rename FP1_* b_*

4961format %9.2f b_*

4962compress
    variable iteration was double now long
    (4,000 bytes saved)

4963save "m5B_s6_beta_prepped.dta", replace
  (note: file m5B_s6_beta_prepped.dta not found)
  file m5B_s6_beta_prepped.dta saved

4964isid iteration

4965codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
4966
4967
4968*------------------------------------------------------------------------------*
4969* PREPARE STRATUM RANDOM EFFECTS CHAINS
4970*------------------------------------------------------------------------------*
4971
4972use "m5B_s6_u.dta", clear

4973drop residual idnum

4974rename value u

4975format %9.2f u

4976sort strata6 iteration

4977order strata6 iteration

4978compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)

4979save "m5B_s6_u_prepped.dta", replace
  (note: file m5B_s6_u_prepped.dta not found)
  file m5B_s6_u_prepped.dta saved

4980isid strata6 iteration
```

```
4981codebook iteration, compact

   Variable     Obs Unique   Mean  Min    Max  Label
  ───────────────────────────────────────────────────────────────────────

   iteration   6000    1000  24976    1  49951  Iteration
  ───────────────────────────────────────────────────────────────────────


4982
4983
4984*------------------------------------------------------------------------------*
4985* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4986*------------------------------------------------------------------------------*
4987
4988use "data6.dta", clear

4989isid strata6

4990cross using "m5B_s6_beta_prepped.dta"

4991isid strata6 iteration

4992sort strata6 iteration

4993merge 1:1 strata6 iteration using "m5B_s6_u_prepped.dta", nogenerate assert(match)

          Result                         # of obs.
         ──────────────────────────────────────────
          not matched                            0
          matched                            6,000
         ──────────────────────────────────────────


4994isid strata6 iteration

4995compress
    variable strata6 was double now byte
    (42,000 bytes saved)

4996save "m5B_s6data_prepped.dta", replace
  (note: file m5B_s6data_prepped.dta not found)
  file m5B_s6data_prepped.dta saved

4997
4998
4999*------------------------------------------------------------------------------*
5000* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5001*------------------------------------------------------------------------------*
5002
5003* Percentage p based on fixed and random part
5004use "m5B_s6data_prepped.dta", clear

5005gen cons = 1

5006generate p = 100*invlogit( ///
  >         b_cons*cons ///
  >        +b_female*female ///
  >        +b_latinx_race*latinx_race ///
  >        +b_black_race*black_race ///
  >        + u ///
  >    )
```

```
5007label var p "Percentage based on main effects and interactions"

5008format %9.3f p

5009
5010* Percentage p based only on the fixed-part
5011generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >    )

5012label var pA "Percentage based only on main effects"

5013format %9.3f pA

5014
5015* Percentage pB calculated as the difference between p and pA
5016generate pB = p - pA

5017label var pB "Percentage point difference based on interaction effects"

5018format %9.3f pB

5019
5020* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5021bysort strata6 (iteration): egen pmn = mean(p)

5022bysort strata6 (iteration): egen plo = pctile(p), p(2.5)

5023bysort strata6 (iteration): egen phi = pctile(p), p(97.5)

5024format %9.3f pmn plo phi

5025label var pmn "Percentage based on main effects and interactions"

5026label var plo "Percentage based on main effects and interactions"

5027label var phi "Percentage based on main effects and interactions"

5028
5029
5030bysort strata6 (iteration): egen pAmn = mean(pA)

5031bysort strata6 (iteration): egen pAlo = pctile(pA), p(2.5)

5032bysort strata6 (iteration): egen pAhi = pctile(pA), p(97.5)

5033format %9.3f pAmn pAlo pAhi

5034label var pAmn "Percentage based on main effects"

5035label var pAlo "Percentage based on main effects"

5036label var pAhi "Percentage based on main effects"

5037
5038bysort strata6 (iteration): egen pBmn = mean(pB)
```

```
5039bysort strata6 (iteration): egen pBlo = pctile(pB), p(2.5)

5040bysort strata6 (iteration): egen pBhi = pctile(pB), p(97.5)

5041format %9.3f pBmn pBlo pBhi

5042label var pBmn "Percentage point difference based on interaction effects"

5043label var pBlo "Percentage point difference based on interaction effects"

5044label var pBhi "Percentage point difference based on interaction effects"

5045
5046* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5047drop iteration b* u* p pA pB

5048duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)

5049isid strata6

5050
5051* Ranks
5052sort pmn

5053generate pmnrank = _n

5054order pmnrank, after(phi)

5055sort pAmn

5056generate pAmnrank = _n

5057order pAmnrank, after(pAhi)

5058sort pBmn

5059generate pBmnrank = _n

5060order pBmnrank, after(pBhi)

5061
5062* Sort the data
5063sort strata6

5064isid strata6

5065
5066* Compress and save the data
5067compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (72 bytes saved)

5068save "m5B_s6results.dta", replace
  (note: file m5B_s6results.dta not found)
  file m5B_s6results.dta saved
```

```
5069
5070* List strata with statistically significant interaction effects on the predicted in
  > cidence
5071use "m5B_s6results.dta", clear

5072list strata6  pBmn pBlo pBhi if pBhi<0, noobs

5073list strata6  pBmn pBlo pBhi if pBlo>0, noobs

5074
5075
5076
5077*****************************************************************************
5078* MODEL 5A_S12 - MARIJUANA USE, Null MODEL
5079*****************************************************************************
5080
5081*---------------------------------------------------------------------------*
5082* FIT THE MODEL
5083*---------------------------------------------------------------------------*
5084
5085* Load the data
5086use "analysisready2.dta", clear

5087sort scid strata12 aid

5088
5089* delete if missing dependent variable (so can record number)
5090drop if use_mj_30days == .
  (232 observations deleted)

5091
5092* Fit model using by PQL2
5093runmlwin use_mj_30days cons , ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs       =      13809
Binomial logit response model
Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata12	1163	1	11.9	216

```
Run time (seconds)   =       2.88
Number of iterations =         11
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.120141	.0671138	-31.59	0.000	-2.251682	-1.988601

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4368871	.0738856	.292074	.5817001
Level 2: strata12				
var(cons)	.1056013	.0339898	.0389825	.1722202

```
5094
5095* Fit model using by MCMC
5096runmlwin use_mj_30days cons , ///
>   level3(scid: cons) ///
>   level2(strata12: cons, residuals(u, savechains("m5A_s12_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m5A_s12_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata12	**12**	**465**	**1150.8**	**2877**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         199
Deviance (dbar)             =    10540.48
Deviance (thetabar)         =    10428.68
Effective no. of pars (pd)  =      111.81
Bayesian DIC                =    10652.29
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	**-2.090603**	**.0900509**	**585**	**0.000**	**-2.269411** **-1.911591**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	**.4538506**	**.0804432**	**811**	**.323875** **.6348049**
Level 2: strata12				
var(cons)	**.0405731**	**.0284376**	**1136**	**.008709** **.1011212**

```
5097rename u0 m1u

5098drop u0se

5099
5100* Present the regression coefficients as odds ratios
5101runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata12	**12**	**465**	**1150.8**	**2877**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         199
Deviance (dbar)             =    10540.48
Deviance (thetabar)         =    10428.68
Effective no. of pars (pd)  =      111.81
Bayesian DIC                =    10652.29
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1245079	.0114768	602	0.000	.1033731	.147845

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4538506	.0804432	811	.323875	.6348049
Level 2: strata12					
var(cons)	.0405731	.0284376	1136	.008709	.1011212

```
5102
5103* Calculate the ICC from the parameter point estimates
5104scalar m1sigma2u = [RP2]var(cons)

5105scalar m1sigma2e = _pi^2/3

5106display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.012

5107
5108* Calculate the ICC from the chains
5109use "m5A_s12_beta.dta", clear

5110rename RP3_var_cons_ sigma2uscid

5111rename RP2_var_cons_ sigma2u

5112generate sigma2e =  _pi^2/3

5113generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5114generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5115mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0103561	.0070341	1141	0.000	.0023256	.0260014
icc_scid	.1196207	.0186901	818	0.000	.0888608	.1603851

```
5116
5117
5118****************************************************************************
5119* MODEL 5B_S12 - MARIJUANA USE, MAIN EFFECTS MODEL
5120****************************************************************************
```

```
5121
5122*-------------------------------------------------------------------------------*
5123* FIT THE MODEL
5124*-------------------------------------------------------------------------------*
5125
5126* Load the data
5127use "analysisready2.dta", clear

5128sort scid strata12 aid

5129
5130* delete if missing dependent variable (so can record number)
5131drop if use_mj_30days == .
  (232 observations deleted)

5132
5133* Fit model using by PQL2
5134runmlwin use_mj_30days cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs      =      13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata12	1163	1	11.9	216

```
Run time (seconds)   =       3.43
Number of iterations =         14
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-1.944719	.0805915	-24.13	0.000	-2.102675	-1.786763
female	-.2550468	.0595791	-4.28	0.000	-.3718198	-.1382739
latinx_race	.0048112	.0963517	0.05	0.960	-.1840346	.1936571
black_race	-.1850903	.0871173	-2.12	0.034	-.3558372	-.0143435
lowparentedu	.0181622	.0643076	0.28	0.778	-.1078784	.1442027

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4318507	.0724857	.2897813	.5739201
Level 2: strata12				
var(cons)	.0809633	.0310775	.0200526	.1418739

```
5135
```

```
5136* Fit model using by MCMC
5137runmlwin use_mj_30days cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons, residuals(u, savechains("m5B_s12_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m5B_s12_beta.dta", replace)) initsprevious /// saving the beta & var
  > iance parameter estimates for the models
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata12	**12**	**465**	**1150.8**	**2877**

```
Burnin                       =       5000
Chain                        =      50000
Thinning                     =         50
Run time (seconds)           =        313
Deviance (dbar)              =   10542.52
Deviance (thetabar)         =   10430.49
Effective no. of pars (pd)  =     112.03
Bayesian DIC                 =   10654.55
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.900179	.1202858	308	0.000	-2.144921	-1.665675
female	-.2853348	.0965484	521	0.007	-.4854576	-.1127752
latinx_race	-.0344842	.1286997	581	0.377	-.2887104	.2267428
black_race	-.1518397	.1249154	436	0.089	-.3776752	.0827075
lowparentedu	.0121978	.0945641	772	0.446	-.1874588	.208494

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4518269	.0794398	1103	.3097451	.6092349
Level 2: strata12					
var(cons)	.0175278	.0224592	477	.0008928	.0754997

```
5138rename u0 m1u

5139drop u0se

5140
5141* Present the regression coefficients as odds ratios
5142runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata12	**12**	**465**	**1150.8**	**2877**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         313
Deviance (dbar)             =    10542.52
Deviance (thetabar)         =    10430.49
Effective no. of pars (pd)  =      112.03
Bayesian DIC                =    10654.55
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1507365	.0180723	308	0.000	.1170775	.189063
female	.7545089	.0713068	522	0.007	.6154155	.8933515
latinx_race	.973719	.1291023	567	0.377	.7492295	1.254508
black_race	.8644483	.107966	416	0.089	.6854531	1.086224
lowparentedu	1.017141	.1004907	763	0.446	.8290633	1.231822

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4518269	.0794398	1103	.3097451	.6092349
Level 2: strata12					
var(cons)	.0175278	.0224592	477	.0008928	.0754997

```
5143
5144* Calculate the ICC from the parameter point estimates
5145scalar m1sigma2u = [RP2]var(cons)

5146scalar m1sigma2e = _pi^2/3

5147display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.005

5148
5149* Calculate the ICC from the chains
5150use "m5B_s12_beta.dta", clear

5151rename RP3_var_cons_ sigma2uscid

5152rename RP2_var_cons_ sigma2u

5153generate sigma2e =  _pi^2/3

5154generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5155generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5156mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0046068	.005613	473	0.000	.0002378	.0199384
icc_scid	.1188525	.0178835	1089	0.000	.0855423	.1556141

```
5157
```

```
5158
5159*-------------------------------------------------------------------------------*
5160* PREPARE FIXED-PART PAREMETER CHAINS
5161*-------------------------------------------------------------------------------*
5162
5163use "m5B_s12_beta.dta", clear

5164drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

5165rename FP1_* b_*

5166format %9.2f b_*

5167compress
    variable iteration was double now long
    (4,000 bytes saved)

5168save "m5B_s12_beta_prepped.dta", replace
  (note: file m5B_s12_beta_prepped.dta not found)
  file m5B_s12_beta_prepped.dta saved

5169isid iteration

5170codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
5171
5172
5173*-------------------------------------------------------------------------------*
5174* PREPARE STRATUM RANDOM EFFECTS CHAINS
5175*-------------------------------------------------------------------------------*
5176
5177use "m5B_s12_u.dta", clear

5178drop residual idnum

5179rename value u

5180format %9.2f u

5181sort strata12 iteration

5182order strata12 iteration

5183compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

5184save "m5B_s12_u_prepped.dta", replace
  (note: file m5B_s12_u_prepped.dta not found)
  file m5B_s12_u_prepped.dta saved

5185isid strata12 iteration
```

```
5186codebook iteration, compact

  Variable     Obs Unique   Mean   Min    Max   Label
─────────────────────────────────────────────────────────────────────────────

  iteration  12000   1000  24976    1  49951   Iteration
─────────────────────────────────────────────────────────────────────────────


5187
5188
5189*-----------------------------------------------------------------------------*
5190* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5191*-----------------------------------------------------------------------------*
5192
5193use "data12.dta", clear

5194isid strata12

5195cross using "m5B_s12_beta_prepped.dta"

5196isid strata12 iteration

5197sort strata12 iteration

5198merge 1:1 strata12 iteration using "m5B_s12_u_prepped.dta", nogenerate assert(match)

        Result                        # of obs.
        ───────────────────────────────────────
        not matched                          0
        matched                         12,000
        ───────────────────────────────────────


5199isid strata12 iteration

5200compress
    variable strata12 was double now int
    (72,000 bytes saved)

5201save "m5B_s12data_prepped.dta", replace
  (note: file m5B_s12data_prepped.dta not found)
  file m5B_s12data_prepped.dta saved

5202
5203
5204*-----------------------------------------------------------------------------*
5205* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5206*-----------------------------------------------------------------------------*
5207
5208* Percentage p based on fixed and random part
5209use "m5B_s12data_prepped.dta", clear

5210gen cons = 1

5211generate p = 100*invlogit( ///
  >         b_cons*cons ///
  >        +b_female*female ///
  >        +b_latinx_race*latinx_race ///
  >        +b_black_race*black_race ///
  >        +b_lowparentedu*lowparentedu ///
  >        + u ///
  >    )
```

```
5212label var p "Percentage based on main effects and interactions"

5213format %9.3f p

5214
5215* Percentage p based only on the fixed-part
5216generate pA = 100*invlogit( ///
   >           b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_race*latinx_race ///
   >          +b_black_race*black_race ///
   >          +b_lowparentedu*lowparentedu ///
   >   )

5217label var pA "Percentage based only on main effects"

5218format %9.3f pA

5219
5220* Percentage pB calculated as the difference between p and pA
5221generate pB = p - pA

5222label var pB "Percentage point difference based on interaction effects"

5223format %9.3f pB

5224
5225* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5226bysort strata12 (iteration): egen pmn = mean(p)

5227bysort strata12 (iteration): egen plo = pctile(p), p(2.5)

5228bysort strata12 (iteration): egen phi = pctile(p), p(97.5)

5229format %9.3f pmn plo phi

5230label var pmn "Percentage based on main effects and interactions"

5231label var plo "Percentage based on main effects and interactions"

5232label var phi "Percentage based on main effects and interactions"

5233
5234
5235bysort strata12 (iteration): egen pAmn = mean(pA)

5236bysort strata12 (iteration): egen pAlo = pctile(pA), p(2.5)

5237bysort strata12 (iteration): egen pAhi = pctile(pA), p(97.5)

5238format %9.3f pAmn pAlo pAhi

5239label var pAmn "Percentage based on main effects"

5240label var pAlo "Percentage based on main effects"

5241label var pAhi "Percentage based on main effects"

5242
5243bysort strata12 (iteration): egen pBmn = mean(pB)
```

```
5244bysort strata12 (iteration): egen pBlo = pctile(pB), p(2.5)

5245bysort strata12 (iteration): egen pBhi = pctile(pB), p(97.5)

5246format %9.3f pBmn pBlo pBhi

5247label var pBmn "Percentage point difference based on interaction effects"

5248label var pBlo "Percentage point difference based on interaction effects"

5249label var pBhi "Percentage point difference based on interaction effects"

5250
5251* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5252drop iteration b* u* p pA pB

5253duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

5254isid strata12

5255
5256* Ranks
5257sort pmn

5258generate pmnrank = _n

5259order pmnrank, after(phi)

5260sort pAmn

5261generate pAmnrank = _n

5262order pAmnrank, after(pAhi)

5263sort pBmn

5264generate pBmnrank = _n

5265order pBmnrank, after(pBhi)

5266
5267* Sort the data
5268sort strata12

5269isid strata12

5270
5271* Compress and save the data
5272compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (144 bytes saved)

5273save "m5B_s12results.dta", replace
  (note: file m5B_s12results.dta not found)
  file m5B_s12results.dta saved
```

```
5274
5275* List strata with statistically significant interaction effects on the predicted in
 > cidence
5276use "m5B_s12results.dta", clear

5277list strata12  pBmn pBlo pBhi if pBhi<0, noobs

5278list strata12  pBmn pBlo pBhi if pBlo>0, noobs

5279
5280
5281*********************************************************************************
5282* MODEL 5A_S18 - MARIJUANA USE, Null MODEL
5283*********************************************************************************
5284
5285*------------------------------------------------------------------------*
5286* FIT THE MODEL
5287*------------------------------------------------------------------------*
5288
5289* Load the data
5290use "analysisready2.dta", clear

5291sort scid strata18 aid

5292
5293* delete if missing dependent variable (so can record number)
5294drop if use_mj_30days == .
 (232 observations deleted)

5295
5296* Fit model using PQL2
5297runmlwin use_mj_30days cons , ///
 >    level3(scid: cons) ///
 >    level2(strata18: cons) ///
 >    level1(aid:) ///
 >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
 >    rigls maxiterations(100) ///
 >    nopause
```

```
 MLwiN 3.2 multilevel model                    Number of obs    =      13809
 Binomial logit response model
 Estimation algorithm: RIGLS, PQL2
```

| | No. of | Observations per Group | | |
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata18	1612	1	8.6	192

```
 Run time (seconds)  =       2.99
 Number of iterations =       10
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.125454	.0672611	-31.60	0.000	-2.257283	-1.993624

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4442915	.074024	.2992071	.5893759
Level 2: strata18				
var(cons)	.1176948	.0358559	.0474186	.187971

```
5298
5299* Fit model using MCMC
5300runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m5A_s18_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5A_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13809
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	94.6	812
strata18	18	210	767.2	1568

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         200
Deviance (dbar)              =    10539.50
Deviance (thetabar)          =    10424.20
Effective no. of pars (pd)   =      115.30
Bayesian DIC                 =    10654.79
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.091228	.08323	593	0.000	-2.259792	-1.93182

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.4528829	.0800562	969	.3193927	.6220822
Level 2: strata18						
	var(cons)	.0378939	.0229776	1008	.0092047	.0953929

```
5301rename u0 m1u

5302drop u0se

5303
5304* Present the regression coefficients as odds ratios
5305runmlwin, or
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13809
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	94.6	812
strata18	18	210	767.2	1568

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         200
Deviance (dbar)               =    10539.50
Deviance (thetabar)           =    10424.20
Effective no. of pars (pd)    =      115.30
Bayesian DIC                  =    10654.79
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1239467	.0103818	604	0.000	.1043722	.1448842

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4528829	.0800562	969	.3193927	.6220822
Level 2: strata18					
var(cons)	.0378939	.0229776	1008	.0092047	.0953929

```
5306
5307* Calculate the ICC from the parameter point estimates
5308scalar m1sigma2u = [RP2]var(cons)

5309scalar m1sigma2e = _pi^2/3

5310display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.011

5311
5312* Calculate the ICC from the chains
5313use "m5A_s18_beta.dta", clear

5314rename RP3_var_cons_ sigma2uscid

5315rename RP2_var_cons_ sigma2u

5316generate sigma2e = _pi^2/3

5317generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5318generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5319mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0101849	.0059541	1002	0.000	.0024695	.0245994
icc_scid	.1189003	.0184689	975	0.000	.0871216	.1579048

```
5320
5321
5322****************************************************************************
5323* MODEL 5B_S18 - MARIJUANA USE, MAIN EFFECTS MODEL
5324****************************************************************************
```

```
5325
5326*------------------------------------------------------------------------------*
5327* FIT THE MODEL
5328*------------------------------------------------------------------------------*
5329
5330* Load the data
5331use "analysisready2.dta", clear

5332sort scid strata18 aid

5333
5334* delete if missing dependent variable (so can record number)
5335drop if use_mj_30days == .
  (232 observations deleted)

5336
5337* Fit model using PQL2
5338runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege, ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata18	**1612**	**1**	**8.6**	**192**

Run time (seconds)   =   **3.63**
Number of iterations =   **13**

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.012957	.0882472	-22.81	0.000	-2.185918	-1.839996
female	-.2562475	.0587193	-4.36	0.000	-.3713352	-.1411597
latinx_race	-.0027863	.0962495	-0.03	0.977	-.1914319	.1858592
black_race	-.1941389	.086583	-2.24	0.025	-.3638386	-.0244393
hsless	.0849135	.0754646	1.13	0.260	-.0629943	.2328214
somecollege	.1304724	.0746885	1.75	0.081	-.0159145	.2768592

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4401004	.0731561	.2967172	.5834837
Level 2: strata18				
var(cons)	.0991863	.0340148	.0325185	.165854

```
5339
5340* Fit model using MCMC
5341runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege, ///
>    level3(scid: cons) ///
>    level2(strata18: cons, residuals(u, savechains("m5B_s18_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5B_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata18	**18**	**210**	**767.2**	**1568**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         344
Deviance (dbar)               =    10539.23
Deviance (thetabar)           =    10426.53
Effective no. of pars (pd)    =      112.70
Bayesian DIC                  =    10651.93
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.975169	.1089548	396	0.000	-2.192362	-1.77484
female	-.2752241	.072058	723	0.000	-.418751	-.1412252
latinx_race	-.033296	.1086258	824	0.358	-.2435141	.1754331
black_race	-.1678363	.1002886	754	0.038	-.3632819	.0239681
hsless	.0922104	.0964842	615	0.151	-.1049119	.2746872
somecollege	.1447645	.0978762	570	0.057	-.037299	.3427085

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4523477	.0804782	734	.3201029	.6228048
Level 2: strata18					
var(cons)	.0110756	.0124415	848	.0006421	.0418206

5342rename u0 m1u

5343drop u0se

```
5344
5345* Present the regression coefficients as odds ratios
5346runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata18	18	210	767.2	1568

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         344
Deviance (dbar)               =    10539.23
Deviance (thetabar)           =    10426.53
Effective no. of pars (pd)    =      112.70
Bayesian DIC                  =    10651.93
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1396404	.0149374	403	0.000	.1116529	.1695105
female	.7609385	.0546102	725	0.000	.657868	.8682938
latinx_race	.9711821	.105668	822	0.358	.7838685	1.191762
black_race	.8486685	.0837763	750	0.038	.6953904	1.024258
hsless	1.100716	.1055197	614	0.151	.900404	1.316119
somecollege	1.162149	.1155971	555	0.057	.9633881	1.408758

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4523477	.0804782	734	.3201029	.6228048
Level 2: strata18					
var(cons)	.0110756	.0124415	848	.0006421	.0418206

```
5347
5348* Calculate the ICC from the parameter point estimates
5349scalar m1sigma2u = [RP2]var(cons)

5350scalar m1sigma2e = _pi^2/3

5351display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.003

5352
5353* Calculate the ICC from the chains
5354use "m5B_s18_beta.dta", clear

5355rename RP3_var_cons_ sigma2uscid

5356rename RP2_var_cons_ sigma2u

5357generate sigma2e = _pi^2/3

5358generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5359generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)
```

5360mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0029031	.0031159	854	0.000	.0001725	.0110773
icc_scid	.1201961	.0176873	735	0.000	.0886191	.157842

5361
5362
5363*--*
5364* PREPARE FIXED-PART PAREMETER CHAINS
5365*--*
5366
5367use "m5B_s18_beta.dta", clear

5368drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

5369rename FP1_* b_*

5370format %9.2f b_*

5371compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

5372save "m5B_s18_beta_prepped.dta", replace
  (note: file m5B_s18_beta_prepped.dta not found)
  file m5B_s18_beta_prepped.dta saved

5373isid iteration

5374codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

5375
5376
5377*--*
5378* PREPARE STRATUM RANDOM EFFECTS CHAINS
5379*--*
5380
5381use "m5B_s18_u.dta", clear

5382drop residual idnum

5383rename value u

5384format %9.2f u

5385sort strata18 iteration

5386order strata18 iteration

5387compress
    variable **strata18** was **double** now **int**
    variable **iteration** was **double** now **long**
    (180,000 bytes saved)

```
5388save "m5B_s18_u_prepped.dta", replace
  (note: file m5B_s18_u_prepped.dta not found)
  file m5B_s18_u_prepped.dta saved

5389isid strata18 iteration

5390codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**18000**	**1000**	**24976**	**1**	**49951**	Iteration

```
5391
5392
5393*-------------------------------------------------------------------------------*
5394* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5395*-------------------------------------------------------------------------------*
5396
5397use "data18.dta", clear

5398isid strata18

5399cross using "m5B_s18_beta_prepped.dta"

5400isid strata18 iteration

5401sort strata18 iteration

5402merge 1:1 strata18 iteration using "m5B_s18_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	**0**
matched	**18,000**

```
5403isid strata18 iteration

5404compress
    variable strata18 was double now int
    (108,000 bytes saved)

5405save "m5B_s18data_prepped.dta", replace
  (note: file m5B_s18data_prepped.dta not found)
  file m5B_s18data_prepped.dta saved

5406
5407
5408*-------------------------------------------------------------------------------*
5409* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5410*-------------------------------------------------------------------------------*
5411
5412* Percentage p based on fixed and random part
5413use "m5B_s18data_prepped.dta", clear

5414gen cons = 1
```

```
5415generate p = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         + u ///
   >   )

5416label var p "Percentage based on main effects and interactions"

5417format %9.3f p

5418
5419* Percentage p based only on the fixed-part
5420generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >   )

5421label var pA "Percentage based only on main effects"

5422format %9.3f pA

5423
5424* Percentage pB calculated as the difference between p and pA
5425generate pB = p - pA

5426label var pB "Percentage point difference based on interaction effects"

5427format %9.3f pB

5428
5429* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5430bysort strata18 (iteration): egen pmn = mean(p)

5431bysort strata18 (iteration): egen plo = pctile(p), p(2.5)

5432bysort strata18 (iteration): egen phi = pctile(p), p(97.5)

5433format %9.3f pmn plo phi

5434label var pmn "Percentage based on main effects and interactions"

5435label var plo "Percentage based on main effects and interactions"

5436label var phi "Percentage based on main effects and interactions"

5437
5438
5439bysort strata18 (iteration): egen pAmn = mean(pA)

5440bysort strata18 (iteration): egen pAlo = pctile(pA), p(2.5)

5441bysort strata18 (iteration): egen pAhi = pctile(pA), p(97.5)
```

```
5442format %9.3f pAmn pAlo pAhi

5443label var pAmn "Percentage based on main effects"

5444label var pAlo "Percentage based on main effects"

5445label var pAhi "Percentage based on main effects"

5446
5447bysort strata18 (iteration): egen pBmn = mean(pB)

5448bysort strata18 (iteration): egen pBlo = pctile(pB), p(2.5)

5449bysort strata18 (iteration): egen pBhi = pctile(pB), p(97.5)

5450format %9.3f pBmn pBlo pBhi

5451label var pBmn "Percentage point difference based on interaction effects"

5452label var pBlo "Percentage point difference based on interaction effects"

5453label var pBhi "Percentage point difference based on interaction effects"

5454
5455* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5456drop iteration b* u* p pA pB

5457duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

5458isid strata18

5459
5460* Ranks
5461sort pmn

5462generate pmnrank = _n

5463order pmnrank, after(phi)

5464sort pAmn

5465generate pAmnrank = _n

5466order pAmnrank, after(pAhi)

5467sort pBmn

5468generate pBmnrank = _n

5469order pBmnrank, after(pBhi)

5470
5471* Sort the data
5472sort strata18

5473isid strata18
```

```
5474
5475* Compress and save the data
5476compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (216 bytes saved)

5477save "m5B_s18results.dta", replace
  (note: file m5B_s18results.dta not found)
  file m5B_s18results.dta saved

5478
5479* List strata with statistically significant interaction effects on the predicted in
  > cidence
5480use "m5B_s18results.dta", clear

5481list strata18  pBmn pBlo pBhi if pBhi<0, noobs

5482list strata18  pBmn pBlo pBhi if pBlo>0, noobs

5483
5484
5485*********************************************************************************
5486* MODEL 5A_S36 - MARIJUANA USE, Null MODEL
5487*********************************************************************************
5488
5489*------------------------------------------------------------------------------*
5490* FIT THE MODEL
5491*------------------------------------------------------------------------------*
5492
5493* Load the data
5494use "analysisready2.dta", clear

5495sort scid strata36 aid

5496
5497* delete if missing dependent variable (so can record number)
5498drop if use_mj_30days == .
  (232 observations deleted)

5499
5500* Fit model using PQL2
5501runmlwin use_mj_30days cons , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

  MLwiN 3.2 multilevel model   Number of obs   =   **13809**
  Binomial logit response model
  Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata36	**2582**	**1**	**5.3**	**171**

  Run time (seconds)   =   **3.63**
  Number of iterations =   **11**

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.127333**	**.0673088**	**-31.61**	**0.000**	**-2.259256**	**-1.99541**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4498728	.0740627	.3047127	.5950329
Level 2: strata36				
var(cons)	.1284221	.0393548	.0512882	.205556

```
5502
5503* Fit model using MCMC
5504runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m5A_s36_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5A_s36_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	94.6	812
strata36	36	45	383.6	1075

```
Burnin                      =       5000
Chain                       =      50000
Thinning                    =         50
Run time (seconds)          =        201
Deviance (dbar)             =   10531.08
Deviance (thetabar)         =   10409.96
Effective no. of pars (pd)  =     121.12
Bayesian DIC                =   10652.20
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	−2.093944	.0772213	607	0.000	−2.250465	−1.955395

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4592039	.0804169	900	.3143038	.6248599
Level 2: strata36					
var(cons)	.034852	.0171822	871	.0098971	.0738624

```
5505rename u0 m1u
```

```
5506drop u0se

5507
5508* Present the regression coefficients as odds ratios
5509runmlwin, or
```

```
  MLwiN 3.2 multilevel model                    Number of obs      =      13809
  Binomial logit response model
  Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	94.6	812
strata36	36	45	383.6	1075

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         201
Deviance (dbar)              =    10531.08
Deviance (thetabar)          =    10409.96
Effective no. of pars (pd) =       121.12
Bayesian DIC                 =    10652.20
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1234672	.0092098	605	0.000	.1053503	.1415085

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4592039	.0804169	900	.3143038	.6248599
Level 2: strata36					
var(cons)	.034852	.0171822	871	.0098971	.0738624

```
5510
5511* Calculate the ICC from the parameter point estimates
5512scalar m1sigma2u = [RP2]var(cons)

5513scalar m1sigma2e = _pi^2/3

5514display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.010

5515
5516* Calculate the ICC from the chains
5517use "m5A_s36_beta.dta", clear

5518rename RP3_var_cons_ sigma2uscid

5519rename RP2_var_cons_ sigma2u

5520generate sigma2e =  _pi^2/3
```

```
5521generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5522generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5523mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.008909	.0043554	881	0.000	.0025679	.0193249
icc_scid	.1203559	.0186097	908	0.000	.0865468	.1583361

```
5524
5525
5526****************************************************************************
5527* MODEL 5B_S36 - MARIJUANA USE, MAIN EFFECTS MODEL
5528****************************************************************************
5529
5530*--------------------------------------------------------------------------*
5531* FIT THE MODEL
5532*--------------------------------------------------------------------------*
5533
5534* Load the data
5535use "analysisready2.dta", clear

5536sort scid strata36 aid

5537
5538* delete if missing dependent variable (so can record number)
5539drop if use_mj_30days == .
  (232 observations deleted)

5540
5541* Fit model using PQL2
5542runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege lowinc,
  > ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                      Number of obs      =      13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata36	2582	1	5.3	171

```
  Run time (seconds)   =      4.05
  Number of iterations =        12
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.085939	.0908868	-22.95	0.000	-2.264074	-1.907804
female	-.2543346	.0569994	-4.46	0.000	-.3660514	-.1426178
latinx_race	-.0370185	.0954574	-0.39	0.698	-.2241116	.1500745
black_race	-.2307813	.0861316	-2.68	0.007	-.3995962	-.0619665
hsless	.0289823	.0757115	0.38	0.702	-.1194094	.177374
somecollege	.1074323	.0728212	1.48	0.140	-.0352946	.2501593
lowinc	.185395	.0625519	2.96	0.003	.0627955	.3079945

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid					
	var(cons)	.4508657	.0739584	.30591	.5958214
Level 2: strata36					
	var(cons)	.1111191	.0377683	.0370945	.1851436

```
5543
5544* Fit model using MCMC
5545runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege lowinc,
> ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m5B_s36_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5B_s36_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata36	**36**	**45**	**383.6**	**1075**

```
Burnin                    =        5000
Chain                     =       50000
Thinning                  =          50
Run time (seconds)        =         370
Deviance (dbar)           =    10530.36
Deviance (thetabar)       =    10415.12
Effective no. of pars (pd) =      115.24
Bayesian DIC              =    10645.59
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.03759	.0991445	407	0.000	-2.223732	-1.844975
female	-.2693914	.0615592	903	0.001	-.3950837	-.1500468
latinx_race	-.055177	.0984518	903	0.287	-.2419902	.1463946
black_race	-.2004567	.0888382	951	0.015	-.3654472	-.0206025
hsless	.0360929	.0781989	906	0.336	-.1187987	.195478
somecollege	.1159224	.0774926	960	0.060	-.0294303	.2629575
lowinc	.1613824	.066331	856	0.010	.0263868	.2965224

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.4616801	.0803575	768	.3272397	.6279357
Level 2: strata36						
	var(cons)	.0072702	.007405	475	.0006344	.0272755

```
5546rename u0 m1u

5547drop u0se

5548
5549* Present the regression coefficients as odds ratios
5550runmlwin, or
```

```
  MLwiN 3.2 multilevel model                    Number of obs      =      13809
  Binomial logit response model
  Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata36	**36**	**45**	**383.6**	**1075**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         370
Deviance (dbar)               =    10530.36
Deviance (thetabar)           =    10415.12
Effective no. of pars (pd)    =      115.24
Bayesian DIC                  =    10645.59
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1309238	.013124	413	0.000	.1082046	.1580293
female	.7682612	.047867	913	0.001	.6736236	.8606677
latinx_race	.9541174	.0958562	884	0.287	.785064	1.157653
black_race	.8219828	.0726721	937	0.015	.6938864	.9796088
hsless	1.036546	.0823025	902	0.336	.8879866	1.215892
somecollege	1.123436	.0869518	943	0.060	.9709986	1.300772
lowinc	1.178744	.0800703	858	0.010	1.026738	1.345173

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4616801	.0803575	768	.3272397	.6279357
Level 2: strata36					
var(cons)	.0072702	.007405	475	.0006344	.0272755

```
5551
5552* Calculate the ICC from the parameter point estimates
5553scalar m1sigma2u = [RP2]var(cons)

5554scalar m1sigma2e = _pi^2/3

5555display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.002

5556
```

```
5557* Calculate the ICC from the chains
5558use "m5B_s36_beta.dta", clear

5559rename RP3_var_cons_ sigma2uscid

5560rename RP2_var_cons_ sigma2u

5561generate sigma2e =  _pi^2/3

5562generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5563generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5564mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0018982	.0019878	472	0.000	.0001704	.0072197
icc_scid	.1227996	.0180565	766	0.000	.0901689	.16001

```
5565
5566
5567*------------------------------------------------------------------------------*
5568* PREPARE FIXED-PART PAREMETER CHAINS
5569*------------------------------------------------------------------------------*
5570
5571use "m5B_s36_beta.dta", clear

5572drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

5573rename FP1_* b_*

5574format %9.2f b_*

5575compress
    variable iteration was double now long
    (4,000 bytes saved)

5576save "m5B_s36_beta_prepped.dta", replace
  (note: file m5B_s36_beta_prepped.dta not found)
  file m5B_s36_beta_prepped.dta saved

5577isid iteration

5578codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
5579
5580
5581*------------------------------------------------------------------------------*
5582* PREPARE STRATUM RANDOM EFFECTS CHAINS
5583*------------------------------------------------------------------------------*
5584
```

5585use "m5B_s36_u.dta", clear

5586drop residual idnum

5587rename value u

5588format %9.2f u

5589sort strata36 iteration

5590order strata36 iteration

5591compress
   variable **strata36** was **double** now **int**
   variable **iteration** was **double** now **long**
   (360,000 bytes saved)

5592save "m5B_s36_u_prepped.dta", replace
  (note: file m5B_s36_u_prepped.dta not found)
  file m5B_s36_u_prepped.dta saved

5593isid strata36 iteration

5594codebook iteration, compact

  Variable   Obs Unique   Mean Min   Max Label
  ───

    ───
    iteration **36000**   **1000** **24976**   **1** **49951** Iteration
  ───

    ───

5595
5596
5597*---*
5598* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5599*---*
5600
5601use "data36.dta", clear

5602isid strata36

5603cross using "m5B_s36_beta_prepped.dta"

5604isid strata36 iteration

5605sort strata36 iteration

5606merge 1:1 strata36 iteration using "m5B_s36_u_prepped.dta", nogenerate assert(match)

        Result   # of obs.
        ───
        not matched   **0**
        matched   **36,000**
        ───

5607isid strata36 iteration

5608compress
   variable **strata36** was **double** now **int**
   (216,000 bytes saved)

```
5609save "m5B_s36data_prepped.dta", replace
   (note: file m5B_s36data_prepped.dta not found)
   file m5B_s36data_prepped.dta saved

5610
5611
5612*------------------------------------------------------------------------------*
5613* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5614*------------------------------------------------------------------------------*
5615
5616* Percentage p based on fixed and random part
5617use "m5B_s36data_prepped.dta", clear

5618gen cons = 1

5619generate p = 100*invlogit( ///
   >         b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >         + u ///
   >   )

5620label var p "Percentage based on main effects and interactions"

5621format %9.3f p

5622
5623* Percentage p based only on the fixed-part
5624generate pA = 100*invlogit( ///
   >         b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >   )

5625label var pA "Percentage based only on main effects"

5626format %9.3f pA

5627
5628* Percentage pB calculated as the difference between p and pA
5629generate pB = p - pA

5630label var pB "Percentage point difference based on interaction effects"

5631format %9.3f pB

5632
5633* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5634bysort strata36 (iteration): egen pmn = mean(p)

5635bysort strata36 (iteration): egen plo = pctile(p), p(2.5)
```

```
5636bysort strata36 (iteration): egen phi = pctile(p), p(97.5)

5637format %9.3f pmn plo phi

5638label var pmn "Percentage based on main effects and interactions"

5639label var plo "Percentage based on main effects and interactions"

5640label var phi "Percentage based on main effects and interactions"

5641
5642
5643bysort strata36 (iteration): egen pAmn = mean(pA)

5644bysort strata36 (iteration): egen pAlo = pctile(pA), p(2.5)

5645bysort strata36 (iteration): egen pAhi = pctile(pA), p(97.5)

5646format %9.3f pAmn pAlo pAhi

5647label var pAmn "Percentage based on main effects"

5648label var pAlo "Percentage based on main effects"

5649label var pAhi "Percentage based on main effects"

5650
5651bysort strata36 (iteration): egen pBmn = mean(pB)

5652bysort strata36 (iteration): egen pBlo = pctile(pB), p(2.5)

5653bysort strata36 (iteration): egen pBhi = pctile(pB), p(97.5)

5654format %9.3f pBmn pBlo pBhi

5655label var pBmn "Percentage point difference based on interaction effects"

5656label var pBlo "Percentage point difference based on interaction effects"

5657label var pBhi "Percentage point difference based on interaction effects"

5658
5659* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5660drop iteration b* u* p pA pB

5661duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

5662isid strata36

5663
5664* Ranks
5665sort pmn

5666generate pmnrank = _n

5667order pmnrank, after(phi)
```

```
5668sort pAmn

5669generate pAmnrank = _n

5670order pAmnrank, after(pAhi)

5671sort pBmn

5672generate pBmnrank = _n

5673order pBmnrank, after(pBhi)

5674
5675* Sort the data
5676sort strata36

5677isid strata36

5678
5679* Compress and save the data
5680compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (432 bytes saved)

5681save "m5B_s36results.dta", replace
  (note: file m5B_s36results.dta not found)
  file m5B_s36results.dta saved

5682
5683* List strata with statistically significant interaction effects on the predicted in
  > cidence
5684use "m5B_s36results.dta", clear

5685list strata36  pBmn pBlo pBhi if pBhi<0, noobs

5686list strata36  pBmn pBlo pBhi if pBlo>0, noobs

5687
5688
5689*******************************************************************************
5690* MODEL 5A_S48 - MARIJUANA USE, Null MODEL
5691*******************************************************************************
5692
5693*-----------------------------------------------------------------------------*
5694* FIT THE MODEL
5695*-----------------------------------------------------------------------------*
5696
5697* Load the data
5698use "analysisready2.dta", clear

5699sort scid strata48 aid

5700
5701* delete if missing dependent variable (so can record number)
5702drop if use_mj_30days == .
  (232 observations deleted)
```

```
5703
5704* Fit model using PQL2
5705runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata48	**2689**	**1**	**5.1**	**142**

Run time (seconds)   =   **3.71**
Number of iterations =   **11**

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.137938**	**.0675093**	**-31.67**	**0.000**	**-2.270253**	**-2.005622**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.4502223**	**.0744716**	**.3042606**	**.596184**
Level 2: strata48			
var(cons)	**.1544827**	**.0419135**	**.0723336**	**.2366317**

```
5706
5707* Fit model using MCMC
5708runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m5A_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5A_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata48	**48**	**3**	**287.7**	**1075**

```
Burnin                        =          5000
Chain                         =         50000
Thinning                      =            50
Run time (seconds)            =           201
Deviance (dbar)               =      10502.63
Deviance (thetabar)           =      10374.23
Effective no. of pars (pd)    =        128.40
Bayesian DIC                  =      10631.03
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.125052	.0847846	605	0.000	-2.283634	-1.954011

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4594946	.0801386	992	.3266853	.6438828
Level 2: strata48					
var(cons)	.0747755	.0331335	981	.0262192	.1575741

5709 rename u0 m1u

5710 drop u0se

5711
5712 * Present the regression coefficients as odds ratios
5713 runmlwin, or

```
MLwiN 3.2 multilevel model                     Number of obs    =      13809
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata48	48	3	287.7	1075

```
Burnin                        =          5000
Chain                         =         50000
Thinning                      =            50
Run time (seconds)            =           201
Deviance (dbar)               =      10502.63
Deviance (thetabar)           =      10374.23
Effective no. of pars (pd)    =        128.40
Bayesian DIC                  =      10631.03
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1198741	.0102308	600	0.000	.1019132	.1417046

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4594946	.0801386	992	.3266853	.6438828
Level 2: strata48					
var(cons)	.0747755	.0331335	981	.0262192	.1575741

```
5714
5715* Calculate the ICC from the parameter point estimates
5716scalar m1sigma2u = [RP2]var(cons)

5717scalar m1sigma2e = _pi^2/3

5718display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.022

5719
5720* Calculate the ICC from the chains
5721use "m5A_s48_beta.dta", clear

5722rename RP3_var_cons_ sigma2uscid

5723rename RP2_var_cons_ sigma2u

5724generate sigma2e =  _pi^2/3

5725generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5726generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5727mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0196689	.0087305	987	0.000	.006914	.0400469
icc_scid	.1190223	.0182131	994	0.000	.0884302	.1597218

```
5728
5729
5730*****************************************************************************
5731* MODEL 5B_S48 - MARIJUANA USE, MAIN EFFECTS MODEL
5732*****************************************************************************
5733
5734*---------------------------------------------------------------------------*
5735* FIT THE MODEL
5736*---------------------------------------------------------------------------*
5737
5738* Load the data
5739use "analysisready2.dta", clear

5740sort scid strata48 aid

5741
5742* delete if missing dependent variable (so can record number)
5743drop if use_mj_30days == .
  (232 observations deleted)

5744
5745* Fit model using PQL2
5746runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
  > winc, ///
  >    level3(scid: cons) ///
  >    level2(strata48: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                Number of obs    =      13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata48	2689	1	5.1	142

```
Run time (seconds)   =      4.06
Number of iterations =        11
```

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.084036	.0901387	-23.12	0.000	-2.260705	-1.907368
female	-.2562563	.0562076	-4.56	0.000	-.3664212	-.1460914
latinx_imm	-1.190776	.2458097	-4.84	0.000	-1.672554	-.7089976
latinx_non	.0769	.0956417	0.80	0.421	-.1105544	.2643543
black	-.2318079	.0852899	-2.72	0.007	-.3989731	-.0646428
hsless	.03092	.0748784	0.41	0.680	-.1158391	.1776791
somecollege	.1053328	.0720572	1.46	0.144	-.0358968	.2465623
lowinc	.2009412	.0618571	3.25	0.001	.0797035	.3221789

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4470025	.0731275	.3036753	.5903298
Level 2: strata48				
var(cons)	.0957994	.0364662	.024327	.1672717

```
5747
5748* Fit model using MCMC
5749runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
> winc, ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m5B_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5B_s48_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

```
MLwiN 3.2 multilevel model                   Number of obs      =     13809
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata48	48	3	287.7	1075

```
Burnin                      =      5000
Chain                       =     50000
Thinning                    =        50
Run time (seconds)          =       401
Deviance (dbar)             =  10494.06
Deviance (thetabar)         =  10379.67
Effective no. of pars (pd)  =    114.39
Bayesian DIC                =  10608.45
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.041299	.0987974	496	0.000	-2.248317	-1.85806
female	-.2711324	.0598999	1300	0.000	-.3892557	-.1568564
latinx_imm	-1.212083	.2386594	931	0.000	-1.69829	-.7601387

latinx_non	.0561956	.0954419	898	0.291	-.1350622	.2341453
black	-.206078	.0865784	1028	0.005	-.3693053	-.0325373
hsless	.0368568	.0777118	721	0.319	-.1030526	.1995865
somecollege	.1142525	.0753832	794	0.066	-.0334233	.2618249
lowinc	.18153	.065252	714	0.003	.0550198	.3046189

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4590587	.0821704	1002	.3254792	.6448958
Level 2: strata48					
var(cons)	.0060449	.0065706	420	.0005092	.0222601

5750rename u0 m1u

5751drop u0se

5752
5753* Present the regression coefficients as odds ratios
5754runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   13809
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata48	48	3	287.7	1075

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   401
Deviance (dbar)   =   10494.06
Deviance (thetabar)   =   10379.67
Effective no. of pars (pd)   =   114.39
Bayesian DIC   =   10608.45

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1301256	.0127482	493	0.000	.1055768	.1559749
female	.7632531	.0471065	1281	0.000	.677561	.8548269
latinx_imm	.3059126	.0741179	892	0.000	.1829962	.4676016
latinx_non	1.05736	.1016296	914	0.291	.8736616	1.263828
black	.8126463	.0679543	1024	0.005	.6912144	.9679863
hsless	1.044006	.0823955	724	0.319	.9020795	1.220898
somecollege	1.129129	.0856709	789	0.066	.9671291	1.299299
lowinc	1.202553	.0755704	713	0.003	1.056562	1.356108

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4590587	.0821704	1002	.3254792	.6448958
Level 2: strata48					
var(cons)	.0060449	.0065706	420	.0005092	.0222601

```
5755
5756* Calculate the ICC from the parameter point estimates
5757scalar m1sigma2u = [RP2]var(cons)

5758scalar m1sigma2e = _pi^2/3

5759display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.002

5760
5761* Calculate the ICC from the chains
5762use "m5B_s48_beta.dta", clear

5763rename RP3_var_cons_ sigma2uscid

5764rename RP2_var_cons_ sigma2u

5765generate sigma2e =  _pi^2/3

5766generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5767generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5768mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0015994	.0016134	418	0.000	.0001353	.005856
icc_scid	.1232551	.0190599	997	0.000	.0899938	.1632756

```
5769
5770
5771*------------------------------------------------------------------------------*
5772* PREPARE FIXED-PART PAREMETER CHAINS
5773*------------------------------------------------------------------------------*
5774
5775use "m5B_s48_beta.dta", clear

5776drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

5777rename FP1_* b_*

5778format %9.2f b_*

5779compress
   variable iteration was double now long
   (4,000 bytes saved)

5780save "m5B_s48_beta_prepped.dta", replace
  (note: file m5B_s48_beta_prepped.dta not found)
  file m5B_s48_beta_prepped.dta saved

5781isid iteration

5782codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
5783
5784
5785*-------------------------------------------------------------------------------*
5786* PREPARE STRATUM RANDOM EFFECTS CHAINS
5787*-------------------------------------------------------------------------------*
5788
5789use "m5B_s48_u.dta", clear

5790drop residual idnum

5791rename value u

5792format %9.2f u

5793sort strata48 iteration

5794order strata48 iteration

5795compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

5796save "m5B_s48_u_prepped.dta", replace
  (note: file m5B_s48_u_prepped.dta not found)
  file m5B_s48_u_prepped.dta saved

5797isid strata48 iteration

5798codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	48000	1000	24976	1	49951	Iteration

```
5799
5800
5801*-------------------------------------------------------------------------------*
5802* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5803*-------------------------------------------------------------------------------*
5804
5805use "data48.dta", clear

5806isid strata48

5807cross using "m5B_s48_beta_prepped.dta"

5808isid strata48 iteration

5809sort strata48 iteration

5810merge 1:1 strata48 iteration using "m5B_s48_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	48,000

```
5811isid strata48 iteration

5812compress
     variable strata48 was double now int
     (288,000 bytes saved)

5813save "m5B_s48data_prepped.dta", replace
   (note: file m5B_s48data_prepped.dta not found)
   file m5B_s48data_prepped.dta saved

5814
5815
5816*-------------------------------------------------------------------------------*
5817* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5818*-------------------------------------------------------------------------------*
5819
5820* Percentage p based on fixed and random part
5821use "m5B_s48data_prepped.dta", clear

5822gen cons = 1

5823generate p = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_imm*latinx_imm ///
   >         +b_latinx_non*latinx_non ///
   >         +b_black*black ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >         + u ///
   >     )

5824label var p "Percentage based on main effects and interactions"

5825format %9.3f p

5826
5827* Percentage p based only on the fixed-part
5828generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_imm*latinx_imm ///
   >         +b_latinx_non*latinx_non ///
   >         +b_black*black ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >     )

5829label var pA "Percentage based only on main effects"

5830format %9.3f pA

5831
5832* Percentage pB calculated as the difference between p and pA
5833generate pB = p - pA

5834label var pB "Percentage point difference based on interaction effects"
```

```
5835format %9.3f pB

5836
5837* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5838bysort strata48 (iteration): egen pmn = mean(p)

5839bysort strata48 (iteration): egen plo = pctile(p), p(2.5)

5840bysort strata48 (iteration): egen phi = pctile(p), p(97.5)

5841format %9.3f pmn plo phi

5842label var pmn "Percentage based on main effects and interactions"

5843label var plo "Percentage based on main effects and interactions"

5844label var phi "Percentage based on main effects and interactions"

5845
5846
5847bysort strata48 (iteration): egen pAmn = mean(pA)

5848bysort strata48 (iteration): egen pAlo = pctile(pA), p(2.5)

5849bysort strata48 (iteration): egen pAhi = pctile(pA), p(97.5)

5850format %9.3f pAmn pAlo pAhi

5851label var pAmn "Percentage based on main effects"

5852label var pAlo "Percentage based on main effects"

5853label var pAhi "Percentage based on main effects"

5854
5855bysort strata48 (iteration): egen pBmn = mean(pB)

5856bysort strata48 (iteration): egen pBlo = pctile(pB), p(2.5)

5857bysort strata48 (iteration): egen pBhi = pctile(pB), p(97.5)

5858format %9.3f pBmn pBlo pBhi

5859label var pBmn "Percentage point difference based on interaction effects"

5860label var pBlo "Percentage point difference based on interaction effects"

5861label var pBhi "Percentage point difference based on interaction effects"

5862
5863* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5864drop iteration b* u* p pA pB

5865duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

5866isid strata48
```

```
5867
5868* Ranks
5869sort pmn

5870generate pmnrank = _n

5871order pmnrank, after(phi)

5872sort pAmn

5873generate pAmnrank = _n

5874order pAmnrank, after(pAhi)

5875sort pBmn

5876generate pBmnrank = _n

5877order pBmnrank, after(pBhi)

5878
5879* Sort the data
5880sort strata48

5881isid strata48

5882
5883* Compress and save the data
5884compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (576 bytes saved)

5885save "m5B_s48results.dta", replace
  (note: file m5B_s48results.dta not found)
  file m5B_s48results.dta saved

5886
5887* List strata with statistically significant interaction effects on the predicted in
  > cidence
5888use "m5B_s48results.dta", clear

5889list strata48  pBmn pBlo pBhi if pBhi<0, noobs

5890list strata48  pBmn pBlo pBhi if pBlo>0, noobs

5891
5892
5893********************************************************************************
5894* MODEL 5A_S96 - MARIJUANA USE, Null MODEL
5895********************************************************************************
5896
5897*------------------------------------------------------------------------------*
5898* FIT THE MODEL
5899*------------------------------------------------------------------------------*
5900
5901* Load the data
5902use "analysisready2.dta", clear
```

```
5903sort scid strata96 aid

5904
5905* delete if missing dependent variable (so can record number)
5906drop if use_mj_30days == .
  (232 observations deleted)

5907
5908* Fit model using PQL2
5909runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata96	**3602**	**1**	**3.8**	**130**

Run time (seconds)   =   **4.21**
Number of iterations =   **11**

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.124909**	**.0673214**	**-31.56**	**0.000**	**-2.256856**	**-1.992961**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.4537146**	**.0740703**	**.3085394**	**.5988898**
Level 2: strata96			
var(cons)	**.1248173**	**.0417682**	**.0429533**	**.2066814**

```
5910
5911* Fit model using MCMC
5912runmlwin use_mj_30days cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons, residuals(u, savechains("m5A_s96_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m5A_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata96	**91**	**1**	**151.7**	**890**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          202
Deviance (dbar)                =     10443.83
Deviance (thetabar)            =     10300.96
Effective no. of pars (pd)     =       142.87
Bayesian DIC                   =     10586.71
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	-2.09578	.0871941	579	0.000	-2.282638	-1.925884

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid					
var(cons)	.4546106	.0804522	932	.3196857	.6415221
Level 2: strata96					
var(cons)	.1131154	.035201	1087	.0594903	.1887208

5913 rename u0 m1u

5914 drop u0se

5915
5916 * Present the regression coefficients as odds ratios
5917 runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs      =      13809
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	94.6	812
strata96	91	1	151.7	890

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          202
Deviance (dbar)                =     10443.83
Deviance (thetabar)            =     10300.96
Effective no. of pars (pd)     =       142.87
Bayesian DIC                   =     10586.71
```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	.12351	.0109842	578	0.000	.1020147	.1457469

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid					
var(cons)	.4546106	.0804522	932	.3196857	.6415221
Level 2: strata96					
var(cons)	.1131154	.035201	1087	.0594903	.1887208

```
5918
5919* Calculate the ICC from the parameter point estimates
5920scalar m1sigma2u = [RP2]var(cons)

5921scalar m1sigma2e = _pi^2/3

5922display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.033

5923
5924* Calculate the ICC from the chains
5925use "m5A_s96_beta.dta", clear

5926rename RP3_var_cons_ sigma2uscid

5927rename RP2_var_cons_ sigma2u

5928generate sigma2e = _pi^2/3

5929generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5930generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5931mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.028953	.0085413	1097	0.000	.0156426	.0482512
icc_scid	.1178046	.0182509	944	0.000	.0862004	.1582857

```
5932
5933
5934*****************************************************************************
5935* MODEL 5B_S96 - MARIJUANA USE, MAIN EFFECTS MODEL
5936*****************************************************************************
5937
5938*---------------------------------------------------------------------------*
5939* FIT THE MODEL
5940*---------------------------------------------------------------------------*
5941
5942* Load the data
5943use "analysisready2.dta", clear

5944sort scid strata96 aid

5945
5946* delete if missing dependent variable (so can record number)
5947drop if use_mj_30days == .
  (232 observations deleted)

5948
5949* Fit model using PQL2
5950runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
  > winc straight_no, ///
  >    level3(scid: cons) ///
  >    level2(strata96: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                  Number of obs    =     13809
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata96	3602	1	3.8	130

Run time (seconds)   =   4.20
Number of iterations =   10

use_mj_30d~s	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.095466	.0870107	-24.08	0.000	-2.266003	-1.924928
female	-.3193492	.0535094	-5.97	0.000	-.4242256	-.2144728
latinx_imm	-1.186038	.2362848	-5.02	0.000	-1.649147	-.7229278
latinx_non	.0553584	.0916137	0.60	0.546	-.1242012	.234918
black	-.1969222	.0815319	-2.42	0.016	-.3567217	-.0371227
hsless	.0390467	.0706401	0.55	0.580	-.0994053	.1774986
somecollege	.1121078	.0678645	1.65	0.099	-.0209042	.2451199
lowinc	.1916157	.0582722	3.29	0.001	.0774044	.3058271
straight_no	.4229202	.0700943	6.03	0.000	.2855379	.5603025

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.4371923	.0705397	.2989369	.5754476
Level 2: strata96				
var(cons)	.021757	.03005	-.0371398	.0806538

```
5951
5952* Fit model using MCMC
5953runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
> winc straight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m5B_s96_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m5B_s96_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
>   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   13809
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	94.6	812
strata96	91	1	151.7	890

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   444
Deviance (dbar)   =   10454.22
Deviance (thetabar)   =   10334.21
Effective no. of pars (pd) =   120.01
Bayesian DIC   =   10574.22

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.102727	.0993786	423	0.000	-2.305507	-1.905476
female	-.2947096	.067749	518	0.000	-.4220974	-.1373782

latinx_imm	-1.184792	.2388288	832	0.000	-1.673592	-.7466566
latinx_non	.066818	.0988571	834	0.252	-.1154012	.2538186
black	-.184143	.0904125	879	0.019	-.3560982	-.0160767
hsless	.0463585	.0811845	821	0.298	-.1241433	.2081219
somecollege	.110859	.0790696	759	0.081	-.0513351	.274508
lowinc	.1783486	.0678168	932	0.005	.0370504	.3037215
straight_no	.4012251	.0802624	848	0.000	.2363155	.5549531

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4484125	.0792428	1106	.3191772	.6182433
Level 2: strata96					
var(cons)	.0119374	.0119752	253	.0006671	.045023

5954 rename u0 m1u

5955 drop u0se

5956
5957 * Present the regression coefficients as odds ratios
5958 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13809**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**94.6**	**812**
strata96	**91**	**1**	**151.7**	**890**

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   444
Deviance (dbar)   =   10454.22
Deviance (thetabar)   =   10334.21
Effective no. of pars (pd)   =   120.01
Bayesian DIC   =   10574.22

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.122708	.0124159	430	0.000	.0997082	.1487519
female	.747308	.0545673	512	0.000	.6556702	.8716405
latinx_imm	.315671	.0751147	847	0.000	.1875721	.4739486
latinx_non	1.073791	.1041729	842	0.252	.8910087	1.288938
black	.8354649	.0740851	858	0.019	.7004039	.984052
hsless	1.047526	.0873713	808	0.298	.8832534	1.231363
somecollege	1.122066	.0900185	768	0.081	.9499603	1.315883
lowinc	1.197134	.0817244	930	0.005	1.037745	1.354892
straight_no	1.501019	.1187196	853	0.000	1.266574	1.741859

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.4484125	.0792428	1106	.3191772	.6182433
Level 2: strata96					
var(cons)	.0119374	.0119752	253	.0006671	.045023

```
5959
5960* Calculate the ICC from the parameter point estimates
5961scalar m1sigma2u = [RP2]var(cons)

5962scalar m1sigma2e = _pi^2/3

5963display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.004

5964
5965* Calculate the ICC from the chains
5966use "m5B_s96_beta.dta", clear

5967rename RP3_var_cons_ sigma2uscid

5968rename RP2_var_cons_ sigma2u

5969generate sigma2e =  _pi^2/3

5970generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

5971generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

5972mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0031925	.0032262	253	0.000	.0001782	.0117211
icc_scid	.1195489	.0182553	1108	0.000	.0882088	.1577601

```
5973
5974
5975*-------------------------------------------------------------------------------*
5976* PREPARE FIXED-PART PAREMETER CHAINS
5977*-------------------------------------------------------------------------------*
5978
5979use "m5B_s96_beta.dta", clear

5980drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

5981rename FP1_* b_*

5982format %9.2f b_*

5983compress
    variable iteration was double now long
    (4,000 bytes saved)

5984save "m5B_s96_beta_prepped.dta", replace
  (note: file m5B_s96_beta_prepped.dta not found)
  file m5B_s96_beta_prepped.dta saved

5985isid iteration

5986codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
5987
5988
5989*------------------------------------------------------------------------------*
5990* PREPARE STRATUM RANDOM EFFECTS CHAINS
5991*------------------------------------------------------------------------------*
5992
5993use "m5B_s96_u.dta", clear

5994drop residual idnum

5995rename value u

5996format %9.2f u

5997sort strata96 iteration

5998order strata96 iteration

5999compress
    variable strata96 was double now int
    variable iteration was double now long
    (910,000 bytes saved)

6000save "m5B_s96_u_prepped.dta", replace
  (note: file m5B_s96_u_prepped.dta not found)
  file m5B_s96_u_prepped.dta saved

6001isid strata96 iteration

6002codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```
6003
6004
6005*------------------------------------------------------------------------------*
6006* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6007*------------------------------------------------------------------------------*
6008
6009use "data96_mj.dta", clear

6010isid strata96

6011cross using "m5B_s96_beta_prepped.dta"

6012isid strata96 iteration

6013sort strata96 iteration

6014merge 1:1 strata96 iteration using "m5B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	91,000

```
6015isid strata96 iteration

6016compress
     variable strata96 was double now int
     (546,000 bytes saved)

6017save "m5B_s96data_prepped.dta", replace
  (note: file m5B_s96data_prepped.dta not found)
  file m5B_s96data_prepped.dta saved

6018
6019
6020*------------------------------------------------------------------------------*
6021* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6022*------------------------------------------------------------------------------*
6023
6024* Percentage p based on fixed and random part
6025use "m5B_s96data_prepped.dta", clear

6026gen cons = 1

6027generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >         + u ///
  >    )

6028label var p "Percentage based on main effects and interactions"

6029format %9.3f p

6030
6031* Percentage p based only on the fixed-part
6032generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >    )

6033label var pA "Percentage based only on main effects"

6034format %9.3f pA

6035
6036* Percentage pB calculated as the difference between p and pA
6037generate pB = p - pA
```

```
6038label var pB "Percentage point difference based on interaction effects"

6039format %9.3f pB

6040
6041* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6042bysort strata96 (iteration): egen pmn = mean(p)

6043bysort strata96 (iteration): egen plo = pctile(p), p(2.5)

6044bysort strata96 (iteration): egen phi = pctile(p), p(97.5)

6045format %9.3f pmn plo phi

6046label var pmn "Percentage based on main effects and interactions"

6047label var plo "Percentage based on main effects and interactions"

6048label var phi "Percentage based on main effects and interactions"

6049
6050
6051bysort strata96 (iteration): egen pAmn = mean(pA)

6052bysort strata96 (iteration): egen pAlo = pctile(pA), p(2.5)

6053bysort strata96 (iteration): egen pAhi = pctile(pA), p(97.5)

6054format %9.3f pAmn pAlo pAhi

6055label var pAmn "Percentage based on main effects"

6056label var pAlo "Percentage based on main effects"

6057label var pAhi "Percentage based on main effects"

6058
6059bysort strata96 (iteration): egen pBmn = mean(pB)

6060bysort strata96 (iteration): egen pBlo = pctile(pB), p(2.5)

6061bysort strata96 (iteration): egen pBhi = pctile(pB), p(97.5)

6062format %9.3f pBmn pBlo pBhi

6063label var pBmn "Percentage point difference based on interaction effects"

6064label var pBlo "Percentage point difference based on interaction effects"

6065label var pBhi "Percentage point difference based on interaction effects"

6066
6067* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6068drop iteration b* u* p pA pB

6069duplicates drop

  Duplicates in terms of all variables

  (90,909 observations deleted)
```

```
6070isid strata96

6071
6072* Ranks
6073sort pmn

6074generate pmnrank = _n

6075order pmnrank, after(phi)

6076sort pAmn

6077generate pAmnrank = _n

6078order pAmnrank, after(pAhi)

6079sort pBmn

6080generate pBmnrank = _n

6081order pBmnrank, after(pBhi)

6082
6083* Sort the data
6084sort strata96

6085isid strata96

6086
6087* Compress and save the data
6088compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (1,092 bytes saved)

6089save "m5B_s96results.dta", replace
  (note: file m5B_s96results.dta not found)
  file m5B_s96results.dta saved

6090
6091* List strata with statistically significant interaction effects on the predicted in
  > cidence
6092use "m5B_s96results.dta", clear

6093list strata96  pBmn pBlo pBhi if pBhi<0, noobs

6094list strata96  pBmn pBlo pBhi if pBlo>0, noobs

6095
6096
6097
6098****************************************************************************
6099****************************************************************************
6100****************************************************************************
6101*
6102*
6103* MODEL 6 - OTHER DRUG, MAIN EFFECTS MODEL
6104*
```

```
6105*
6106****************************************************************************
6107****************************************************************************
6108****************************************************************************
6109
6110****************************************************************************
6111* MODEL 6A_S6 - OTHER DRUG, Null MODEL
6112****************************************************************************
6113
6114*-------------------------------------------------------------------------*
6115* FIT THE MODEL
6116*-------------------------------------------------------------------------*
6117
6118* Load the data
6119use "analysisready2.dta", clear

6120sort scid strata6 aid

6121
6122* delete if missing dependent variable (so can record number)
6123drop if drugs_w1 == .
  (137 observations deleted)

6124
6125* Fit model using by PQL2
6126runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**678**	**1**	**20.5**	**340**

Run time (seconds)   =   **2.53**
Number of iterations =   **10**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.791417**	**.074924**	**-37.26**	**0.000**	**-2.938265**	**-2.644569**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.3720962**	**.0935713**	**.1886999**	**.5554926**
Level 2: strata6				
var(cons)	**.3793185**	**.0831615**	**.2163249**	**.5423121**

```
6127
6128* Fit model using by MCMC
6129runmlwin drugs_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m6A_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m6A_s6_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**6**	**1147**	**2317.3**	**4276**

```
Burnin                      =         5000
Chain                       =        50000
Thinning                    =           50
Run time (seconds)          =         3141
Deviance (dbar)             =      7603.61
Deviance (thetabar)         =      7517.11
Effective no. of pars (pd)  =        86.50
Bayesian DIC                =      7690.11
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	**-2.923347**	**.365904**	**42**	**0.000**	**-3.779911 -2.234414**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	**.3138524**	**.0638964**	**957**	**.2103117 .4439481**
Level 2: strata6				
var(cons)	**1.012644**	**1.060475**	**634**	**.2564494 3.572524**

6130rename u0 m1u

6131drop u0se

```
6132
6133* Present the regression coefficients as odds ratios
6134runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**6**	**1147**	**2317.3**	**4276**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =         3141
Deviance (dbar)               =      7603.61
Deviance (thetabar)           =      7517.11
Effective no. of pars (pd) =       86.50
Bayesian DIC                  =      7690.11
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.057297	.0202152	65	0.000	.022826	.1070549

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3138524	.0638964	957	.2103117	.4439481
Level 2: strata6					
var(cons)	1.012644	1.060475	634	.2564494	3.572524

```
6135
6136* Calculate the ICC from the parameter point estimates
6137scalar m1sigma2u = [RP2]var(cons)

6138scalar m1sigma2e = _pi^2/3

6139display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.235

6140
6141* Calculate the ICC from the chains
6142use "m6A_s6_beta.dta", clear

6143rename RP3_var_cons_ sigma2uscid

6144rename RP2_var_cons_ sigma2u

6145generate sigma2e =  _pi^2/3

6146generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6147generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6148mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1993561	.1137069	553	0.000	.0666839	.496221
icc_scid	.0686088	.0160252	714	0.000	.0393363	.1014273

```
6149
6150*****************************************************************************
6151* MODEL 6B_S6 - OTHER DRUG, MAIN EFFECTS MODEL
6152*****************************************************************************
6153
```

```
6154*------------------------------------------------------------------------------*
6155* FIT THE MODEL
6156*------------------------------------------------------------------------------*
6157
6158* Load the data
6159use "analysisready2.dta", clear

6160sort scid strata6 aid

6161
6162* delete if missing dependent variable (so can record number)
6163drop if drugs_w1 == .
  (137 observations deleted)

6164
6165* Fit model using by PQL2
6166runmlwin drugs_w1 cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**678**	**1**	**20.5**	**340**

Run time (seconds)   =   **2.71**
Number of iterations =   **10**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.353873**	**.0788131**	**-29.87**	**0.000**	**-2.508344**	**-2.199402**
female	**-.0131572**	**.0756759**	**-0.17**	**0.862**	**-.1614791**	**.1351648**
latinx_race	**-.1450774**	**.1112589**	**-1.30**	**0.192**	**-.3631408**	**.0729861**
black_race	**-1.586201**	**.1477353**	**-10.74**	**0.000**	**-1.875757**	**-1.296646**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.2830627**	**.0641508**	**.1573296**	**.4087959**
Level 2: strata6				
var(cons)	**.0787166**	**.0413288**	**-.0022864**	**.1597196**

```
6167
6168* Fit model using by MCMC
6169runmlwin drugs_w1 cons female latinx_race black_race , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m6B_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m6B_s6_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**6**	**1147**	**2317.3**	**4276**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         299
Deviance (dbar)             =     7605.23
Deviance (thetabar)         =     7518.47
Effective no. of pars (pd)  =       86.76
Bayesian DIC                =     7691.98
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.227329	.2755464	58	0.000	-2.81293	-1.5482
female	-.1723505	.2395237	83	0.157	-.6535162	.2931122
latinx_race	-.1947226	.3064135	102	0.198	-1.003146	.4390657
black_race	-1.66872	.3175917	291	0.000	-2.38152	-1.070968

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3124276	.0645356	904	.2027876	.4577966
Level 2: strata6					
var(cons)	.1127213	.6197896	94	.0010955	.5814043

```
6170 rename u0 m1u

6171 drop u0se

6172
6173 * Present the regression coefficients as odds ratios
6174 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata6	**6**	**1147**	**2317.3**	**4276**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         299
Deviance (dbar)             =     7605.23
Deviance (thetabar)         =     7518.47
Effective no. of pars (pd)  =       86.76
Bayesian DIC                =     7691.98
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1122648	.034296	60	0.000	.0600289	.2126304
female	.8658626	.2343171	74	0.157	.5202139	1.340594
latinx_race	.8630714	.2621359	127	0.198	.3667241	1.551258
black_race	.1997557	.0697474	331	0.000	.0924102	.3426766

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.3124276	.0645356	904	.2027876 .4577966
Level 2: strata6				
var(cons)	.1127213	.6197896	94	.0010955 .5814043

```
6175
6176* Calculate the ICC from the parameter point estimates
6177scalar m1sigma2u = [RP2]var(cons)

6178scalar m1sigma2e = _pi^2/3

6179display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.033

6180
6181* Calculate the ICC from the chains
6182use "m6B_s6_beta.dta", clear

6183rename RP3_var_cons_ sigma2uscid

6184rename RP2_var_cons_ sigma2u

6185generate sigma2e = _pi^2/3

6186generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6187generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6188mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
icc_strata	.0242466	.0511801	84	0.000	.0003071 .1412118
icc_scid	.0841051	.0163462	715	0.000	.0557499 .1203793

```
6189
6190
6191*------------------------------------------------------------------------------*
6192* PREPARE FIXED-PART PAREMETER CHAINS
6193*------------------------------------------------------------------------------*
6194
6195use "m6B_s6_beta.dta", clear

6196drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

6197rename FP1_* b_*

6198format %9.2f b_*

6199compress
    variable iteration was double now long
    (4,000 bytes saved)

6200save "m6B_s6_beta_prepped.dta", replace
  (note: file m6B_s6_beta_prepped.dta not found)
  file m6B_s6_beta_prepped.dta saved
```

6201isid iteration

6202codebook iteration, compact

```
  Variable    Obs Unique   Mean  Min   Max  Label
  ─────────────────────────────────────────────────────────────────────

    iteration  1000    1000  24976    1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────
```

6203
6204
6205*--*
6206* PREPARE STRATUM RANDOM EFFECTS CHAINS
6207*--*
6208
6209use "m6B_s6_u.dta", clear

6210drop residual idnum

6211rename value u

6212format %9.2f u

6213sort strata6 iteration

6214order strata6 iteration

6215compress
    variable **strata6** was **double** now **byte**
    variable **iteration** was **double** now **long**
    (66,000 bytes saved)

6216save "m6B_s6_u_prepped.dta", replace
  (note: file m6B_s6_u_prepped.dta not found)
  file m6B_s6_u_prepped.dta saved

6217isid strata6 iteration

6218codebook iteration, compact

```
  Variable    Obs Unique   Mean  Min   Max  Label
  ─────────────────────────────────────────────────────────────────────

    iteration  6000    1000  24976    1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────
```

6219
6220
6221*--*
6222* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6223*--*
6224
6225use "data6.dta", clear

6226isid strata6

6227cross using "m6B_s6_beta_prepped.dta"

```
6228isid strata6 iteration

6229sort strata6 iteration

6230merge 1:1 strata6 iteration using "m6B_s6_u_prepped.dta", nogenerate assert(match)

        Result                           # of obs.
        ─────────────────────────────────────────
        not matched                             0
        matched                             6,000
        ─────────────────────────────────────────


6231isid strata6 iteration

6232compress
    variable strata6 was double now byte
    (42,000 bytes saved)

6233save "m6B_s6data_prepped.dta", replace
  (note: file m6B_s6data_prepped.dta not found)
  file m6B_s6data_prepped.dta saved

6234
6235
6236*------------------------------------------------------------------------------*
6237* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6238*------------------------------------------------------------------------------*
6239
6240* Percentage p based on fixed and random part
6241use "m6B_s6data_prepped.dta", clear

6242gen cons = 1

6243generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         + u ///
  >     )

6244label var p "Percentage based on main effects and interactions"

6245format %9.3f p

6246
6247* Percentage p based only on the fixed-part
6248generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >     )

6249label var pA "Percentage based only on main effects"

6250format %9.3f pA

6251
6252* Percentage pB calculated as the difference between p and pA
```

```
6253generate pB = p - pA

6254label var pB "Percentage point difference based on interaction effects"

6255format %9.3f pB

6256
6257* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6258bysort strata6 (iteration): egen pmn = mean(p)

6259bysort strata6 (iteration): egen plo = pctile(p), p(2.5)

6260bysort strata6 (iteration): egen phi = pctile(p), p(97.5)

6261format %9.3f pmn plo phi

6262label var pmn "Percentage based on main effects and interactions"

6263label var plo "Percentage based on main effects and interactions"

6264label var phi "Percentage based on main effects and interactions"

6265
6266
6267bysort strata6 (iteration): egen pAmn = mean(pA)

6268bysort strata6 (iteration): egen pAlo = pctile(pA), p(2.5)

6269bysort strata6 (iteration): egen pAhi = pctile(pA), p(97.5)

6270format %9.3f pAmn pAlo pAhi

6271label var pAmn "Percentage based on main effects"

6272label var pAlo "Percentage based on main effects"

6273label var pAhi "Percentage based on main effects"

6274
6275bysort strata6 (iteration): egen pBmn = mean(pB)

6276bysort strata6 (iteration): egen pBlo = pctile(pB), p(2.5)

6277bysort strata6 (iteration): egen pBhi = pctile(pB), p(97.5)

6278format %9.3f pBmn pBlo pBhi

6279label var pBmn "Percentage point difference based on interaction effects"

6280label var pBlo "Percentage point difference based on interaction effects"

6281label var pBhi "Percentage point difference based on interaction effects"

6282
6283* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6284drop iteration b* u* p pA pB

6285duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)
```

```
6286isid strata6

6287
6288* Ranks
6289sort pmn

6290generate pmnrank = _n

6291order pmnrank, after(phi)

6292sort pAmn

6293generate pAmnrank = _n

6294order pAmnrank, after(pAhi)

6295sort pBmn

6296generate pBmnrank = _n

6297order pBmnrank, after(pBhi)

6298
6299* Sort the data
6300sort strata6

6301isid strata6

6302
6303* Compress and save the data
6304compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (72 bytes saved)

6305save "m6B_s6results.dta", replace
  (note: file m6B_s6results.dta not found)
  file m6B_s6results.dta saved

6306
6307* List strata with statistically significant interaction effects on the predicted in
  > cidence
6308use "m6B_s6results.dta", clear

6309list strata6  pBmn pBlo pBhi if pBhi<0, noobs

6310list strata6  pBmn pBlo pBhi if pBlo>0, noobs

6311
6312
6313*********************************************************************************
6314* MODEL 6A_S12 - OTHER DRUG, Null MODEL
6315*********************************************************************************
6316
6317*-------------------------------------------------------------------------------*
6318* FIT THE MODEL
6319*-------------------------------------------------------------------------------*
6320
```

```
6321* Load the data
6322use "analysisready2.dta", clear

6323sort scid strata12 aid

6324
6325* delete if missing dependent variable (so can record number)
6326drop if drugs_w1 == .
  (137 observations deleted)

6327
6328* Fit model using by PQL2
6329runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata12: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata12	**1166**	**1**	**11.9**	**217**

Run time (seconds)   =   **3.02**
Number of iterations =   **11**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.778206**	**.0755078**	**-36.79**	**0.000**	**-2.926198**	**-2.630213**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.4426471**	**.0927011**	**.2609563**	**.6243379**
Level 2: strata12				
var(cons)	**.3420322**	**.0731257**	**.1987086**	**.4853559**

```
6330
6331* Fit model using by MCMC
6332runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata12: cons, residuals(u, savechains("m6A_s12_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m6A_s12_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata12	**12**	**466**	**1158.7**	**2893**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          204
Deviance (dbar)               =      7596.65
Deviance (thetabar)           =      7504.01
Effective no. of pars (pd)    =        92.65
Bayesian DIC                  =      7689.30
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.904865	.2361318	83	0.000	-3.366885	-2.444057

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3261895	.0657483	840	.2124407	.4582957
Level 2: strata12					
var(cons)	.703277	.3920932	732	.2694507	1.684448

6333rename u0 m1u

6334drop u0se

6335
6336* Present the regression coefficients as odds ratios
6337runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs     =       13904
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.2	820
strata12	12	466	1158.7	2893

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          204
Deviance (dbar)               =      7596.65
Deviance (thetabar)           =      7504.01
Effective no. of pars (pd)    =        92.65
Bayesian DIC                  =      7689.30
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0562541	.0136514	79	0.000	.0344969	.0868079

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3261895	.0657483	840	.2124407	.4582957
Level 2: strata12					
var(cons)	.703277	.3920932	732	.2694507	1.684448

```
6338
6339* Calculate the ICC from the parameter point estimates
6340scalar m1sigma2u = [RP2]var(cons)

6341scalar m1sigma2e = _pi^2/3

6342display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.176

6343
6344* Calculate the ICC from the chains
6345use "m6A_s12_beta.dta", clear

6346rename RP3_var_cons_ sigma2uscid

6347rename RP2_var_cons_ sigma2u

6348generate sigma2e =  _pi^2/3

6349generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6350generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6351mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1559915	.0634255	718	0.000	.0695269	.3173957
icc_scid	.074993	.0150437	834	0.000	.048742	.1067399

```
6352
6353
6354**************************************************************************
6355* MODEL 6B_S12 - OTHER DRUG, MAIN EFFECTS MODEL
6356**************************************************************************
6357
6358*------------------------------------------------------------------------*
6359* FIT THE MODEL
6360*------------------------------------------------------------------------*
6361
6362* Load the data
6363use "analysisready2.dta", clear

6364sort scid strata12 aid

6365
6366* delete if missing dependent variable (so can record number)
6367drop if drugs_w1 == .
  (137 observations deleted)

6368
6369* Fit model using by PQL2
6370runmlwin drugs_w1 cons female latinx_race black_race lowparentedu, ///
  >   level3(scid: cons) ///
  >   level2(strata12: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                 Number of obs     =      13904
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata12	1166	1	11.9	217

Run time (seconds)   =   3.12
Number of iterations =   11

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.368056	.0819284	-28.90	0.000	-2.528632	-2.207479
female	-.0121499	.0726018	-0.17	0.867	-.1544468	.1301471
latinx_race	-.1662805	.1100535	-1.51	0.131	-.3819813	.0494204
black_race	-1.605309	.1464787	-10.96	0.000	-1.892402	-1.318216
lowparentedu	.0481373	.0778578	0.62	0.536	-.1044612	.2007358

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.2935732	.0632258	.1696528	.4174936
Level 2: strata12				
var(cons)	.087973	.0416459	.0063485	.1695974

6371
6372* Fit model using by MCMC
6373runmlwin drugs_w1 cons female latinx_race black_race lowparentedu, ///
>   level3(scid: cons) ///
>   level2(strata12: cons, residuals(u, savechains("m6B_s12_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>   savechains("m6B_s12_beta.dta", replace)) initsprevious

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata12	12	466	1158.7	2893

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   395
Deviance (dbar)   =   7602.39
Deviance (thetabar)   =   7512.29
Effective no. of pars (pd) =   90.09
Bayesian DIC   =   7692.48

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.315356	.1561781	142	0.000	-2.677766	-2.040177
female	-.1168761	.1506256	272	0.186	-.4492564	.144846
latinx_race	-.1560818	.1826378	173	0.130	-.4727048	.2019122
black_race	-1.621865	.1955472	556	0.000	-1.989965	-1.228063
lowparentedu	.0930568	.1695561	176	0.260	-.1615116	.4824617

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3179321	.0655147	1133	.2154175	.4696988
Level 2: strata12						
	var(cons)	.0413092	.0853686	143	.001161	.2078503

6374 rename u0 m1u

6375 drop u0se

6376
6377 * Present the regression coefficients as odds ratios
6378 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata12	**12**	**466**	**1158.7**	**2893**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         395
Deviance (dbar)               =     7602.39
Deviance (thetabar)           =     7512.29
Effective no. of pars (pd)    =       90.09
Bayesian DIC                  =     7692.48
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0999882	.0147549	165	0.000	.0687166	.1300057
female	.8964206	.1277839	325	0.186	.638103	1.155862
latinx_race	.8663585	.2042337	131	0.130	.623314	1.223746
black_race	.2014932	.0414368	520	0.000	.1367002	.2928594
lowparentedu	1.114879	.2595432	147	0.260	.8508567	1.62006

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3179321	.0655147	1133	.2154175	.4696988
Level 2: strata12						
	var(cons)	.0413092	.0853686	143	.001161	.2078503

6379
6380 * Calculate the ICC from the parameter point estimates

6381scalar m1sigma2u = [RP2]var(cons)

6382scalar m1sigma2e = _pi^2/3

6383display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =   0.012

6384
6385* Calculate the ICC from the chains
6386use "m6B_s12_beta.dta", clear

6387rename RP3_var_cons_ sigma2uscid

6388rename RP2_var_cons_ sigma2u

6389generate sigma2e = _pi^2/3

6390generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6391generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6392mcmcsum icc_strata icc_scid, variables

	Mean	Std. Dev.	ESS	P	[95% Cred.	Interval]
icc_strata	.010794	.020533	141	0.000	.000321	.0552644
icc_scid	.0870955	.0159629	973	0.000	.0604991	.1236524

6393
6394
6395*--*
6396* PREPARE FIXED-PART PAREMETER CHAINS
6397*--*
6398
6399use "m6B_s12_beta.dta", clear

6400drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

6401rename FP1_* b_*

6402format %9.2f b_*

6403compress
    variable **iteration** was **double** now **long**
    (4,000 bytes saved)

6404save "m6B_s12_beta_prepped.dta", replace
  (note: file m6B_s12_beta_prepped.dta not found)
  file m6B_s12_beta_prepped.dta saved

6405isid iteration

6406codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	**1000**	**1000**	**24976**	**1**	**49951**	Iteration

```
6407
6408
6409*-------------------------------------------------------------------------------*
6410* PREPARE STRATUM RANDOM EFFECTS CHAINS
6411*-------------------------------------------------------------------------------*
6412
6413use "m6B_s12_u.dta", clear

6414drop residual idnum

6415rename value u

6416format %9.2f u

6417sort strata12 iteration

6418order strata12 iteration

6419compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

6420save "m6B_s12_u_prepped.dta", replace
  (note: file m6B_s12_u_prepped.dta not found)
  file m6B_s12_u_prepped.dta saved

6421isid strata12 iteration

6422codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	12000	1000	24976	1	49951	Iteration

```
6423
6424
6425*-------------------------------------------------------------------------------*
6426* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6427*-------------------------------------------------------------------------------*
6428
6429use "data12.dta", clear

6430isid strata12

6431cross using "m6B_s12_beta_prepped.dta"

6432isid strata12 iteration

6433sort strata12 iteration

6434merge 1:1 strata12 iteration using "m6B_s12_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	12,000

```
6435isid strata12 iteration

6436compress
    variable strata12 was double now int
    (72,000 bytes saved)

6437save "m6B_s12data_prepped.dta", replace
  (note: file m6B_s12data_prepped.dta not found)
  file m6B_s12data_prepped.dta saved

6438
6439
6440*-------------------------------------------------------------------------------*
6441* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6442*-------------------------------------------------------------------------------*
6443
6444* Percentage p based on fixed and random part
6445use "m6B_s12data_prepped.dta", clear

6446gen cons = 1

6447generate p = 100*invlogit( ///
  >         b_cons*cons ///
  >        +b_female*female ///
  >        +b_latinx_race*latinx_race ///
  >        +b_black_race*black_race ///
  >        +b_lowparentedu*lowparentedu ///
  >        + u ///
  >   )

6448label var p "Percentage based on main effects and interactions"

6449format %9.3f p

6450
6451* Percentage p based only on the fixed-part
6452generate pA = 100*invlogit( ///
  >         b_cons*cons ///
  >        +b_female*female ///
  >        +b_latinx_race*latinx_race ///
  >        +b_black_race*black_race ///
  >        +b_lowparentedu*lowparentedu ///
  >   )

6453label var pA "Percentage based only on main effects"

6454format %9.3f pA

6455
6456* Percentage pB calculated as the difference between p and pA
6457generate pB = p - pA

6458label var pB "Percentage point difference based on interaction effects"

6459format %9.3f pB

6460
6461* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6462bysort strata12 (iteration): egen pmn = mean(p)
```

```
6463bysort strata12 (iteration): egen plo = pctile(p), p(2.5)

6464bysort strata12 (iteration): egen phi = pctile(p), p(97.5)

6465format %9.3f pmn plo phi

6466label var pmn "Percentage based on main effects and interactions"

6467label var plo "Percentage based on main effects and interactions"

6468label var phi "Percentage based on main effects and interactions"

6469
6470
6471bysort strata12 (iteration): egen pAmn = mean(pA)

6472bysort strata12 (iteration): egen pAlo = pctile(pA), p(2.5)

6473bysort strata12 (iteration): egen pAhi = pctile(pA), p(97.5)

6474format %9.3f pAmn pAlo pAhi

6475label var pAmn "Percentage based on main effects"

6476label var pAlo "Percentage based on main effects"

6477label var pAhi "Percentage based on main effects"

6478
6479bysort strata12 (iteration): egen pBmn = mean(pB)

6480bysort strata12 (iteration): egen pBlo = pctile(pB), p(2.5)

6481bysort strata12 (iteration): egen pBhi = pctile(pB), p(97.5)

6482format %9.3f pBmn pBlo pBhi

6483label var pBmn "Percentage point difference based on interaction effects"

6484label var pBlo "Percentage point difference based on interaction effects"

6485label var pBhi "Percentage point difference based on interaction effects"

6486
6487* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6488drop iteration b* u* p pA pB

6489duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

6490isid strata12

6491
6492* Ranks
6493sort pmn

6494generate pmnrank = _n
```

```
6495order pmnrank, after(phi)

6496sort pAmn

6497generate pAmnrank = _n

6498order pAmnrank, after(pAhi)

6499sort pBmn

6500generate pBmnrank = _n

6501order pBmnrank, after(pBhi)

6502
6503* Sort the data
6504sort strata12

6505isid strata12

6506
6507* Compress and save the data
6508compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (144 bytes saved)

6509save "m6B_s12results.dta", replace
  (note: file m6B_s12results.dta not found)
  file m6B_s12results.dta saved

6510
6511* List strata with statistically significant interaction effects on the predicted in
  > cidence
6512use "m6B_s12results.dta", clear

6513list strata12  pBmn pBlo pBhi if pBhi<0, noobs

6514list strata12  pBmn pBlo pBhi if pBlo>0, noobs

6515
6516
6517
6518
6519********************************************************************************
6520* MODEL 6A_S18 - OTHER DRUG, Null MODEL
6521********************************************************************************
6522
6523*------------------------------------------------------------------------------*
6524* FIT THE MODEL
6525*------------------------------------------------------------------------------*
6526
6527* Load the data
6528use "analysisready2.dta", clear

6529sort scid strata18 aid

6530
```

```
6531* delete if missing dependent variable (so can record number)
6532drop if drugs_w1 == .
  (137 observations deleted)

6533
6534* Fit model using PQL2
6535runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata18	**1616**	**1**	**8.6**	**193**

Run time (seconds)   =   **3.30**
Number of iterations =   **12**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**−2.765955**	**.0757972**	**−36.49**	**0.000**	**−2.914514**	**−2.617395**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.4789249**	**.0929853**	**.2966772**	**.6611727**
Level 2: strata18				
var(cons)	**.3029554**	**.0681608**	**.1693627**	**.4365481**

```
6536
6537* Fit model using MCMC
6538runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons, residuals(u, savechains("m6A_s18_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m6A_s18_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata18	**18**	**212**	**772.4**	**1579**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          576
Deviance (dbar)                =      7589.10
Deviance (thetabar)            =      7490.14
Effective no. of pars (pd)     =        98.96
Bayesian DIC                   =      7688.05
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.923726	.2502669	103	0.000	-3.415625	-2.391254

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3316011	.0678721	953	.2185656	.4781545
Level 2: strata18					
var(cons)	.7446052	.3506576	603	.3281541	1.606602

6539 rename u0 m1u

6540 drop u0se

6541
6542 * Present the regression coefficients as odds ratios
6543 runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs        =        13904
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.2	820
strata18	18	212	772.4	1579

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          576
Deviance (dbar)                =      7589.10
Deviance (thetabar)            =      7490.14
Effective no. of pars (pd)     =        98.96
Bayesian DIC                   =      7688.05
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0556529	.0153512	100	0.000	.0328559	.0915149

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3316011	.0678721	953	.2185656	.4781545
Level 2: strata18					
var(cons)	.7446052	.3506576	603	.3281541	1.606602

```
6544
6545* Calculate the ICC from the parameter point estimates
6546scalar m1sigma2u = [RP2]var(cons)

6547scalar m1sigma2e = _pi^2/3

6548display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.185

6549
6550* Calculate the ICC from the chains
6551use "m6A_s18_beta.dta", clear

6552rename RP3_var_cons_ sigma2uscid

6553rename RP2_var_cons_ sigma2u

6554generate sigma2e = _pi^2/3

6555generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6556generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6557mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1659458	.0592961	558	0.000	.0832401	.3084974
icc_scid	.076262	.0151261	770	0.000	.0500979	.1090955

```
6558
6559
6560*********************************************************************************
6561* MODEL 6B_S18 - OTHER DRUG, MAIN EFFECTS MODEL
6562*********************************************************************************
6563
6564*------------------------------------------------------------------------------*
6565* FIT THE MODEL
6566*------------------------------------------------------------------------------*
6567
6568* Load the data
6569use "analysisready2.dta", clear

6570sort scid strata18 aid

6571
6572* delete if missing dependent variable (so can record number)
6573drop if drugs_w1 == .
  (137 observations deleted)

6574
6575* Fit model using PQL2
6576runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege, ///
  >    level3(scid: cons) ///
  >    level2(strata18: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs     =      13904
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

```
                          No. of      Observations per Group
     Level Variable       Groups    Minimum    Average    Maximum

               scid        146          1        95.2        820
            strata18      1616          1         8.6        193
```

```
Run time (seconds)    =        3.66
Number of iterations  =          13
```

```
      drugs_w1  |    Coef.     Std. Err.      z      P>|z|     [95% Conf. Interval]

          cons  | -2.428659   .0914403    -26.56    0.000    -2.607879   -2.249439
        female  | -.0135071   .0692391     -0.20    0.845    -.1492133    .122199
    latinx_race | -.1734057   .1081903     -1.60    0.109    -.3854547    .0386433
     black_race | -1.631571   .1446488    -11.28    0.000    -1.915078   -1.348065
        hsless  |  .1172485   .0887605      1.32    0.187    -.0567189    .291216
    somecollege |  .1439955   .0882219      1.63    0.103    -.0289162    .3169073
```

```
   Random-effects Parameters  |   Estimate    Std. Err.    [95% Conf. Interval]

Level 3: scid
                    var(cons)  |   .3082263   .0634539     .1838589    .4325938

Level 2: strata18
                    var(cons)  |   .0709722   .0403387    -.0080902    .1500347
```

```
6577
6578* Fit model using MCMC
6579runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege, ///
>   level3(scid: cons) ///
>   level2(strata18: cons, residuals(u, savechains("m6B_s18_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m6B_s18_beta.dta", replace)) initsprevious
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13904
Binomial logit response model
Estimation algorithm: MCMC
```

```
                          No. of      Observations per Group
     Level Variable       Groups    Minimum    Average    Maximum

               scid        146          1        95.2        820
            strata18        18        212       772.4       1579
```

```
Burnin                      =         5000
Chain                       =        50000
Thinning                    =           50
Run time (seconds)          =          482
Deviance (dbar)             =      7596.04
Deviance (thetabar)         =      7503.26
Effective no. of pars (pd)  =        92.78
Bayesian DIC                =      7688.82
```

```
      drugs_w1  |    Mean      Std. Dev.    ESS      P       [95% Cred. Interval]

          cons  | -2.34035    .1493541     304    0.000    -2.638562   -2.033505
        female  | -.1104917   .1325582     457    0.182    -.3995377    .1131825
    latinx_race | -.1597963   .1511088     567    0.131    -.4444571    .1309974
     black_race | -1.669151   .1770115     652    0.000    -2.010872   -1.332776
        hsless  |  .1198216   .1429093     478    0.188    -.1665745    .4195731
    somecollege |  .0993044   .1424884     593    0.230    -.1932664    .3757398
```

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3207983	.0644836	1256	.2088555	.4742541
Level 2: strata18						
	var(cons)	.035145	.0417466	417	.0007816	.1634952

6580rename u0 m1u

6581drop u0se

6582
6583* Present the regression coefficients as odds ratios
6584runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata18	**18**	**212**	**772.4**	**1579**

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	482
Deviance (dbar)	=	7596.04
Deviance (thetabar)	=	7503.26
Effective no. of pars (pd)	=	92.78
Bayesian DIC	=	7688.82

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0972997	.0148136	296	0.000	.0714641	.130876
female	.9071141	.1152678	497	0.182	.6706301	1.119836
latinx_race	.8629053	.1325571	559	0.131	.6411723	1.139965
black_race	.1907978	.0344623	659	0.000	.1338718	.2637442
hsless	1.134803	.1630526	483	0.188	.8465598	1.521312
somecollege	1.113883	.1603691	604	0.230	.8242624	1.456068

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3207983	.0644836	1256	.2088555	.4742541
Level 2: strata18						
	var(cons)	.035145	.0417466	417	.0007816	.1634952

6585

```
6586* Calculate the ICC from the parameter point estimates
6587scalar m1sigma2u = [RP2]var(cons)

6588scalar m1sigma2e = _pi^2/3

6589display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.011

6590
6591* Calculate the ICC from the chains
6592use "m6B_s18_beta.dta", clear

6593rename RP3_var_cons_ sigma2uscid

6594rename RP2_var_cons_ sigma2u

6595generate sigma2e = _pi^2/3

6596generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6597generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6598mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0096362	.0115864	409	0.000	.0002161	.0438729
icc_scid	.088256	.0167786	1236	0.000	.0589397	.1250265

```
6599
6600
6601*------------------------------------------------------------------------------*
6602* PREPARE FIXED-PART PAREMETER CHAINS
6603*------------------------------------------------------------------------------*
6604
6605use "m6B_s18_beta.dta", clear

6606drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

6607rename FP1_* b_*

6608format %9.2f b_*

6609compress
   variable iteration was double now long
   (4,000 bytes saved)

6610save "m6B_s18_beta_prepped.dta", replace
  (note: file m6B_s18_beta_prepped.dta not found)
  file m6B_s18_beta_prepped.dta saved

6611isid iteration

6612codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
6613
6614
6615*-------------------------------------------------------------------------------*
6616* PREPARE STRATUM RANDOM EFFECTS CHAINS
6617*-------------------------------------------------------------------------------*
6618
6619use "m6B_s18_u.dta", clear

6620drop residual idnum

6621rename value u

6622format %9.2f u

6623sort strata18 iteration

6624order strata18 iteration

6625compress
    variable strata18 was double now int
    variable iteration was double now long
    (180,000 bytes saved)

6626save "m6B_s18_u_prepped.dta", replace
  (note: file m6B_s18_u_prepped.dta not found)
  file m6B_s18_u_prepped.dta saved

6627isid strata18 iteration

6628codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	18000	1000	24976	1	49951	Iteration

```
6629
6630
6631*-------------------------------------------------------------------------------*
6632* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6633*-------------------------------------------------------------------------------*
6634
6635use "data18.dta", clear

6636isid strata18

6637cross using "m6B_s18_beta_prepped.dta"

6638isid strata18 iteration

6639sort strata18 iteration

6640merge 1:1 strata18 iteration using "m6B_s18_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	18,000

```
6641isid strata18 iteration

6642compress
    variable strata18 was double now int
    (108,000 bytes saved)

6643save "m6B_s18data_prepped.dta", replace
  (note: file m6B_s18data_prepped.dta not found)
  file m6B_s18data_prepped.dta saved

6644
6645
6646*-------------------------------------------------------------------------------*
6647* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6648*-------------------------------------------------------------------------------*
6649
6650* Percentage p based on fixed and random part
6651use "m6B_s18data_prepped.dta", clear

6652gen cons = 1

6653generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         + u ///
  >     )

6654label var p "Percentage based on main effects and interactions"

6655format %9.3f p

6656
6657* Percentage p based only on the fixed-part
6658generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >     )

6659label var pA "Percentage based only on main effects"

6660format %9.3f pA

6661
6662* Percentage pB calculated as the difference between p and pA
6663generate pB = p - pA

6664label var pB "Percentage point difference based on interaction effects"

6665format %9.3f pB

6666
6667* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
```

```
6668bysort strata18 (iteration): egen pmn = mean(p)

6669bysort strata18 (iteration): egen plo = pctile(p), p(2.5)

6670bysort strata18 (iteration): egen phi = pctile(p), p(97.5)

6671format %9.3f pmn plo phi

6672label var pmn "Percentage based on main effects and interactions"

6673label var plo "Percentage based on main effects and interactions"

6674label var phi "Percentage based on main effects and interactions"

6675
6676
6677bysort strata18 (iteration): egen pAmn = mean(pA)

6678bysort strata18 (iteration): egen pAlo = pctile(pA), p(2.5)

6679bysort strata18 (iteration): egen pAhi = pctile(pA), p(97.5)

6680format %9.3f pAmn pAlo pAhi

6681label var pAmn "Percentage based on main effects"

6682label var pAlo "Percentage based on main effects"

6683label var pAhi "Percentage based on main effects"

6684
6685bysort strata18 (iteration): egen pBmn = mean(pB)

6686bysort strata18 (iteration): egen pBlo = pctile(pB), p(2.5)

6687bysort strata18 (iteration): egen pBhi = pctile(pB), p(97.5)

6688format %9.3f pBmn pBlo pBhi

6689label var pBmn "Percentage point difference based on interaction effects"

6690label var pBlo "Percentage point difference based on interaction effects"

6691label var pBhi "Percentage point difference based on interaction effects"

6692
6693* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6694drop iteration b* u* p pA pB

6695duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

6696isid strata18

6697
6698* Ranks
6699sort pmn
```

```
6700generate pmnrank = _n

6701order pmnrank, after(phi)

6702sort pAmn

6703generate pAmnrank = _n

6704order pAmnrank, after(pAhi)

6705sort pBmn

6706generate pBmnrank = _n

6707order pBmnrank, after(pBhi)

6708
6709* Sort the data
6710sort strata18

6711isid strata18

6712
6713* Compress and save the data
6714compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (216 bytes saved)

6715save "m6B_s18results.dta", replace
  (note: file m6B_s18results.dta not found)
  file m6B_s18results.dta saved

6716
6717* List strata with statistically significant interaction effects on the predicted in
  > cidence
6718use "m6B_s18results.dta", clear

6719list strata18  pBmn pBlo pBhi if pBhi<0, noobs

6720list strata18  pBmn pBlo pBhi if pBlo>0, noobs

6721
6722
6723**************************************************************************************
6724* MODEL 6A_S36 - OTHER DRUG, Null MODEL
6725**************************************************************************************
6726
6727*----------------------------------------------------------------------------------*
6728* FIT THE MODEL
6729*----------------------------------------------------------------------------------*
6730
6731* Load the data
6732use "analysisready2.dta", clear

6733sort scid strata36 aid

6734
```

```
6735* delete if missing dependent variable (so can record number)
6736drop if drugs_w1 == .
  (137 observations deleted)

6737
6738* Fit model using PQL2
6739runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata36	**2590**	**1**	**5.4**	**172**

Run time (seconds)   =   **3.82**
Number of iterations =   **12**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.748435**	**.0758865**	**-36.22**	**0.000**	**-2.897169**	**-2.5997**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.5028087**	**.0929738**	**.3205833**	**.685034**
Level 2: strata36				
var(cons)	**.2714964**	**.0677312**	**.1387457**	**.4042472**

```
6740
6741* Fit model using MCMC
6742runmlwin drugs_w1 cons , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons, residuals(u, savechains("m6A_s36_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m6A_s36_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata36	**36**	**47**	**386.2**	**1081**

```
Burnin                         =        5000
Chain                          =       50000
Thinning                       =          50
Run time (seconds)             =         317
Deviance (dbar)                =     7571.32
Deviance (thetabar)            =     7458.49
Effective no. of pars (pd) =       112.83
Bayesian DIC                   =     7684.16
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.90831	.1538103	259	0.000	-3.218796	-2.614969

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3435691	.0688524	989	.2290028	.4913676
Level 2: strata36					
var(cons)	.665636	.2209558	725	.3538275	1.174424

6743 rename u0 m1u

6744 drop u0se

6745
6746 * Present the regression coefficients as odds ratios
6747 runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs      =      13904
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.2	820
strata36	36	47	386.2	1081

```
Burnin                         =        5000
Chain                          =       50000
Thinning                       =          50
Run time (seconds)             =         317
Deviance (dbar)                =     7571.32
Deviance (thetabar)            =     7458.49
Effective no. of pars (pd) =       112.83
Bayesian DIC                   =     7684.16
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0552666	.0084623	263	0.000	.0400032	.07317

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3435691	.0688524	989	.2290028	.4913676
Level 2: strata36					
var(cons)	.665636	.2209558	725	.3538275	1.174424

```
6748
6749* Calculate the ICC from the parameter point estimates
6750scalar m1sigma2u = [RP2]var(cons)

6751scalar m1sigma2e = _pi^2/3

6752display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.168

6753
6754* Calculate the ICC from the chains
6755use "m6A_s36_beta.dta", clear

6756rename RP3_var_cons_ sigma2uscid

6757rename RP2_var_cons_ sigma2u

6758generate sigma2e =  _pi^2/3

6759generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6760generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6761mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1510274	.0411892	728	0.000	.0879998	.2440268
icc_scid	.0795616	.01471	930	0.000	.0543861	.1127043

```
6762
6763
6764*******************************************************************************
6765* MODEL 6B_S36 - OTHER DRUG, MAIN EFFECTS MODEL
6766*******************************************************************************
6767
6768*-----------------------------------------------------------------------------*
6769* FIT THE MODEL
6770*-----------------------------------------------------------------------------*
6771
6772* Load the data
6773use "analysisready2.dta", clear

6774sort scid strata36 aid

6775
6776* delete if missing dependent variable (so can record number)
6777drop if drugs_w1 == .
  (137 observations deleted)

6778
6779* Fit model using PQL2
6780runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                 Number of obs    =      13904
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata36	2590	1	5.4	172

```
Run time (seconds)     =      4.10
Number of iterations =        12
```

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.501294	.0951834	-26.28	0.000	-2.68785	-2.314738
female	-.0184367	.0678081	-0.27	0.786	-.1513381	.1144647
latinx_race	-.2016821	.1080446	-1.87	0.062	-.4134457	.0100815
black_race	-1.687052	.1452268	-11.62	0.000	-1.971692	-1.402413
hsless	.0557988	.0899593	0.62	0.535	-.1205182	.2321157
somecollege	.1139065	.0869566	1.31	0.190	-.0565253	.2843382
lowinc	.2000113	.0736329	2.72	0.007	.0556936	.344329

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.3185146	.0642807	.1925268	.4445025
Level 2: strata36				
var(cons)	.079162	.0456886	-.010386	.16871

```
6781
6782* Fit model using MCMC
6783runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m6B_s36_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m6B_s36_beta.dta", replace)) initsprevious
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     13904
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata36	36	47	386.2	1081

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        411
Deviance (dbar)               =    7582.81
Deviance (thetabar)           =    7484.01
Effective no. of pars (pd)  =      98.80
Bayesian DIC                  =    7681.61
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.422182	.1339875	336	0.000	-2.665422	-2.131355
female	-.0749014	.098568	639	0.212	-.275748	.1082702
latinx_race	-.1713203	.1278698	836	0.095	-.4286825	.0909533
black_race	-1.723118	.1618457	853	0.000	-2.047807	-1.419243
hsless	.0632321	.1214882	500	0.300	-.1781362	.3042156
somecollege	.0735755	.1252068	452	0.277	-.1967607	.3173863
lowinc	.1842949	.1028091	827	0.043	-.0193325	.384503

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3263005	.0658124	926	.2126661	.4573434
Level 2: strata36						
	var(cons)	.0310283	.0297311	371	.0009632	.1090117

6784 rename u0 m1u

6785 drop u0se

6786
6787 * Present the regression coefficients as odds ratios
6788 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata36	**36**	**47**	**386.2**	**1081**

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	411
Deviance (dbar)	=	7582.81
Deviance (thetabar)	=	7484.01
Effective no. of pars (pd)	=	98.80
Bayesian DIC	=	7681.61

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0896819	.0123435	331	0.000	.06957	.1186764
female	.9330074	.0899254	661	0.212	.7590042	1.114349
latinx_race	.8488292	.1106591	796	0.095	.6513667	1.095218
black_race	.1815	.0295296	861	0.000	.1290176	.2418972
hsless	1.071341	.1333758	502	0.300	.8368285	1.355562
somecollege	1.080554	.1348788	466	0.277	.8213872	1.373533
lowinc	1.209265	.1224226	845	0.043	.9808532	1.468884

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.3263005	.0658124	926	.2126661	.4573434
Level 2: strata36						
	var(cons)	.0310283	.0297311	371	.0009632	.1090117

```
6789
6790* Calculate the ICC from the parameter point estimates
6791scalar m1sigma2u = [RP2]var(cons)

6792scalar m1sigma2e = _pi^2/3

6793display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.009

6794
6795* Calculate the ICC from the chains
6796use "m6B_s36_beta.dta", clear

6797rename RP3_var_cons_ sigma2uscid

6798rename RP2_var_cons_ sigma2u

6799generate sigma2e =  _pi^2/3

6800generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6801generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6802mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred.	Interval]
icc_strata	.0084451	.0081269	370	0.000	.0002695	.0293363
icc_scid	.0883418	.0157445	957	0.000	.0603542	.1210582

```
6803
6804
6805*-------------------------------------------------------------------------------*
6806* PREPARE FIXED-PART PAREMETER CHAINS
6807*-------------------------------------------------------------------------------*
6808
6809use "m6B_s36_beta.dta", clear

6810drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

6811rename FP1_* b_*

6812format %9.2f b_*

6813compress
    variable iteration was double now long
    (4,000 bytes saved)

6814save "m6B_s36_beta_prepped.dta", replace
  (note: file m6B_s36_beta_prepped.dta not found)
  file m6B_s36_beta_prepped.dta saved

6815isid iteration

6816codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
6817
6818
6819*-------------------------------------------------------------------------------*
6820* PREPARE STRATUM RANDOM EFFECTS CHAINS
6821*-------------------------------------------------------------------------------*
6822
6823use "m6B_s36_u.dta", clear

6824drop residual idnum

6825rename value u

6826format %9.2f u

6827sort strata36 iteration

6828order strata36 iteration

6829compress
    variable strata36 was double now int
    variable iteration was double now long
    (360,000 bytes saved)

6830save "m6B_s36_u_prepped.dta", replace
  (note: file m6B_s36_u_prepped.dta not found)
  file m6B_s36_u_prepped.dta saved

6831isid strata36 iteration

6832codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	36000	1000	24976	1	49951	Iteration

```
6833
6834
6835*-------------------------------------------------------------------------------*
6836* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6837*-------------------------------------------------------------------------------*
6838
6839use "data36.dta", clear

6840isid strata36

6841cross using "m6B_s36_beta_prepped.dta"

6842isid strata36 iteration

6843sort strata36 iteration

6844merge 1:1 strata36 iteration using "m6B_s36_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	36,000

```
6845isid strata36 iteration

6846compress
    variable strata36 was double now int
    (216,000 bytes saved)

6847save "m6B_s36data_prepped.dta", replace
  (note: file m6B_s36data_prepped.dta not found)
  file m6B_s36data_prepped.dta saved

6848
6849
6850*-------------------------------------------------------------------------------*
6851* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6852*-------------------------------------------------------------------------------*
6853
6854* Percentage p based on fixed and random part
6855use "m6B_s36data_prepped.dta", clear

6856gen cons = 1

6857generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         + u ///
  >    )

6858label var p "Percentage based on main effects and interactions"

6859format %9.3f p

6860
6861* Percentage p based only on the fixed-part
6862generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >    )

6863label var pA "Percentage based only on main effects"

6864format %9.3f pA

6865
6866* Percentage pB calculated as the difference between p and pA
6867generate pB = p - pA

6868label var pB "Percentage point difference based on interaction effects"

6869format %9.3f pB
```

```
6870
6871* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6872bysort strata36 (iteration): egen pmn = mean(p)

6873bysort strata36 (iteration): egen plo = pctile(p), p(2.5)

6874bysort strata36 (iteration): egen phi = pctile(p), p(97.5)

6875format %9.3f pmn plo phi

6876label var pmn "Percentage based on main effects and interactions"

6877label var plo "Percentage based on main effects and interactions"

6878label var phi "Percentage based on main effects and interactions"

6879
6880
6881bysort strata36 (iteration): egen pAmn = mean(pA)

6882bysort strata36 (iteration): egen pAlo = pctile(pA), p(2.5)

6883bysort strata36 (iteration): egen pAhi = pctile(pA), p(97.5)

6884format %9.3f pAmn pAlo pAhi

6885label var pAmn "Percentage based on main effects"

6886label var pAlo "Percentage based on main effects"

6887label var pAhi "Percentage based on main effects"

6888
6889bysort strata36 (iteration): egen pBmn = mean(pB)

6890bysort strata36 (iteration): egen pBlo = pctile(pB), p(2.5)

6891bysort strata36 (iteration): egen pBhi = pctile(pB), p(97.5)

6892format %9.3f pBmn pBlo pBhi

6893label var pBmn "Percentage point difference based on interaction effects"

6894label var pBlo "Percentage point difference based on interaction effects"

6895label var pBhi "Percentage point difference based on interaction effects"

6896
6897* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6898drop iteration b* u* p pA pB

6899duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

6900isid strata36

6901
```

```
6902* Ranks
6903sort pmn

6904generate pmnrank = _n

6905order pmnrank, after(phi)

6906sort pAmn

6907generate pAmnrank = _n

6908order pAmnrank, after(pAhi)

6909sort pBmn

6910generate pBmnrank = _n

6911order pBmnrank, after(pBhi)

6912
6913* Sort the data
6914sort strata36

6915isid strata36

6916
6917* Compress and save the data
6918compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (432 bytes saved)

6919save "m6B_s36results.dta", replace
  (note: file m6B_s36results.dta not found)
  file m6B_s36results.dta saved

6920
6921* List strata with statistically significant interaction effects on the predicted in
  > cidence
6922use "m6B_s36results.dta", clear

6923list strata36  pBmn pBlo pBhi if pBhi<0, noobs

6924list strata36  pBmn pBlo pBhi if pBlo>0, noobs

6925
6926
6927********************************************************************************
6928* MODEL 6A_S48 - OTHER DRUG, Null MODEL
6929********************************************************************************
6930
6931*------------------------------------------------------------------------------*
6932* FIT THE MODEL
6933*------------------------------------------------------------------------------*
6934
6935* Load the data
6936use "analysisready2.dta", clear
```

```
6937sort scid strata48 aid

6938
6939* delete if missing dependent variable (so can record number)
6940drop if drugs_w1 == .
  (137 observations deleted)

6941
6942* Fit model using PQL2
6943runmlwin drugs_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata48	**2696**	**1**	**5.2**	**143**

Run time (seconds)   =   **3.95**
Number of iterations =   **12**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.759098**	**.075957**	**-36.32**	**0.000**	**-2.907971**	**-2.610225**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.5010569**	**.0930836**	**.3186163**	**.6834975**
Level 2: strata48				
var(cons)	**.2952922**	**.0701743**	**.1577531**	**.4328313**

```
6944
6945* Fit model using MCMC
6946runmlwin drugs_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m6A_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m6A_s48_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata48	**48**	**3**	**289.7**	**1081**

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          267
Deviance (dbar)                =      7546.90
Deviance (thetabar)            =      7428.03
Effective no. of pars (pd)     =       118.87
Bayesian DIC                   =      7665.77
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.968045	.1607987	271	0.000	-3.279754	-2.66323

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.345771	.0696187	897	.2270475	.5044654
Level 2: strata48					
var(cons)	.6925308	.2122705	731	.382609	1.191229

6947rename u0 m1u

6948drop u0se

6949
6950* Present the regression coefficients as odds ratios
6951runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs    =      13904
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata48	48	3	289.7	1081

```
Burnin                         =         5000
Chain                          =        50000
Thinning                       =           50
Run time (seconds)             =          267
Deviance (dbar)                =      7546.90
Deviance (thetabar)            =      7428.03
Effective no. of pars (pd)     =       118.87
Bayesian DIC                   =      7665.77
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0520668	.0083407	272	0.000	.0376375	.0697227

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.345771	.0696187	897	.2270475	.5044654
Level 2: strata48					
var(cons)	.6925308	.2122705	731	.382609	1.191229

```
6952
6953* Calculate the ICC from the parameter point estimates
6954scalar m1sigma2u = [RP2]var(cons)

6955scalar m1sigma2e = _pi^2/3

6956display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.174

6957
6958* Calculate the ICC from the chains
6959use "m6A_s48_beta.dta", clear

6960rename RP3_var_cons_ sigma2uscid

6961rename RP2_var_cons_ sigma2u

6962generate sigma2e = _pi^2/3

6963generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

6964generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

6965mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.159298	.0403959	749	0.000	.0961271	.2485716
icc_scid	.0798931	.0155624	874	0.000	.0524368	.1128915

```
6966
6967
6968********************************************************************************
6969* MODEL 6B_S48 - OTHER DRUG, MAIN EFFECTS MODEL
6970********************************************************************************
6971
6972*------------------------------------------------------------------------------*
6973* FIT THE MODEL
6974*------------------------------------------------------------------------------*
6975
6976* Load the data
6977use "analysisready2.dta", clear

6978sort scid strata48 aid

6979
6980* delete if missing dependent variable (so can record number)
6981drop if drugs_w1 == .
  (137 observations deleted)

6982
6983* Fit model using PQL2
6984runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
  > ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                 Number of obs     =      13904
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata48	2696	1	5.2	143

```
Run time (seconds)   =      3.79
Number of iterations =       10
```

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.502128	.0945002	-26.48	0.000	-2.687345	-2.316911
female	-.0249965	.0667448	-0.37	0.708	-.1558139	.1058208
latinx_imm	-1.358842	.2747741	-4.95	0.000	-1.897389	-.8202946
latinx_non	-.0810257	.1078338	-0.75	0.452	-.2923761	.1303247
black	-1.693481	.1441836	-11.75	0.000	-1.976075	-1.410886
hsless	.0588086	.0889203	0.66	0.508	-.115472	.2330893
somecollege	.1116225	.0860108	1.30	0.194	-.0569555	.2802006
lowinc	.2227717	.0727072	3.06	0.002	.0802683	.3652752

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.3214475	.0642313	.1955564	.4473386
Level 2: strata48				
var(cons)	.0621051	.0436944	-.0235343	.1477445

```
6985
6986* Fit model using MCMC
6987runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
> ///
>   level3(scid: cons) ///
>   level2(strata48: cons, residuals(u, savechains("m6B_s48_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m6B_s48_beta.dta", replace)) initsprevious
```

```
MLwiN 3.2 multilevel model                     Number of obs     =      13904
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata48	48	3	289.7	1081

```
Burnin                       =       5000
Chain                        =      50000
Thinning                     =         50
Run time (seconds)           =        418
Deviance (dbar)              =    7556.28
Deviance (thetabar)          =    7459.72
Effective no. of pars (pd)   =      96.56
Bayesian DIC                 =    7652.83
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.447117	.1187322	368	0.000	-2.675305	-2.21212
female	-.0679866	.0871406	576	0.196	-.2629321	.0940091
latinx_imm	-1.363123	.276779	989	0.000	-1.900281	-.879308
latinx_non	-.0682664	.1184275	688	0.267	-.3108494	.1658443
black	-1.716073	.15382	882	0.000	-2.024653	-1.428197

hsless	.0580665	.1111317	811	0.298	-.1713878	.2655539
somecollege	.0836111	.1126695	521	0.236	-.1591632	.2911235
lowinc	.216973	.0893586	794	0.007	.0351091	.3993138

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3311541	.0669403	836	.221081	.4731726
Level 2: strata48					
var(cons)	.0192098	.0215332	344	.000635	.0758396

6988rename u0 m1u

6989drop u0se

6990
6991* Present the regression coefficients as odds ratios
6992runmlwin, or

```
MLwiN 3.2 multilevel model                  Number of obs     =     13904
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata48	48	3	289.7	1081

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         418
Deviance (dbar)               =     7556.28
Deviance (thetabar)           =     7459.72
Effective no. of pars (pd)    =       96.56
Bayesian DIC                  =     7652.83
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0871481	.0104231	368	0.000	.0688858	.1094684
female	.9356601	.0805133	586	0.196	.7687942	1.09857
latinx_imm	.2617528	.0693132	960	0.000	.1495267	.4150701
latinx_non	.9374747	.1108975	679	0.267	.7328243	1.180389
black	.1811065	.02737	889	0.000	.1320397	.2397408
hsless	1.064602	.1191449	819	0.298	.8424948	1.304153
somecollege	1.093823	.1244291	536	0.236	.8528572	1.33793
lowinc	1.252637	.1134512	795	0.007	1.035733	1.490801

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3311541	.0669403	836	.221081	.4731726
Level 2: strata48					
var(cons)	.0192098	.0215332	344	.000635	.0758396

```
6993
6994* Calculate the ICC from the parameter point estimates
6995scalar m1sigma2u = [RP2]var(cons)

6996scalar m1sigma2e = _pi^2/3

6997display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.006

6998
6999* Calculate the ICC from the chains
7000use "m6B_s48_beta.dta", clear

7001rename RP3_var_cons_ sigma2uscid

7002rename RP2_var_cons_ sigma2u

7003generate sigma2e =  _pi^2/3

7004generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

7005generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

7006mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0052962	.0057301	341	0.000	.0001741	.0204781
icc_scid	.0906801	.0159479	839	0.000	.0627153	.1247935

```
7007
7008
7009*------------------------------------------------------------------------------*
7010* PREPARE FIXED-PART PAREMETER CHAINS
7011*------------------------------------------------------------------------------*
7012
7013use "m6B_s48_beta.dta", clear

7014drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

7015rename FP1_* b_*

7016format %9.2f b_*

7017compress
    variable iteration was double now long
    (4,000 bytes saved)

7018save "m6B_s48_beta_prepped.dta", replace
  (note: file m6B_s48_beta_prepped.dta not found)
  file m6B_s48_beta_prepped.dta saved

7019isid iteration

7020codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
7021
7022
7023*--------------------------------------------------------------------------------*
7024* PREPARE STRATUM RANDOM EFFECTS CHAINS
7025*--------------------------------------------------------------------------------*
7026
7027use "m6B_s48_u.dta", clear

7028drop residual idnum

7029rename value u

7030format %9.2f u

7031sort strata48 iteration

7032order strata48 iteration

7033compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

7034save "m6B_s48_u_prepped.dta", replace
  (note: file m6B_s48_u_prepped.dta not found)
  file m6B_s48_u_prepped.dta saved

7035isid strata48 iteration

7036codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	48000	1000	24976	1	49951	Iteration

```
7037
7038
7039*--------------------------------------------------------------------------------*
7040* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
7041*--------------------------------------------------------------------------------*
7042
7043use "data48.dta", clear

7044isid strata48

7045cross using "m6B_s48_beta_prepped.dta"

7046isid strata48 iteration

7047sort strata48 iteration

7048merge 1:1 strata48 iteration using "m6B_s48_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	48,000

```
7049isid strata48 iteration

7050compress
    variable strata48 was double now int
    (288,000 bytes saved)

7051save "m6B_s48data_prepped.dta", replace
  (note: file m6B_s48data_prepped.dta not found)
  file m6B_s48data_prepped.dta saved

7052
7053
7054*-------------------------------------------------------------------------------*
7055* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
7056*-------------------------------------------------------------------------------*
7057
7058* Percentage p based on fixed and random part
7059use "m6B_s48data_prepped.dta", clear

7060gen cons = 1

7061generate p = 100*invlogit( ///
   >           b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_imm*latinx_imm ///
   >          +b_latinx_non*latinx_non ///
   >          +b_black*black ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >          +b_lowinc*lowinc ///
   >          + u ///
   >     )

7062label var p "Percentage based on main effects and interactions"

7063format %9.3f p

7064
7065* Percentage p based only on the fixed-part
7066generate pA = 100*invlogit( ///
   >           b_cons*cons ///
   >          +b_female*female ///
   >          +b_latinx_imm*latinx_imm ///
   >          +b_latinx_non*latinx_non ///
   >          +b_black*black ///
   >          +b_hsless*hsless ///
   >          +b_somecollege*somecollege ///
   >          +b_lowinc*lowinc ///
   >     )

7067label var pA "Percentage based only on main effects"

7068format %9.3f pA

7069
7070* Percentage pB calculated as the difference between p and pA
7071generate pB = p - pA

7072label var pB "Percentage point difference based on interaction effects"
```

7073format %9.3f pB

7074
7075* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
7076bysort strata48 (iteration): egen pmn = mean(p)

7077bysort strata48 (iteration): egen plo = pctile(p), p(2.5)

7078bysort strata48 (iteration): egen phi = pctile(p), p(97.5)

7079format %9.3f pmn plo phi

7080label var pmn "Percentage based on main effects and interactions"

7081label var plo "Percentage based on main effects and interactions"

7082label var phi "Percentage based on main effects and interactions"

7083
7084
7085bysort strata48 (iteration): egen pAmn = mean(pA)

7086bysort strata48 (iteration): egen pAlo = pctile(pA), p(2.5)

7087bysort strata48 (iteration): egen pAhi = pctile(pA), p(97.5)

7088format %9.3f pAmn pAlo pAhi

7089label var pAmn "Percentage based on main effects"

7090label var pAlo "Percentage based on main effects"

7091label var pAhi "Percentage based on main effects"

7092
7093bysort strata48 (iteration): egen pBmn = mean(pB)

7094bysort strata48 (iteration): egen pBlo = pctile(pB), p(2.5)

7095bysort strata48 (iteration): egen pBhi = pctile(pB), p(97.5)

7096format %9.3f pBmn pBlo pBhi

7097label var pBmn "Percentage point difference based on interaction effects"

7098label var pBlo "Percentage point difference based on interaction effects"

7099label var pBhi "Percentage point difference based on interaction effects"

7100
7101* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
7102drop iteration b* u* p pA pB

7103duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

7104isid strata48

```
7105
7106* Ranks
7107sort pmn

7108generate pmnrank = _n

7109order pmnrank, after(phi)

7110sort pAmn

7111generate pAmnrank = _n

7112order pAmnrank, after(pAhi)

7113sort pBmn

7114generate pBmnrank = _n

7115order pBmnrank, after(pBhi)

7116
7117* Sort the data
7118sort strata48

7119isid strata48

7120
7121* Compress and save the data
7122compress
   variable cons was float now byte
   variable pmnrank was float now byte
   variable pAmnrank was float now byte
   variable pBmnrank was float now byte
   (576 bytes saved)

7123save "m6B_s48results.dta", replace
  (note: file m6B_s48results.dta not found)
  file m6B_s48results.dta saved

7124
7125* List strata with statistically significant interaction effects on the predicted in
  > cidence
7126use "m6B_s48results.dta", clear

7127list strata48  pBmn pBlo pBhi if pBhi<0, noobs

7128list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7129
7130
7131*********************************************************************************
7132* MODEL 6A_S96 - OTHER DRUG, Null MODEL
7133*********************************************************************************
7134
7135*-------------------------------------------------------------------------------*
7136* FIT THE MODEL
7137*-------------------------------------------------------------------------------*
7138
7139* Load the data
7140use "analysisready2.dta", clear
```

```
7141sort scid strata96 aid

7142
7143* delete if missing dependent variable (so can record number)
7144drop if drugs_w1 == .
  (137 observations deleted)

7145
7146* Fit model using PQL2
7147runmlwin drugs_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata96	**3614**	**1**	**3.8**	**131**

Run time (seconds) =   **5.01**
Number of iterations =   **14**

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.772712**	**.0770089**	**-36.01**	**0.000**	**-2.923647**	**-2.621777**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.5195644**	**.0956541**	**.3320859**	**.7070429**
Level 2: strata96			
var(cons)	**.3471964**	**.0783268**	**.1936786**	**.5007142**

```
7148
7149* Fit model using MCMC
7150runmlwin drugs_w1 cons , ///
>    level3(scid: cons) ///
>    level2(strata96: cons, residuals(u, savechains("m6A_s96_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m6A_s96_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   **13904**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**95.2**	**820**
strata96	**91**	**1**	**152.8**	**897**

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        208
Deviance (dbar)               =    7477.62
Deviance (thetabar)           =    7337.21
Effective no. of pars (pd)    =     140.41
Bayesian DIC                  =    7618.03
```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	−2.879156	.1333438	346	0.000	−3.135595	−2.633244

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3448046	.0699687	967	.2277071	.5113382
Level 2: strata96					
var(cons)	.7820045	.200956	779	.4707862	1.180114

7151rename u0 m1u

7152drop u0se

7153
7154* Present the regression coefficients as odds ratios
7155runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs      =      13904
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	95.2	820
strata96	91	1	152.8	897

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        208
Deviance (dbar)               =    7477.62
Deviance (thetabar)           =    7337.21
Effective no. of pars (pd)    =     140.41
Bayesian DIC                  =    7618.03
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0566538	.0073738	360	0.000	.0434739	.071845

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3448046	.0699687	967	.2277071	.5113382
Level 2: strata96					
var(cons)	.7820045	.200956	779	.4707862	1.180114

```
7156
7157* Calculate the ICC from the parameter point estimates
7158scalar m1sigma2u = [RP2]var(cons)

7159scalar m1sigma2e = _pi^2/3

7160display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.192

7161
7162* Calculate the ICC from the chains
7163use "m6A_s96_beta.dta", clear

7164rename RP3_var_cons_ sigma2uscid

7165rename RP2_var_cons_ sigma2u

7166generate sigma2e =  _pi^2/3

7167generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

7168generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

7169mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.1753251	.0345394	799	0.000	.1151201	.2444899
icc_scid	.0787707	.0155147	980	0.000	.0525836	.1130463

```
7170
7171
7172***********************************************************************************
7173* MODEL 6B_S96 - OTHER DRUG, MAIN EFFECTS MODEL
7174***********************************************************************************
7175
7176*-------------------------------------------------------------------------------*
7177* FIT THE MODEL
7178*-------------------------------------------------------------------------------*
7179
7180* Load the data
7181use "analysisready2.dta", clear

7182sort scid strata96 aid

7183
7184* delete if missing dependent variable (so can record number)
7185drop if drugs_w1 == .
  (137 observations deleted)

7186
7187* Fit model using PQL2
7188runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc
  > straight_no, /7/
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                    Number of obs     =       13904
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	95.2	820
strata96	3614	1	3.8	131

Run time (seconds)   =   4.53
Number of iterations =   11

drugs_w1	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.555618	.0934872	-27.34	0.000	-2.73885	-2.372386
female	-.1171506	.0669819	-1.75	0.080	-.2484327	.0141315
latinx_imm	-1.328326	.2709754	-4.90	0.000	-1.859429	-.7972245
latinx_non	-.0923056	.1065128	-0.87	0.386	-.3010668	.1164557
black	-1.678167	.1428003	-11.75	0.000	-1.95805	-1.398284
hsless	.0709924	.0874839	0.81	0.417	-.1004729	.2424578
somecollege	.1236024	.0845656	1.46	0.144	-.0421432	.289348
lowinc	.2231708	.0715055	3.12	0.002	.0830227	.363319
straight_no	.5772922	.082007	7.04	0.000	.4165613	.738023

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.3145275	.0627218	.191595	.4374599
Level 2: strata96				
var(cons)	.0430792	.0453692	-.0458428	.1320012

```
7189
7190* Fit model using MCMC
7191runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc
>  straight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m6B_s96_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m6B_s96_beta.dta", replace)) initsprevious
```

MLwiN 3.2 multilevel model   Number of obs   =   13904
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	95.2	820
strata96	91	1	152.8	897

Burnin   =   5000
Chain   =   50000
Thinning   =   50
Run time (seconds)   =   542
Deviance (dbar)   =   7500.80
Deviance (thetabar)   =   7397.98
Effective no. of pars (pd) =   102.82
Bayesian DIC   =   7603.62

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.517456	.1213185	481	0.000	-2.762988	-2.261936
female	-.1107783	.0886855	791	0.108	-.2740391	.0630138
latinx_imm	-1.354161	.281329	897	0.000	-1.970942	-.7793747
latinx_non	-.0790483	.1215056	963	0.261	-.3133075	.176964

black	-1.731685	.1592359	749	0.000	-2.056496	-1.44547
hsless	.0671728	.1081734	772	0.258	-.1428444	.2723271
somecollege	.0973955	.1095771	626	0.174	-.1263885	.2928467
lowinc	.2051826	.0949487	748	0.015	.0211526	.3750535
straight_no	.5320543	.1031866	719	0.000	.3253254	.7203439

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3219871	.0655917	1008	.2118945	.470109
Level 2: strata96					
var(cons)	.0322904	.0315655	236	.0009557	.1149761

7192 rename u0 m1u

7193 drop u0se

7194
7195 * Present the regression coefficients as odds ratios
7196 runmlwin, or

```
MLwiN 3.2 multilevel model              Number of obs    =    13904
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	95.2	820
strata96	91	1	152.8	897

```
Burnin                      =       5000
Chain                       =      50000
Thinning                    =         50
Run time (seconds)          =        542
Deviance (dbar)             =    7500.80
Deviance (thetabar)         =    7397.98
Effective no. of pars (pd)  =     102.82
Bayesian DIC                =    7603.62
```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0811589	.0102415	472	0.000	.0631029	.1041486
female	.8987991	.0789648	766	0.108	.7603024	1.065042
latinx_imm	.2695343	.0783049	929	0.000	.1393255	.4586928
latinx_non	.9318913	.1177947	974	0.261	.7310251	1.193589
black	.1792907	.0278025	783	0.000	.1279014	.2356353
hsless	1.077307	.1184085	766	0.258	.8668889	1.313017
somecollege	1.10961	.1197469	648	0.174	.8812724	1.340237
lowinc	1.232491	.1158125	762	0.015	1.021378	1.455069
straight_no	1.713731	.174947	754	0.000	1.384481	2.05514

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.3219871	.0655917	1008	.2118945	.470109
Level 2: strata96					
var(cons)	.0322904	.0315655	236	.0009557	.1149761

```
7197
7198* Calculate the ICC from the parameter point estimates
7199scalar m1sigma2u = [RP2]var(cons)

7200scalar m1sigma2e = _pi^2/3

7201display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.010

7202
7203* Calculate the ICC from the chains
7204use "m6B_s96_beta.dta", clear

7205rename RP3_var_cons_ sigma2uscid

7206rename RP2_var_cons_ sigma2u

7207generate sigma2e =  _pi^2/3

7208generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

7209generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

7210mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0088491	.0084423	233	0.000	.0002631	.0310433
icc_scid	.087953	.0161605	1024	0.000	.0599116	.1236102

```
7211
7212
7213*-------------------------------------------------------------------------------*
7214* PREPARE FIXED-PART PAREMETER CHAINS
7215*-------------------------------------------------------------------------------*
7216
7217use "m6B_s96_beta.dta", clear

7218drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

7219rename FP1_* b_*

7220format %9.2f b_*

7221compress
   variable iteration was double now long
   (4,000 bytes saved)

7222save "m6B_s96_beta_prepped.dta", replace
  (note: file m6B_s96_beta_prepped.dta not found)
  file m6B_s96_beta_prepped.dta saved

7223isid iteration

7224codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
7225
7226
7227*-------------------------------------------------------------------------------*
7228* PREPARE STRATUM RANDOM EFFECTS CHAINS
7229*-------------------------------------------------------------------------------*
7230
7231use "m6B_s96_u.dta", clear

7232drop residual idnum

7233rename value u

7234format %9.2f u

7235sort strata96 iteration

7236order strata96 iteration

7237compress
    variable strata96 was double now int
    variable iteration was double now long
    (910,000 bytes saved)

7238save "m6B_s96_u_prepped.dta", replace
  (note: file m6B_s96_u_prepped.dta not found)
  file m6B_s96_u_prepped.dta saved

7239isid strata96 iteration

7240codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```
7241
7242
7243*-------------------------------------------------------------------------------*
7244* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
7245*-------------------------------------------------------------------------------*
7246
7247use "data96_drugs.dta", clear

7248isid strata96

7249cross using "m6B_s96_beta_prepped.dta"

7250isid strata96 iteration

7251sort strata96 iteration

7252merge 1:1 strata96 iteration using "m6B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	91,000

```
7253isid strata96 iteration

7254compress
    variable strata96 was double now int
    (546,000 bytes saved)

7255save "m6B_s96data_prepped.dta", replace
  (note: file m6B_s96data_prepped.dta not found)
  file m6B_s96data_prepped.dta saved

7256
7257
7258*------------------------------------------------------------------------------*
7259* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
7260*------------------------------------------------------------------------------*
7261
7262* Percentage p based on fixed and random part
7263use "m6B_s96data_prepped.dta", clear

7264gen cons = 1

7265generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >         + u ///
  >   )

7266label var p "Percentage based on main effects and interactions"

7267format %9.3f p

7268
7269* Percentage p based only on the fixed-part
7270generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_imm*latinx_imm ///
  >         +b_latinx_non*latinx_non ///
  >         +b_black*black ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >         +b_lowinc*lowinc ///
  >         +b_straight_no*straight_no ///
  >   )

7271label var pA "Percentage based only on main effects"

7272format %9.3f pA

7273
7274* Percentage pB calculated as the difference between p and pA
7275generate pB = p - pA
```

```
7276label var pB "Percentage point difference based on interaction effects"

7277format %9.3f pB

7278
7279* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
7280bysort strata96 (iteration): egen pmn = mean(p)

7281bysort strata96 (iteration): egen plo = pctile(p), p(2.5)

7282bysort strata96 (iteration): egen phi = pctile(p), p(97.5)

7283format %9.3f pmn plo phi

7284label var pmn "Percentage based on main effects and interactions"

7285label var plo "Percentage based on main effects and interactions"

7286label var phi "Percentage based on main effects and interactions"

7287
7288
7289bysort strata96 (iteration): egen pAmn = mean(pA)

7290bysort strata96 (iteration): egen pAlo = pctile(pA), p(2.5)

7291bysort strata96 (iteration): egen pAhi = pctile(pA), p(97.5)

7292format %9.3f pAmn pAlo pAhi

7293label var pAmn "Percentage based on main effects"

7294label var pAlo "Percentage based on main effects"

7295label var pAhi "Percentage based on main effects"

7296
7297bysort strata96 (iteration): egen pBmn = mean(pB)

7298bysort strata96 (iteration): egen pBlo = pctile(pB), p(2.5)

7299bysort strata96 (iteration): egen pBhi = pctile(pB), p(97.5)

7300format %9.3f pBmn pBlo pBhi

7301label var pBmn "Percentage point difference based on interaction effects"

7302label var pBlo "Percentage point difference based on interaction effects"

7303label var pBhi "Percentage point difference based on interaction effects"

7304
7305* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
7306drop iteration b* u* p pA pB

7307duplicates drop

  Duplicates in terms of all variables

  (90,909 observations deleted)
```

```
7308isid strata96

7309
7310* Ranks
7311sort pmn

7312generate pmnrank = _n

7313order pmnrank, after(phi)

7314sort pAmn

7315generate pAmnrank = _n

7316order pAmnrank, after(pAhi)

7317sort pBmn

7318generate pBmnrank = _n

7319order pBmnrank, after(pBhi)

7320
7321* Sort the data
7322sort strata96

7323isid strata96

7324
7325* Compress and save the data
7326compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (1,092 bytes saved)

7327save "m6B_s96results.dta", replace
  (note: file m6B_s96results.dta not found)
  file m6B_s96results.dta saved

7328
7329* List strata with statistically significant interaction effects on the predicted in
  > cidence
7330use "m6B_s96results.dta", clear

7331list strata96  pBmn pBlo pBhi if pBhi<0, noobs

7332list strata96  pBmn pBlo pBhi if pBlo>0, noobs

7333
7334
7335
7336******************************************************************************
7337******************************************************************************
7338******************************************************************************
7339*
7340*
7341* MODEL 7 - GOOD HEALTH, MAIN EFFECTS MODEL
7342*
```

```
7343*
7344*************************************************************************
7345*************************************************************************
7346*************************************************************************
7347
7348*************************************************************************
7349* MODEL 7A_S6 - GOOD HEALTH, Null MODEL
7350*************************************************************************
7351
7352*------------------------------------------------------------------------*
7353* FIT THE MODEL
7354*------------------------------------------------------------------------*
7355
7356* Load the data
7357use "analysisready2.dta", clear

7358sort scid strata6 aid

7359
7360* delete if missing dependent variable (so can record number)
7361drop if goodhealth == .
  (6 observations deleted)

7362
7363* Fit model using by PQL2
7364runmlwin goodhealth cons , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata6	**680**	**1**	**20.6**	**343**

Run time (seconds)   =   **2.56**
Number of iterations =   **10**

goodhealth	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**2.703832**	**.0498716**	**54.22**	**0.000**	**2.606085**	**2.801578**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.1053003**	**.042089**	**.0228073**	**.1877933**
Level 2: strata6				
var(cons)	**.0982303**	**.0486032**	**.0029698**	**.1934908**

```
7365
7366* Fit model using by MCMC
7367runmlwin goodhealth cons , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons, residuals(u, savechains("m7A_s6_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m7A_s6_beta.dta", replace)) initsprevious
```

  **The model did not run properly in MLwiN. You most likely clicked the 'Abort Macro' but
  > ton in MLwiN, rather than the 'Resume Macro' button.**

  r(198);

  end of do-file

  r(198);

```
7368do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
```

```
7369
7370
7371*******************************************************************************
7372*******************************************************************************
7373*******************************************************************************
7374*
7375*
7376* REPRINT FROM ABOVE:
7377* LIST STRATA WITH STATISTICALLY SIGNIFICANT INTERACTION EFFECTS
7378* AFTER ADJUSTMENT FOR ADDITIVE MAIN EFFECTS.
7379*
7380*
7381*******************************************************************************
7382*******************************************************************************
7383*******************************************************************************
7384
7385***                     MODEL 1: BMI MODELS                          ***
7386use "m1B_s6results.dta", clear
```

```
7387list strata6  REmn RElo REhi if REhi<0, noobs
```

```
7388list strata6  REmn RElo REhi if RElo>0, noobs
```

```
7389
7390use "m1B_s12results.dta", clear
```

```
7391list strata12  REmn RElo REhi if REhi<0, noobs
```

```
7392list strata12  REmn RElo REhi if RElo>0, noobs
```

```
7393
7394use "m1B_s18results.dta", clear
```

```
7395list strata18  REmn RElo REhi if REhi<0, noobs
```

strata18	REmn	RElo	REhi
121	-0.694	-1.406	-0.029
122	-0.705	-1.437	-0.056

7396list strata18 REmn RElo REhi if RElo>0, noobs

7397
7398use "m1B_s36results.dta", clear

7399list strata36 REmn RElo REhi if REhi<0, noobs

strata36	REmn	RElo	REhi
1211	−0.673	−1.278	−0.119
1221	−0.618	−1.193	−0.095

7400list strata36 REmn RElo REhi if RElo>0, noobs

strata36	REmn	RElo	REhi
2220	0.610	0.004	1.319

7401
7402use "m1B_s48results.dta", clear

7403list strata48 REmn RElo REhi if REhi<0, noobs

strata48	REmn	RElo	REhi
1311	−0.726	−1.325	−0.224
1321	−0.657	−1.218	−0.112

7404list strata48 REmn RElo REhi if RElo>0, noobs

strata48	REmn	RElo	REhi
2320	0.628	0.028	1.333

7405
7406use "m1B_s96results.dta", clear

7407list strata96 REmn RElo REhi if REhi<0, noobs

strata96	REmn	RElo	REhi
13111	−0.676	−1.203	−0.161
13211	−0.643	−1.224	−0.101
28300	−0.595	−1.231	−0.047

7408list strata96 REmn RElo REhi if RElo>0, noobs

strata96	REmn	RElo	REhi
18201	0.492	0.068	0.955
23310	1.011	0.131	1.970

```
7409
7410
  end of do-file

7411do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7412
7413
7414***                         MODEL 2: CESD MODELS                              ***
7415use "m2B_s6results.dta", clear

7416list strata6  REmn RElo REhi if REhi<0, noobs

7417list strata6  REmn RElo REhi if RElo>0, noobs

7418
7419use "m2B_s12results.dta", clear

7420list strata12  REmn RElo REhi if REhi<0, noobs

7421list strata12  REmn RElo REhi if RElo>0, noobs

7422
7423use "m2B_s18results.dta", clear

7424list strata18  REmn RElo REhi if REhi<0, noobs

7425list strata18  REmn RElo REhi if RElo>0, noobs

7426
7427use "m2B_s36results.dta", clear

7428list strata36  REmn RElo REhi if REhi<0, noobs

7429list strata36  REmn RElo REhi if RElo>0, noobs

7430
7431use "m2B_s48results.dta", clear

7432list strata48  REmn RElo REhi if REhi<0, noobs

7433list strata48  REmn RElo REhi if RElo>0, noobs

7434
7435use "m2B_s96results.dta", clear

7436list strata96  REmn RElo REhi if REhi<0, noobs

7437list strata96  REmn RElo REhi if RElo>0, noobs

7438
7439
7440
  end of do-file

7441do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7442
7443***                          MODEL 3: BINGE MODELS                             ***
7444use "m3B_s6results.dta", clear
```

7445list strata6 pBmn pBlo pBhi if pBhi<0, noobs

7446list strata6 pBmn pBlo pBhi if pBlo>0, noobs

7447
7448use "m3B_s12results.dta", clear

7449list strata12 pBmn pBlo pBhi if pBhi<0, noobs

7450list strata12 pBmn pBlo pBhi if pBlo>0, noobs

7451
7452use "m3B_s18results.dta", clear

7453list strata18 pBmn pBlo pBhi if pBhi<0, noobs

7454list strata18 pBmn pBlo pBhi if pBlo>0, noobs

7455
7456use "m3B_s36results.dta", clear

7457list strata36 pBmn pBlo pBhi if pBhi<0, noobs

7458list strata36 pBmn pBlo pBhi if pBlo>0, noobs

7459
7460use "m3B_s48results.dta", clear

7461list strata48 pBmn pBlo pBhi if pBhi<0, noobs

7462list strata48 pBmn pBlo pBhi if pBlo>0, noobs

7463
7464use "m3B_s96results.dta", clear

7465list strata96 pBmn pBlo pBhi if pBhi<0, noobs

7466list strata96 pBmn pBlo pBhi if pBlo>0, noobs

7467
7468
  end of do-file

7469do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7470
7471
7472***   MODEL 4: CIGARETTE MODELS   ***
7473use "m4B_s6results.dta", clear

7474list strata6 pBmn pBlo pBhi if pBhi<0, noobs

7475list strata6 pBmn pBlo pBhi if pBlo>0, noobs

7476
7477use "m4B_s12results.dta", clear

7478list strata12 pBmn pBlo pBhi if pBhi<0, noobs

7479list strata12 pBmn pBlo pBhi if pBlo>0, noobs

```
7480
7481use "m4B_s18results.dta", clear

7482list strata18  pBmn pBlo pBhi if pBhi<0, noobs

7483list strata18  pBmn pBlo pBhi if pBlo>0, noobs

7484
7485use "m4B_s36results.dta", clear

7486list strata36  pBmn pBlo pBhi if pBhi<0, noobs

7487list strata36  pBmn pBlo pBhi if pBlo>0, noobs

7488
7489use "m4B_s48results.dta", clear

7490list strata48  pBmn pBlo pBhi if pBhi<0, noobs

7491list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7492
7493use "m4B_s96results.dta", clear

7494list strata96  pBmn pBlo pBhi if pBhi<0, noobs

7495list strata96  pBmn pBlo pBhi if pBlo>0, noobs
```

strata96	pBmn	pBlo	pBhi
28111	5.210	0.783	9.957

```
7496
7497
  end of do-file

7498do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7499
7500
7501***                      MODEL 5: MARIJUANA MODELS                      ***
7502use "m5B_s6results.dta", clear

7503list strata6  pBmn pBlo pBhi if pBhi<0, noobs

7504list strata6  pBmn pBlo pBhi if pBlo>0, noobs

7505
7506use "m5B_s12results.dta", clear

7507list strata12  pBmn pBlo pBhi if pBhi<0, noobs

7508list strata12  pBmn pBlo pBhi if pBlo>0, noobs

7509
7510use "m5B_s18results.dta", clear

7511list strata18  pBmn pBlo pBhi if pBhi<0, noobs
```

```
7512list strata18  pBmn pBlo pBhi if pBlo>0, noobs

7513
7514use "m5B_s36results.dta", clear

7515list strata36  pBmn pBlo pBhi if pBhi<0, noobs

7516list strata36  pBmn pBlo pBhi if pBlo>0, noobs

7517
7518use "m5B_s48results.dta", clear

7519list strata48  pBmn pBlo pBhi if pBhi<0, noobs

7520list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7521
7522use "m5B_s96results.dta", clear

7523list strata96  pBmn pBlo pBhi if pBhi<0, noobs

7524list strata96  pBmn pBlo pBhi if pBlo>0, noobs

7525
  end of do-file

7526do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7527
7528
7529***                        MODEL 6: DRUG MODELS                              ***
7530use "m6B_s6results.dta", clear

7531list strata6  pBmn pBlo pBhi if pBhi<0, noobs

7532list strata6  pBmn pBlo pBhi if pBlo>0, noobs

7533
7534use "m6B_s12results.dta", clear

7535list strata12  pBmn pBlo pBhi if pBhi<0, noobs

7536list strata12  pBmn pBlo pBhi if pBlo>0, noobs

7537
7538use "m6B_s18results.dta", clear

7539list strata18  pBmn pBlo pBhi if pBhi<0, noobs

7540list strata18  pBmn pBlo pBhi if pBlo>0, noobs

7541
7542use "m6B_s36results.dta", clear

7543list strata36  pBmn pBlo pBhi if pBhi<0, noobs

7544list strata36  pBmn pBlo pBhi if pBlo>0, noobs

7545
7546use "m6B_s48results.dta", clear
```

```
7547list strata48  pBmn pBlo pBhi if pBhi<0, noobs

7548list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7549
7550use "m6B_s96results.dta", clear

7551list strata96  pBmn pBlo pBhi if pBhi<0, noobs

7552list strata96  pBmn pBlo pBhi if pBlo>0, noobs

7553
  end of do-file

7554do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7555
7556
7557* Close log file
7558capture log close
```

```
73. save "data96_fairpoorhealth.dta", replace
  (note: file data96_fairpoorhealth.dta not found)
  file data96_fairpoorhealth.dta saved

74. tab strata96, nofreq /* how many strata96 remain after dropping outcome */

75. display r(r)
  92

76.
  end of do-file

77. do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

78.
79. * fairpoorhealth
80. use "analysisready2.dta", clear

81. drop if fairpoorhealth == .
  (6 observations deleted)

82. tab strata12, nofreq

83. display r(r)
  12

84. tab strata18, nofreq

85. display r(r)
  18

86. tab strata36, nofreq

87. display r(r)
  36

88. tab strata48, nofreq

89. display r(r)
  48

90. tab strata96, nofreq /* HAS 92 STRATA */

91. display r(r)
  92

92.
  end of do-file

93. do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

94.
95. ********************************************************************************
96. ********************************************************************************
97. ********************************************************************************
98. *
99. *
100 * MODEL 7 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
101 *
102 *
```

```
103 ********************************************************************************
104 ********************************************************************************
105 ********************************************************************************
106
107 ********************************************************************************
108 * MODEL 7A_S6 - FAIR OR POOR HEALTH, Null MODEL
109 ********************************************************************************
110
111 *------------------------------------------------------------------------------*
112 * FIT THE MODEL
113 *------------------------------------------------------------------------------*
114
115 * Load the data
116 use "analysisready2.dta", clear

117 sort scid strata6 aid

118
119 * delete if missing dependent variable (so can record number)
120 drop if fairpoorhealth == .
  (6 observations deleted)

121
122 * Fit model using by PQL2
123 runmlwin fairpoorhealth cons , ///
  >   level3(scid: cons) ///
  >   level2(strata6: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   14035
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata6	**680**	**1**	**20.6**	**343**

Run time (seconds) =   **2.62**
Number of iterations =   **10**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-2.703606**	**.049861**	**-54.22**	**0.000**	**-2.801332**	**-2.60588**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.105295**	**.042034**	**.02291**	**.1876801**
Level 2: strata6				
var(cons)	**.0980625**	**.0485114**	**.0029819**	**.1931431**

```
124
125 * Fit model using by MCMC
126 runmlwin fairpoorhealth cons , ///
>    level3(scid: cons) ///
>    level2(strata6: cons, residuals(u, savechains("m7A_s6_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m7A_s6_beta.dta", replace)) initsprevious  ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   14035
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata6	**6**	**1165**	**2339.2**	**4295**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          199
Deviance (dbar)               =      6944.82
Deviance (thetabar)           =      6885.09
Effective no. of pars (pd)    =        59.74
Bayesian DIC                  =      7004.56
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-2.60734**	**.1776166**	**229**	**0.000**	**-2.94181**	**-2.206066**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.1286667	.0375175	904	.0647843	.2149093
Level 2: strata6					
var(cons)	.1520284	.196762	624	.031377	.6496424

```
127 rename u0 m1u

128 drop u0se

129
130 * Present the regression coefficients as odds ratios
131 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   14035
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata6	**6**	**1165**	**2339.2**	**4295**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         199
Deviance (dbar)               =     6944.82
Deviance (thetabar)           =     6885.09
Effective no. of pars (pd)    =       59.74
Bayesian DIC                  =     7004.56
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0752241	.0142731	210	0.000	.0527703	.1101332

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.1286667	.0375175	904	.0647843	.2149093
Level 2: strata6					
var(cons)	.1520284	.196762	624	.031377	.6496424

```
132
133 * Calculate the ICC from the parameter point estimates
134 scalar m1sigma2u = [RP2]var(cons)

135 scalar m1sigma2e = _pi^2/3

136 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.044

137
138 * Calculate the ICC from the chains
139 use "m7A_s6_beta.dta", clear

140 rename RP3_var_cons_ sigma2uscid

141 rename RP2_var_cons_ sigma2u

142 generate sigma2e = _pi^2/3

143 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

144 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

145 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0417713	.0405961	600	0.000	.0089553	.1607437
icc_scid	.0361326	.0104332	883	0.000	.0180004	.0592374

```
146
147
148 ********************************************************************************
149 * MODEL 7B_S6 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
150 ********************************************************************************
```

```
151
152 *-------------------------------------------------------------------------------*
153 * FIT THE MODEL
154 *-------------------------------------------------------------------------------*
155
156 * Load the data
157 use "analysisready2.dta", clear

158 sort scid strata6 aid

159
160 * delete if missing dependent variable (so can record number)
161 drop if fairpoorhealth == .
  (6 observations deleted)

162
163 * Fit model using by PQL2
164 runmlwin fairpoorhealth cons female latinx_race black_race , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata6	**680**	**1**	**20.6**	**343**

Run time (seconds)   =   **2.74**
Number of iterations =   **11**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	**-3.064094**	**.0756614**	**-40.50**	**0.000**	**-3.212388**	**-2.915801**
female	**.4191645**	**.0725666**	**5.78**	**0.000**	**.2769367**	**.5613924**
latinx_race	**.4091633**	**.1068793**	**3.83**	**0.000**	**.1996838**	**.6186429**
black_race	**.3115156**	**.0932411**	**3.34**	**0.001**	**.1287664**	**.4942648**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	**.1247043**	**.0393987**	**.0474842**	**.2019244**
Level 2: strata6				
var(cons)	**.0197022**	**.0337604**	**-.046467**	**.0858714**

```
165
166 * Fit model using by MCMC
```

```
167 runmlwin fairpoorhealth cons female latinx_race black_race , ///
  >    level3(scid: cons) ///
  >    level2(strata6: cons, residuals(u, savechains("m7B_s6_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >       savechains("m7B_s6_beta.dta", replace)) initsprevious  ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Minimum	Average	Maximum
scid	146	1	96.1	828
strata6	6	1165	2339.2	4295

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	282
Deviance (dbar)	=	6944.27
Deviance (thetabar)	=	6884.48
Effective no. of pars (pd)	=	59.79
Bayesian DIC	=	7004.06

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.054285	.1792603	173	0.000	-3.458252	-2.703363
female	.4081142	.1977504	192	0.025	.0017161	.8882277
latinx_race	.4308324	.23358	297	0.029	-.0195898	.9817531
black_race	.2896749	.232369	254	0.081	-.1905736	.7976505

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.1307623	.0391306	877	.0643462	.2140251
Level 2: strata6					
var(cons)	.057894	.1443973	262	.0009124	.3188562

```
168 rename u0 m1u

169 drop u0se

170
171 * Present the regression coefficients as odds ratios
172 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Minimum	Average	Maximum
scid	146	1	96.1	828
strata6	6	1165	2339.2	4295

```
Burnin                      =         5000
Chain                       =        50000
Thinning                    =           50
Run time (seconds)          =          282
Deviance (dbar)             =      6944.27
Deviance (thetabar)         =      6884.48
Effective no. of pars (pd)  =        59.79
Bayesian DIC                =      7004.06
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0479478	.0085483	173	0.000	.0314849	.0669799
female	1.533731	.3187431	211	0.025	1.001718	2.430818
latinx_race	1.587462	.4133937	236	0.029	.9806008	2.669131
black_race	1.366676	.3660896	235	0.081	.8264849	2.220318

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.1307623	.0391306	877	.0643462	.2140251
Level 2: strata6					
var(cons)	.057894	.1443973	262	.0009124	.3188562

```
173
174 * Calculate the ICC from the parameter point estimates
175 scalar m1sigma2u = [RP2]var(cons)

176 scalar m1sigma2e = _pi^2/3

177 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
    ICC =      0.017

178
179 * Calculate the ICC from the chains
180 use "m7B_s6_beta.dta", clear

181 rename RP3_var_cons_ sigma2uscid

182 rename RP2_var_cons_ sigma2u

183 generate sigma2e = _pi^2/3

184 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

185 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

186 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0147902	.0279	238	0.000	.0002616	.0842018
icc_scid	.0374845	.0109347	844	0.000	.0187824	.0602912

```
187
188
```

```
189 *-------------------------------------------------------------------------------*
190 * PREPARE FIXED-PART PAREMETER CHAINS
191 *-------------------------------------------------------------------------------*
192
193 use "m7B_s6_beta.dta", clear

194 drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

195 rename FP1_* b_*

196 format %9.2f b_*

197 compress
    variable iteration was double now long
    (4,000 bytes saved)

198 save "m7B_s6_beta_prepped.dta", replace
  file m7B_s6_beta_prepped.dta saved

199 isid iteration

200 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
201
202
203 *-------------------------------------------------------------------------------*
204 * PREPARE STRATUM RANDOM EFFECTS CHAINS
205 *-------------------------------------------------------------------------------*
206
207 use "m7B_s6_u.dta", clear

208 drop residual idnum

209 rename value u

210 format %9.2f u

211 sort strata6 iteration

212 order strata6 iteration

213 compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)

214 save "m7B_s6_u_prepped.dta", replace
  file m7B_s6_u_prepped.dta saved

215 isid strata6 iteration

216 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	6000	1000	24976	1	49951	Iteration

```
217
218
219 *-------------------------------------------------------------------------------*
220 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
221 *-------------------------------------------------------------------------------*
222
223 use "data6.dta", clear

224 isid strata6

225 cross using "m7B_s6_beta_prepped.dta"

226 isid strata6 iteration

227 sort strata6 iteration

228 merge 1:1 strata6 iteration using "m7B_s6_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	**0**
matched	**6,000**

```
229 isid strata6 iteration

230 compress
    variable strata6 was double now byte
    (42,000 bytes saved)

231 save "m7B_s6data_prepped.dta", replace
  file m7B_s6data_prepped.dta saved

232
233
234 *-------------------------------------------------------------------------------*
235 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
236 *-------------------------------------------------------------------------------*
237
238 * Percentage p based on fixed and random part
239 use "m7B_s6data_prepped.dta", clear

240 gen cons = 1

241 generate p = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         + u ///
  >    )

242 label var p "Percentage based on main effects and interactions"

243 format %9.3f p

244
245 * Percentage p based only on the fixed-part
246 generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >    )
```

```
247 label var pA "Percentage based only on main effects"

248 format %9.3f pA

249
250 * Percentage pB calculated as the difference between p and pA
251 generate pB = p - pA

252 label var pB "Percentage point difference based on interaction effects"

253 format %9.3f pB

254
255 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
256 bysort strata6 (iteration): egen pmn = mean(p)

257 bysort strata6 (iteration): egen plo = pctile(p), p(2.5)

258 bysort strata6 (iteration): egen phi = pctile(p), p(97.5)

259 format %9.3f pmn plo phi

260 label var pmn "Percentage based on main effects and interactions"

261 label var plo "Percentage based on main effects and interactions"

262 label var phi "Percentage based on main effects and interactions"

263
264
265 bysort strata6 (iteration): egen pAmn = mean(pA)

266 bysort strata6 (iteration): egen pAlo = pctile(pA), p(2.5)

267 bysort strata6 (iteration): egen pAhi = pctile(pA), p(97.5)

268 format %9.3f pAmn pAlo pAhi

269 label var pAmn "Percentage based on main effects"

270 label var pAlo "Percentage based on main effects"

271 label var pAhi "Percentage based on main effects"

272
273 bysort strata6 (iteration): egen pBmn = mean(pB)

274 bysort strata6 (iteration): egen pBlo = pctile(pB), p(2.5)

275 bysort strata6 (iteration): egen pBhi = pctile(pB), p(97.5)

276 format %9.3f pBmn pBlo pBhi

277 label var pBmn "Percentage point difference based on interaction effects"

278 label var pBlo "Percentage point difference based on interaction effects"

279 label var pBhi "Percentage point difference based on interaction effects"

280
```

```
281 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
282 drop iteration b* u* p pA pB

283 duplicates drop

  Duplicates in terms of all variables

  (5,994 observations deleted)

284 isid strata6

285
286 * Ranks
287 sort pmn

288 generate pmnrank = _n

289 order pmnrank, after(phi)

290 sort pAmn

291 generate pAmnrank = _n

292 order pAmnrank, after(pAhi)

293 sort pBmn

294 generate pBmnrank = _n

295 order pBmnrank, after(pBhi)

296
297 * Sort the data
298 sort strata6

299 isid strata6

300
301 * Compress and save the data
302 compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (72 bytes saved)

303 save "m7B_s6results.dta", replace
  file m7B_s6results.dta saved

304
305 * List strata with statistically significant interaction effects on the predicted in
  > cidence
306 use "m7B_s6results.dta", clear

307 list strata6  pBmn pBlo pBhi if pBhi<0, noobs

308 list strata6  pBmn pBlo pBhi if pBlo>0, noobs

309
310
```

```
311
312 **************************************************************************
313 * MODEL 7A_S12 - FAIR OR POOR HEALTH, Null MODEL
314 **************************************************************************
315
316 *-----------------------------------------------------------------------*
317 * FIT THE MODEL
318 *-----------------------------------------------------------------------*
319
320 * Load the data
321 use "analysisready2.dta", clear

322 sort scid strata12 aid

323
324 * delete if missing dependent variable (so can record number)
325 drop if fairpoorhealth == .
  (6 observations deleted)

326
327 * Fit model using by PQL2
328 runmlwin fairpoorhealth cons , ///
 >    level3(scid: cons) ///
 >    level2(strata12: cons) ///
 >    level1(aid:) ///
 >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
 >    rigls maxiterations(100) ///
 >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata12	**1169**	**1**	**12.0**	**217**

Run time (seconds)   =   **2.87**
Number of iterations =   **10**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.735851**	**.0502997**	**-54.39**	**0.000**	**-2.834436 -2.637265**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.0956839**	**.0411752**	**.014982 .1763858**
Level 2: strata12			
var(cons)	**.2101259**	**.0632717**	**.0861156 .3341362**

```
329
```

```
330 * Fit model using by MCMC
331 runmlwin fairpoorhealth cons , ///
>    level3(scid: cons) ///
>    level2(strata12: cons, residuals(u, savechains("m7A_s12_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m7A_s12_beta.dta", replace)) initsprevious ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata12	**12**	**472**	**1169.6**	**2904**

```
Burnin                     =        5000
Chain                      =       50000
Thinning                   =          50
Run time (seconds)         =         200
Deviance (dbar)            =     6920.52
Deviance (thetabar)        =     6865.85
Effective no. of pars (pd) =       54.67
Bayesian DIC               =     6975.19
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-2.579719**	**.1183008**	**472**	**0.000**	**-2.807128**	**-2.349385**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.0908967**	**.0331909**	**680**	**.0358097**	**.1638767**
Level 2: strata12					
var(cons)	**.134937**	**.0777556**	**1122**	**.0470995**	**.3203066**

```
332 rename u0 m1u

333 drop u0se

334
335 * Present the regression coefficients as odds ratios
336 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata12	**12**	**472**	**1169.6**	**2904**

```
Burnin                      =        5000
Chain                       =       50000
Thinning                    =          50
Run time (seconds)          =         200
Deviance (dbar)             =     6920.52
Deviance (thetabar)         =     6865.85
Effective no. of pars (pd)  =       54.67
Bayesian DIC                =     6975.19
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0764246	.009137	473	0.000	.0603782	.0954278

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0908967	.0331909	680	.0358097	.1638767
Level 2: strata12					
var(cons)	.134937	.0777556	1122	.0470995	.3203066

```
337
338 * Calculate the ICC from the parameter point estimates
339 scalar m1sigma2u = [RP2]var(cons)

340 scalar m1sigma2e = _pi^2/3

341 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
   ICC =      0.039

342
343 * Calculate the ICC from the chains
344 use "m7A_s12_beta.dta", clear

345 rename RP3_var_cons_ sigma2uscid

346 rename RP2_var_cons_ sigma2u

347 generate sigma2e = _pi^2/3

348 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

349 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

350 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0381502	.0214597	1127	0.000	.0136464	.0861327
icc_scid	.0257257	.0091203	674	0.000	.0101898	.0459476

```
351
352
353 ****************************************************************************
354 * MODEL 7B_S12 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
355 ****************************************************************************
```

```
356
357 *------------------------------------------------------------------------------*
358 * FIT THE MODEL
359 *------------------------------------------------------------------------------*
360
361 * Load the data
362 use "analysisready2.dta", clear

363 sort scid strata12 aid

364
365 * delete if missing dependent variable (so can record number)
366 drop if fairpoorhealth == .
  (6 observations deleted)

367
368 * Fit model using by PQL2
369 runmlwin fairpoorhealth cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause

  MLwiN 3.2 multilevel model                    Number of obs      =      14035
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.1	828
strata12	1169	1	12.0	217

```
Run time (seconds)   =        3.06
Number of iterations =          11
```

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-3.230631	.0813499	-39.71	0.000	-3.390074	-3.071188
female	.4109616	.0762711	5.39	0.000	.2614729	.5604502
latinx_race	.2982428	.1100126	2.71	0.007	.0826222	.5138634
black_race	.2816849	.0940704	2.99	0.003	.0973102	.4660595
lowparentedu	.4427296	.0763843	5.80	0.000	.2930191	.5924401

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.0802883	.0341293	.0133961	.1471805
Level 2: strata12				
var(cons)	.0829403	.0477435	-.0106352	.1765158

```
370
```

```
371 * Fit model using by MCMC
372 runmlwin fairpoorhealth cons female latinx_race black_race lowparentedu, ///
  >    level3(scid: cons) ///
  >    level2(strata12: cons, residuals(u, savechains("m7B_s12_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m7B_s12_beta.dta", replace)) initsprevious ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata12	**12**	**472**	**1169.6**	**2904**

Burnin	=	**5000**	
Chain	=	**50000**	
Thinning	=	**50**	
Run time (seconds)	=	**310**	
Deviance (dbar)	=	**6920.24**	
Deviance (thetabar)	=	**6868.32**	
Effective no. of pars (pd)	=	**51.92**	
Bayesian DIC	=	**6972.16**	

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-3.172487**	**.1172984**	**494**	**0.000**	**-3.404336**	**-2.933206**
female	**.4008562**	**.1100552**	**640**	**0.002**	**.1657106**	**.6334704**
latinx_race	**.3101843**	**.1439637**	**675**	**0.016**	**.0252823**	**.5811064**
black_race	**.2607204**	**.1360246**	**637**	**0.026**	**-.0020408**	**.5503475**
lowparentedu	**.4095392**	**.1088218**	**838**	**0.000**	**.176074**	**.6204**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.0909545**	**.0321352**	**698**	**.0344352**	**.16322**
Level 2: strata12					
var(cons)	**.021379**	**.0264106**	**694**	**.0012557**	**.0939578**

```
373 rename u0 m1u

374 drop u0se

375
376 * Present the regression coefficients as odds ratios
377 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata12	**12**	**472**	**1169.6**	**2904**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         310
Deviance (dbar)               =     6920.24
Deviance (thetabar)           =     6868.32
Effective no. of pars (pd)    =       51.92
Bayesian DIC                  =     6972.16
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0422909	.0050911	505	0.000	.0332289	.0532261
female	1.501325	.169469	644	0.002	1.180231	1.884138
latinx_race	1.378234	.2090713	629	0.016	1.025605	1.788016
black_race	1.307703	.1850977	609	0.026	.9979613	1.733855
lowparentedu	1.512806	.168101	827	0.000	1.192526	1.859672

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0909545	.0321352	698	.0344352	.16322
Level 2: strata12					
var(cons)	.021379	.0264106	694	.0012557	.0939578

```
378
379 * Calculate the ICC from the parameter point estimates
380 scalar m1sigma2u = [RP2]var(cons)

381 scalar m1sigma2e = _pi^2/3

382 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
    ICC =      0.006

383
384 * Calculate the ICC from the chains
385 use "m7B_s12_beta.dta", clear

386 rename RP3_var_cons_ sigma2uscid

387 rename RP2_var_cons_ sigma2u

388 generate sigma2e =  _pi^2/3

389 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

390 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

391 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0065656	.0082303	692	0.000	.0003725	.0271615
icc_scid	.0263062	.0090351	696	0.000	.0103124	.046984

```
392
```

```
393
394 *-------------------------------------------------------------------------------*
395 * PREPARE FIXED-PART PAREMETER CHAINS
396 *-------------------------------------------------------------------------------*
397
398 use "m7B_s12_beta.dta", clear

399 drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

400 rename FP1_* b_*

401 format %9.2f b_*

402 compress
    variable iteration was double now long
    (4,000 bytes saved)

403 save "m7B_s12_beta_prepped.dta", replace
  file m7B_s12_beta_prepped.dta saved

404 isid iteration

405 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
406
407
408 *-------------------------------------------------------------------------------*
409 * PREPARE STRATUM RANDOM EFFECTS CHAINS
410 *-------------------------------------------------------------------------------*
411
412 use "m7B_s12_u.dta", clear

413 drop residual idnum

414 rename value u

415 format %9.2f u

416 sort strata12 iteration

417 order strata12 iteration

418 compress
    variable strata12 was double now int
    variable iteration was double now long
    (120,000 bytes saved)

419 save "m7B_s12_u_prepped.dta", replace
  file m7B_s12_u_prepped.dta saved

420 isid strata12 iteration

421 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	12000	1000	24976	1	49951	Iteration

```
422
423
424 *-----------------------------------------------------------------------------*
425 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
426 *-----------------------------------------------------------------------------*
427
428 use "data12.dta", clear

429 isid strata12

430 cross using "m7B_s12_beta_prepped.dta"

431 isid strata12 iteration

432 sort strata12 iteration

433 merge 1:1 strata12 iteration using "m7B_s12_u_prepped.dta", nogenerate assert(match)

        Result                         # of obs.
      ─────────────────────────────────────────────
        not matched                            0
        matched                           12,000
      ─────────────────────────────────────────────


434 isid strata12 iteration

435 compress
    variable strata12 was double now int
    (72,000 bytes saved)

436 save "m7B_s12data_prepped.dta", replace
  file m7B_s12data_prepped.dta saved

437
438
439 *-----------------------------------------------------------------------------*
440 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
441 *-----------------------------------------------------------------------------*
442
443 * Percentage p based on fixed and random part
444 use "m7B_s12data_prepped.dta", clear

445 gen cons = 1

446 generate p = 100*invlogit( ///
  >           b_cons*cons ///
  >          +b_female*female ///
  >          +b_latinx_race*latinx_race ///
  >          +b_black_race*black_race ///
  >          +b_lowparentedu*lowparentedu ///
  >          + u ///
  >   )

447 label var p "Percentage based on main effects and interactions"

448 format %9.3f p

449
450 * Percentage p based only on the fixed-part
451 generate pA = 100*invlogit( ///
  >           b_cons*cons ///
  >          +b_female*female ///
  >          +b_latinx_race*latinx_race ///
  >          +b_black_race*black_race ///
  >          +b_lowparentedu*lowparentedu ///
  >   )
```

```
452 label var pA "Percentage based only on main effects"

453 format %9.3f pA

454
455 * Percentage pB calculated as the difference between p and pA
456 generate pB = p - pA

457 label var pB "Percentage point difference based on interaction effects"

458 format %9.3f pB

459
460 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
461 bysort strata12 (iteration): egen pmn = mean(p)

462 bysort strata12 (iteration): egen plo = pctile(p), p(2.5)

463 bysort strata12 (iteration): egen phi = pctile(p), p(97.5)

464 format %9.3f pmn plo phi

465 label var pmn "Percentage based on main effects and interactions"

466 label var plo "Percentage based on main effects and interactions"

467 label var phi "Percentage based on main effects and interactions"

468
469
470 bysort strata12 (iteration): egen pAmn = mean(pA)

471 bysort strata12 (iteration): egen pAlo = pctile(pA), p(2.5)

472 bysort strata12 (iteration): egen pAhi = pctile(pA), p(97.5)

473 format %9.3f pAmn pAlo pAhi

474 label var pAmn "Percentage based on main effects"

475 label var pAlo "Percentage based on main effects"

476 label var pAhi "Percentage based on main effects"

477
478 bysort strata12 (iteration): egen pBmn = mean(pB)

479 bysort strata12 (iteration): egen pBlo = pctile(pB), p(2.5)

480 bysort strata12 (iteration): egen pBhi = pctile(pB), p(97.5)

481 format %9.3f pBmn pBlo pBhi

482 label var pBmn "Percentage point difference based on interaction effects"

483 label var pBlo "Percentage point difference based on interaction effects"

484 label var pBhi "Percentage point difference based on interaction effects"

485
```

```
486 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
487 drop iteration b* u* p pA pB

488 duplicates drop

  Duplicates in terms of all variables

  (11,988 observations deleted)

489 isid strata12

490
491 * Ranks
492 sort pmn

493 generate pmnrank = _n

494 order pmnrank, after(phi)

495 sort pAmn

496 generate pAmnrank = _n

497 order pAmnrank, after(pAhi)

498 sort pBmn

499 generate pBmnrank = _n

500 order pBmnrank, after(pBhi)

501
502 * Sort the data
503 sort strata12

504 isid strata12

505
506 * Compress and save the data
507 compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (144 bytes saved)

508 save "m7B_s12results.dta", replace
  file m7B_s12results.dta saved

509
510 * List strata with statistically significant interaction effects on the predicted in
  > cidence
511 use "m7B_s12results.dta", clear

512 list strata12  pBmn pBlo pBhi if pBhi<0, noobs

513 list strata12  pBmn pBlo pBhi if pBlo>0, noobs

514
515
```

```
516 ********************************************************************************
517 * MODEL 7A_S18 - FAIR OR POOR HEALTH, Null MODEL
518 ********************************************************************************
519
520 *------------------------------------------------------------------------------*
521 * FIT THE MODEL
522 *------------------------------------------------------------------------------*
523
524 * Load the data
525 use "analysisready2.dta", clear

526 sort scid strata18 aid

527
528 * delete if missing dependent variable (so can record number)
529 drop if fairpoorhealth == .
  (6 observations deleted)

530
531 * Fit model using PQL2
532 runmlwin fairpoorhealth cons , ///
>    level3(scid: cons) ///
>    level2(strata18: cons) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>    rigls maxiterations(100) ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata18	**1621**	**1**	**8.7**	**193**

Run time (seconds)   =   **3.89**
Number of iterations =   **15**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.763341**	**.0503803**	**-54.85**	**0.000**	**-2.862084** **-2.664597**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	**.1017083**	**.0405163**	**.0222977** **.1811188**
Level 2: strata18			
var(cons)	**.2400179**	**.0691062**	**.1045722** **.3754635**

```
533
534 * Fit model using MCMC
```

```
535 runmlwin fairpoorhealth cons , ///
>     level3(scid: cons) ///
>     level2(strata18: cons, residuals(u, savechains("m7A_s18_u.dta", replace))) ///
>     level1(aid:) ///
>     discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>     mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>       savechains("m7A_s18_beta.dta", replace)) initsprevious ///
>     nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata18	**18**	**215**	**779.7**	**1582**

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         204
Deviance (dbar)              =     6912.12
Deviance (thetabar)          =     6855.60
Effective no. of pars (pd)   =       56.52
Bayesian DIC                 =     6968.64
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-2.640413**	.1105036	**603**	**0.000**	**-2.850201**	**-2.419832**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0806932	.0314849	**554**	.0278852	.147666
Level 2: strata18					
var(cons)	.160537	.0747943	**1109**	.0714981	.3729248

536 rename u0 m1u

537 drop u0se

538
539 * Present the regression coefficients as odds ratios
540 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata18	**18**	**215**	**779.7**	**1582**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         204
Deviance (dbar)               =     6912.12
Deviance (thetabar)           =     6855.60
Effective no. of pars (pd)    =       56.52
Bayesian DIC                  =     6968.64
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0715894	.0080692	593	0.000	.0578327	.0889366

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0806932	.0314849	554	.0278852	.147666
Level 2: strata18					
var(cons)	.160537	.0747943	1109	.0714981	.3729248

```
541
542 * Calculate the ICC from the parameter point estimates
543 scalar m1sigma2u = [RP2]var(cons)

544 scalar m1sigma2e = _pi^2/3

545 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.047

546
547 * Calculate the ICC from the chains
548 use "m7A_s18_beta.dta", clear

549 rename RP3_var_cons_ sigma2uscid

550 rename RP2_var_cons_ sigma2u

551 generate sigma2e = _pi^2/3

552 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

553 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

554 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0459564	.0205417	1114	0.000	.0208425	.0992302
icc_scid	.0225338	.0087006	546	0.000	.007902	.0410507

```
555
556
557 *******************************************************************************
558 * MODEL 7B_S18 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
559 *******************************************************************************
```

```
560
561 *------------------------------------------------------------------------------*
562 * FIT THE MODEL
563 *------------------------------------------------------------------------------*
564
565 * Load the data
566 use "analysisready2.dta", clear

567 sort scid strata18 aid

568
569 * delete if missing dependent variable (so can record number)
570 drop if fairpoorhealth == .
 (6 observations deleted)

571
572 * Fit model using PQL2
573 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege, ///
 >    level3(scid: cons) ///
 >    level2(strata18: cons) ///
 >    level1(aid:) ///
 >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
 >    rigls maxiterations(100) ///
 >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata18	**1621**	**1**	**8.7**	**193**

Run time (seconds)   =   **3.34**
Number of iterations =   **11**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-3.391934	.0972503	-34.88	0.000	-3.582541	-3.201327
female	.4101663	.0758786	5.41	0.000	.261447	.5588856
latinx_race	.2904078	.109522	2.65	0.008	.0757486	.505067
black_race	.2797069	.0931371	3.00	0.003	.0971615	.4622522
hsless	.6079067	.095068	6.39	0.000	.4215767	.7942366
somecollege	.3126229	.1021511	3.06	0.002	.1124105	.5128353

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.0727448	.0324104	.0092216	.1362681
Level 2: strata18				
var(cons)	.0960792	.0522989	-.0064248	.1985833

```
574
575 * Fit model using MCMC
576 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege, ///
  >   level3(scid: cons) ///
  >   level2(strata18: cons, residuals(u, savechains("m7B_s18_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m7B_s18_beta.dta", replace)) initsprevious ///
  >   nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs      =      14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata18	18	215	779.7	1582

```
Burnin                     =        5000
Chain                      =       50000
Thinning                   =          50
Run time (seconds)         =         345
Deviance (dbar)            =     6915.22
Deviance (thetabar)        =     6863.44
Effective no. of pars (pd) =       51.78
Bayesian DIC               =     6967.01
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.336906	.1305461	427	0.000	-3.599086	-3.067454
female	.4069248	.1070458	697	0.002	.1972254	.6208374
latinx_race	.3164894	.140223	671	0.012	.0427012	.5899508
black_race	.2679973	.125608	881	0.017	.0198037	.4980841
hsless	.5765883	.1308673	415	0.000	.2983037	.8460547
somecollege	.2971381	.1381772	592	0.024	.0057983	.5772929

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0797029	.0315728	615	.0297497	.1483437
Level 2: strata18					
var(cons)	.0239007	.0270996	439	.0009411	.1041098

```
577 rename u0 m1u

578 drop u0se

579
580 * Present the regression coefficients as odds ratios
581 runmlwin, or
```

```
MLwiN 3.2 multilevel model                    Number of obs      =      14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata18	18	215	779.7	1582

```
Burnin                       =          5000
Chain                        =         50000
Thinning                     =            50
Run time (seconds)           =           345
Deviance (dbar)              =       6915.22
Deviance (thetabar)          =       6863.44
Effective no. of pars (pd)   =         51.78
Bayesian DIC                 =       6967.01
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.035863	.0048629	435	0.000	.0273487	.0465395
female	1.50837	.164893	711	0.002	1.218019	1.860486
latinx_race	1.391359	.1990975	673	0.012	1.043626	1.8039
black_race	1.322417	.1611784	872	0.017	1.020001	1.645566
hsless	1.798588	.241927	407	0.000	1.347571	2.330434
somecollege	1.358929	.1876953	599	0.024	1.005815	1.78121

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0797029	.0315728	615	.0297497	.1483437
Level 2: strata18					
var(cons)	.0239007	.0270996	439	.0009411	.1041098

```
582
583 * Calculate the ICC from the parameter point estimates
584 scalar m1sigma2u = [RP2]var(cons)

585 scalar m1sigma2e = _pi^2/3

586 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
    ICC =       0.007

587
588 * Calculate the ICC from the chains
589 use "m7B_s18_beta.dta", clear

590 rename RP3_var_cons_ sigma2uscid

591 rename RP2_var_cons_ sigma2u

592 generate sigma2e =  _pi^2/3

593 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

594 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

595 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0071541	.0080718	439	0.000	.0002767	.0299734
icc_scid	.0234575	.0090177	613	0.000	.0088863	.0425904

```
596
597
598 *-------------------------------------------------------------------------------*
599 * PREPARE FIXED-PART PAREMETER CHAINS
600 *-------------------------------------------------------------------------------*
601
602 use "m7B_s18_beta.dta", clear

603 drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

604 rename FP1_* b_*

605 format %9.2f b_*

606 compress
    variable iteration was double now long
    (4,000 bytes saved)

607 save "m7B_s18_beta_prepped.dta", replace
  file m7B_s18_beta_prepped.dta saved

608 isid iteration

609 codebook iteration, compact

  Variable    Obs Unique   Mean  Min    Max  Label
  ─────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────
  iteration  1000   1000  24976    1  49951  Iteration
  ─────────────────────────────────────────────────────────────────────

  ─────────────────────────────────────────────────────────────────────


610
611
612 *-------------------------------------------------------------------------------*
613 * PREPARE STRATUM RANDOM EFFECTS CHAINS
614 *-------------------------------------------------------------------------------*
615
616 use "m7B_s18_u.dta", clear

617 drop residual idnum

618 rename value u

619 format %9.2f u

620 sort strata18 iteration

621 order strata18 iteration

622 compress
    variable strata18 was double now int
    variable iteration was double now long
    (180,000 bytes saved)

623 save "m7B_s18_u_prepped.dta", replace
  file m7B_s18_u_prepped.dta saved

624 isid strata18 iteration
```

```
625 codebook iteration, compact

   Variable     Obs Unique   Mean  Min    Max  Label
  ────────────────────────────────────────────────────────────────────────

   iteration   18000   1000  24976    1  49951  Iteration
  ────────────────────────────────────────────────────────────────────────

626
627
628 *------------------------------------------------------------------------------*
629 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
630 *------------------------------------------------------------------------------*
631
632 use "data18.dta", clear

633 isid strata18

634 cross using "m7B_s18_beta_prepped.dta"

635 isid strata18 iteration

636 sort strata18 iteration

637 merge 1:1 strata18 iteration using "m7B_s18_u_prepped.dta", nogenerate assert(match)

        Result                          # of obs.
        ─────────────────────────────────────────
        not matched                             0
        matched                            18,000
        ─────────────────────────────────────────

638 isid strata18 iteration

639 compress
    variable strata18 was double now int
    (108,000 bytes saved)

640 save "m7B_s18data_prepped.dta", replace
  file m7B_s18data_prepped.dta saved

641
642
643 *------------------------------------------------------------------------------*
644 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
645 *------------------------------------------------------------------------------*
646
647 * Percentage p based on fixed and random part
648 use "m7B_s18data_prepped.dta", clear

649 gen cons = 1

650 generate p = 100*invlogit( ///
  >         b_cons*cons ///
  >        +b_female*female ///
  >        +b_latinx_race*latinx_race ///
  >        +b_black_race*black_race ///
  >        +b_hsless*hsless ///
  >        +b_somecollege*somecollege ///
  >        + u ///
  >    )
```

```
651 label var p "Percentage based on main effects and interactions"

652 format %9.3f p

653
654 * Percentage p based only on the fixed-part
655 generate pA = 100*invlogit( ///
  >          b_cons*cons ///
  >         +b_female*female ///
  >         +b_latinx_race*latinx_race ///
  >         +b_black_race*black_race ///
  >         +b_hsless*hsless ///
  >         +b_somecollege*somecollege ///
  >    )

656 label var pA "Percentage based only on main effects"

657 format %9.3f pA

658
659 * Percentage pB calculated as the difference between p and pA
660 generate pB = p - pA

661 label var pB "Percentage point difference based on interaction effects"

662 format %9.3f pB

663
664 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
665 bysort strata18 (iteration): egen pmn = mean(p)

666 bysort strata18 (iteration): egen plo = pctile(p), p(2.5)

667 bysort strata18 (iteration): egen phi = pctile(p), p(97.5)

668 format %9.3f pmn plo phi

669 label var pmn "Percentage based on main effects and interactions"

670 label var plo "Percentage based on main effects and interactions"

671 label var phi "Percentage based on main effects and interactions"

672
673
674 bysort strata18 (iteration): egen pAmn = mean(pA)

675 bysort strata18 (iteration): egen pAlo = pctile(pA), p(2.5)

676 bysort strata18 (iteration): egen pAhi = pctile(pA), p(97.5)

677 format %9.3f pAmn pAlo pAhi

678 label var pAmn "Percentage based on main effects"

679 label var pAlo "Percentage based on main effects"

680 label var pAhi "Percentage based on main effects"

681
```

```
682 bysort strata18 (iteration): egen pBmn = mean(pB)

683 bysort strata18 (iteration): egen pBlo = pctile(pB), p(2.5)

684 bysort strata18 (iteration): egen pBhi = pctile(pB), p(97.5)

685 format %9.3f pBmn pBlo pBhi

686 label var pBmn "Percentage point difference based on interaction effects"

687 label var pBlo "Percentage point difference based on interaction effects"

688 label var pBhi "Percentage point difference based on interaction effects"

689
690 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
691 drop iteration b* u* p pA pB

692 duplicates drop

  Duplicates in terms of all variables

  (17,982 observations deleted)

693 isid strata18

694
695 * Ranks
696 sort pmn

697 generate pmnrank = _n

698 order pmnrank, after(phi)

699 sort pAmn

700 generate pAmnrank = _n

701 order pAmnrank, after(pAhi)

702 sort pBmn

703 generate pBmnrank = _n

704 order pBmnrank, after(pBhi)

705
706 * Sort the data
707 sort strata18

708 isid strata18

709
710 * Compress and save the data
711 compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (216 bytes saved)
```

```
712 save "m7B_s18results.dta", replace
  file m7B_s18results.dta saved

713
714 * List strata with statistically significant interaction effects on the predicted in
  > cidence
715 use "m7B_s18results.dta", clear

716 list strata18  pBmn pBlo pBhi if pBhi<0, noobs

717 list strata18  pBmn pBlo pBhi if pBlo>0, noobs

718
719
720 ********************************************************************************
721 * MODEL 7A_S36 - FAIR OR POOR HEALTH, Null MODEL
722 ********************************************************************************
723
724 *------------------------------------------------------------------------------*
725 * FIT THE MODEL
726 *------------------------------------------------------------------------------*
727
728 * Load the data
729 use "analysisready2.dta", clear

730 sort scid strata36 aid

731
732 * delete if missing dependent variable (so can record number)
733 drop if fairpoorhealth == .
  (6 observations deleted)

734
735 * Fit model using PQL2
736 runmlwin fairpoorhealth cons , ///
  >    level3(scid: cons) ///
  >    level2(strata36: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata36	**2597**	**1**	**5.4**	**172**

Run time (seconds)   =   **16.97**
Number of iterations =   **76**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	**-2.821484**	**.0514776**	**-54.81**	**0.000**	**-2.922378** **-2.720589**

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	.1079296	.0419651	.0256796 .1901796
Level 2: strata36			
var(cons)	.3580289	.0866677	.1881632 .5278945

```
737
738 * Fit model using MCMC
739 runmlwin fairpoorhealth cons , ///
>    level3(scid: cons) ///
>    level2(strata36: cons, residuals(u, savechains("m7A_s36_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m7A_s36_beta.dta", replace)) initsprevious   ///
>    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata36	**36**	**47**	**389.9**	**1083**

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        203
Deviance (dbar)               =    6904.63
Deviance (thetabar)           =    6838.71
Effective no. of pars (pd)    =      65.91
Bayesian DIC                  =    6970.54
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	**-2.68204**	**.079483**	**759**	**0.000**	**-2.834297**	**-2.533499**

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	**.0786271**	**.0318758**	**546**	**.0253369**	**.1550609**
Level 2: strata36					
var(cons)	**.1481941**	**.052684**	**975**	**.071921**	**.2612041**

```
740 rename u0 m1u

741 drop u0se

742
743 * Present the regression coefficients as odds ratios
744 runmlwin, or
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata36	**36**	**47**	**389.9**	**1083**

```
Burnin                      =          5000
Chain                       =         50000
Thinning                    =            50
Run time (seconds)          =           203
Deviance (dbar)             =       6904.63
Deviance (thetabar)         =       6838.71
Effective no. of pars (pd)  =         65.91
Bayesian DIC                =       6970.54
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0686303	.0054299	775	0.000	.0587598	.0793808

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0786271	.0318758	546	.0253369	.1550609
Level 2: strata36					
var(cons)	.1481941	.052684	975	.071921	.2612041

```
745
746 * Calculate the ICC from the parameter point estimates
747 scalar m1sigma2u = [RP2]var(cons)

748 scalar m1sigma2e = _pi^2/3

749 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.043

750
751 * Calculate the ICC from the chains
752 use "m7A_s36_beta.dta", clear

753 rename RP3_var_cons_ sigma2uscid

754 rename RP2_var_cons_ sigma2u

755 generate sigma2e =  _pi^2/3

756 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

757 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

758 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0410575	.0132681	980	0.000	.0207472	.0715683
icc_scid	.0223358	.0090566	548	0.000	.0073969	.0436706

```
759
760
761 ****************************************************************************
762 * MODEL 7B_S36 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
763 ****************************************************************************
```

```
764
765 *-------------------------------------------------------------------------------*
766 * FIT THE MODEL
767 *-------------------------------------------------------------------------------*
768
769 * Load the data
770 use "analysisready2.dta", clear

771 sort scid strata36 aid

772
773 * delete if missing dependent variable (so can record number)
774 drop if fairpoorhealth == .
  (6 observations deleted)

775
776 * Fit model using PQL2
777 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege lowinc
  > , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata36	**2597**	**1**	**5.4**	**172**

Run time (seconds) =   **4.41**
Number of iterations =   **13**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-3.531233	.1043815	-33.83	0.000	-3.735818	-3.326649
female	.4121625	.0771062	5.35	0.000	.2610371	.563288
latinx_race	.2502105	.1118819	2.24	0.025	.030926	.4694951
black_race	.2247287	.0960336	2.34	0.019	.0365064	.412951
hsless	.5175234	.0996938	5.19	0.000	.3221272	.7129197
somecollege	.2734266	.1037246	2.64	0.008	.0701302	.4767231
lowinc	.2913979	.0856363	3.40	0.001	.1235538	.459242

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.0711358	.0325506	.0073378	.1349339
Level 2: strata36				
var(cons)	.1587131	.0652139	.0308962	.28653

```
778
779 * Fit model using MCMC
780 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege lowinc
  > , ///
  >   level3(scid: cons) ///
  >   level2(strata36: cons, residuals(u, savechains("m7B_s36_u.dta", replace))) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >     savechains("m7B_s36_beta.dta", replace)) initsprevious   ///
  >   nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata36	**36**	**47**	**389.9**	**1083**

```
Burnin                        =        5000
Chain                         =       50000
Thinning                      =          50
Run time (seconds)            =         375
Deviance (dbar)               =     6904.85
Deviance (thetabar)           =     6853.05
Effective no. of pars (pd)    =       51.80
Bayesian DIC                  =     6956.65
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.456049	.1135141	576	0.000	-3.671831	-3.229362
female	.4021548	.0843212	821	0.000	.2366574	.557012
latinx_race	.2647347	.1222407	877	0.017	.0150388	.5086497
black_race	.2350618	.1063419	845	0.013	.015559	.4234846
hsless	.5076452	.1087082	631	0.000	.3073857	.7202785
somecollege	.2698851	.1129323	740	0.007	.0558778	.4898105
lowinc	.2757584	.0926966	829	0.004	.0981661	.4588598

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0760098	.0311872	626	.0237585	.152358
Level 2: strata36					
var(cons)	.0148876	.0144455	460	.0007635	.0515811

```
781 rename u0 m1u

782 drop u0se

783
784 * Present the regression coefficients as odds ratios
```

```
785 runmlwin, or
```

```
   MLwiN 3.2 multilevel model                    Number of obs      =     14035
   Binomial logit response model
   Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata36	36	47	389.9	1083

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         375
Deviance (dbar)              =     6904.85
Deviance (thetabar)          =     6853.05
Effective no. of pars (pd)   =       51.80
Bayesian DIC                 =     6956.65
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0318162	.0035175	574	0.000	.0254299	.0395827
female	1.496877	.1234429	815	0.000	1.267007	1.745449
latinx_race	1.313084	.1667043	868	0.017	1.015153	1.663044
black_race	1.266069	.1341333	834	0.013	1.015681	1.527274
hsless	1.675487	.1818051	650	0.000	1.359865	2.055006
somecollege	1.323405	.1509	731	0.007	1.057469	1.632007
lowinc	1.32145	.1195373	828	0.004	1.103146	1.582269

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0760098	.0311872	626	.0237585	.152358
Level 2: strata36					
var(cons)	.0148876	.0144455	460	.0007635	.0515811

```
786
787 * Calculate the ICC from the parameter point estimates
788 scalar m1sigma2u = [RP2]var(cons)
```

```
789 scalar m1sigma2e = _pi^2/3
```

```
790 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
   ICC =       0.005
```

```
791
792 * Calculate the ICC from the chains
793 use "m7B_s36_beta.dta", clear
```

```
794 rename RP3_var_cons_ sigma2uscid
```

```
795 rename RP2_var_cons_ sigma2u
```

```
796 generate sigma2e =  _pi^2/3

797 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

798 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

799 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0043987	.004115	457	0.000	.000228	.015295
icc_scid	.0224135	.0090706	621	0.000	.0071401	.0438493

```
800
801
802 *-------------------------------------------------------------------------------*
803 * PREPARE FIXED-PART PAREMETER CHAINS
804 *-------------------------------------------------------------------------------*
805
806 use "m7B_s36_beta.dta", clear

807 drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

808 rename FP1_* b_*

809 format %9.2f b_*

810 compress
    variable iteration was double now long
    (4,000 bytes saved)

811 save "m7B_s36_beta_prepped.dta", replace
   file m7B_s36_beta_prepped.dta saved

812 isid iteration

813 codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
814
815
816 *-------------------------------------------------------------------------------*
817 * PREPARE STRATUM RANDOM EFFECTS CHAINS
818 *-------------------------------------------------------------------------------*
819
820 use "m7B_s36_u.dta", clear

821 drop residual idnum

822 rename value u

823 format %9.2f u
```

824 sort strata36 iteration

825 order strata36 iteration

826 compress
    variable **strata36** was **double** now **int**
    variable **iteration** was **double** now **long**
    (360,000 bytes saved)

827 save "m7B_s36_u_prepped.dta", replace
  file m7B_s36_u_prepped.dta saved

828 isid strata36 iteration

829 codebook iteration, compact

  Variable   Obs Unique   Mean Min   Max Label
  ───

  iteration **36000**   **1000** **24976**   **1** **49951** Iteration
  ───

830
831
832 *--*
833 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
834 *--*
835
836 use "data36.dta", clear

837 isid strata36

838 cross using "m7B_s36_beta_prepped.dta"

839 isid strata36 iteration

840 sort strata36 iteration

841 merge 1:1 strata36 iteration using "m7B_s36_u_prepped.dta", nogenerate assert(match)

        Result   # of obs.
        ───
        not matched   **0**
        matched   **36,000**
        ───

842 isid strata36 iteration

843 compress
    variable **strata36** was **double** now **int**
    (216,000 bytes saved)

844 save "m7B_s36data_prepped.dta", replace
  file m7B_s36data_prepped.dta saved

845
846
847 *--*
848 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)

```
 849 *------------------------------------------------------------------------------*
 850
 851 * Percentage p based on fixed and random part
 852 use "m7B_s36data_prepped.dta", clear

 853 gen cons = 1

 854 generate p = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >         + u ///
   >    )

 855 label var p "Percentage based on main effects and interactions"

 856 format %9.3f p

 857
 858 * Percentage p based only on the fixed-part
 859 generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_race*latinx_race ///
   >         +b_black_race*black_race ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >    )

 860 label var pA "Percentage based only on main effects"

 861 format %9.3f pA

 862
 863 * Percentage pB calculated as the difference between p and pA
 864 generate pB = p - pA

 865 label var pB "Percentage point difference based on interaction effects"

 866 format %9.3f pB

 867
 868 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
 869 bysort strata36 (iteration): egen pmn = mean(p)

 870 bysort strata36 (iteration): egen plo = pctile(p), p(2.5)

 871 bysort strata36 (iteration): egen phi = pctile(p), p(97.5)

 872 format %9.3f pmn plo phi

 873 label var pmn "Percentage based on main effects and interactions"

 874 label var plo "Percentage based on main effects and interactions"
```

```
875 label var phi "Percentage based on main effects and interactions"

876
877
878 bysort strata36 (iteration): egen pAmn = mean(pA)

879 bysort strata36 (iteration): egen pAlo = pctile(pA), p(2.5)

880 bysort strata36 (iteration): egen pAhi = pctile(pA), p(97.5)

881 format %9.3f pAmn pAlo pAhi

882 label var pAmn "Percentage based on main effects"

883 label var pAlo "Percentage based on main effects"

884 label var pAhi "Percentage based on main effects"

885
886 bysort strata36 (iteration): egen pBmn = mean(pB)

887 bysort strata36 (iteration): egen pBlo = pctile(pB), p(2.5)

888 bysort strata36 (iteration): egen pBhi = pctile(pB), p(97.5)

889 format %9.3f pBmn pBlo pBhi

890 label var pBmn "Percentage point difference based on interaction effects"

891 label var pBlo "Percentage point difference based on interaction effects"

892 label var pBhi "Percentage point difference based on interaction effects"

893
894 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
895 drop iteration b* u* p pA pB

896 duplicates drop

  Duplicates in terms of all variables

  (35,964 observations deleted)

897 isid strata36

898
899 * Ranks
900 sort pmn

901 generate pmnrank = _n

902 order pmnrank, after(phi)

903 sort pAmn

904 generate pAmnrank = _n

905 order pAmnrank, after(pAhi)

906 sort pBmn
```

```
907 generate pBmnrank = _n

908 order pBmnrank, after(pBhi)

909
910 * Sort the data
911 sort strata36

912 isid strata36

913
914 * Compress and save the data
915 compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (432 bytes saved)

916 save "m7B_s36results.dta", replace
  file m7B_s36results.dta saved

917
918 * List strata with statistically significant interaction effects on the predicted in
 > cidence
919 use "m7B_s36results.dta", clear

920 list strata36  pBmn pBlo pBhi if pBhi<0, noobs

921 list strata36  pBmn pBlo pBhi if pBlo>0, noobs

922
923
924 ********************************************************************************
925 * MODEL 7A_S48 - FAIR OR POOR HEALTH, Null MODEL
926 ********************************************************************************
927
928 *------------------------------------------------------------------------------*
929 * FIT THE MODEL
930 *------------------------------------------------------------------------------*
931
932 * Load the data
933 use "analysisready2.dta", clear

934 sort scid strata48 aid

935
936 * delete if missing dependent variable (so can record number)
937 drop if fairpoorhealth == .
  (6 observations deleted)

938
939 * Fit model using PQL2
940 runmlwin fairpoorhealth cons , ///
  >   level3(scid: cons) ///
  >   level2(strata48: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                  Number of obs      =      14035
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	2705	1	5.2	143

```
Run time (seconds)   =      22.96
Number of iterations =       100
```

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-2.83462	.0510674	-55.51	0.000	-2.93471	-2.73453

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.1041556	.0425542	.0207509	.1875603
Level 2: strata48				
var(cons)	.3533246	.0901936	.1765485	.5301008

WARNING: RIGLS algorithm failed to converge. Increase the number of iterations. See th
> e maxiterations() option.

```
941
942 * Fit model using MCMC
943 runmlwin fairpoorhealth cons , ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m7A_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m7A_s48_beta.dta", replace)) initsprevious   ///
>    nopause
```

```
MLwiN 3.2 multilevel model                 Number of obs      =     14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	48	3	292.4	1083

```
Burnin                      =       5000
Chain                       =      50000
Thinning                    =         50
Run time (seconds)          =        204
Deviance (dbar)             =    6904.83
Deviance (thetabar)         =    6839.41
Effective no. of pars (pd)  =      65.42
Bayesian DIC                =    6970.26
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.670141	.0778026	834	0.000	-2.819684	-2.531716

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.075043	.0310212	550	.0222314 .1464433
Level 2: strata48				
var(cons)	.1389672	.0475091	1051	.067622 .2504651

944 rename u0 m1u

945 drop u0se

946
947 * Present the regression coefficients as odds ratios
948 runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs      =      14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	48	3	292.4	1083

```
Burnin                       =         5000
Chain                        =        50000
Thinning                     =           50
Run time (seconds)           =          204
Deviance (dbar)              =      6904.83
Deviance (thetabar)          =      6839.41
Effective no. of pars (pd)   =        65.42
Bayesian DIC                 =      6970.26
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	.0694131	.0052782	812	0.000	.0596248 .0795224

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.075043	.0310212	550	.0222314 .1464433
Level 2: strata48				
var(cons)	.1389672	.0475091	1051	.067622 .2504651

949
950 * Calculate the ICC from the parameter point estimates
951 scalar m1sigma2u = [RP2]var(cons)

952 scalar m1sigma2e = _pi^2/3

```
953 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
   ICC =      0.041

954
955 * Calculate the ICC from the chains
956 use "m7A_s48_beta.dta", clear

957 rename RP3_var_cons_ sigma2uscid

958 rename RP2_var_cons_ sigma2u

959 generate sigma2e =  _pi^2/3

960 generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

961 generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

962 mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0391058	.0127794	1052	0.000	.0194512	.0696787
icc_scid	.0211858	.0085346	549	0.000	.0064631	.0407871

```
963
964
965 *********************************************************************************
966 * MODEL 7B_S48 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
967 *********************************************************************************
968
969 *-------------------------------------------------------------------------------*
970 * FIT THE MODEL
971 *-------------------------------------------------------------------------------*
972
973 * Load the data
974 use "analysisready2.dta", clear

975 sort scid strata48 aid

976
977 * delete if missing dependent variable (so can record number)
978 drop if fairpoorhealth == .
   (6 observations deleted)

979
980 * Fit model using PQL2
981 runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege l
   > owinc, ///
   >   level3(scid: cons) ///
   >   level2(strata48: cons) ///
   >   level1(aid:) ///
   >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
   >   rigls maxiterations(100) ///
   >   nopause

   MLwiN 3.2 multilevel model                    Number of obs      =     14035
   Binomial logit response model
   Estimation algorithm: RIGLS, PQL2
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	2705	1	5.2	143

```
Run time (seconds)   =        4.51
Number of iterations =          13
```

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-3.533845	.1044733	-33.83	0.000	-3.738609	-3.329081
female	.4079249	.077147	5.29	0.000	.2567196	.5591303
latinx_imm	-.0539896	.2259332	-0.24	0.811	-.4968104	.3888313
latinx_non	.2906156	.1159369	2.51	0.012	.0633834	.5178478
black	.2255076	.0962284	2.34	0.019	.0369034	.4141118
hsless	.5147358	.1000049	5.15	0.000	.3187297	.7107419
somecollege	.2723828	.1041023	2.62	0.009	.068346	.4764196
lowinc	.2968652	.0860815	3.45	0.001	.1281486	.4655819

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.0675492	.0320228	.0047856	.1303127
Level 2: strata48				
var(cons)	.1719511	.0672303	.0401821	.3037202

```
982
983 * Fit model using MCMC
984 runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege l
> owinc, ///
>    level3(scid: cons) ///
>    level2(strata48: cons, residuals(u, savechains("m7B_s48_u.dta", replace))) ///
>    level1(aid:) ///
>    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>      savechains("m7B_s48_beta.dta", replace)) initsprevious   ///
>    nopause

MLwiN 3.2 multilevel model                      Number of obs    =       14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	48	3	292.4	1083

```
Burnin                     =        5000
Chain                      =       50000
Thinning                   =          50
Run time (seconds)         =         420
Deviance (dbar)            =     6909.12
Deviance (thetabar)        =     6858.79
Effective no. of pars (pd) =       50.33
Bayesian DIC               =     6959.45
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.45117	.1102645	637	0.000	-3.66384	-3.241172
female	.3929852	.0784032	869	0.000	.2369956	.5492782
latinx_imm	-.0464065	.2196217	719	0.427	-.4843849	.378551
latinx_non	.301447	.1213863	926	0.006	.0736703	.5567084
black	.2299765	.1034293	986	0.012	.0293879	.4469752
hsless	.5026579	.1059549	784	0.000	.2915414	.7024694
somecollege	.2665989	.1104554	798	0.012	.0367153	.4798491
lowinc	.2908845	.0901167	907	0.001	.1075844	.4754282

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0695278	.0309315	339	.0185203	.1382714
Level 2: strata48					
var(cons)	.0113285	.0116534	336	.0007263	.0415768

985 rename u0 m1u

986 drop u0se

987
988 * Present the regression coefficients as odds ratios
989 runmlwin, or

```
MLwiN 3.2 multilevel model              Number of obs      =      14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
scid	146	1	96.1	828
strata48	48	3	292.4	1083

```
Burnin                       =        5000
Chain                        =       50000
Thinning                     =          50
Run time (seconds)           =         420
Deviance (dbar)              =     6909.12
Deviance (thetabar)          =     6858.79
Effective no. of pars (pd)   =       50.33
Bayesian DIC                 =     6959.45
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0317928	.0035096	644	0.000	.0256339	.039118
female	1.487595	.11588	868	0.000	1.267436	1.732003
latinx_imm	.9776008	.2145143	717	0.427	.6160761	1.460167
latinx_non	1.36822	.1682613	883	0.006	1.076452	1.74492
black	1.266507	.1365514	964	0.012	1.029824	1.563576
hsless	1.660193	.1719382	786	0.000	1.338489	2.018731
somecollege	1.315093	.1481138	803	0.012	1.037398	1.615831
lowinc	1.345573	.1240461	895	0.001	1.113585	1.608703

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid					
var(cons)	.0695278	.0309315	339	.0185203	.1382714
Level 2: strata48					
var(cons)	.0113285	.0116534	336	.0007263	.0415768

```
990
991 * Calculate the ICC from the parameter point estimates
992 scalar m1sigma2u = [RP2]var(cons)

993 scalar m1sigma2e = _pi^2/3

994 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.003

995
996 * Calculate the ICC from the chains
997 use "m7B_s48_beta.dta", clear

998 rename RP3_var_cons_ sigma2uscid

999 rename RP2_var_cons_ sigma2u

1000generate sigma2e =  _pi^2/3

1001generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1002generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1003mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred.	Interval]
icc_strata	.0033927	.0033395	335	0.000	.0002142	.0122989
icc_scid	.020758	.0089959	335	0.000	.0055919	.0402288

```
1004
1005
1006*-------------------------------------------------------------------------------*
1007* PREPARE FIXED-PART PAREMETER CHAINS
1008*-------------------------------------------------------------------------------*
1009
1010use "m7B_s48_beta.dta", clear

1011drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

1012rename FP1_* b_*

1013format %9.2f b_*

1014compress
   variable iteration was double now long
   (4,000 bytes saved)

1015save "m7B_s48_beta_prepped.dta", replace
  file m7B_s48_beta_prepped.dta saved

1016isid iteration

1017codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
1018
1019
1020*-------------------------------------------------------------------------------*
1021* PREPARE STRATUM RANDOM EFFECTS CHAINS
1022*-------------------------------------------------------------------------------*
1023
1024use "m7B_s48_u.dta", clear

1025drop residual idnum

1026rename value u

1027format %9.2f u

1028sort strata48 iteration

1029order strata48 iteration

1030compress
    variable strata48 was double now int
    variable iteration was double now long
    (480,000 bytes saved)

1031save "m7B_s48_u_prepped.dta", replace
  file m7B_s48_u_prepped.dta saved

1032isid strata48 iteration

1033codebook iteration, compact

  Variable      Obs Unique   Mean  Min    Max  Label
  ----------------------------------------------------------------------------------

  iteration  48000    1000  24976    1  49951  Iteration
  ----------------------------------------------------------------------------------


1034
1035
1036*-------------------------------------------------------------------------------*
1037* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1038*-------------------------------------------------------------------------------*
1039
1040use "data48.dta", clear

1041isid strata48

1042cross using "m7B_s48_beta_prepped.dta"

1043isid strata48 iteration

1044sort strata48 iteration

1045merge 1:1 strata48 iteration using "m7B_s48_u_prepped.dta", nogenerate assert(match)

        Result                          # of obs.
        -----------------------------------------
        not matched                             0
        matched                            48,000
        -----------------------------------------
```

```
1046isid strata48 iteration

1047compress
    variable strata48 was double now int
    (288,000 bytes saved)

1048save "m7B_s48data_prepped.dta", replace
  file m7B_s48data_prepped.dta saved

1049
1050
1051*-------------------------------------------------------------------------------*
1052* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
1053*-------------------------------------------------------------------------------*
1054
1055* Percentage p based on fixed and random part
1056use "m7B_s48data_prepped.dta", clear

1057gen cons = 1

1058generate p = 100*invlogit( ///
>           b_cons*cons ///
>          +b_female*female ///
>          +b_latinx_imm*latinx_imm ///
>          +b_latinx_non*latinx_non ///
>          +b_black*black ///
>          +b_hsless*hsless ///
>          +b_somecollege*somecollege ///
>          +b_lowinc*lowinc ///
>          + u ///
>    )

1059label var p "Percentage based on main effects and interactions"

1060format %9.3f p

1061
1062* Percentage p based only on the fixed-part
1063generate pA = 100*invlogit( ///
>           b_cons*cons ///
>          +b_female*female ///
>          +b_latinx_imm*latinx_imm ///
>          +b_latinx_non*latinx_non ///
>          +b_black*black ///
>          +b_hsless*hsless ///
>          +b_somecollege*somecollege ///
>          +b_lowinc*lowinc ///
>    )

1064label var pA "Percentage based only on main effects"

1065format %9.3f pA

1066
1067* Percentage pB calculated as the difference between p and pA
1068generate pB = p - pA

1069label var pB "Percentage point difference based on interaction effects"

1070format %9.3f pB
```

```
1071
1072* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1073bysort strata48 (iteration): egen pmn = mean(p)

1074bysort strata48 (iteration): egen plo = pctile(p), p(2.5)

1075bysort strata48 (iteration): egen phi = pctile(p), p(97.5)

1076format %9.3f pmn plo phi

1077label var pmn "Percentage based on main effects and interactions"

1078label var plo "Percentage based on main effects and interactions"

1079label var phi "Percentage based on main effects and interactions"

1080
1081
1082bysort strata48 (iteration): egen pAmn = mean(pA)

1083bysort strata48 (iteration): egen pAlo = pctile(pA), p(2.5)

1084bysort strata48 (iteration): egen pAhi = pctile(pA), p(97.5)

1085format %9.3f pAmn pAlo pAhi

1086label var pAmn "Percentage based on main effects"

1087label var pAlo "Percentage based on main effects"

1088label var pAhi "Percentage based on main effects"

1089
1090bysort strata48 (iteration): egen pBmn = mean(pB)

1091bysort strata48 (iteration): egen pBlo = pctile(pB), p(2.5)

1092bysort strata48 (iteration): egen pBhi = pctile(pB), p(97.5)

1093format %9.3f pBmn pBlo pBhi

1094label var pBmn "Percentage point difference based on interaction effects"

1095label var pBlo "Percentage point difference based on interaction effects"

1096label var pBhi "Percentage point difference based on interaction effects"

1097
1098* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1099drop iteration b* u* p pA pB

1100duplicates drop

  Duplicates in terms of all variables

  (47,952 observations deleted)

1101isid strata48

1102
```

```
1103* Ranks
1104sort pmn

1105generate pmnrank = _n

1106order pmnrank, after(phi)

1107sort pAmn

1108generate pAmnrank = _n

1109order pAmnrank, after(pAhi)

1110sort pBmn

1111generate pBmnrank = _n

1112order pBmnrank, after(pBhi)

1113
1114* Sort the data
1115sort strata48

1116isid strata48

1117
1118* Compress and save the data
1119compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (576 bytes saved)

1120save "m7B_s48results.dta", replace
  file m7B_s48results.dta saved

1121
1122* List strata with statistically significant interaction effects on the predicted in
  > cidence
1123use "m7B_s48results.dta", clear

1124list strata48  pBmn pBlo pBhi if pBhi<0, noobs

1125list strata48  pBmn pBlo pBhi if pBlo>0, noobs

1126
1127
1128********************************************************************************
1129* MODEL 7A_S96 - FAIR OR POOR HEALTH, Null MODEL
1130********************************************************************************
1131
1132*------------------------------------------------------------------------------*
1133* FIT THE MODEL
1134*------------------------------------------------------------------------------*
1135
1136* Load the data
1137use "analysisready2.dta", clear

1138sort scid strata96 aid
```

```
1139
1140* delete if missing dependent variable (so can record number)
1141drop if fairpoorhealth == .
  (6 observations deleted)

1142
1143* Fit model using PQL2
1144runmlwin fairpoorhealth cons , ///
  >    level3(scid: cons) ///
  >    level2(strata96: cons) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >    rigls maxiterations(100) ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **RIGLS, PQL2**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata96	**3626**	**1**	**3.9**	**131**

Run time (seconds)   =   **26.76**
Number of iterations =   **100**

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
cons	−2.883148	.051157	−56.36	0.000	−2.983414 −2.782882

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]
Level 3: scid			
var(cons)	.1283291	.0498385	.0306475 .2260107
Level 2: strata96			
var(cons)	.1968371	.1045332	−.0080442 .4017185

  WARNING: RIGLS algorithm failed to converge. Increase the number of iterations. See th
  > e maxiterations() option.

```
1145
1146* Fit model using MCMC
1147runmlwin fairpoorhealth cons , ///
  >    level3(scid: cons) ///
  >    level2(strata96: cons, residuals(u, savechains("m7A_s96_u.dta", replace))) ///
  >    level1(aid:) ///
  >    discrete(distribution(binomial) link(logit) denominator(denominator)) ///
  >    mcmc(cc burnin(5000) chain(50000) thinning(50) ///
  >      savechains("m7A_s96_beta.dta", replace)) initsprevious   ///
  >    nopause
```

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata96	**92**	**1**	**152.6**	**900**

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          201
Deviance (dbar)               =      6901.05
Deviance (thetabar)           =      6825.48
Effective no. of pars (pd)    =        75.57
Bayesian DIC                  =      6976.62
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	−2.631308	.0702784	962	0.000	−2.769967 −2.502561

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.0782926	.0313174	543	.028135 .1492225
Level 2: strata96				
var(cons)	.1415872	.0449382	1003	.0692379 .2557574

1148rename u0 m1u

1149drop u0se

1150
1151* Present the regression coefficients as odds ratios
1152runmlwin, or

```
MLwiN 3.2 multilevel model                 Number of obs    =      14035
Binomial logit response model
Estimation algorithm: MCMC
```

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	146	1	96.1	828
strata96	92	1	152.6	900

```
Burnin                        =         5000
Chain                         =        50000
Thinning                      =           50
Run time (seconds)            =          201
Deviance (dbar)               =      6901.05
Deviance (thetabar)           =      6825.48
Effective no. of pars (pd)    =        75.57
Bayesian DIC                  =      6976.62
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]
cons	.072161	.0049492	966	0.000	.0626641 .0818751

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]
Level 3: scid				
var(cons)	.0782926	.0313174	543	.028135 .1492225
Level 2: strata96				
var(cons)	.1415872	.0449382	1003	.0692379 .2557574

```
1153
1154* Calculate the ICC from the parameter point estimates
1155scalar m1sigma2u = [RP2]var(cons)

1156scalar m1sigma2e = _pi^2/3

1157display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.041

1158
1159* Calculate the ICC from the chains
1160use "m7A_s96_beta.dta", clear

1161rename RP3_var_cons_ sigma2uscid

1162rename RP2_var_cons_ sigma2u

1163generate sigma2e =  _pi^2/3

1164generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1165generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1166mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.0405092	.0124404	1000	0.000	.0200927	.0711618
icc_scid	.0222042	.0087413	543	0.000	.0081508	.0417785

```
1167
1168
1169*******************************************************************************
1170* MODEL 7B_S96 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
1171*******************************************************************************
1172
1173*----------------------------------------------------------------------------*
1174* FIT THE MODEL
1175*----------------------------------------------------------------------------*
1176
1177* Load the data
1178use "analysisready2.dta", clear

1179sort scid strata96 aid

1180
1181* delete if missing dependent variable (so can record number)
1182drop if fairpoorhealth == .
  (6 observations deleted)

1183
1184* Fit model using PQL2
1185runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege l
  > owinc straight_no, ///
  >   level3(scid: cons) ///
  >   level2(strata96: cons) ///
  >   level1(aid:) ///
  >   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
  >   rigls maxiterations(100) ///
  >   nopause

  MLwiN 3.2 multilevel model                  Number of obs     =      14035
  Binomial logit response model
  Estimation algorithm: RIGLS, PQL2
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.1	828
strata96	3626	1	3.9	131

```
Run time (seconds)   =       6.31
Number of iterations =         17
```

fairpoorhe~h	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
cons	-3.570823	.1056286	-33.81	0.000	-3.777851	-3.363795
female	.3814242	.078811	4.84	0.000	.2269574	.535891
latinx_imm	-.0277573	.2268023	-0.12	0.903	-.4722816	.416767
latinx_non	.2893877	.1164409	2.49	0.013	.0611677	.5176077
black	.2334113	.0968185	2.41	0.016	.0436505	.423172
hsless	.5194016	.1003224	5.18	0.000	.3227733	.71603
somecollege	.2735455	.1044808	2.62	0.009	.068767	.478324
lowinc	.2870388	.0863362	3.32	0.001	.117823	.4562545
straight_no	.2239995	.0983749	2.28	0.023	.0311882	.4168108

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 3: scid				
var(cons)	.0740825	.0328665	.0096653	.1384997
Level 2: strata96				
var(cons)	.2076606	.0766767	.0573771	.3579442

```
1186
1187* Fit model using MCMC
1188runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege l
> owinc straight_no, ///
>   level3(scid: cons) ///
>   level2(strata96: cons, residuals(u, savechains("m7B_s96_u.dta", replace))) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///
>   mcmc(cc burnin(5000) chain(50000) thinning(50) ///
>     savechains("m7B_s96_beta.dta", replace)) initsprevious   ///
>   nopause
```

```
MLwiN 3.2 multilevel model                    Number of obs     =     14035
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Observations per Group Minimum	Average	Maximum
scid	146	1	96.1	828
strata96	92	1	152.6	900

```
Burnin                        =       5000
Chain                         =      50000
Thinning                      =         50
Run time (seconds)            =        460
Deviance (dbar)               =    6903.39
Deviance (thetabar)           =    6851.36
Effective no. of pars (pd)    =      52.03
Bayesian DIC                  =    6955.43
```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.466037	.1075207	605	0.000	-3.676259	-3.249574
female	.3624356	.0789135	845	0.000	.2133617	.5272074
latinx_imm	-.0398371	.2124753	1016	0.471	-.4288443	.3735243

latinx_non	.2892416	.1148894	819	0.006	.0539714	.5045374
black	.2283877	.0979157	1020	0.008	.0302106	.4217797
hsless	.5140932	.1013184	879	0.000	.3221298	.7067176
somecollege	.2708703	.1050551	1153	0.002	.0836746	.4724607
lowinc	.2792402	.0868846	817	0.002	.1095783	.4467549
straight_no	.2193191	.0967483	953	0.014	.0199756	.3997649

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.0722162	.0304479	596	.0217723	.1433494
Level 2: strata96						
	var(cons)	.0095936	.0096304	188	.0006837	.0373169

1189 rename u0 m1u

1190 drop u0se

1191
1192 * Present the regression coefficients as odds ratios
1193 runmlwin, or

MLwiN 3.2 multilevel model   Number of obs   =   **14035**
Binomial logit response model
Estimation algorithm: **MCMC**

	No. of	Observations per Group		
Level Variable	Groups	Minimum	Average	Maximum
scid	**146**	**1**	**96.1**	**828**
strata96	**92**	**1**	**152.6**	**900**

Burnin	=	5000		
Chain	=	50000		
Thinning	=	50		
Run time (seconds)	=	460		
Deviance (dbar)	=	6903.39		
Deviance (thetabar)	=	6851.36		
Effective no. of pars (pd)	=	52.03		
Bayesian DIC	=	6955.43		

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0314314	.0033633	602	0.000	.0253175	.0387907
female	1.439351	.1147399	837	0.000	1.237832	1.694195
latinx_imm	.9952512	.2060938	1015	0.471	.6512614	1.452846
latinx_non	1.344123	.1585917	806	0.006	1.055454	1.656219
black	1.260414	.1247835	1020	0.008	1.030672	1.524673
hsless	1.681127	.166795	886	0.000	1.380064	2.027326
somecollege	1.323869	.1330054	1163	0.002	1.087275	1.603936
lowinc	1.329912	.1169982	829	0.002	1.115807	1.563231
straight_no	1.250596	.1211096	964	0.014	1.020176	1.491474

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 3: scid						
	var(cons)	.0722162	.0304479	596	.0217723	.1433494
Level 2: strata96						
	var(cons)	.0095936	.0096304	188	.0006837	.0373169

```
1194
1195* Calculate the ICC from the parameter point estimates
1196scalar m1sigma2u = [RP2]var(cons)

1197scalar m1sigma2e = _pi^2/3

1198display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =     0.003

1199
1200* Calculate the ICC from the chains
1201use "m7B_s96_beta.dta", clear

1202rename RP3_var_cons_ sigma2uscid

1203rename RP2_var_cons_ sigma2u

1204generate sigma2e =  _pi^2/3

1205generate icc_strata = sigma2u/(sigma2uscid + sigma2u + sigma2e)

1206generate icc_scid = sigma2uscid/(sigma2uscid + sigma2u + sigma2e)

1207mcmcsum icc_strata icc_scid, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc_strata	.002878	.0029003	187	0.000	.0002032	.0110127
icc_scid	.0213121	.0088633	590	0.000	.0065684	.0416482

```
1208
1209
1210*-------------------------------------------------------------------------------*
1211* PREPARE FIXED-PART PAREMETER CHAINS
1212*-------------------------------------------------------------------------------*
1213
1214use "m7B_s96_beta.dta", clear

1215drop deviance RP3_var_cons_ RP2_var_cons_ OD_bcons_1

1216rename FP1_* b_*

1217format %9.2f b_*

1218compress
    variable iteration was double now long
    (4,000 bytes saved)

1219save "m7B_s96_beta_prepped.dta", replace
  file m7B_s96_beta_prepped.dta saved

1220isid iteration

1221codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	1000	1000	24976	1	49951	Iteration

```
1222
1223
1224*------------------------------------------------------------------------------*
1225* PREPARE STRATUM RANDOM EFFECTS CHAINS
1226*------------------------------------------------------------------------------*
1227
1228use "m7B_s96_u.dta", clear

1229drop residual idnum

1230rename value u

1231format %9.2f u

1232sort strata96 iteration

1233order strata96 iteration

1234compress
    variable strata96 was double now int
    variable iteration was double now long
    (920,000 bytes saved)

1235save "m7B_s96_u_prepped.dta", replace
  file m7B_s96_u_prepped.dta saved

1236isid strata96 iteration

1237codebook iteration, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	92000	1000	24976	1	49951	Iteration

```
1238
1239
1240*------------------------------------------------------------------------------*
1241* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1242*------------------------------------------------------------------------------*
1243
1244use "data96_fairpoorhealth.dta", clear

1245isid strata96

1246cross using "m7B_s96_beta_prepped.dta"

1247isid strata96 iteration

1248sort strata96 iteration

1249merge 1:1 strata96 iteration using "m7B_s96_u_prepped.dta", nogenerate assert(match)
```

Result	# of obs.
not matched	0
matched	92,000

```
1250isid strata96 iteration

1251compress
    variable strata96 was double now int
    (552,000 bytes saved)

1252save "m7B_s96data_prepped.dta", replace
  file m7B_s96data_prepped.dta saved

1253
1254
1255*-------------------------------------------------------------------------------*
1256* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
1257*-------------------------------------------------------------------------------*
1258
1259* Percentage p based on fixed and random part
1260use "m7B_s96data_prepped.dta", clear

1261gen cons = 1

1262generate p = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_imm*latinx_imm ///
   >         +b_latinx_non*latinx_non ///
   >         +b_black*black ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >         +b_straight_no*straight_no ///
   >         + u ///
   >    )

1263label var p "Percentage based on main effects and interactions"

1264format %9.3f p

1265
1266* Percentage p based only on the fixed-part
1267generate pA = 100*invlogit( ///
   >          b_cons*cons ///
   >         +b_female*female ///
   >         +b_latinx_imm*latinx_imm ///
   >         +b_latinx_non*latinx_non ///
   >         +b_black*black ///
   >         +b_hsless*hsless ///
   >         +b_somecollege*somecollege ///
   >         +b_lowinc*lowinc ///
   >         +b_straight_no*straight_no ///
   >    )

1268label var pA "Percentage based only on main effects"

1269format %9.3f pA

1270
1271* Percentage pB calculated as the difference between p and pA
1272generate pB = p - pA

1273label var pB "Percentage point difference based on interaction effects"
```

```
1274format %9.3f pB

1275
1276* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1277bysort strata96 (iteration): egen pmn = mean(p)

1278bysort strata96 (iteration): egen plo = pctile(p), p(2.5)

1279bysort strata96 (iteration): egen phi = pctile(p), p(97.5)

1280format %9.3f pmn plo phi

1281label var pmn "Percentage based on main effects and interactions"

1282label var plo "Percentage based on main effects and interactions"

1283label var phi "Percentage based on main effects and interactions"

1284
1285
1286bysort strata96 (iteration): egen pAmn = mean(pA)

1287bysort strata96 (iteration): egen pAlo = pctile(pA), p(2.5)

1288bysort strata96 (iteration): egen pAhi = pctile(pA), p(97.5)

1289format %9.3f pAmn pAlo pAhi

1290label var pAmn "Percentage based on main effects"

1291label var pAlo "Percentage based on main effects"

1292label var pAhi "Percentage based on main effects"

1293
1294bysort strata96 (iteration): egen pBmn = mean(pB)

1295bysort strata96 (iteration): egen pBlo = pctile(pB), p(2.5)

1296bysort strata96 (iteration): egen pBhi = pctile(pB), p(97.5)

1297format %9.3f pBmn pBlo pBhi

1298label var pBmn "Percentage point difference based on interaction effects"

1299label var pBlo "Percentage point difference based on interaction effects"

1300label var pBhi "Percentage point difference based on interaction effects"

1301
1302* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1303drop iteration b* u* p pA pB

1304duplicates drop

  Duplicates in terms of all variables

  (91,908 observations deleted)

1305isid strata96
```

```
1306
1307* Ranks
1308sort pmn

1309generate pmnrank = _n

1310order pmnrank, after(phi)

1311sort pAmn

1312generate pAmnrank = _n

1313order pAmnrank, after(pAhi)

1314sort pBmn

1315generate pBmnrank = _n

1316order pBmnrank, after(pBhi)

1317
1318* Sort the data
1319sort strata96

1320isid strata96

1321
1322* Compress and save the data
1323compress
    variable cons was float now byte
    variable pmnrank was float now byte
    variable pAmnrank was float now byte
    variable pBmnrank was float now byte
    (1,104 bytes saved)

1324save "m7B_s96results.dta", replace
  file m7B_s96results.dta saved

1325
1326* List strata with statistically significant interaction effects on the predicted in
  > cidence
1327use "m7B_s96results.dta", clear

1328list strata96  pBmn pBlo pBhi if pBhi<0, noobs

1329list strata96  pBmn pBlo pBhi if pBlo>0, noobs

1330
1331
1332
1333
  end of do-file

1334do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

1335
1336***                     MODEL 7: FAIR OR POOR HEALTH MODELS              ***
1337use "m7B_s6results.dta", clear

1338list strata6  pBmn pBlo pBhi if pBhi<0, noobs
```

```
1339list strata6  pBmn pBlo pBhi if pBlo>0, noobs

1340
1341use "m7B_s12results.dta", clear

1342list strata12  pBmn pBlo pBhi if pBhi<0, noobs

1343list strata12  pBmn pBlo pBhi if pBlo>0, noobs

1344
1345use "m7B_s18results.dta", clear

1346list strata18  pBmn pBlo pBhi if pBhi<0, noobs

1347list strata18  pBmn pBlo pBhi if pBlo>0, noobs

1348
1349use "m7B_s36results.dta", clear

1350list strata36  pBmn pBlo pBhi if pBhi<0, noobs

1351list strata36  pBmn pBlo pBhi if pBlo>0, noobs

1352
1353use "m7B_s48results.dta", clear

1354list strata48  pBmn pBlo pBhi if pBhi<0, noobs

1355list strata48  pBmn pBlo pBhi if pBlo>0, noobs

1356
1357use "m7B_s96results.dta", clear

1358list strata96  pBmn pBlo pBhi if pBhi<0, noobs

1359list strata96  pBmn pBlo pBhi if pBlo>0, noobs

1360
1361
1362
1363* Close log file
1364capture log close
```