

```

264 drop if goodhealth == .
    (6 observations deleted)

265 tab strata12, nofreq

266 display r(r)
    12

267 tab strata18, nofreq

268 display r(r)
    18

269 tab strata36, nofreq

270 display r(r)
    36

271 tab strata48, nofreq

272 display r(r)
    48

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

274 display r(r)
    92

275
276 end of do-file

277 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

278
279 *****
280 *****
281 >
282 *****
283 *****
284 *****
285 *****
286 *****
287 *****
288 *****
289 *****
290 *
291 *
292 * MODEL 1 - BMI, MAIN EFFECTS MODEL
293 *
294 *
295 *****
296 *****
297 *****
298 *****
299 *****
300 * MODEL 1A_S6 - BMI, Null MODEL
301 *****

```

```

302
303 * Load the data
304 use "analysisready2.dta", clear

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

306 sort strata6 aid

307
308 * delete if missing dependent variable (so can record number)
309 drop if bmi_w1 == .
    (347 observations deleted)

310
311 * Fit model using PQL2
312 runmlwin bmi_w1 cons , ///
>   level2(strata6: cons) ///
>   level1(aid: cons) ///
>   rlgls 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
strata6	6	1142	2282.3	4165

Run time (seconds) = **1.95**
Number of iterations = **4**
Log restricted-likelihood = **-39912.621**
Restricted-deviance = **79825.241**

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.91235	.2718804	84.27	0.000	22.37947	23.44522

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.4322392	.255159	-.0678632	.9323416
Level 1: aid					
	var(cons)	19.88068	.2403124	19.40968	20.35169

```

313
314 * Fit model using MCMC
315 runmlwin bmi_w1 cons , ///
>   level2(strata6: cons, residuals(u, savechains("mlA_s6_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(burnin(5000) chain(50000) thinning(50) ///
>       savechains("mlA_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
strata6	6	1142	2282.3	4165

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 27.5
 Deviance (dbar) = 79804.55
 Deviance (thetabar) = 79797.64
 Effective no. of pars (pd) = 6.91
 Bayesian DIC = 79811.46

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.86677	.3715344	250	0.000	22.07313	23.57467

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6	var(cons)	.7489979	.9432743	633	.1667141	2.71822
Level 1: aid	var(cons)	19.88408	.2388833	1075	19.46603	20.37227

316 rename u0 mlu

317 drop u0se

318

319 * Calculate the ICC from the chains

320 use "mlA_s6_beta.dta", clear

321 rename RP2_var_cons_ sigma2u

322 rename RP1_var_cons_ sigma2e

323 generate icc = sigma2u/(sigma2u + sigma2e)

324 mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0337489	.0301972	623	0.000	.0083495	.1205796

325

326 *****

327 * MODEL 1B_S6 - BMI, MAIN EFFECTS MODEL

328 *****

329

330 * Load the data

331 use "analysisready2.dta", clear

```

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

333 sort strata6 aid

334
335 * delete if missing dependent variable (so can record number)
336 drop if bmi_w1 == .
    (347 observations deleted)

```

```

337
338 * Fit model using PQL2
339 runmlwin bmi_w1 cons female latinx_race black_race , ///
> level2(strata6: cons) ///
> level1(aid: cons) ///
> rlgls 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
strata6	6	1142	2282.3	4165

Run time (seconds) = **1.79**
Number of iterations = **11**
Log restricted-likelihood = **-39910.414**
Restricted-deviance = **79820.828**

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.37879	.4779072	46.83	0.000	21.44211	23.31547
female	-.2775674	.4811226	-0.58	0.564	-1.22055	.6654155
latinx_race	1.008171	.5889381	1.71	0.087	-.1461261	2.162469
black_race	1.024465	.5869757	1.75	0.081	-.1259867	2.174916

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.3359569	.1989363	-.0539512	.7258649
Level 1: aid					
	var(cons)	19.88072	.240313	19.40972	20.35173

```

340
341 * Fit model using MCMC
342 runmlwin bmi_w1 cons female latinx_race black_race , ///
> level2(strata6: cons, residuals(u, savechains("mlB_s6_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("mlB_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
strata6	6	1142	2282.3	4165

```

Burnin                =      5000
Chain                  =     50000
Thinning                =       50
Run time (seconds)     =       34
Deviance (dbar)        =    79804.68
Deviance (thetabar)    =    79797.61
Effective no. of pars (pd) =    7.07
Bayesian DIC           =    79811.76

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.22464	.773197	146	0.000	20.30242	23.50306
female	-.21701	.957145	102	0.345	-2.295118	2.134309
latinx_race	1.158836	.9727219	192	0.075	-.5481588	3.650045
black_race	1.081457	.8846704	168	0.084	-.6293051	2.941138

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	1.149637	2.552169	257	.0843836	5.845759
Level 1: aid						
	var(cons)	19.88466	.2396761	1282	19.43633	20.36304

```

343 rename u0 mlu
344 drop u0se
345
346 * Calculate the ICC from the chains
347 use "m1B_s6_beta.dta", clear
348 rename RP2_var_cons_ sigma2u
349 rename RP1_var_cons_ sigma2e
350 generate icc = sigma2u/(sigma2u + sigma2e)
351 mcmcsu mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0465495	.063952	214	0.000	.0042107	.226022

```

352
352 end of do-file
353 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
354
355 *-----*
356 * PREPARE FIXED-PART PAREMETER CHAINS
357 *-----*
358
359 use "m1B_s6_beta.dta", clear

```

```

360 drop deviance RP2_var_cons_ RP1_var_cons_
361 rename FP1_ * b_*
362 format %9.2f b_*
363 compress
    variable iteration was double now long
    (4,000 bytes saved)
364 save "m1B_s6_beta_prepped.dta", replace
    (note: file m1B_s6_beta_prepped.dta not found)
    file m1B_s6_beta_prepped.dta saved
365 isid iteration

```

```

366 codebook iteration, compact

```

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

```

367
368
369 *-----*
370 * PREPARE STRATUM RANDOM EFFECTS CHAINS
371 *-----*
372
373 use "m1B_s6_u.dta", clear
374 drop residual idnum
375 rename value u
376 format %9.2f u
377 sort strata6 iteration
378 order strata6 iteration
379 compress
    variable strata6 was double now byte
    variable iteration was double now long
    (66,000 bytes saved)
380 save "m1B_s6_u_prepped.dta", replace
    (note: file m1B_s6_u_prepped.dta not found)
    file m1B_s6_u_prepped.dta saved

```

```

381 isid strata6 iteration

```

```

382 codebook iteration, compact

```

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

```

383
384
385 *-----*
386 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
387 *-----*
388
389 use "data6.dta", clear

390 isid strata6

391 cross using "m1B_s6_beta_prepped.dta"

392 isid strata6 iteration

393 sort strata6 iteration

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

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

395 isid strata6 iteration

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

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

398
399
400 *-----*
401 * CALCULATE VALUES OF INTEREST
402 *-----*
403
404 * Expected value based on fixed and random part
405 use "m1B_s6data_prepped.dta", clear

406 gen cons = 1

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

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

409 format %9.3f expectedvalue

410
411 * Expected value based only on the fixed-part
412 generate fixedeffect = (b_cons*cons ///
      >                                     + b_female*female ///
      >                                     + b_latinx_race*latinx_race ///
      >                                     + b_black_race*black_race ///
      >                                     )

```

```

413 label var fixedeffect "Expected value based only on main effects"
414 format %9.3f fixedeffect

415
416 * Expected value based only on the random-part
417 generate randomeffect = u

418 label var randomeffect "Random Effect"
419 format %9.3f randomeffect

420
421 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
422 bysort strata6 (iteration): egen expmn = mean(expectedvalue)

423 bysort strata6 (iteration): egen explo = pctlile(expectedvalue), p(2.5)
424 bysort strata6 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)
425 format %9.3f expmn explo exphi

426
427 bysort strata6 (iteration): egen FEmn = mean(fixedeffect)

428 bysort strata6 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
429 bysort strata6 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
430 format %9.3f FEmn FElo FEhi

431
432 bysort strata6 (iteration): egen REmn = mean(randomeffect)

433 bysort strata6 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
434 bysort strata6 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
435 format %9.3f REmn RElo REhi

436
437 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
438 drop iteration b* u* expectedvalue fixedeffect randomeffect

439 duplicates drop

    Duplicates in terms of all variables

    (5,994 observations deleted)

440 isid strata6

441
442 * Ranks
443 sort expmn

444 generate exprank = _n

445 order exprank, after(exphi)

```



```

446 sort FEmn
447 generate FErnk = _n
448 order FErnk, after(FEhi)
449 sort REmn
450 generate RErnk = _n
451 order RErnk, after(REhi)
452
453 * Sort the data
454 sort strata6
455 isid strata6
456
457 * Compress and save the data
458 compress
    variable cons was float now byte
    variable exprnk was float now byte
    variable FErnk was float now byte
    variable RErnk was float now byte
    (72 bytes saved)
459 save "m1B_s6results.dta", replace
    (note: file m1B_s6results.dta not found)
    file m1B_s6results.dta saved
460
461 * List strata with statistically significant interaction effects
462 use "m1B_s6results.dta", clear
463 list strata6 REmn RElo REhi if REhi<0, noobs
464 list strata6 REmn RElo REhi if RElo>0, noobs
465
466
    end of do-file
467 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
468
469
470 *****
471 * MODEL 1A_S12 - BMI, Null MODEL
472 *****
473
474 * Load the data
475 use "analysisready2.dta", clear
476 recast float bmi_w1
    bmi_w1:  13694 values would be changed; not changed
477 sort strata12 aid
478

```

```

479 * delete if missing dependent variable (so can record number)
480 drop if bmi_w1 == .
    (347 observations deleted)

```

```

481
482 * Fit model using PQL2
483 runmlwin bmi_w1 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
strata12	12	467	1141.2	2828

```

Run time (seconds)      =      1.72
Number of iterations    =      4
Log restricted-likelihood = -39870.648
Restricted-deviance     =  79741.296

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.95143	.201871	113.69	0.000	22.55577	23.34709

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12					
	var(cons)	.4652295	.1998193	.0735908	.8568682
Level 1: aid					
	var(cons)	19.73733	.238632	19.26962	20.20504

```

484
485 * Fit model using MCMC
486 runmlwin bmi_w1 cons , ///
    > level2(strata12: cons, residuals(u, savechains("mlA_s12_u.dta", replace))) ///
    > level1(aid: cons) ///
    > mcmc(burnin(5000) chain(50000) thinning(50) ///
    > savechains("mlA_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
strata12	12	467	1141.2	2828

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =     26.3
Deviance (dbar)     =    79705.34
Deviance (thetabar) =    79692.95
Effective no. of pars (pd) =    12.40
Bayesian DIC        =    79717.74

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.95347	.2160008	707	0.000	22.51807	23.36911

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12						
	var(cons)	.5667291	.3113762	909	.2208418	1.306348
Level 1: aid						
	var(cons)	19.74105	.2392395	1057	19.28277	20.21378

```

487 rename u0 mlu
488 drop u0se
489
490 * Calculate the ICC from the chains
491 use "m1A_s12_beta.dta", clear
492 rename RP2_var_cons_ sigma2u
493 rename RP1_var_cons_ sigma2e
494 generate icc = sigma2u/(sigma2u + sigma2e)
495 mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0273869	.0147459	917	0.000	.0110282	.0624423

```

496
497
498 *****
499 * MODEL 1B_S12 - BMI, MAIN EFFECTS MODEL
500 *****
501
502 * Load the data
503 use "analysisready2.dta", clear
504 recast float bmi_w1
505   bmi_w1: 13694 values would be changed; not changed
506 sort strata12 aid
507
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```

```

507 * delete if missing dependent variable (so can record number)
508 drop if bmi_w1 == .
    (347 observations deleted)

```

```

509
510 * Fit model using PQL2
511 runmlwin bmi_w1 cons female latinx_race black_race lowparentedu, ///
>   level2(strata12: cons) ///
>   level1(aid: cons) ///
>   rlgls 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
strata12	12	467	1141.2	2828

```

Run time (seconds)      =      1.81
Number of iterations    =      7
Log restricted-likelihood = -39865.498
Restricted-deviance     =  79730.996

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.21831	.3373523	65.86	0.000	21.55711	22.87951
female	-.2590544	.3067745	-0.84	0.398	-.8603214	.3422126
latinx_race	.777844	.3753221	2.07	0.038	.0422261	1.513462
black_race	.898685	.3723996	2.41	0.016	.1687953	1.628575
lowparentedu	.627044	.3068311	2.04	0.041	.0256661	1.228422

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12					
	var(cons)	.2587165	.114346	.0346024	.4828307
Level 1: aid					
	var(cons)	19.73769	.2386362	19.26997	20.20541

```

512
513 * Fit model using MCMC
514 runmlwin bmi_w1 cons female latinx_race black_race lowparentedu, ///
>   level2(strata12: cons, residuals(u, savechains("mlB_sl2_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(burnin(5000) chain(50000) thinning(50) ///
>   savechains("mlB_sl2_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
strata12	12	467	1141.2	2828

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =     36.1
Deviance (dbar)     =    79705.99
Deviance (thetabar) =    79693.28
Effective no. of pars (pd) =    12.70
Bayesian DIC        =    79718.69

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.21705	.3869696	510	0.000	21.47983	23.01429
female	-.2735971	.3527877	742	0.213	-.9464589	.4123104
latinx_race	.7851453	.4267249	578	0.025	.0115677	1.694696
black_race	.9082344	.4250378	678	0.020	.0719746	1.761832
lowparentedu	.6338517	.3613853	728	0.035	-.0419298	1.382203

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.3561868	.2793774	864	.0968006	.9578438
Level 1: aid					
var(cons)	19.74229	.2381909	974	19.28203	20.21208

```
515 rename u0 mlu
```

```
516 drop u0se
```

```
517
```

```
518 * Calculate the ICC from the chains
```

```
519 use "m1B_s12_beta.dta", clear
```

```
520 rename RP2_var_cons_ sigma2u
```

```
521 rename RP1_var_cons_ sigma2e
```

```
522 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
523 mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.017114	.0125796	865	0.000	.0048452	.0465909

```
524
```

```
525
```

```
end of do-file
```

```
526 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
```

```
527
```

```
528 *-----*
```

```
529 * PREPARE FIXED-PART PAREMETER CHAINS
```

```
530 *-----*
```

```
531
```

```

532 use "m1B_s12_beta.dta", clear
533 drop deviance RP2_var_cons_ RP1_var_cons_
534 rename FP1_* b_*
535 format %9.2f b_*
536 compress
    variable iteration was double now long
    (4,000 bytes saved)
537 save "m1B_s12_beta_prepped.dta", replace
    file m1B_s12_beta_prepped.dta saved
538 isid iteration
539 codebook iteration, compact

```

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

```

540
541
542 *-----*
543 * PREPARE STRATUM RANDOM EFFECTS CHAINS
544 *-----*
545
546 use "m1B_s12_u.dta", clear
547 drop residual idnum
548 rename value u
549 format %9.2f u
550 sort stratal2 iteration
551 order stratal2 iteration
552 compress
    variable stratal2 was double now int
    variable iteration was double now long
    (120,000 bytes saved)
553 save "m1B_s12_u_prepped.dta", replace
    file m1B_s12_u_prepped.dta saved
554 isid stratal2 iteration
555 codebook iteration, compact

```

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

```

556
557
558 *-----*
559 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
560 *-----*
561
562 use "data12.dta", clear

563 isid strata12

564 cross using "m1B_s12_beta_prepped.dta"

565 isid strata12 iteration

566 sort strata12 iteration

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

```

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

```

568 isid strata12 iteration

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

570 save "m1B_s12data_prepped.dta", replace
    file m1B_s12data_prepped.dta saved

571
572
573 *-----*
574 * CALCULATE VALUES OF INTEREST
575 *-----*
576
577 * Expected value based on fixed and random part
578 use "m1B_s12data_prepped.dta", clear

579 gen cons = 1

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

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

582 format %9.3f expectedvalue

583
584 * Expected value based only on the fixed-part
585 generate fixedeffect = (b_cons*cons ///
    >                                     + b_female*female ///
    >                                     + b_latinx_race*latinx_race ///
    >                                     + b_black_race*black_race ///
    >                                     + b_lowparentedu*lowparentedu ///
    >                                     )

```

```

586 label var fixedeffect "Expected value based only on main effects"
587 format %9.3f fixedeffect

588
589 * Expected value based only on the random-part
590 generate randomeffect = u

591 label var randomeffect "Random Effect"
592 format %9.3f randomeffect

593
594 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
595 bysort stratal2 (iteration): egen expmn = mean(expectedvalue)

596 bysort stratal2 (iteration): egen explo = pctlile(expectedvalue), p(2.5)
597 bysort stratal2 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)
598 format %9.3f expmn explo exphi

599
600 bysort stratal2 (iteration): egen FEmn = mean(fixedeffect)
601 bysort stratal2 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
602 bysort stratal2 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
603 format %9.3f FEmn FElo FEhi

604
605 bysort stratal2 (iteration): egen REmn = mean(randomeffect)
606 bysort stratal2 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
607 bysort stratal2 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
608 format %9.3f REmn RElo REhi

609
610 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
611 drop iteration b* u* expectedvalue fixedeffect randomeffect

612 duplicates drop

    Duplicates in terms of all variables

    (11,988 observations deleted)

613 isid stratal2

614
615 * Ranks
616 sort expmn

617 generate exprank = _n

618 order exprank, after(exphi)

```



```

619 sort FEmn
620 generate FErank = _n
621 order FErank, after(FEhi)
622 sort REmn
623 generate RErank = _n
624 order RErank, after(REhi)
625
626 * Sort the data
627 sort stratal2
628 isid stratal2
629
630 * Compress and save the data
631 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)
632 save "m1B_s12results.dta", replace
    file m1B_s12results.dta saved
633
634 * List strata with statistically significant interaction effects
635 use "m1B_s12results.dta", clear
636 list stratal2  REmn RElo REhi if REhi<0, noobs
637 list stratal2  REmn RElo REhi if RElo>0, noobs
638
639 end of do-file
640 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
641
642 *****
643 * MODEL 1A_S18 - BMI, Null MODEL
644 *****
645
646 * Load the data
647 use "analysisready2.dta", clear
648 recast float bmi_w1
    bmi_w1:  13694 values would be changed; not changed
649 sort stratal8 aid
650
651 * delete if missing dependent variable (so can record number)
652 drop if bmi_w1 == .
    (347 observations deleted)

```

653

654 * Fit model using PQL2

655 runmlwin bmi_w1 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
strata18	18	209	760.8	1537

Run time (seconds) = **1.73**Number of iterations = **3**Log restricted-likelihood = **-39859.192**Restricted-deviance = **79718.383**

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.85015	.178305	128.15	0.000	22.50068	23.19962

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18					
	var(cons)	.5346132	.191809	.1586746	.9105519
Level 1: aid					
	var(cons)	19.68364	.2380354	19.2171	20.15018

656

657 * Fit model using MCMC

658 runmlwin bmi_w1 cons , ///

> level2(strata18: cons, residuals(u, savechains("mlA_s18_u.dta", replace))) ///

> level1(aid: cons) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("mlA_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
strata18	18	209	760.8	1537

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **27.8**Deviance (dbar) = **79668.34**Deviance (thetabar) = **79650.20**Effective no. of pars (pd) = **18.13**Bayesian DIC = **79686.47**

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.85241	.1928964	713	0.000	22.46885	23.24131

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.6092956	.2518362	1087	.2805654	1.251525
Level 1: aid					
var(cons)	19.688	.238301	1143	19.22525	20.17627

```
659 rename u0 mlu
```

```
660 drop u0se
```

```
661
```

```
662 * Calculate the ICC from the chains
```

```
663 use "mlA_sl8_beta.dta", clear
```

```
664 rename RP2_var_cons_ sigma2u
```

```
665 rename RP1_var_cons_ sigma2e
```

```
666 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
667 mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0297311	.0118291	1076	0.000	.014147	.0593079

```
668
```

```
669
```

```
670 *****
```

```
671 * MODEL 1B S18 - BMI, MAIN EFFECTS MODEL
```

```
672 *****
```

```
673
```

```
674 * Load the data
```

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

```
676 recast float bmi_w1
```

```
    bmi_w1: 13694 values would be changed; not changed
```

```
677 sort strata18 aid
```

```
678
```

```
679 * delete if missing dependent variable (so can record number)
```

```
680 drop if bmi_w1 == .
```

```
    (347 observations deleted)
```

```
681
```

```
682 * Fit model using PQL2
```

```
683 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege, ///
```

```
    > level2(strata18: cons) ///
```

```
    > level1(aid: cons) ///
```

```
    > rlgls 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
strata18	18	209	760.8	1537

```

Run time (seconds)      =      1.87
Number of iterations    =      7
Log restricted-likelihood = -39851.175
Restricted-deviance     =      79702.35

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.03435	.3112667	70.79	0.000	21.42428	22.64442
female	-.3406593	.2587387	-1.32	0.188	-.8477778	.1664592
latinx_race	.7772029	.3180926	2.44	0.015	.1537528	1.400653
black_race	.978477	.3110429	3.15	0.002	.368844	1.58811
hsless	.8263029	.3159251	2.62	0.009	.2071011	1.445505
somecollege	.4000706	.3200656	1.25	0.211	-.2272463	1.027388

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18					
	var(cons)	.2645082	.0997618	.0689787	.4600378
Level 1: aid					
	var(cons)	19.68428	.2380419	19.21773	20.15084

684

685 * Fit model using MCMC

```

686 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("mlB_sl8_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("mlB_sl8_beta.dta", replace)) initsprevious ///
> nopause

```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **MCMC**

Number of obs = **13694**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	209	760.8	1537

```

Burnin      =      5000
Chain       =      50000
Thinning    =      50
Run time (seconds) =      39.8
Deviance (dbar) =      79668.78
Deviance (thetabar) =      79651.13
Effective no. of pars (pd) =      17.65
Bayesian DIC =      79686.42

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.01937	.3392573	882	0.000	21.33791	22.66018
female	-.3457037	.2857884	664	0.093	-.8822516	.2140571
latinx_race	.7904855	.347732	959	0.019	.0898039	1.517848
black_race	.9950756	.3301611	852	0.004	.3401694	1.681464
hsless	.8462506	.3444375	1337	0.009	.2153288	1.550719
somecollege	.416643	.3433606	1198	0.111	-.2861139	1.095673

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.3177075	.1848921	928	.1164407	.7221273
Level 1: aid					
var(cons)	19.68867	.2384889	902	19.27148	20.16629

```
687 rename u0 mlu
```

```
688 drop u0se
```

```
689
```

```
690 * Calculate the ICC from the chains
```

```
691 use "m1B_s18_beta.dta", clear
```

```
692 rename RP2_var_cons_ sigma2u
```

```
693 rename RP1_var_cons_ sigma2e
```

```
694 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
695 mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0159684	.0089664	931	0.000	.0059052	.0353935

```
696
```

```
697
```

```
end of do-file
```

```
698 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
```

```
699
```

```
700 *-----*
```

```
701 * PREPARE FIXED-PART PARAMETER CHAINS
```

```
702 *-----*
```

```
703
```

```
704 use "m1B_s18_beta.dta", clear
```

```
705 drop deviance RP2_var_cons_ RP1_var_cons_
```

```
706 rename FP1_* b_*
```

```
707 format %9.2f b_*
```

```
708 compress
```

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

```
709 save "m1B_s18_beta_prepped.dta", replace
```

```
file m1B_s18_beta_prepped.dta saved
```

```
710 isid iteration
```

```
711 codebook iteration, compact
```

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

```

712
713
714 *-----*
715 * PREPARE STRATUM RANDOM EFFECTS CHAINS
716 *-----*
717
718 use "m1B_s18_u.dta", clear

719 drop residual idnum

720 rename value u

721 format %9.2f u

722 sort stratal8 iteration

723 order stratal8 iteration

724 compress
    variable stratal8 was double now int
    variable iteration was double now long
    (180,000 bytes saved)

725 save "m1B_s18_u_prepped.dta", replace
    file m1B_s18_u_prepped.dta saved

726 isid stratal8 iteration

727 codebook iteration, compact

```

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

```

728
729
730 *-----*
731 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
732 *-----*
733
734 use "data18.dta", clear

735 isid stratal8

736 cross using "m1B_s18_beta_prepped.dta"

737 isid stratal8 iteration

738 sort stratal8 iteration

739 merge 1:1 stratal8 iteration using "m1B_s18_u_prepped.dta", nogenerate assert(match)

```

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

```

740 isid stratal8 iteration

741 compress
    variable stratal8 was double now int
    (108,000 bytes saved)

742 save "m1B_sl8data_prepped.dta", replace
    file m1B_sl8data_prepped.dta saved

743
744
745 *-----*
746 * CALCULATE VALUES OF INTEREST
747 *-----*
748
749 * Expected value based on fixed and random part
750 use "m1B_sl8data_prepped.dta", clear

751 gen cons = 1

752 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_)

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

754 format %9.3f expectedvalue

755
756 * Expected value based only on the fixed-part
757 generate fixedeffect = (b_cons*cons ///
>                                + b_female*female ///
>                                + b_latinx_race*latinx_race ///
>                                + b_black_race*black_race ///
>                                + b_hsless*hsless ///
>                                + b_somecollege*somecollege ///
>                                )

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

759 format %9.3f fixedeffect

760
761 * Expected value based only on the random-part
762 generate randomeffect = u

763 label var randomeffect "Random Effect"

764 format %9.3f randomeffect

765
766 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
767 bysort stratal8 (iteration): egen expmn = mean(expectedvalue)

768 bysort stratal8 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

```

```

769 bysort strata18 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)
770 format %9.3f expmn explo exphi
771
772 bysort strata18 (iteration): egen FEmn = mean(fixedeffect)
773 bysort strata18 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
774 bysort strata18 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
775 format %9.3f FEmn FElo FEhi
776
777 bysort strata18 (iteration): egen REmn = mean(randomeffect)
778 bysort strata18 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
779 bysort strata18 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
780 format %9.3f REmn RElo REhi
781
782 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
783 drop iteration b* u* expectedvalue fixedeffect randomeffect
784 duplicates drop
      Duplicates in terms of all variables
      (17,982 observations deleted)
785 isid strata18
786
787 * Ranks
788 sort expmn
789 generate exprank = _n
790 order exprank, after(exphi)
791 sort FEmn
792 generate FErnk = _n
793 order FErnk, after(FEhi)
794 sort REmn
795 generate RErnk = _n
796 order RErnk, after(REhi)
797
798 * Sort the data
799 sort strata18
800 isid strata18

```



```

801
802 * Compress and save the data
803 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)

804 save "m1B_sl8results.dta", replace
      file m1B_sl8results.dta saved

805
806 * List strata with statistically significant interaction effects
807 use "m1B_sl8results.dta", clear

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

```

strata18	REmn	RElo	REhi
121	-0.804	-1.554	-0.084

```

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

810
811 end of do-file

812 do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

813
814
815 *****
816 * MODEL 1A S36 - BMI, Null MODEL
817 *****
818
819 * Load the data
820 use "analysisready2.dta", clear

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

822 sort strata36 aid

823
824 * delete if missing dependent variable (so can record number)
825 drop if bmi_w1 == .
      (347 observations deleted)

826
827 * Fit model using PQL2
828 runmlwin bmi_w1 cons , ///
      > level2(strata36: cons) ///
      > level1(aid: cons) ///
      > rlgls 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
strata36	36	47	380.4	1052

```

Run time (seconds)      =      1.71
Number of iterations    =      3
Log restricted-likelihood = -39864.394
Restricted-deviance     = 79728.788

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.82263	.1332103	171.33	0.000	22.56154	23.08371

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36					
	var(cons)	.5457825	.1498169	.2521467	.8394182
Level 1: aid					
	var(cons)	19.6603	.2379074	19.19401	20.12659

829

830 * Fit model using MCMC

```

831 runmlwin bmi_w1 cons , ///
>   level2(strata36: cons, residuals(u, savechains("mlA_s36_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(burnin(5000) chain(50000) thinning(50) ///
>       savechains("mlA_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
strata36	36	47	380.4	1052

```

Burnin              =      5000
Chain               =     50000
Thinning            =      50
Run time (seconds)  =     27.7
Deviance (dbar)     =    79652.36
Deviance (thetabar) =    79619.99
Effective no. of pars (pd) =    32.36
Bayesian DIC        =    79684.72

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.82252	.1361723	1145	0.000	22.55209	23.10523

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36						
	var(cons)	.5792028	.1668966	843	.3360136	.9500696
Level 1: aid						
	var(cons)	19.66394	.2369114	927	19.22595	20.13681

```

832 rename u0 mlu
833 drop u0se
834
835 * Calculate the ICC from the chains
836 use "m1A_s36_beta.dta", clear
837 rename RP2_var_cons_ sigma2u
838 rename RP1_var_cons_ sigma2e
839 generate icc = sigma2u/(sigma2u + sigma2e)
840 mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0283966	.0076947	833	0.000	.0166533	.0461487

```

841
842
843 *****
844 * MODEL 1B_S36 - BMI, MAIN EFFECTS MODEL
845 *****
846
847 * Load the data
848 use "analysisready2.dta", clear
849 recast float bmi_w1
850 sort strata36 aid
851
852 * delete if missing dependent variable (so can record number)
853 drop if bmi_w1 == .
854 (347 observations deleted)
855
856 * Fit model using PQL2
857 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
858 > level2(strata36: cons) ///
859 > level1(aid: cons) ///
860 > rlgls maxiterations(100) ///
861 > 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
strata36	36	47	380.4	1052

```

Run time (seconds)      =      1.89
Number of iterations    =      6
Log restricted-likelihood = -39849.125
Restricted-deviance      =      79698.25

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	21.94352	.2271129	96.62	0.000	21.49838	22.38865
female	-.3694986	.1811901	-2.04	0.041	-.7246246	-.0143726
latinx_race	.7632417	.2237868	3.41	0.001	.3246276	1.201856
black_race	.9815842	.2154888	4.56	0.000	.559234	1.403934
hsless	.7923241	.2231011	3.55	0.000	.355054	1.229594
somecollege	.3753363	.2221421	1.69	0.091	-.0600542	.8107268

lowinc	.2399739	.1833781	1.31	0.191	-.1194407	.5993884
--------	----------	----------	------	-------	-----------	----------

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36					
	var(const)	.2116616	.0676305	.0791082	.3442149
Level 1: aid					
	var(const)	19.66375	.2379358	19.1974	20.1301

857

858 * Fit model using MCMC

```

859 runmlwin bmi_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
> level2(strata36: cons, residuals(u, savechains("mlB_s36_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("mlB_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
strata36	36	47	380.4	1052

```

Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =     43.5
Deviance (dbar)  =    79655.00
Deviance (thetabar) =    79625.88
Effective no. of pars (pd) =     29.12
Bayesian DIC     =    79684.12

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.95106	.2320302	832	0.000	21.49979	22.41411
female	-.3683089	.1844461	1169	0.026	-.71866	.0022943
latinx_race	.761642	.2301842	983	0.000	.3156259	1.212421
black_race	.975402	.2204345	1109	0.000	.5733289	1.405466
hsless	.7877457	.2328851	1095	0.002	.3345715	1.233109
somecollege	.3693259	.2295132	909	0.046	-.0644646	.8162154
lowinc	.2364303	.1876487	1091	0.099	-.1310032	.636661

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36						
	var(const)	.2281709	.0932161	1489	.0971447	.4461168
Level 1: aid						
	var(const)	19.6652	.2372393	1174	19.20402	20.1245

```

860 rename u0 mlu
861 drop u0se
862
863 * Calculate the ICC from the chains
864 use "m1B_s36_beta.dta", clear
865 rename RP2_var_cons_ sigma2u
866 rename RP1_var_cons_ sigma2e
867 generate icc = sigma2u/(sigma2u + sigma2e)
868 mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0112349	.0044422	1484	0.000	.004876	.0223245

```

869
870
871 *-----*
872 * PREPARE FIXED-PART PARAMETER CHAINS
873 *-----*
874
875 use "m1B_s36_beta.dta", clear
876 drop deviance RP2_var_cons_ RP1_var_cons_
877 rename FP1_* b_*
878 format %9.2f b_*
879 compress
    variable iteration was double now long
    (4,000 bytes saved)
880 save "m1B_s36_beta_prepped.dta", replace
    file m1B_s36_beta_prepped.dta saved
881 isid iteration
882 codebook iteration, compact

```

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

```

883
884
885 *-----*
886 * PREPARE STRATUM RANDOM EFFECTS CHAINS
887 *-----*
888
889 use "m1B_s36_u.dta", clear

```

```

890 drop residual idnum
891 rename value u
892 format %9.2f u
893 sort strata36 iteration
894 order strata36 iteration
895 compress
    variable strata36 was double now int
    variable iteration was double now long
    (360,000 bytes saved)

```

```

896 save "m1B_s36_u_prepped.dta", replace
    file m1B_s36_u_prepped.dta saved

```

```

897 isid strata36 iteration
898 codebook iteration, compact

```

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

```

899
900
901 *-----*
902 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
903 *-----*
904
905 use "data36.dta", clear
906 isid strata36
907 cross using "m1B_s36_beta_prepped.dta"
908 isid strata36 iteration
909 sort strata36 iteration
910 merge 1:1 strata36 iteration using "m1B_s36_u_prepped.dta", nogenerate assert(match)

```

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

```

911 isid strata36 iteration
912 compress
    variable strata36 was double now int
    (216,000 bytes saved)
913 save "m1B_s36data_prepped.dta", replace
    file m1B_s36data_prepped.dta saved

```

```

914
915
916 *-----*
917 * CALCULATE VALUES OF INTEREST
918 *-----*
919
920 * Expected value based on fixed and random part
921 use "mlB_s36data_prepped.dta", clear

922 gen cons = 1

923 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_)

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

925 format %9.3f expectedvalue

926
927 * Expected value based only on the fixed-part
928 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 ///
>                                )

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

930 format %9.3f fixedeffect

931
932 * Expected value based only on the random-part
933 generate randomeffect = u

934 label var randomeffect "Random Effect"

935 format %9.3f randomeffect

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

939 bysort strata36 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

940 bysort strata36 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

941 format %9.3f expmn explo exphi

942
943 bysort strata36 (iteration): egen FEmn = mean(fixedeffect)

```

```

944 bysort strata36 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
945 bysort strata36 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
946 format %9.3f FEmn FElo FEhi

947
948 bysort strata36 (iteration): egen REmn = mean(randomeffect)
949 bysort strata36 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
950 bysort strata36 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
951 format %9.3f REmn RElo REhi

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

955 duplicates drop

    Duplicates in terms of all variables

    (35,964 observations deleted)

956 isid strata36

957
958 * Ranks
959 sort expmn

960 generate exprank = _n

961 order exprank, after(exphi)

962 sort FEmn

963 generate FErank = _n

964 order FErank, after(FEhi)

965 sort REmn

966 generate RErank = _n

967 order RErank, after(REhi)

968
969 * Sort the data
970 sort strata36

971 isid strata36

972
973 * Compress and save the data
974 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)

```



```
975 save "m1B_s36results.dta", replace
      file m1B_s36results.dta saved
```

```
976
```

```
977 * List strata with statistically significant interaction effects
```

```
978 use "m1B_s36results.dta", clear
```

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

strata36	REmn	RElo	REhi
1211	-0.798	-1.369	-0.271
1221	-0.637	-1.224	-0.060

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

strata36	REmn	RElo	REhi
2220	0.671	0.045	1.407

```
981
```

```
982
```

```
983 *****
```

```
984 * MODEL 1A S48 - BMI, Null MODEL
```

```
985 *****
```

```
986
```

```
987 * Load the data
```

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

```
989 recast float bmi_w1
```

```
      bmi_w1: 13694 values would be changed; not changed
```

```
990 sort strata48 aid
```

```
991
```

```
992 * delete if missing dependent variable (so can record number)
```

```
993 drop if bmi_w1 == .
```

```
      (347 observations deleted)
```

```
994
```

```
995 * Fit model using PQL2
```

```
996 runmlwin bmi_w1 cons , ///
```

```
      > level2(strata48: cons) ///
```

```
      > level1(aid: cons) ///
```

```
      > rigns 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
strata48	48	3	285.3	1052

```
Run time (seconds) = 1.80
```

```
Number of iterations = 3
```

```
Log restricted-likelihood = -39861.178
```

```
Restricted-deviance = 79722.356
```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.83452	.1274832	179.12	0.000	22.58466	23.08439

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Intervall]	
Level 2: strata48 var (cons)	.5703518	.1512442	.2739186	.866785
Level 1: aid var (cons)	19.64144	.2377369	19.17548	20.10739

```

997
998 * Fit model using MCMC
999 runmlwin bmi_wl cons , ///
> level2(strata48: cons, residuals(u, savechains("m1A_s48_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(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
strata48	48	3	285.3	1052

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	27.9
Deviance (dbar)	=	79638.63
Deviance (thetabar)	=	79602.40
Effective no. of pars (pd)	=	36.23
Bayesian DIC	=	79674.86

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.83381	.1316074	1050	0.000	22.57089	23.07632

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata48 var (cons)	.6003889	.1672382	1038	.3506994	.9891538
Level 1: aid var (cons)	19.64623	.2365923	1196	19.16454	20.12129

```
1000rename u0 mlu
1001drop u0se
1002
1003* Calculate the ICC from the chains
```

```

1004use "mlA_s48_beta.dta", clear
1005rename RP2_var_cons_ sigma2u
1006rename RP1_var_cons_ sigma2e
1007generate icc = sigma2u/(sigma2u + sigma2e)
1008mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0293652	.0078631	1031	0.000	.017558	.0482574

```

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 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, /
> //
> level2(strata48: cons) ///
> level1(aid: cons) ///
> rlgls 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
strata48	48	3	285.3	1052

```

Run time (seconds)      =      1.87
Number of iterations    =      6
Log restricted-likelihood = -39844.522
Restricted-deviance     = 79689.043

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	21.96838	.2269802	96.79	0.000	21.5235	22.41325
female	-.4086639	.1769054	-2.31	0.021	-.755392	-.0619357
latinx_imm	.2721478	.3283628	0.83	0.407	-.3714314	.9157269
latinx_non	.8597814	.2317357	3.71	0.000	.4055877	1.313975
black	.9820282	.2195212	4.47	0.000	.5517746	1.412282
hsless	.7948099	.2180123	3.65	0.000	.3675137	1.222106
somecollege	.3599866	.2197278	1.64	0.101	-.0706719	.7906451
lowinc	.2382752	.1835409	1.30	0.194	-.1214583	.5980087

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var(cons)	.2220396	.0690801	.086645	.3574342
Level 1: aid				
var(cons)	19.64679	.2377765	19.18076	20.11282

1025

1026* Fit model using MCMC

```

1027runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc, /
> //
> level2(strata48: cons, residuals(u, savechains("mlB_s48_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("mlB_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
strata48	48	3	285.3	1052

```

Burnin = 5000
Chain = 50000
Thinning = 50
Run time (seconds) = 47.6
Deviance (dbar) = 79643.41
Deviance (thetabar) = 79610.60
Effective no. of pars (pd) = 32.81
Bayesian DIC = 79676.21

```

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.97176	.2343657	971	0.000	21.54801	22.437
female	-.4123254	.1826418	902	0.010	-.7536195	-.0585985
latinx_imm	.2739295	.3326762	1047	0.197	-.4071492	.9618445
latinx_non	.8605981	.2354668	1090	0.000	.3830096	1.327522
black	.9804014	.2232206	965	0.000	.507295	1.402755
hsless	.7961299	.2263192	852	0.000	.3275309	1.281064
somecollege	.3584243	.2278995	1178	0.044	-.0924731	.7871265
lowinc	.234221	.1893742	1389	0.103	-.1451054	.588241

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.2386573	.096353	902	.1074519	.4473905
Level 1: aid					
var(cons)	19.65032	.2370773	938	19.19844	20.13773

1028rename u0 mlu

1029drop u0se

1030

1031* Calculate the ICC from the chains

1032use "m1B_s48_beta.dta", clear

1033rename RP2_var_cons_ sigma2u

1034rename RP1_var_cons_ sigma2e

1035generate icc = sigma2u/(sigma2u + sigma2e)

1036mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.011774	.0044081	906	0.000	.0054494	.0222819

1037

1038

1039*-----*

1040* PREPARE FIXED-PART PARAMETER CHAINS

1041*-----*

1042

1043use "m1B_s48_beta.dta", clear

1044drop deviance RP2_var_cons_ RP1_var_cons_

1045rename FP1_* b_*

1046format %9.2f b_*

1047compress

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

1048save "m1B_s48_beta_prepped.dta", replace
file m1B_s48_beta_prepped.dta saved

1049isid iteration

1050codebook iteration, compact

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

1051

1052

1053*-----*

1054* PREPARE STRATUM RANDOM EFFECTS CHAINS

1055*-----*

1056

1057use "m1B_s48_u.dta", clear

1058drop residual idnum

1059rename value u

1060format %9.2f u

1061sort strata48 iteration

1062order strata48 iteration

1063compress
variable **strata48** was **double** now **int**
variable **iteration** was **double** now **long**
(480,000 bytes saved)

1064save "m1B_s48_u_prepped.dta", replace
file m1B_s48_u_prepped.dta saved

1065isid strata48 iteration

1066codebook iteration, compact

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

1067

1068

1069*-----*

1070* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

1071*-----*

1072

1073use "data48.dta", clear

1074isid strata48

1075cross using "m1B_s48_beta_prepped.dta"

1076isid strata48 iteration

1077sort strata48 iteration

1078merge 1:1 strata48 iteration using "m1B_s48_u_prepped.dta", nogenerate assert(match)

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

1079isid strata48 iteration

1080compress
variable **strata48** was **double** now **int**
(288,000 bytes saved)

1081save "m1B_s48data_prepped.dta", replace
file m1B_s48data_prepped.dta saved

```

1082
1083
1084*-----*
1085* CALCULATE VALUES OF INTEREST
1086*-----*
1087
1088* Expected value based on fixed and random part
1089use "mlB_s48data_prepped.dta", clear

1090gen cons = 1

1091generate 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 )

1092label var expectedvalue "Expected value based on main effects and interactions"

1093format %9.3f expectedvalue

1094
1095* Expected value based only on the fixed-part
1096generate 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 ///
>                                )

1097label var fixedeffect "Expected value based only on main effects"

1098format %9.3f fixedeffect

1099
1100* Expected value based only on the random-part
1101generate randomeffect = u

1102label var randomeffect "Random Effect"

1103format %9.3f randomeffect

1104
1105* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1106bysort strata48 (iteration): egen expmn = mean(expectedvalue)

1107bysort strata48 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

1108bysort strata48 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

1109format %9.3f expmn explo exphi

1110

```

```

1111bysort strata48 (iteration): egen FEmn = mean(fixedeffect)
1112bysort strata48 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
1113bysort strata48 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
1114format %9.3f FEmn FElo FEhi

1115
1116bysort strata48 (iteration): egen REmn = mean(randomeffect)
1117bysort strata48 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
1118bysort strata48 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
1119format %9.3f REmn RElo REhi

1120
1121* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1122drop iteration b* u* expectedvalue fixedeffect randomeffect

1123duplicates drop

    Duplicates in terms of all variables

    (47,952 observations deleted)

1124isid strata48

1125
1126* Ranks
1127sort expmn

1128generate exprank = _n

1129order exprank, after(exphi)

1130sort FEmn

1131generate FErank = _n

1132order FErank, after(FEhi)

1133sort REmn

1134generate RErank = _n

1135order RErank, after(REhi)

1136
1137* Sort the data
1138sort strata48

1139isid strata48

1140
1141* Compress and save the data
1142compress
    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)

```



```
1143save "m1B_s48results.dta", replace
      file m1B_s48results.dta saved
```

```
1144
```

```
1145* List strata with statistically significant interaction effects
```

```
1146use "m1B_s48results.dta", clear
```

```
1147list strata48 REmn RElo REhi if REhi<0, noobs
```

strata48	REmn	RElo	REhi
1311	-0.827	-1.368	-0.264
1321	-0.646	-1.266	-0.063

```
1148list strata48 REmn RElo REhi if RElo>0, noobs
```

strata48	REmn	RElo	REhi
2320	0.689	0.026	1.355

```
1149
```

```
1150
```

```
1151*****
```

```
1152* MODEL 1A S96 - BMI, Null MODEL
```

```
1153*****
```

```
1154
```

```
1155* Load the data
```

```
1156use "analysisready2.dta", clear
```

```
1157recast float bmi_w1
```

```
      bmi_w1: 13694 values would be changed; not changed
```

```
1158sort strata96 aid
```

```
1159
```

```
1160* delete if missing dependent variable (so can record number)
```

```
1161drop if bmi_w1 == .
```

```
      (347 observations deleted)
```

```
1162
```

```
1163* Fit model using PQL2
```

```
1164runmlwin bmi_w1 cons, ///
```

```
> level2(strata96: cons) ///
```

```
> level1(aid: cons) ///
```

```
> rigns 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
strata96	92	1	148.8	896

```
Run time (seconds) = 1.74
```

```
Number of iterations = 4
```

```
Log restricted-likelihood = -39868.279
```

```
Restricted-deviance = 79736.558
```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	22.89939	.1158707	197.63	0.000	22.67229	23.1265

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.7517022	.1635898	.4310721	1.072332
Level 1: aid				
var(cons)	19.60685	.2375977	19.14117	20.07253

1165

1166* Fit model using MCMC

1167runmlwin bmi_w1 cons , ///

> level2(strata96: cons, residuals(u, savechains("mlA_s96_u.dta", replace))) ///

> level1(aid: cons) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("mlA_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
strata96	92	1	148.8	896

Burnin = 5000

Chain = 50000

Thinning = 50

Run time (seconds) = 30.2

Deviance (dbar) = 79614.61

Deviance (thetabar) = 79557.24

Effective no. of pars (pd) = 57.37

Bayesian DIC = 79671.98

bmi_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	22.90138	.1200558	1128	0.000	22.67848	23.14631

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.7765595	.1823003	975	.4899416	1.216627
Level 1: aid					
var(cons)	19.61002	.237277	1009	19.15386	20.08281

1168rename u0 mlu

1169drop u0se

1170

1171* Calculate the ICC from the chains

```

1172use "m1A_s96_beta.dta", clear
1173rename RP2_var_cons_ sigma2u
1174rename RP1_var_cons_ sigma2e
1175generate icc = sigma2u/(sigma2u + sigma2e)
1176mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0383438	.0087178	971	0.000	.0242977	.0583411

```

1177
1178
1179*****
1180* MODEL 1B_S96 - BMI, MAIN EFFECTS MODEL
1181*****
1182
1183* Load the data
1184use "analysisready2.dta", clear

1185recast float bmi_w1
    bmi_w1: 13694 values would be changed; not changed

1186sort strata96 aid

1187
1188* delete if missing dependent variable (so can record number)
1189drop if bmi_w1 == .
    (347 observations deleted)

1190
1191* Fit model using PQL2
1192runmlwin bmi_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc st
> raight no, ///
> level2(strata96: cons) ///
> level1(aid: cons) ///
> rlgls 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
strata96	92	1	148.8	896

```

Run time (seconds)      =      1.88
Number of iterations    =      7
Log restricted-likelihood = -39842.907
Restricted-deviance      =      79685.813

```

bmi_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	21.77693	.2084897	104.45	0.000	21.3683	22.18556
female	-.3997517	.1630636	-2.45	0.014	-.7193505	-.0801529
latinx_imm	.3655394	.3176743	1.15	0.250	-.2570907	.9881695
latinx_non	.9346547	.2110561	4.43	0.000	.5209923	1.348317
black	1.148239	.1980742	5.80	0.000	.7600209	1.536457
hsless	.8137683	.1977667	4.11	0.000	.4261527	1.201384
somecollege	.4210666	.1997717	2.11	0.035	.0295213	.812612
lowinc	.2650911	.1673623	1.58	0.113	-.0629329	.5931152
straight_no	.4400464	.1796075	2.45	0.014	.0880221	.7920708

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.2618716	.0723194	.1201281	.4036151
Level 1: aid				
var(cons)	19.61878	.2376503	19.153	20.08457

1193

1194* Fit model using MCMC

1195runmlwin bmi_wl cons female latinx_imm latinx_non black hsless somecollege lowinc st

> raight no, ///

> level2(strata96: cons, residuals(u, savechains("mlB_s96_u.dta", replace))) ///

> level1(aid: cons) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("mlB_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
strata96	92	1	148.8	896

Burnin = 5000

Chain = 50000

Thinning = 50

Run time (seconds) = 52.5

Deviance (dbar) = 79623.97

Deviance (thetabar) = 79577.96

Effective no. of pars (pd) = 46.02

Bayesian DIC = 79669.99

bmi_wl	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	21.77997	.2092786	899	0.000	21.3744	22.16304
female	-.4035556	.1615505	1034	0.004	-.7204707	-.1041016
latinx_imm	.3667093	.3226864	815	0.097	-.239362	1.04094
latinx_non	.9349114	.2132982	1121	0.000	.5137419	1.326288
black	1.145553	.201791	1064	0.000	.7535725	1.537612
hsless	.814704	.1982736	1064	0.000	.3972289	1.203694
somecollege	.4197222	.2010172	1054	0.026	-.0087056	.8050941
lowinc	.2642609	.1706387	871	0.076	-.0651099	.6058536
straight_no	.4376393	.1820279	1351	0.010	.0774053	.801244

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.2730056	.1002187	912	.1153447	.5036865
Level 1: aid					
var(cons)	19.62181	.2375864	940	19.17871	20.13008

```

1196rename u0 mlu
1197drop u0se
1198
1199* Calculate the ICC from the chains
1200use "m1B_s96_beta.dta", clear
1201rename RP2_var_cons_ sigma2u
1202rename RP1_var_cons_ sigma2e
1203generate icc = sigma2u/(sigma2u + sigma2e)
1204mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0137151	.0048965	913	0.000	.0058186	.0250633

```

1205
1206
1207*-----*
1208* PREPARE FIXED-PART PARAMETER CHAINS
1209*-----*
1210
1211use "m1B_s96_beta.dta", clear
1212drop deviance RP2_var_cons_ RP1_var_cons_
1213rename FP1_ b_
1214format %9.2f b_
1215compress
      variable iteration was double now long
      (4,000 bytes saved)
1216save "m1B_s96_beta_prepped.dta", replace
      file m1B_s96_beta_prepped.dta saved
1217isid iteration
1218codebook iteration, compact

```

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

```

1219
1220
1221*-----*
1222* PREPARE STRATUM RANDOM EFFECTS CHAINS
1223*-----*
1224
1225use "m1B_s96_u.dta", clear

```

1226drop residual idnum

1227rename value u

1228format %9.2f u

1229sort strata96 iteration

1230order strata96 iteration

1231compress
variable **strata96** was **double** now **int**
variable **iteration** was **double** now **long**
(920,000 bytes saved)

1232save "m1B_s96_u_prepped.dta", replace
file m1B_s96_u_prepped.dta saved

1233isid strata96 iteration

1234codebook iteration, compact

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

1235

1236

1237*-----*

1238* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

1239*-----*

1240

1241use "data96_bmi.dta", clear

1242isid strata96

1243cross using "m1B_s96_beta_prepped.dta"

1244isid strata96 iteration

1245sort strata96 iteration

1246merge 1:1 strata96 iteration using "m1B_s96_u_prepped.dta", nogenerate assert(match)

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

1247isid strata96 iteration

1248compress
variable **strata96** was **double** now **int**
(552,000 bytes saved)

1249save "m1B_s96data_prepped.dta", replace
file m1B_s96data_prepped.dta saved

```

1250
1251
1252*-----*
1253* CALCULATE VALUES OF INTEREST
1254*-----*
1255
1256* Expected value based on fixed and random part
1257use "mlB_s96data_prepped.dta", clear

1258gen cons = 1

1259generate 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 )

1260label var expectedvalue "Expected value based on main effects and interactions"

1261format %9.3f expectedvalue

1262
1263* Expected value based only on the fixed-part
1264generate 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 ///
>                                )

1265label var fixedeffect "Expected value based only on main effects"

1266format %9.3f fixedeffect

1267
1268* Expected value based only on the random-part
1269generate randomeffect = u

1270label var randomeffect "Random Effect"

1271format %9.3f randomeffect

1272
1273* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1274bysort strata96 (iteration): egen expmn = mean(expectedvalue)

1275bysort strata96 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

1276bysort strata96 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

1277format %9.3f expmn explo exphi

```

```

1278
1279 bysort strata96 (iteration): egen FEmn = mean(fixedeffect)

1280 bysort strata96 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)

1281 bysort strata96 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)

1282 format %9.3f FEmn FElo FEhi

1283
1284 bysort strata96 (iteration): egen REmn = mean(randomeffect)

1285 bysort strata96 (iteration): egen RElo = pctlile(randomeffect), p(2.5)

1286 bysort strata96 (iteration): egen REhi = pctlile(randomeffect), p(97.5)

1287 format %9.3f REmn RElo REhi

1288
1289 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1290 drop iteration b* u* expectedvalue fixedeffect randomeffect

1291 duplicates drop

      Duplicates in terms of all variables

      (91,908 observations deleted)

1292 isid strata96

1293
1294 * Ranks
1295 sort expmn

1296 generate exprank = _n

1297 order exprank, after(exphi)

1298 sort FEmn

1299 generate FErnk = _n

1300 order FErnk, after(FEhi)

1301 sort REmn

1302 generate RErnk = _n

1303 order RErnk, after(REhi)

1304
1305 * Sort the data
1306 sort strata96

1307 isid strata96

1308
1309 * Compress and save the data
1310 compress
      variable cons was float now byte
      variable exprank was float now byte
      variable FErnk was float now byte
      variable RErnk was float now byte
      (1,104 bytes saved)

```



```
1311save "m1B_s96results.dta", replace
      file m1B_s96results.dta saved
```

```
1312
```

```
1313* List strata with statistically significant interaction effects
```

```
1314use "m1B_s96results.dta", clear
```

```
1315list strata96 REmn RElo REhi if REhi<0, noobs
```

strata96	REmn	RElo	REhi
13111	-0.828	-1.365	-0.317
13211	-0.675	-1.270	-0.134
28300	-0.682	-1.298	-0.104

```
1316list strata96 REmn RElo REhi if RElo>0, noobs
```

strata96	REmn	RElo	REhi
18201	0.503	0.034	1.013
23201	0.692	0.001	1.434
23310	1.099	0.267	2.056

```
1317
```

```
1318
```

```
      end of do-file
```

```
1319do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
```

```
1320
```

```
1321*****
```

```
1322*****
```

```
1323*****
```

```
1324*
```

```
1325*
```

```
1326* MODEL 2 - CESD, MAIN EFFECTS MODEL
```

```
1327*
```

```
1328*
```

```
1329*****
```

```
1330*****
```

```
1331*****
```

```
1332
```

```
1333
```

```
1334*****
```

```
1335* MODEL AB_S6 - CESD, Null MODEL
```

```
1336*****
```

```
1337
```

```
1338* Load the data
```

```
1339use "analysisready2.dta", clear
```

```
1340recast float cesd_w1
```

```
      cesd_w1: 13375 values would be changed; not changed
```

```
1341sort strata6 aid
```

```
1342
```

```

1343* delete if missing dependent variable (so can record number)
1344drop if cesd_w1 == .
      (19 observations deleted)

```

```

1345

```

```

1346* Fit model using PQL2

```

```

1347runmlwin cesd_w1 cons , ///
>   level2(strata6: cons) ///
>   level1(aid: cons) ///
>   rlgls 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
strata6	6	1164	2337.0	4295

```

Run time (seconds)      =      1.78
Number of iterations    =      5
Log restricted-likelihood = -48710.582
Restricted-deviance     =  97421.164

```

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	12.14972	.6816815	17.82	0.000	10.81365	13.48579

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	2.75443	1.606942	-.3951193	5.903979
Level 1: aid					
	var(cons)	60.82438	.7265754	59.40032	62.24845

```

1348

```

```

1349* Fit model using MCMC

```

```

1350runmlwin cesd_w1 cons , ///
>   level2(strata6: cons, residuals(u, savechains("m2A_s6_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(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
strata6	6	1164	2337.0	4295

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =     27.1
Deviance (dbar)     =    97395.96
Deviance (thetabar) =    97389.02
Effective no. of pars (pd) =    6.94
Bayesian DIC        =    97402.90

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.95953	.9370974	128	0.000	9.701644	13.62321

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	4.795843	5.747128	315	1.032867	17.30381
Level 1: aid						
	var(cons)	60.83472	.7225566	976	59.42578	62.2756

```
1351rename u0 mlu
```

```
1352drop u0se
```

```
1353
```

```
1354* Calculate the ICC from the chains
```

```
1355use "m2A_s6_beta.dta", clear
```

```
1356rename RP2_var_cons_ sigma2u
```

```
1357rename RP1_var_cons_ sigma2e
```

```
1358generate icc = sigma2u/(sigma2u + sigma2e)
```

```
1359mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0683313	.0540355	308	0.000	.0167311	.2246867

```
1360
```

```
1361
```

```
1362*****
```

```
1363* MODEL 2B_S6 - CESD, MAIN EFFECTS MODEL
```

```
1364*****
```

```
1365
```

```
1366* Load the data
```

```
1367use "analysisready2.dta", clear
```

```
1368recast float cesd_w1
```

```
cesd_w1: 13375 values would be changed; not changed
```

```
1369sort strata6 aid
```

```
1370
```

```
1371* delete if missing dependent variable (so can record number)
1372drop if cesd_w1 == .
      (19 observations deleted)
```

```
1373
```

```
1374* Fit model using PQL2
```

```
1375runmlwin cesd_w1 cons female latinx_race black_race , ///
>   level2(strata6: cons) ///
>   level1(aid: cons) ///
>   rglis 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
strata6	6	1164	2337.0	4295

```
Run time (seconds)      =      1.93
Number of iterations    =      11
Log restricted-likelihood = -48701.359
Restricted-deviance     =  97402.718
```

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	9.81169	.3628141	27.04	0.000	9.100587	10.52279
female	2.281257	.3745632	6.09	0.000	1.547126	3.015387
latinx_race	2.342308	.4584433	5.11	0.000	1.443776	3.24084
black_race	1.262885	.4508346	2.80	0.005	.379265	2.146504

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.1776713	.1201642	-.0578462	.4131889
Level 1: aid					
	var(cons)	60.82444	.7265752	59.40038	62.2485

```
1376
```

```
1377* Fit model using MCMC
```

```
1378runmlwin cesd_w1 cons female latinx_race black_race , ///
>   level2(strata6: cons, residuals(u, savechains("m2B_s6_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(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
strata6	6	1164	2337.0	4295

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =       36
Deviance (dbar)     =    97396.56
Deviance (thetabar) =    97389.43
Effective no. of pars (pd) =    7.14
Bayesian DIC        =    97403.70

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	9.718446	.7867957	165	0.000	8.109212	10.94674
female	2.310883	.8699799	191	0.012	.9258427	4.339372
latinx_race	2.433728	.9735531	215	0.008	.7903793	4.723653
black_race	1.271634	.8154942	282	0.041	-.4425638	2.984027

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	.9397564	3.785353	219	.0118154	7.188499
Level 1: aid						
	var(cons)	60.83864	.7246033	866	59.36819	62.19898

```
1379rename u0 mlu
```

```
1380drop u0se
```

```
1381
```

```
1382* Calculate the ICC from the chains
```

```
1383use "m2B_s6_beta.dta", clear
```

```
1384rename RP2_var_cons_ sigma2u
```

```
1385rename RP1_var_cons_ sigma2e
```

```
1386generate icc = sigma2u/(sigma2u + sigma2e)
```

```
1387mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0145093	.04064	189	0.000	.0001937	.1057029

```
1388
```

```
1389
```

```
end of do-file
```

```
1390do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
```

```
1391
```

```
1392*-----*
```

```
1393* PREPARE FIXED-PART PAREMETER CHAINS
```

```
1394*-----*
```

```
1395
```

```
1396use "m2B_s6_beta.dta", clear
```

```

1397drop deviance RP2_var_cons_ RP1_var_cons_
1398rename FP1_ * b_*
1399format %9.2f b_*
1400compress
      variable iteration was double now long
      (4,000 bytes saved)
1401save "m2B_s6_beta_prepped.dta", replace
      (note: file m2B_s6_beta_prepped.dta not found)
      file m2B_s6_beta_prepped.dta saved

```

```
1402isid iteration
```

```
1403codebook iteration, compact
```

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

```

1404
1405
1406*-----*
1407* PREPARE STRATUM RANDOM EFFECTS CHAINS
1408*-----*
1409
1410use "m2B_s6_u.dta", clear
1411drop residual idnum
1412rename value u
1413format %9.2f u
1414sort strata6 iteration
1415order strata6 iteration
1416compress
      variable strata6 was double now byte
      variable iteration was double now long
      (66,000 bytes saved)
1417save "m2B_s6_u_prepped.dta", replace
      (note: file m2B_s6_u_prepped.dta not found)
      file m2B_s6_u_prepped.dta saved

```

```
1418isid strata6 iteration
```

```
1419codebook iteration, compact
```

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

```

1420
1421
1422*-----*
1423* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1424*-----*
1425
1426use "data6.dta", clear

1427isid strata6

1428cross using "m2B_s6_beta_prepped.dta"

1429isid strata6 iteration

1430sort strata6 iteration

1431merge 1:1 strata6 iteration using "m2B_s6_u_prepped.dta", nogenerate assert(match)

```

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

```

1432isid strata6 iteration

1433compress
      variable strata6 was double now byte
      (42,000 bytes saved)

1434save "m2B_s6data_prepped.dta", replace
      (note: file m2B_s6data_prepped.dta not found)
      file m2B_s6data_prepped.dta saved

1435
1436
1437*-----*
1438* CALCULATE VALUES OF INTEREST
1439*-----*
1440
1441* Expected value based on fixed and random part
1442use "m2B_s6data_prepped.dta", clear

1443gen cons = 1

1444generate expectedvalue = (b_cons*cons ///
      >
      >                                + b_female*female ///
      >                                + b_latinx_race*latinx_race ///
      >                                + b_black_race*black_race ///
      >                                + u )

1445label var expectedvalue "Expected value based on main effects and interactions"

1446format %9.3f expectedvalue

1447
1448* Expected value based only on the fixed-part
1449generate fixedeffect = (b_cons*cons ///
      >
      >                                + b_female*female ///
      >                                + b_latinx_race*latinx_race ///
      >                                + b_black_race*black_race ///
      >                                )

```

```

1450label var fixedeffect "Expected value based only on main effects"
1451format %9.3f fixedeffect
1452
1453* Expected value based only on the random-part
1454generate randomeffect = u
1455label var randomeffect "Random Effect"
1456format %9.3f randomeffect
1457
1458* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1459bysort strata6 (iteration): egen expmn = mean(expectedvalue)
1460bysort strata6 (iteration): egen explo = pctlile(expectedvalue), p(2.5)
1461bysort strata6 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)
1462format %9.3f expmn explo exphi
1463
1464bysort strata6 (iteration): egen FEmn = mean(fixedeffect)
1465bysort strata6 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
1466bysort strata6 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
1467format %9.3f FEmn FElo FEhi
1468
1469bysort strata6 (iteration): egen REmn = mean(randomeffect)
1470bysort strata6 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
1471bysort strata6 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
1472format %9.3f REmn RElo REhi
1473
1474* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1475drop iteration b* u* expectedvalue fixedeffect randomeffect
1476duplicates drop
      Duplicates in terms of all variables
      (5,994 observations deleted)
1477isid strata6
1478
1479* Ranks
1480sort expmn
1481generate exprank = _n
1482order exprank, after(exphi)

```



```

1483sort FEmn
1484generate FErnk = _n
1485order FErnk, after(FEhi)
1486sort REmn
1487generate RErnk = _n
1488order RErnk, after(REhi)

1489
1490* Sort the data
1491sort strata6

1492isid strata6

1493
1494* Compress and save the data
1495compress
    variable cons was float now byte
    variable exprnk was float now byte
    variable FErnk was float now byte
    variable RErnk was float now byte
    (72 bytes saved)

1496save "m2B_s6results.dta", replace
    (note: file m2B_s6results.dta not found)
    file m2B_s6results.dta saved

1497
1498* List strata with statistically significant interaction effects
1499use "m2B_s6results.dta", clear

1500list strata6 REmn RElo REhi if REhi<0, noobs

1501list strata6 REmn RElo REhi if RElo>0, noobs

1502
1503
    end of do-file

1504do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

1505
1506
1507*****
1508* MODEL 2A_S12 - CESD, Null MODEL
1509*****
1510
1511* Load the data
1512use "analysisready2.dta", clear

1513recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed

1514sort strata12 aid

1515

```

```

1516* delete if missing dependent variable (so can record number)
1517drop if cesd_w1 == .
      (19 observations deleted)

```

```

1518

```

```

1519* Fit model using PQL2

```

```

1520runmlwin cesd_w1 cons , ///
>   level2(strata12: cons) ///
>   level1(aid: cons) ///
>   rlgls maxiterations(100) ///
>   nopause

```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **RIGLS**

Number of obs = **14022**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	472	1168.5	2903

Run time (seconds) = **1.75**
Number of iterations = **4**
Log restricted-likelihood = **-48613.754**
Restricted-deviance = **97227.509**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	12.28129	.5249627	23.39	0.000	11.25238	13.31019

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12					
	var(cons)	3.236246	1.348201	.5938201	5.878672
Level 1: aid					
	var(cons)	59.90201	.7157103	58.49924	61.30477

```

1521

```

```

1522* Fit model using MCMC

```

```

1523runmlwin cesd_w1 cons , ///
>   level2(strata12: cons, residuals(u, savechains("m2A_s12_u.dta", replace))) ///
>   level1(aid: cons) ///
>   mcmc(burnin(5000) chain(50000) thinning(50) ///
>   savechains("m2A_s12_beta.dta", replace)) initsprevious ///
>   nopause

```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **MCMC**

Number of obs = **14022**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	472	1168.5	2903

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =     29.5
Deviance (dbar)       =    97181.85
Deviance (thetabar)   =    97168.93
Effective no. of pars (pd) =    12.92
Bayesian DIC          =    97194.76

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	12.29068	.5522466	357	0.000	11.1855	13.38352

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12						
	var(cons)	3.925861	2.116616	893	1.585487	9.478306
Level 1: aid						
	var(cons)	59.91277	.7176632	1066	58.54672	61.3327

```
1524rename u0 mlu
```

```
1525drop u0se
```

```
1526
```

```
1527* Calculate the ICC from the chains
```

```
1528use "m2A_s12_beta.dta", clear
```

```
1529rename RP2_var_cons_ sigma2u
```

```
1530rename RP1_var_cons_ sigma2e
```

```
1531generate icc = sigma2u/(sigma2u + sigma2e)
```

```
1532mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0608265	.0303918	900	0.000	.0257487	.1367601

```
1533
```

```
1534
```

```
1535*****
```

```
1536* MODEL 2B_S12 - CESD, MAIN EFFECTS MODEL
```

```
1537*****
```

```
1538
```

```
1539* Load the data
```

```
1540use "analysisready2.dta", clear
```

```
1541recast float cesd_w1
```

```
cesd_w1: 13375 values would be changed; not changed
```

```
1542sort strata12 aid
```

```
1543
```

1544* delete if missing dependent variable (so can record number)

1545drop if cesd_w1 == .
(19 observations deleted)

1546

1547* Fit model using PQL2

1548runmlwin cesd_w1 cons female latinx_race black_race lowparentedu, ///

```
> level2(strata12: cons) ///  
> level1(aid: cons) ///  
> rigls maxiterations(100) ///  
> nopause
```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **RIGLS**

Number of obs = **14022**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	472	1168.5	2903

Run time (seconds) = **1.80**

Number of iterations = **6**

Log restricted-likelihood = **-48593.465**

Restricted-deviance = **97186.93**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	9.173696	.2378972	38.56	0.000	8.707426	9.639966
female	2.205414	.2311872	9.54	0.000	1.752295	2.658532
latinx_race	1.789503	.2861238	6.25	0.000	1.228711	2.350295
black_race	1.166688	.2732456	4.27	0.000	.6311367	1.70224
lowparentedu	2.05672	.2322043	8.86	0.000	1.601608	2.511832

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12					
	var(cons)	.096028	.0636965	-.0288149	.2208709
Level 1: aid					
	var(cons)	59.89979	.7156704	58.49711	61.30248

1549

1550* Fit model using MCMC

1551runmlwin cesd_w1 cons female latinx_race black_race lowparentedu, ///

```
> level2(strata12: cons, residuals(u, savechains("m2B_sl2_u.dta", replace))) ///  
> level1(aid: cons) ///  
> mcmc(burnin(5000) chain(50000) thinning(50) ///  
> savechains("m2B_sl2_beta.dta", replace)) initsprevious ///  
> nopause
```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **MCMC**

Number of obs = **14022**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	472	1168.5	2903

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =     39.1
Deviance (dbar)       =    97182.38
Deviance (thetabar)   =    97171.95
Effective no. of pars (pd) =    10.43
Bayesian DIC          =    97192.82

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	9.184779	.2638528	1066	0.000	8.634402	9.687549
female	2.182755	.2559369	910	0.000	1.734643	2.742806
latinx_race	1.792358	.3072464	1079	0.000	1.207359	2.41047
black_race	1.166508	.2938354	905	0.001	.5037368	1.736315
lowparentedu	2.05605	.2511692	959	0.000	1.587943	2.576664

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.1226215	.1465761	778	.0061324	.4963156
Level 1: aid					
var(cons)	59.91804	.7145445	869	58.54828	61.30545

```
1552rename u0 mlu
```

```
1553drop u0se
```

```
1554
```

```
1555* Calculate the ICC from the chains
```

```
1556use "m2B_s12_beta.dta", clear
```

```
1557rename RP2_var_cons_ sigma2u
```

```
1558rename RP1_var_cons_ sigma2e
```

```
1559generate icc = sigma2u/(sigma2u + sigma2e)
```

```
1560mcmcsum icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0020793	.0022489	779	0.000	.0001012	.0082149

```
1561
```

```
1562
```

```
1563*-----*
```

```
1564* PREPARE FIXED-PART PAREMETER CHAINS
```

```
1565*-----*
```

```
1566
```

```
1567use "m2B_s12_beta.dta", clear
```

```
1568drop deviance RP2_var_cons_ RP1_var_cons_
```

```
1569rename FP1_* b_*
```

1570format %9.2f b_*

1571compress
variable **iteration** was **double** now **long**
(4,000 bytes saved)

1572save "m2B_s12_beta_prepped.dta", replace
file m2B_s12_beta_prepped.dta saved

1573isid iteration

1574codebook iteration, compact

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

1575

1576

1577*-----*

1578* PREPARE STRATUM RANDOM EFFECTS CHAINS

1579*-----*

1580

1581use "m2B_s12_u.dta", clear

1582drop residual idnum

1583rename value u

1584format %9.2f u

1585sort stratal2 iteration

1586order stratal2 iteration

1587compress
variable **stratal2** was **double** now **int**
variable **iteration** was **double** now **long**
(120,000 bytes saved)

1588save "m2B_s12_u_prepped.dta", replace
file m2B_s12_u_prepped.dta saved

1589isid stratal2 iteration

1590codebook iteration, compact

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

1591

1592

1593*-----*

```

1594* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1595*-----*
1596
1597use "data12.dta", clear

1598isid strata12

1599cross using "m2B_s12_beta_prepped.dta"

1600isid strata12 iteration

1601sort strata12 iteration

1602merge 1:1 strata12 iteration using "m2B_s12_u_prepped.dta", nogenerate assert(match)

```

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

```

1603isid strata12 iteration

1604compress
      variable strata12 was double now int
      (72,000 bytes saved)

1605save "m2B_s12data_prepped.dta", replace
      file m2B_s12data_prepped.dta saved

1606
1607
1608*-----*
1609* CALCULATE VALUES OF INTEREST
1610*-----*
1611
1612* Expected value based on fixed and random part
1613use "m2B_s12data_prepped.dta", clear

1614gen cons = 1

1615generate expectedvalue = (b_cons*cons ///
>                                + b_female*female ///
>                                + b_latinx_race*latinx_race ///
>                                + b_black_race*black_race ///
>                                + b_lowparentedu*lowparentedu ///
>                                + u )

1616label var expectedvalue "Expected value based on main effects and interactions"

1617format %9.3f expectedvalue

1618
1619* Expected value based only on the fixed-part
1620generate fixedeffect = (b_cons*cons ///
>                                + b_female*female ///
>                                + b_latinx_race*latinx_race ///
>                                + b_black_race*black_race ///
>                                + b_lowparentedu*lowparentedu ///
>                                )

```

```

1621label var fixedeffect "Expected value based only on main effects"
1622format %9.3f fixedeffect
1623
1624* Expected value based only on the random-part
1625generate randomeffect = u
1626label var randomeffect "Random Effect"
1627format %9.3f randomeffect
1628
1629* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1630bysort stratal2 (iteration): egen expmn = mean(expectedvalue)
1631bysort stratal2 (iteration): egen explo = pctlile(expectedvalue), p(2.5)
1632bysort stratal2 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)
1633format %9.3f expmn explo exphi
1634
1635bysort stratal2 (iteration): egen FEmn = mean(fixedeffect)
1636bysort stratal2 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)
1637bysort stratal2 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
1638format %9.3f FEmn FElo FEhi
1639
1640bysort stratal2 (iteration): egen REmn = mean(randomeffect)
1641bysort stratal2 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
1642bysort stratal2 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
1643format %9.3f REmn RElo REhi
1644
1645* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1646drop iteration b* u* expectedvalue fixedeffect randomeffect
1647duplicates drop
    Duplicates in terms of all variables
    (11,988 observations deleted)
1648isid stratal2
1649
1650* Ranks
1651sort expmn
1652generate exprank = _n
1653order exprank, after(exphi)

```



```

1654sort FEmn
1655generate FErank = _n
1656order FErank, after(FEhi)
1657sort REmn
1658generate RErank = _n
1659order RErank, after(REhi)
1660
1661* Sort the data
1662sort strata12
1663isid strata12
1664
1665* Compress and save the data
1666compress
    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)
1667save "m2B_s12results.dta", replace
    file m2B_s12results.dta saved
1668
1669* List strata with statistically significant interaction effects
1670use "m2B_s12results.dta", clear
1671list strata12 REmn RElo REhi if REhi<0, noobs
1672list strata12 REmn RElo REhi if RElo>0, noobs
1673
1674
1675*****
1676* MODEL 2A S18 - CESD, Null MODEL
1677*****
1678
1679* Load the data
1680use "analysisready2.dta", clear
1681recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed
1682sort strata18 aid
1683
1684* delete if missing dependent variable (so can record number)
1685drop if cesd_w1 == .
    (19 observations deleted)
1686
1687* Fit model using PQL2
1688runmlwin cesd_w1 cons , ///
> level2(strata18: cons) ///
> level1(aid: cons) ///
> rigls maxiterations(100) ///
> nopause

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

```

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	212	779.0	1582

Run time (seconds) = **1.79**
 Number of iterations = **2**
 Log restricted-likelihood = **-48595.968**
 Restricted-deviance = **97191.936**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	11.95779	.4186512	28.56	0.000	11.13725	12.77833

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18					
	var(cons)	3.041607	1.047607	.9883346	5.09488
Level 1: aid					
	var(cons)	59.6836	.7141256	58.28394	61.08326

1689

1690* Fit model using MCMC

1691runmlwin cesd_w1 cons , ///

> level2(strata18: cons, residuals(u, savechains("m2A_s18_u.dta", replace))) ///

> level1(aid: cons) ///

> mcmc(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**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	212	779.0	1582

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **27.3**
 Deviance (dbar) = **97130.46**
 Deviance (thetabar) = **97112.08**
 Effective no. of pars (pd) = **18.38**
 Bayesian DIC = **97148.84**

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.96191	.4571787	452	0.000	11.02957	12.87122

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18						
	var(cons)	3.46656	1.403334	921	1.665491	6.850195
Level 1: aid						
	var(cons)	59.69644	.7138478	993	58.28015	61.1154

```

1692rename u0 mlu
1693drop u0se
1694
1695* Calculate the ICC from the chains
1696use "m2A_s18_beta.dta", clear
1697rename RP2_var_cons_ sigma2u
1698rename RP1_var_cons_ sigma2e
1699generate icc = sigma2u/(sigma2u + sigma2e)
1700mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0548962	.0206404	901	0.000	.0268961	.1030477

```

1701
1702
1703*****
1704* MODEL 2B_S18 - CESD, MAIN EFFECTS MODEL
1705*****
1706
1707* Load the data
1708use "analysisready2.dta", clear
1709recast float cesd_w1
1709cesd_w1: 13375 values would be changed; not changed
1710sort strata18 aid
1711
1712* delete if missing dependent variable (so can record number)
1713drop if cesd_w1 == .
1713(19 observations deleted)
1714
1715* Fit model using PQL2
1716runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons) ///
> level1(aid: cons) ///
> rigns 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
strata18	18	212	779.0	1582

```

Run time (seconds)      =      1.81
Number of iterations    =      5
Log restricted-likelihood = -48569.119
Restricted-deviance     =      97138.238

```

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	8.742017	.247348	35.34	0.000	8.257224	9.22681
female	2.126192	.2152003	9.88	0.000	1.704407	2.547976
latinx_race	1.705673	.272686	6.26	0.000	1.171218	2.240128
black_race	1.127801	.2513603	4.49	0.000	.6351435	1.620458
hsless	2.568635	.2621374	9.80	0.000	2.054855	3.082415
somecollege	1.067982	.2717564	3.93	0.000	.5353494	1.600615

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(cons)	.1138641	.0664542	-.0163837	.2441119
Level 1: aid				
var(cons)	59.68111	.7131897	58.28328	61.07894

1717

1718* Fit model using MCMC

```

1719runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("m2B_sl8_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m2B_sl8_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
strata18	18	212	779.0	1582

```

Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =     41.3
Deviance (dbar)  =    97131.44
Deviance (thetabar) =    97117.64
Effective no. of pars (pd) =    13.81
Bayesian DIC     =    97145.25

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.739659	.2549751	1410	0.000	8.213511	9.236119
female	2.115192	.223098	969	0.000	1.713036	2.584981
latinx_race	1.712998	.2794498	1100	0.000	1.12694	2.260886
black_race	1.135161	.2588168	1039	0.000	.6427325	1.616843
hsless	2.574867	.270583	1192	0.000	2.040377	3.117034
somecollege	1.078992	.2798569	1330	0.000	.5098139	1.615114

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.1279684	.1061281	936	.0103817	.4114876
Level 1: aid					
var(cons)	59.69978	.7147342	898	58.45414	61.10747

```

1720rename u0 mlu
1721drop u0se
1722
1723* Calculate the ICC from the chains
1724use "m2B_s18_beta.dta", clear
1725rename RP2_var_cons_ sigma2u
1726rename RP1_var_cons_ sigma2e
1727generate icc = sigma2u/(sigma2u + sigma2e)
1728mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.002188	.0017213	940	0.000	.0001734	.006886

```

1729
1730
1731*-----*
1732* PREPARE FIXED-PART PAREMETER CHAINS
1733*-----*
1734
1735use "m2B_s18_beta.dta", clear
1736drop deviance RP2_var_cons_ RP1_var_cons_
1737rename FP1_* b_*
1738format %9.2f b_*
1739compress
      variable iteration was double now long
      (4,000 bytes saved)
1740save "m2B_s18_beta_prepped.dta", replace
      file m2B_s18_beta_prepped.dta saved
1741lisid iteration
1742codebook iteration, compact

```

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

```

1743
1744
1745*-----*
1746* PREPARE STRATUM RANDOM EFFECTS CHAINS
1747*-----*
1748
1749use "m2B_s18_u.dta", clear

```

1750drop residual idnum

1751rename value u

1752format %9.2f u

1753sort stratal8 iteration

1754order stratal8 iteration

1755compress
 variable **stratal8** was **double** now **int**
 variable **iteration** was **double** now **long**
 (180,000 bytes saved)

1756save "m2B_s18_u_prepped.dta", replace
 file m2B_s18_u_prepped.dta saved

1757isid stratal8 iteration

1758codebook iteration, compact

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

1759

1760

1761*-----*

1762* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

1763*-----*

1764

1765use "data18.dta", clear

1766isid stratal8

1767cross using "m2B_s18_beta_prepped.dta"

1768isid stratal8 iteration

1769sort stratal8 iteration

1770merge 1:1 stratal8 iteration using "m2B_s18_u_prepped.dta", nogenerate assert(match)

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

1771isid stratal8 iteration

1772compress
 variable **stratal8** was **double** now **int**
 (108,000 bytes saved)

1773save "m2B_s18data_prepped.dta", replace
 file m2B_s18data_prepped.dta saved

```

1774
1775
1776*-----*
1777* CALCULATE VALUES OF INTEREST
1778*-----*
1779
1780* Expected value based on fixed and random part
1781use "m2B_sl8data_prepped.dta", clear

1782gen cons = 1

1783generate expectedvalue = (b_cons*cons ///
>                                + b_female*female ///
>                                + b_latinx_race*latinx_race ///
>                                + b_black_race*black_race ///
>                                + b_hsless*hsless ///
>                                + b_somecollege*somecollege ///
>                                + u )

1784label var expectedvalue "Expected value based on main effects and interactions"

1785format %9.3f expectedvalue

1786
1787* Expected value based only on the fixed-part
1788generate fixedeffect = (b_cons*cons ///
>                                + b_female*female ///
>                                + b_latinx_race*latinx_race ///
>                                + b_black_race*black_race ///
>                                + b_hsless*hsless ///
>                                + b_somecollege*somecollege ///
>                                )

1789label var fixedeffect "Expected value based only on main effects"

1790format %9.3f fixedeffect

1791
1792* Expected value based only on the random-part
1793generate randomeffect = u

1794label var randomeffect "Random Effect"

1795format %9.3f randomeffect

1796
1797* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1798bysort strata18 (iteration): egen expmn = mean(expectedvalue)

1799bysort strata18 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

1800bysort strata18 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

1801format %9.3f expmn explo exphi

1802
1803bysort strata18 (iteration): egen FEmn = mean(fixedeffect)

1804bysort strata18 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)

```

```

1805bysort strata18 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
1806format %9.3f FEmn FElo FEhi
1807
1808bysort strata18 (iteration): egen REmn = mean(randomeffect)
1809bysort strata18 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
1810bysort strata18 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
1811format %9.3f REmn RElo REhi
1812
1813* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1814drop iteration b* u* expectedvalue fixedeffect randomeffect
1815duplicates drop
      Duplicates in terms of all variables
      (17,982 observations deleted)
1816isid strata18
1817
1818* Ranks
1819sort expmn
1820generate exprank = _n
1821order exprank, after(exphi)
1822sort FEmn
1823generate FErank = _n
1824order FErank, after(FEhi)
1825sort REmn
1826generate RErank = _n
1827order RErank, after(REhi)
1828
1829* Sort the data
1830sort strata18
1831isid strata18
1832
1833* Compress and save the data
1834compress
      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)

```



```

1835save "m2B_sl8results.dta", replace
      file m2B_sl8results.dta saved

1836
1837* List strata with statistically significant interaction effects
1838use "m2B_sl8results.dta", clear

1839list strata18  REmn RElo REhi if REhi<0, noobs

1840list strata18  REmn RElo REhi if RElo>0, noobs

1841
1842
1843*****
1844* MODEL 2A_S36 - CESD, Null MODEL
1845*****
1846
1847* Load the data
1848use "analysisready2.dta", clear

1849recast float cesd_w1
      cesd_w1: 13375 values would be changed; not changed

1850sort strata36 aid

1851
1852* delete if missing dependent variable (so can record number)
1853drop if cesd_w1 == .
      (19 observations deleted)

1854
1855* Fit model using PQL2
1856runmlwin cesd_w1 cons , ///
>   level2(strata36: cons) ///
>   level1(aid: cons) ///
>   rlgls 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
strata36	36	47	389.5	1083

Run time (seconds) = **1.71**
Number of iterations = **3**
Log restricted-likelihood = **-48587.192**
Restricted-deviance = **97174.385**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	11.73066	.2868582	40.89	0.000	11.16843	12.29289

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36					
	var(cons)	2.676271	.6954479	1.313218	4.039323
Level 1: aid					
	var(cons)	59.47524	.7112329	58.08125	60.86923

1857

1858* Fit model using MCMC

```
1859runmlwin cesd_w1 cons , ///
> level2(strata36: cons, residuals(u, savechains("m2A_s36_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(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
strata36	36	47	389.5	1083

```
Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =     27.8
Deviance (dbar)  =    97081.92
Deviance (thetabar) =    97047.80
Effective no. of pars (pd) =    34.12
Bayesian DIC     =    97116.04
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.73016	.292937	969	0.000	11.15183	12.30558

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36						
	var(cons)	2.841042	.7736921	958	1.703187	4.69501
Level 1: aid						
	var(cons)	59.48545	.708333	1042	58.14424	60.87137

1860rename u0 mlu

1861drop u0se

1862

1863* Calculate the ICC from the chains

1864use "m2A_s36_beta.dta", clear

1865rename RP2_var_cons_ sigma2u

1866rename RP1_var_cons_ sigma2e

1867generate icc = sigma2u/(sigma2u + sigma2e)

1868mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0455247	.0119039	951	0.000	.0274563	.0726795

```

1869
1870
1871*****
1872* MODEL 2B_S36 - CESD, MAIN EFFECTS MODEL
1873*****
1874
1875* Load the data
1876use "analysisready2.dta", clear

1877recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed

1878sort strata36 aid

1879
1880* delete if missing dependent variable (so can record number)
1881drop if cesd_w1 == .
    (19 observations deleted)

1882
1883* Fit model using PQL2
1884runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
> level2(strata36: cons) ///
> level1(aid: cons) ///
> rlgls 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
strata36	36	47	389.5	1083

Run time (seconds) = **1.81**
Number of iterations = **3**
Log restricted-likelihood = **-48543.589**
Restricted-deviance = **97087.179**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	8.40254	.2177237	38.59	0.000	7.975809	8.82927
female	2.057025	.1830203	11.24	0.000	1.698312	2.415738
latinx_race	1.53289	.2396538	6.40	0.000	1.063177	2.002603
black_race	.8780215	.2168187	4.05	0.000	.4530647	1.302978
hsless	2.141933	.2279063	9.40	0.000	1.695244	2.588621
somecollege	.9531136	.2288306	4.17	0.000	.5046139	1.401613
lowinc	1.066012	.1924026	5.54	0.000	.6889104	1.443115

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.1096165	.0634304	-.0147049	.2339379
Level 1: aid				
var(cons)	59.45772	.7107998	58.06458	60.85086

1885

1886* Fit model using MCMC

```
1887runmlwin cesd_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
> level2(strata36: cons, residuals(u, savechains("m2B_s36_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(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
strata36	36	47	389.5	1083

```
Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =      44
Deviance (dbar)  =    97079.74
Deviance (thetabar) =  97061.91
Effective no. of pars (pd) =  17.83
Bayesian DIC     =    97097.57
```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.412092	.2146275	945	0.000	8.008323	8.815885
female	2.049822	.1804223	1116	0.000	1.713318	2.393033
latinx_race	1.534803	.2379137	841	0.000	1.022556	2.003333
black_race	.8780153	.2137088	1053	0.000	.4498798	1.29846
hsless	2.147969	.2271233	1091	0.000	1.714319	2.546788
somecollege	.9556772	.2279134	940	0.000	.5205239	1.382012
lowinc	1.058988	.1894359	746	0.000	.7141815	1.480576

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36						
	var(cons)	.1049164	.0740037	1078	.0052288	.2844933
Level 1: aid						
	var(cons)	59.47127	.7088533	905	58.16742	60.86782

1888rename u0 mlu

1889drop u0se

1890

1891* Calculate the ICC from the chains

1892use "m2B_s36_beta.dta", clear

1893rename RP2_var_cons_ sigma2u

1894rename RP1_var_cons_ sigma2e

1895generate icc = sigma2u/(sigma2u + sigma2e)

1896mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0017499	.0012563	1078	0.000	.0000881	.0047239

1897

1898

1899*-----*

1900* PREPARE FIXED-PART PAREMETER CHAINS

1901*-----*

1902

1903use "m2B_s36_beta.dta", clear

1904drop deviance RP2_var_cons_ RP1_var_cons_

1905rename FP1_* b_*

1906format %9.2f b_*

1907compress

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

1908save "m2B_s36_beta_prepped.dta", replace
file m2B_s36_beta_prepped.dta saved

1909isid iteration

1910codebook iteration, compact

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

1911

1912

1913*-----*

1914* PREPARE STRATUM RANDOM EFFECTS CHAINS

1915*-----*

1916

1917use "m2B_s36_u.dta", clear

1918drop residual idnum

1919rename value u

1920format %9.2f u

1921sort strata36 iteration

1922order strata36 iteration

```

1923compress
    variable strata36 was double now int
    variable iteration was double now long
    (360,000 bytes saved)

```

```

1924save "m2B_s36_u_prepped.dta", replace
    file m2B_s36_u_prepped.dta saved

```

```

1925isid strata36 iteration

```

```

1926codebook iteration, compact

```

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

```

1927
1928
1929*-----*
1930* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1931*-----*
1932
1933use "data36.dta", clear

1934isid strata36

1935cross using "m2B_s36_beta_prepped.dta"

1936isid strata36 iteration

1937sort strata36 iteration

1938merge 1:1 strata36 iteration using "m2B_s36_u_prepped.dta", nogenerate assert(match)

```

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

```

1939isid strata36 iteration

```

```

1940compress
    variable strata36 was double now int
    (216,000 bytes saved)

```

```

1941save "m2B_s36data_prepped.dta", replace
    file m2B_s36data_prepped.dta saved

```

```

1942
1943
1944*-----*
1945* CALCULATE VALUES OF INTEREST
1946*-----*
1947
1948* Expected value based on fixed and random part
1949use "m2B_s36data_prepped.dta", clear

```

```

1950gen cons = 1

1951generate 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 )

1952label var expectedvalue "Expected value based on main effects and interactions"

1953format %9.3f expectedvalue

1954
1955* Expected value based only on the fixed-part
1956generate 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 ///
>                                )

1957label var fixedeffect "Expected value based only on main effects"

1958format %9.3f fixedeffect

1959
1960* Expected value based only on the random-part
1961generate randomeffect = u

1962label var randomeffect "Random Effect"

1963format %9.3f randomeffect

1964
1965* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1966bysort strata36 (iteration): egen expmn = mean(expectedvalue)

1967bysort strata36 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

1968bysort strata36 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

1969format %9.3f expmn explo exphi

1970
1971bysort strata36 (iteration): egen FEmn = mean(fixedeffect)

1972bysort strata36 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)

1973bysort strata36 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)

1974format %9.3f FEmn FElo FEhi

1975
1976bysort strata36 (iteration): egen REMn = mean(randomeffect)

```

```

1977 bysort strata36 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
1978 bysort strata36 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
1979 format %9.3f REmn RElo REhi

1980
1981 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1982 drop iteration b* u* expectedvalue fixedeffect randomeffect

1983 duplicates drop

      Duplicates in terms of all variables

      (35,964 observations deleted)

1984 isid strata36

1985
1986 * Ranks
1987 sort expmn

1988 generate exprank = _n

1989 order exprank, after(exphi)

1990 sort FEmn

1991 generate FErank = _n

1992 order FErank, after(FEhi)

1993 sort REmn

1994 generate RErank = _n

1995 order RErank, after(REhi)

1996
1997 * Sort the data
1998 sort strata36

1999 isid strata36

2000
2001 * Compress and save the data
2002 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)

2003 save "m2B_s36results.dta", replace
      file m2B_s36results.dta saved

2004
2005 * List strata with statistically significant interaction effects
2006 use "m2B_s36results.dta", clear

```



```

2007list strata36 REmn RElo REhi if REhi<0, noobs
2008list strata36 REmn RElo REhi if RElo>0, noobs
2009
2010
2011*****
2012* MODEL 2A S48 - CESD, Null MODEL
2013*****
2014
2015* Load the data
2016use "analysisready2.dta", clear

2017recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed

2018sort strata48 aid

2019
2020* delete if missing dependent variable (so can record number)
2021drop if cesd_w1 == .
    (19 observations deleted)

2022
2023* Fit model using PQL2
2024runmlwin cesd_w1 cons , ///
    > level2(strata48: cons) ///
    > level1(aid: cons) ///
    > rlgls 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
strata48	48	3	292.1	1083

Run time (seconds) = **1.78**
Number of iterations = **4**
Log restricted-likelihood = **-48592.082**
Restricted-deviance = **97184.163**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	11.82377	.2714712	43.55	0.000	11.2917	12.35584

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48					
	var(cons)	2.791385	.690506	1.438018	4.144751
Level 1: aid					
	var(cons)	59.47849	.7114565	58.08406	60.87291

2025

2026* Fit model using MCMC

2027runmlwin cesd_w1 cons , ///

> level2(strata48: cons, residuals(u, savechains("m2A_s48_u.dta", replace))) ///

> level1(aid: cons) ///

> mcmc(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
strata48	48	3	292.1	1083

Burnin = 5000

Chain = 50000

Thinning = 50

Run time (seconds) = 28

Deviance (dbar) = 97082.14

Deviance (thetabar) = 97043.14

Effective no. of pars (pd) = 39.00

Bayesian DIC = 97121.14

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	11.82057	.281138	902	0.000	11.26422	12.35799

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48						
	var(cons)	2.930436	.7368625	1167	1.801376	4.642762
Level 1: aid						
	var(cons)	59.49245	.707804	1177	58.04182	60.8876

2028rename u0 mlu

2029drop u0se

2030

2031* Calculate the ICC from the chains

2032use "m2A_s48_beta.dta", clear

2033rename RP2_var_cons_ sigma2u

2034rename RP1_var_cons_ sigma2e

2035generate icc = sigma2u/(sigma2u + sigma2e)

2036mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0465559	.0111051	1153	0.000	.0294097	.0726572

```
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
strata48	48	3 292.1 1083

Run time (seconds)	=	1.83
Number of iterations	=	4
Log restricted-likelihood	=	-48543.27
Restricted-deviance	=	97086.54

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	8.378222	.2145639	39.05	0.000	7.957684	8.798759
female	2.082281	.1788826	11.64	0.000	1.731678	2.432885
latinx_imm	1.096905	.4152914	2.64	0.008	.2829488	1.910861
latinx_non	1.640024	.2486486	6.60	0.000	1.152682	2.127366
black	.8731695	.2150552	4.06	0.000	.4516691	1.29467
hsless	2.152981	.2238093	9.62	0.000	1.714322	2.591639
somecollege	.942545	.2259408	4.17	0.000	.4997092	1.385381
lowinc	1.090216	.1910059	5.71	0.000	.7158517	1.464581

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48 var (cons)	.1054596	.0629859	-.0179905	.2289098
Level 1: aid var (cons)	59.46039	.7109182	58.06702	60.85376

2053

2054* Fit model using MCMC

```

2055runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
> ///
> level2(strata48: cons, residuals(u, savechains("m2B_s48_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m2B_s48_beta.dta", replace)) initsprevious ///
> nopause

```

MLwiN 3.2 multilevel model
Normal response model
Estimation algorithm: **MCMC**

Number of obs = **14022**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	292.1	1083

Burnin = **5000**
Chain = **50000**
Thinning = **50**
Run time (seconds) = **49**
Deviance (dbar) = **97080.98**
Deviance (thetabar) = **97062.17**
Effective no. of pars (pd) = **18.81**
Bayesian DIC = **97099.79**

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.390102	.2098819	968	0.000	7.976615	8.788987
female	2.06776	.1779807	955	0.000	1.74013	2.404617
latinx_imm	1.095895	.409939	838	0.004	.3420845	1.898659
latinx_non	1.642109	.2446753	897	0.000	1.189813	2.098156
black	.8758989	.2101172	970	0.000	.4792494	1.274919
hsless	2.160619	.2212126	1068	0.000	1.715904	2.576805
somecollege	.9487308	.2227665	1073	0.000	.5206442	1.379959
lowinc	1.081104	.1888204	1068	0.000	.7287066	1.426337

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48						
	var(cons)	.0969297	.0735011	689	.0029613	.2850084
Level 1: aid						
	var(cons)	59.48189	.7088448	1064	58.11079	60.8728

2056rename u0 mlu

2057drop u0se

2058

2059* Calculate the ICC from the chains

2060use "m2B_s48_beta.dta", clear

```

2061rename RP2_var_cons_ sigma2u
2062rename RP1_var_cons_ sigma2e
2063generate icc = sigma2u/(sigma2u + sigma2e)
2064mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0016253	.0011979	684	0.000	.0000494	.0047708

```

2065
2066
2067*-----*
2068* PREPARE FIXED-PART PAREMETER CHAINS
2069*-----*
2070
2071use "m2B_s48_beta.dta", clear
2072drop deviance RP2_var_cons_ RP1_var_cons_
2073rename FP1_* b_*
2074format %9.2f b_*
2075compress
      variable iteration was double now long
      (4,000 bytes saved)
2076save "m2B_s48_beta_prepped.dta", replace
      file m2B_s48_beta_prepped.dta saved
2077isid iteration
2078codebook iteration, compact

```

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

```

2079
2080
2081*-----*
2082* PREPARE STRATUM RANDOM EFFECTS CHAINS
2083*-----*
2084
2085use "m2B_s48_u.dta", clear
2086drop residual idnum
2087rename value u
2088format %9.2f u
2089sort strata48 iteration

```

2090order strata48 iteration

2091compress
variable **strata48** was **double** now **int**
variable **iteration** was **double** now **long**
(480,000 bytes saved)

2092save "m2B_s48_u_prepped.dta", replace
file m2B_s48_u_prepped.dta saved

2093isid strata48 iteration

2094codebook iteration, compact

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

2095

2096

2097*-----*

2098* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

2099*-----*

2100

2101use "data48.dta", clear

2102isid strata48

2103cross using "m2B_s48_beta_prepped.dta"

2104isid strata48 iteration

2105sort strata48 iteration

2106merge 1:1 strata48 iteration using "m2B_s48_u_prepped.dta", nogenerate assert(match)

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

2107isid strata48 iteration

2108compress
variable **strata48** was **double** now **int**
(288,000 bytes saved)

2109save "m2B_s48data_prepped.dta", replace
file m2B_s48data_prepped.dta saved

2110

2111

2112*-----*

2113* CALCULATE VALUES OF INTEREST

2114*-----*

2115

```

2116* Expected value based on fixed and random part
2117use "m2B_s48data_prepped.dta", clear

2118gen cons = 1

2119generate 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 )

2120label var expectedvalue "Expected value based on main effects and interactions"

2121format %9.3f expectedvalue

2122
2123* Expected value based only on the fixed-part
2124generate 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 ///
>                                )

2125label var fixedeffect "Expected value based only on main effects"

2126format %9.3f fixedeffect

2127
2128* Expected value based only on the random-part
2129generate randomeffect = u

2130label var randomeffect "Random Effect"

2131format %9.3f randomeffect

2132
2133* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2134bysort strata48 (iteration): egen expmn = mean(expectedvalue)

2135bysort strata48 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

2136bysort strata48 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

2137format %9.3f expmn explo exphi

2138
2139bysort strata48 (iteration): egen FEmn = mean(fixedeffect)

2140bysort strata48 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)

2141bysort strata48 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)

```

```

2142format %9.3f FEmn FElo FEhi
2143
2144bysort strata48 (iteration): egen REmn = mean(randomeffect)
2145bysort strata48 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
2146bysort strata48 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
2147format %9.3f REmn RElo REhi
2148
2149* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2150drop iteration b* u* expectedvalue fixedeffect randomeffect
2151duplicates drop
      Duplicates in terms of all variables
      (47,952 observations deleted)
2152isid strata48
2153
2154* Ranks
2155sort expmn
2156generate exprank = _n
2157order exprank, after(exphi)
2158sort FEmn
2159generate FErank = _n
2160order FErank, after(FEhi)
2161sort REmn
2162generate RErank = _n
2163order RErank, after(REhi)
2164
2165* Sort the data
2166sort strata48
2167isid strata48
2168
2169* Compress and save the data
2170compress
      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)
2171save "m2B_s48results.dta", replace
      file m2B_s48results.dta saved

```



```

2172
2173* List strata with statistically significant interaction effects
2174use "m2B_s48results.dta", clear

2175list strata48 REmn RElo REhi if REhi<0, noobs

2176list strata48 REmn RElo REhi if RElo>0, noobs

2177
2178
2179*****
2180* MODEL 2A_S96 - CESD, Null MODEL
2181*****
2182
2183* Load the data
2184use "analysisready2.dta", clear

2185recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed

2186sort strata96 aid

2187
2188* delete if missing dependent variable (so can record number)
2189drop if cesd_w1 == .
    (19 observations deleted)

2190
2191* Fit model using PQL2
2192runmlwin cesd_w1 cons , ///
> level2(strata96: cons) ///
> level1(aid: cons) ///
> rlgls 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
strata96	91	1	154.1	900

Run time (seconds) = **1.77**
Number of iterations = **3**
Log restricted-likelihood = **-48557.914**
Restricted-deviance = **97115.828**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	12.31112	.2560812	48.08	0.000	11.80921	12.81303

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	4.235339	.8279254	2.612635	5.858043
Level 1: aid					
	var(cons)	58.93828	.7058992	57.55474	60.32181

2193

2194* Fit model using MCMC

2195runmlwin cesd_w1 cons , ///

```

> level2(strata96: cons, residuals(u, savechains("m2A_s96_u.dta", replace))) ///  

> level1(aid: cons) ///  

> mcmc(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
strata96	91	1	154.1	900

```

Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =     30.1
Deviance (dbar)  =    96954.90
Deviance (thetabar) =    96888.48
Effective no. of pars (pd) =    66.41
Bayesian DIC     =    97021.31

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	12.31614	.2599246	885	0.000	11.82644	12.83307

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	4.345134	.8689291	1003	2.952237	6.344155
Level 1: aid						
	var(cons)	58.94413	.7056257	971	57.52866	60.44366

2196rename u0 mlu

2197drop u0se

2198

2199* Calculate the ICC from the chains

2200use "m2A_s96_beta.dta", clear

2201rename RP2_var_cons_ sigma2u

2202rename RP1_var_cons_ sigma2e

2203generate icc = sigma2u/(sigma2u + sigma2e)

2204mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0684854	.0126585	1018	0.000	.0475033	.0973653

```

2205
2206
2207*****
2208* MODEL 2B S96 - CESD, MAIN EFFECTS MODEL
2209*****
2210
2211* Load the data
2212use "analysisready2.dta", clear

2213recast float cesd_w1
    cesd_w1: 13375 values would be changed; not changed

2214sort strata96 aid

2215
2216* delete if missing dependent variable (so can record number)
2217drop if cesd_w1 == .
    (19 observations deleted)

2218
2219* Fit model using PQL2
2220runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc s
> traight_no, ///
> 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
strata96	91	1	154.1	900

Run time (seconds) = **1.91**
Number of iterations = **8**
Log restricted-likelihood = **-48495.422**
Restricted-deviance = **96990.844**

cesd_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	8.178103	.2104192	38.87	0.000	7.765688	8.590517
female	1.835712	.1768638	10.38	0.000	1.489065	2.182358
latinx_imm	1.160837	.4124671	2.81	0.005	.3524167	1.969258
latinx_non	1.670082	.2424076	6.89	0.000	1.194972	2.145192
black	.9496027	.2092919	4.54	0.000	.5393982	1.359807
hsless	2.258174	.2167064	10.42	0.000	1.833437	2.68291
somecollege	.9880453	.2188319	4.52	0.000	.5591426	1.416948
lowinc	1.069291	.1855106	5.76	0.000	.7056964	1.432885
straight_no	1.916191	.2200318	8.71	0.000	1.484936	2.347445

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	.1277226	.0708373	-.011116	.2665612
Level 1: aid					
	var(cons)	59.04116	.7062627	57.65691	60.42541

2221

2222* Fit model using MCMC

```

2223runmlwin cesd_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc s
> straight_no, ///
> level2(strata96: cons, residuals(u, savechains("m2B_s96_u.dta", replace))) ///
> level1(aid: cons) ///
> mcmc(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
strata96	91	1	154.1	900

```

Burnin = 5000
Chain = 50000
Thinning = 50
Run time (seconds) = 52.2
Deviance (dbar) = 96982.82
Deviance (thetabar) = 96959.75
Effective no. of pars (pd) = 23.07
Bayesian DIC = 97005.89

```

cesd_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	8.198858	.2066136	968	0.000	7.758463	8.597879
female	1.818771	.177579	1072	0.000	1.490912	2.19561
latinx_imm	1.163946	.4113907	1180	0.007	.2988132	1.923044
latinx_non	1.660339	.2375527	959	0.000	1.242681	2.128071
black	.9488375	.2044139	841	0.000	.5323765	1.339965
hsless	2.258303	.2114197	1221	0.000	1.839981	2.685922
somecollege	.9945411	.2140476	1006	0.000	.6057011	1.402729
lowinc	1.0617	.1802558	986	0.000	.7011848	1.423502
straight_no	1.909053	.2174341	1098	0.000	1.505427	2.306405

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	.1156288	.1020575	432	.0030433	.3712743
Level 1: aid						
	var(cons)	59.06498	.7055616	874	57.68473	60.4258

2224rename u0 mlu

2225drop u0se

2226

2227* Calculate the ICC from the chains

2228use "m2B_s96_beta.dta", clear

```

2229rename RP2_var_cons_ sigma2u
2230rename RP1_var_cons_ sigma2e
2231generate icc = sigma2u/(sigma2u + sigma2e)
2232mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.00192	.0016856	432	0.000	.0000514	.0061538

```

2233
2234
2235*-----*
2236* PREPARE FIXED-PART PAREMETER CHAINS
2237*-----*
2238
2239use "m2B_s96_beta.dta", clear

2240drop deviance RP2_var_cons_ RP1_var_cons_

2241rename FP1_* b_*

2242format %9.2f b_*

2243compress
      variable iteration was double now long
      (4,000 bytes saved)

2244save "m2B_s96_beta_prepped.dta", replace
      file m2B_s96_beta_prepped.dta saved

```

```

2245isid iteration

```

```

2246codebook iteration, compact

```

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

```

2247
2248
2249*-----*
2250* PREPARE STRATUM RANDOM EFFECTS CHAINS
2251*-----*
2252
2253use "m2B_s96_u.dta", clear

2254drop residual idnum

2255rename value u

2256format %9.2f u

2257sort strata96 iteration

```

2258order strata96 iteration

2259compress
 variable **strata96** was **double** now **int**
 variable **iteration** was **double** now **long**
 (910,000 bytes saved)

2260save "m2B_s96_u_prepped.dta", replace
 file m2B_s96_u_prepped.dta saved

2261isid strata96 iteration

2262codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

2263

2264

2265*-----*

2266* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

2267*-----*

2268

2269use "data96_cesd.dta", clear

2270isid strata96

2271cross using "m2B_s96_beta_prepped.dta"

2272isid strata96 iteration

2273sort strata96 iteration

2274merge 1:1 strata96 iteration using "m2B_s96_u_prepped.dta", nogenerate assert(match)

Result	# of obs.
not matched	0
matched	91,000

2275isid strata96 iteration

2276compress
 variable **strata96** was **double** now **int**
 (546,000 bytes saved)

2277save "m2B_s96data_prepped.dta", replace
 file m2B_s96data_prepped.dta saved

2278

2279

2280*-----*

2281* CALCULATE VALUES OF INTEREST

2282*-----*

2283

```

2284* Expected value based on fixed and random part
2285use "m2B_s96data_prepped.dta", clear

2286gen cons = 1

2287generate 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 )

2288label var expectedvalue "Expected value based on main effects and interactions"

2289format %9.3f expectedvalue

2290
2291* Expected value based only on the fixed-part
2292generate 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 ///
>                                )

2293label var fixedeffect "Expected value based only on main effects"

2294format %9.3f fixedeffect

2295
2296* Expected value based only on the random-part
2297generate randomeffect = u

2298label var randomeffect "Random Effect"

2299format %9.3f randomeffect

2300
2301* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2302bysort strata96 (iteration): egen expmn = mean(expectedvalue)

2303bysort strata96 (iteration): egen explo = pctlile(expectedvalue), p(2.5)

2304bysort strata96 (iteration): egen exphi = pctlile(expectedvalue), p(97.5)

2305format %9.3f expmn explo exphi

2306
2307bysort strata96 (iteration): egen FEmn = mean(fixedeffect)

2308bysort strata96 (iteration): egen FElo = pctlile(fixedeffect), p(2.5)

```

```

2309bysort strata96 (iteration): egen FEhi = pctlile(fixedeffect), p(97.5)
2310format %9.3f FEmn FElo FEhi
2311
2312bysort strata96 (iteration): egen REmn = mean(randomeffect)
2313bysort strata96 (iteration): egen RElo = pctlile(randomeffect), p(2.5)
2314bysort strata96 (iteration): egen REhi = pctlile(randomeffect), p(97.5)
2315format %9.3f REmn RElo REhi
2316
2317* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2318drop iteration b* u* expectedvalue fixedeffect randomeffect
2319duplicates drop
      Duplicates in terms of all variables
      (90,909 observations deleted)
2320isid strata96
2321
2322* Ranks
2323sort expmn
2324generate exprank = _n
2325order exprank, after(exphi)
2326sort FEmn
2327generate FErank = _n
2328order FErank, after(FEhi)
2329sort REmn
2330generate RErank = _n
2331order RErank, after(REhi)
2332
2333* Sort the data
2334sort strata96
2335isid strata96
2336
2337* Compress and save the data
2338compress
      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)

```



```

2339save "m2B_s96results.dta", replace
      file m2B_s96results.dta saved

2340
2341* List strata with statistically significant interaction effects
2342use "m2B_s96results.dta", clear

2343list strata96  REmn RElo REhi if REhi<0, noobs

2344list strata96  REmn RElo REhi if RElo>0, noobs

2345
2346      end of do-file

2347do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

2348
2349
2350*****
2351*****
2352*****
2353*
2354*
2355*  MODEL 3 - BINGE DRINKING, MAIN EFFECTS MODEL
2356*
2357*
2358*****
2359*****
2360*****
2361
2362*****
2363*  MODEL 3A_S6 - BINGE DRINKING, Null MODEL
2364*****
2365
2366*-----*
2367*  FIT THE MODEL
2368*-----*
2369
2370* Load the data
2371use "analysisready2.dta", clear

2372sort strata6 aid

2373
2374* delete if missing dependent variable (so can record number)
2375drop if binge_12mo == .
      (157 observations deleted)

2376
2377* Fit model using PQL2
2378runmlwin binge_12mo 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
strata6	6	1145	2314.0	4267

Run time (seconds) = 1.83
 Number of iterations = 7

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.180002	.2236129	-5.28	0.000	-1.618275	-.7417286

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.2961799	.1740179	-.0448889	.6372487

2379

2380* Fit model using MCMC

```
2381runmlwin binge_12mo cons , ///
> level2(strata6: cons, residuals(u, savechains("m3A_s6_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata6	6	1145	2314.0	4267

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 144
 Deviance (dbar) = 15583.88
 Deviance (thetabar) = 15577.97
 Effective no. of pars (pd) = 5.91
 Bayesian DIC = 15589.79

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.260173	.2997634	21	0.000	-2.055137	-.7076582

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	.5115633	.6347468	349	.1158748	2.008494

2382rename u0 mlu

2383drop use

2384

2385* Present the regression coefficients as odds ratios

2386runmlwin, or

```
MLwiN 3.2 multilevel model
Binomial logit response model
Estimation algorithm: MCMC
```

```
Number of obs      =    13884
```

Level Variable	No. of Groups	Observations per Group Minimum Average Maximum
strata6	6	1145 2314.0 4267

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	144
Deviance (dbar)	=	15583.88
Deviance (thetabar)	=	15577.97
Effective no. of pars (pd)	=	5.91
Bayesian DIC	=	15589.79

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2955109	.0824457	23	0.000	.1280753	.4927975

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var (cons)	.5115633	.6347468	349	.1158748	2.008494

2387

2388* Calculate the ICC from the parameter point estimates

```
2389 scalar mlsigma2u = [RP2]var(cons)
```

```
2390 scalar mlsigma2e = pi^2/3
```

```
2391display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC = 0.135
```

2392

2393* Calculate the ICC from the chains

```
2394 use "m3A_s6_beta.dta", clear
```

```
2395 rename RP2_var_cons_ sigma2u
```

```
2396 generate sigma2e = pi^2/3
```

```
2397 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
2398mcmcsum icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1188168	.0902702	228	0.000	.0340233	.3790774

```

2399
2400
2401*****
2402* MODEL 3B S6 - BINGE DRINKING, MAIN EFFECTS MODEL
2403*****
2404
2405*-----*
2406* FIT THE MODEL
2407*-----*
2408
2409* Load the data
2410use "analysisready2.dta", clear

```

```

2411sort strata6 aid

```

```

2412
2413* delete if missing dependent variable (so can record number)
2414drop if binge_12mo == .
      (157 observations deleted)

```

```

2415
2416* Fit model using PQL2
2417runmlwin binge_12mo cons female latinx_race black_race , ///
>   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
strata6	6	1145	2314.0	4267

Run time (seconds) = **2.15**
 Number of iterations = **21**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.631871	.0308779	-20.46	0.000	-.6923906	-.5713514
female	-.3184602	.0390858	-8.15	0.000	-.395067	-.2418534
latinx_race	-.0901142	.0510101	-1.77	0.077	-.190092	.0098637
black_race	-1.043835	.0557979	-18.71	0.000	-1.153197	-.9344735

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6				
var(cons)	0	0	0	0

```

2418
2419* Fit model using MCMC

```

```

2420runmlwin binge_12mo cons female latinx_race black_race , ///
> level2(strata6: cons, residuals(u, savechains("m3B_s6_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata6	6	1145	2314.0	4267

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 230
 Deviance (dbar) = 15583.05
 Deviance (thetabar) = 15578.05
 Effective no. of pars (pd) = 5.00
 Bayesian DIC = 15588.05

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.6285604	.092525	217	0.000	-.7960254	-.4193511
female	-.3223283	.1050748	153	0.001	-.5722224	-.1521267
latinx_race	-.0975146	.1170807	359	0.153	-.328466	.1065375
black_race	-1.044727	.121547	361	0.000	-1.31035	-.8345061

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	.0159404	.0851692	136	.0004687	.08638

```
2421rename u0 mlu
```

```
2422drop u0se
```

```
2423
```

```
2424* Present the regression coefficients as odds ratios
```

```
2425runmlwin, 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
strata6	6	1145	2314.0	4267

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      230
Deviance (dbar)       =    15583.05
Deviance (thetabar)   =    15578.05
Effective no. of pars (pd) =    5.00
Bayesian DIC          =    15588.05

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.535491	.0527952	190	0.000	.4511184	.6574735
female	.7290211	.0696077	189	0.001	.5642701	.8588795
latinx_race	.9118068	.1023751	388	0.153	.720028	1.11242
black_race	.3528485	.0461404	335	0.000	.2697256	.43409

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0159404	.0851692	136	.0004687	.08638

2426

2427* Calculate the ICC from the parameter point estimates

2428scalar mlsigma2u = [RP2]var(cons)

2429scalar mlsigma2e = _pi^2/3

2430display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.005

2431

2432* Calculate the ICC from the chains

2433use "m3B_s6_beta.dta", clear

2434rename RP2_var_cons_ sigma2u

2435generate sigma2e = _pi^2/3

2436generate icc = sigma2u/(sigma2u + sigma2e)

2437mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0040173	.0128584	134	0.000	.0001424	.0255843

2438

2439

end of do-file

2440do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

2441

2442*-----*

2443* PREPARE FIXED-PART PAREMETER CHAINS

2444*-----*

```

2445
2446use "m3B_s6_beta.dta", clear

2447drop deviance RP2_var_cons_ OD_bcons_1

2448rename FP1_* b_*

2449format %9.2f b_*

2450compress
      variable iteration was double now long
      (4,000 bytes saved)

2451save "m3B_s6_beta_prepped.dta", replace
      (note: file m3B_s6_beta_prepped.dta not found)
      file m3B_s6_beta_prepped.dta saved

```

```
2452isid iteration
```

```
2453codebook iteration, compact
```

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

```

2454
2455
2456*-----*
2457* PREPARE STRATUM RANDOM EFFECTS CHAINS
2458*-----*
2459
2460use "m3B_s6_u.dta", clear

2461drop residual idnum

2462rename value u

2463format %9.2f u

2464sort strata6 iteration

2465order strata6 iteration

2466compress
      variable strata6 was double now byte
      variable iteration was double now long
      (66,000 bytes saved)

2467save "m3B_s6_u_prepped.dta", replace
      (note: file m3B_s6_u_prepped.dta not found)
      file m3B_s6_u_prepped.dta saved

```

```
2468isid strata6 iteration
```

```
2469codebook iteration, compact
```

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

```

2470
2471
2472*-----*
2473* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2474*-----*
2475
2476use "data6.dta", clear

2477isid strata6

2478cross using "m3B_s6_beta_prepped.dta"

2479isid strata6 iteration

2480sort strata6 iteration

2481merge 1:1 strata6 iteration using "m3B_s6_u_prepped.dta", nogenerate assert(match)

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

2482isid strata6 iteration

2483compress
      variable strata6 was double now byte
      (42,000 bytes saved)

2484save "m3B_s6data_prepped.dta", replace
      (note: file m3B_s6data_prepped.dta not found)
      file m3B_s6data_prepped.dta saved

2485
2486
2487*-----*
2488* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
2489*-----*
2490
2491* Percentage p based on fixed and random part
2492use "m3B_s6data_prepped.dta", clear

2493gen cons = 1

2494generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      + u ///
> )

2495label var p "Percentage based on main effects and interactions"

2496format %9.3f p

2497
2498* Percentage p based only on the fixed-part
2499generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
> )

```



```

2500label var pA "Percentage based only on main effects"
2501format %9.3f pA
2502
2503* Percentage pB calculated as the difference between p and pA
2504generate pB = p - pA
2505label var pB "Percentage point difference based on interaction effects"
2506format %9.3f pB
2507
2508* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2509bysort strata6 (iteration): egen pmn = mean(p)
2510bysort strata6 (iteration): egen plo = pctl(p), p(2.5)
2511bysort strata6 (iteration): egen phi = pctl(p), p(97.5)
2512format %9.3f pmn plo phi
2513label var pmn "Percentage based on main effects and interactions"
2514label var plo "Percentage based on main effects and interactions"
2515label var phi "Percentage based on main effects and interactions"
2516
2517
2518bysort strata6 (iteration): egen pAmn = mean(pA)
2519bysort strata6 (iteration): egen pAlo = pctl(pA), p(2.5)
2520bysort strata6 (iteration): egen pAhi = pctl(pA), p(97.5)
2521format %9.3f pAmn pAlo pAhi
2522label var pAmn "Percentage based on main effects"
2523label var pAlo "Percentage based on main effects"
2524label var pAhi "Percentage based on main effects"
2525
2526bysort strata6 (iteration): egen pBmn = mean(pB)
2527bysort strata6 (iteration): egen pBlo = pctl(pB), p(2.5)
2528bysort strata6 (iteration): egen pBhi = pctl(pB), p(97.5)
2529format %9.3f pBmn pBlo pBhi
2530label var pBmn "Percentage point difference based on interaction effects"
2531label var pBlo "Percentage point difference based on interaction effects"
2532label var pBhi "Percentage point difference based on interaction effects"
2533

```

```

2534* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2535drop iteration b* u* p pA pB

2536duplicates drop

    Duplicates in terms of all variables

    (5,994 observations deleted)

2537isid strata6

2538
2539* Ranks
2540sort pmn

2541generate pmnrank = _n
2542order pmnrank, after(phi)
2543sort pAmn

2544generate pAmnrank = _n
2545order pAmnrank, after(pAhi)
2546sort pBmn

2547generate pBmnrank = _n
2548order pBmnrank, after(pBhi)

2549
2550* Sort the data
2551sort strata6

2552isid strata6

2553
2554* Compress and save the data
2555compress
    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)

2556save "m3B_s6results.dta", replace
    (note: file m3B_s6results.dta not found)
    file m3B_s6results.dta saved

2557
2558* List strata with statistically significant interaction effects on the predicted in
    > cidence
2559use "m3B_s6results.dta", clear

2560list strata6  pBmn pBlo pBhi if pBhi<0, noobs
2561list strata6  pBmn pBlo pBhi if pBlo>0, noobs

2562

```

```
MLwiN 3.2 multilevel model                                Number of obs      =    13884
Binomial logit response model
Estimation algorithm: RIGLS, PQL2
```

```
Run time (seconds)      =      1.87
Number of iterations    =      6
```

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var (cons)	.2792213	.117462	.049	.5094425

2585

2586* Fit model using MCMC

2587runmlwin binge_12mo cons , ///

> level2(strata12: cons, residuals(u, savechains("m3A_s12_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	465	1157.0	2886

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **145**Deviance (dbar) = **15571.42**Deviance (thetabar) = **15559.66**Effective no. of pars (pd) = **11.77**Bayesian DIC = **15583.19**

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.128404	.1770421	74	0.000	-1.467238	-.720615

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12	var(cons)	.3443095	.1892297	610	.1280994	.8159777

2588rename u0 mlu

2589drop u0se

2590

2591* Present the regression coefficients as odds ratios

2592runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	465	1157.0	2886

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =     145
Deviance (dbar)       =    15571.42
Deviance (thetabar)   =    15559.66
Effective no. of pars (pd) =    11.77
Bayesian DIC          =    15583.19

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3290053	.06151	73	0.000	.2305615	.486453

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.3443095	.1892297	610	.1280994	.8159777

2593

2594* Calculate the ICC from the parameter point estimates

2595scalar mlsigma2u = [RP2]var(cons)

2596scalar mlsigma2e = _pi^2/3

2597display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)

ICC = 0.095

2598

2599* Calculate the ICC from the chains

2600use "m3A_s12_beta.dta", clear

2601rename RP2_var_cons_ sigma2u

2602generate sigma2e = _pi^2/3

2603generate icc = sigma2u/(sigma2u + sigma2e)

2604mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0921963	.0424575	598	0.000	.0374782	.1987356

2605

2606

2607*****

2608* MODEL 3B_S12 - BINGE DRINKING, MAIN EFFECTS MODEL

2609*****

2610

2611*-----*

2612* FIT THE MODEL

2613*-----*

2614

2615* Load the data

2616use "analysisready2.dta", clear

2617sort strata12 aid

2618

2619* delete if missing dependent variable (so can record number)

2620drop if binge_12mo == .
(157 observations deleted)

2621

2622* Fit model using PQL2

2623runmlwin binge_12mo cons female latinx_race black_race lowparentedu, ///

> 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
strata12	12	465	1157.0	2886

Run time (seconds) = **2.13**

Number of iterations = **15**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.6635139	.04802	-13.82	0.000	-.7576314	-.5693965
female	-.31087	.0513704	-6.05	0.000	-.4115541	-.2101859
latinx_race	-.1273266	.0627982	-2.03	0.043	-.2504087	-.0042444
black_race	-1.062684	.0661548	-16.06	0.000	-1.192345	-.9330234
lowparentedu	.1104688	.0521934	2.12	0.034	.0081716	.2127661

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12					
	var(cons)	.0023946	.0029106	-.0033101	.0080992

2624

2625* Fit model using MCMC

2626runmlwin binge_12mo cons female latinx_race black_race lowparentedu, ///

> level2(strata12: cons, residuals(u, savechains("m3B_sl2_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("m3B_sl2_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
strata12	12	465	1157.0	2886

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      260
Deviance (dbar)       =    15570.00
Deviance (thetabar)   =    15562.09
Effective no. of pars (pd) =    7.91
Bayesian DIC          =    15577.91

```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.661775	.059915	582	0.000	-.7761122	-.5289155
female	-.3092817	.0613212	874	0.000	-.4256272	-.1800391
latinx_race	-.1242059	.072905	786	0.042	-.2580293	.0217843
black_race	-1.067031	.0780816	887	0.000	-1.235411	-.9210933
lowparentedu	.1031495	.0633056	736	0.053	-.0259151	.2230713

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0057836	.0072391	716	.0004637	.0220304

2627rename u0 mlu

2628drop u0se

2629

2630* Present the regression coefficients as odds ratios

2631runmlwin, 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
strata12	12	465	1157.0	2886

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      260
Deviance (dbar)       =    15570.00
Deviance (thetabar)   =    15562.09
Effective no. of pars (pd) =    7.91
Bayesian DIC          =    15577.91

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.5172257	.0316849	582	0.000	.4601917	.5892436
female	.7337776	.0455096	862	0.000	.6533599	.8352376
latinx_race	.887293	.0630962	785	0.042	.7725726	1.022023
black_race	.3447395	.0270647	882	0.000	.2907153	.3980836
lowparentedu	1.10997	.0696543	740	0.053	.9744185	1.24991

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0057836	.0072391	716	.0004637	.0220304

```

2632
2633* Calculate the ICC from the parameter point estimates
2634scalar mlsigma2u = [RP2]var(cons)

2635scalar mlsigma2e = _pi^2/3

2636display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.002

```

```

2637
2638* Calculate the ICC from the chains
2639use "m3B_s12_beta.dta", clear

2640rename RP2_var_cons_ sigma2u

2641generate sigma2e = _pi^2/3

2642generate icc = sigma2u/(sigma2u + sigma2e)

2643mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0016722	.0018185	716	0.000	.0001409	.0066519

```

2644
2645
2646*-----*
2647* PREPARE FIXED-PART PARAMETER CHAINS
2648*-----*
2649
2650use "m3B_s12_beta.dta", clear

2651drop deviance RP2_var_cons_ OD_bcons_1

2652rename FP1_* b_*

2653format %9.2f b_*

2654compress
      variable iteration was double now long
      (4,000 bytes saved)

2655save "m3B_s12_beta_prepped.dta", replace
      file m3B_s12_beta_prepped.dta saved

2656isid iteration

2657codebook iteration, compact

```

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

```

2658
2659

```



```

2660*-----*
2661* PREPARE STRATUM RANDOM EFFECTS CHAINS
2662*-----*
2663
2664use "m3B_s12_u.dta", clear

2665drop residual idnum

2666rename value u

2667format %9.2f u

2668sort stratal2 iteration

2669order stratal2 iteration

2670compress
      variable stratal2 was double now int
      variable iteration was double now long
      (120,000 bytes saved)

2671save "m3B_s12_u_prepped.dta", replace
      file m3B_s12_u_prepped.dta saved

2672isid stratal2 iteration

2673codebook iteration, compact

```

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

```

2674
2675
2676*-----*
2677* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
2678*-----*
2679
2680use "data12.dta", clear

2681isid stratal2

2682cross using "m3B_s12_beta_prepped.dta"

2683isid stratal2 iteration

2684sort stratal2 iteration

2685merge 1:1 stratal2 iteration using "m3B_s12_u_prepped.dta", nogenerate assert(match)

```

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

```

2686isid stratal2 iteration

```

```

2687compress
      variable strata12 was double now int
      (72,000 bytes saved)

2688save "m3B_sl2data_prepped.dta", replace
      file m3B_sl2data_prepped.dta saved

2689
2690
2691*-----*
2692* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
2693*-----*
2694
2695* Percentage p based on fixed and random part
2696use "m3B_sl2data_prepped.dta", clear

2697gen cons = 1

2698generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      + u ///
> )

2699label var p "Percentage based on main effects and interactions"

2700format %9.3f p

2701
2702* Percentage p based only on the fixed-part
2703generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      )

2704label var pA "Percentage based only on main effects"

2705format %9.3f pA

2706
2707* Percentage pB calculated as the difference between p and pA
2708generate pB = p - pA

2709label var pB "Percentage point difference based on interaction effects"

2710format %9.3f pB

2711
2712* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2713bysort strata12 (iteration): egen pmn = mean(p)

2714bysort strata12 (iteration): egen plo = pctl(p), p(2.5)

2715bysort strata12 (iteration): egen phi = pctl(p), p(97.5)

```

```

2716format %9.3f pmn plo phi
2717label var pmn "Percentage based on main effects and interactions"
2718label var plo "Percentage based on main effects and interactions"
2719label var phi "Percentage based on main effects and interactions"

2720
2721
2722bysort stratal2 (iteration): egen pAmn = mean(pA)
2723bysort stratal2 (iteration): egen pAlo = pctlile(pA), p(2.5)
2724bysort stratal2 (iteration): egen pAhi = pctlile(pA), p(97.5)
2725format %9.3f pAmn pAlo pAhi
2726label var pAmn "Percentage based on main effects"
2727label var pAlo "Percentage based on main effects"
2728label var pAhi "Percentage based on main effects"

2729
2730bysort stratal2 (iteration): egen pBmn = mean(pB)
2731bysort stratal2 (iteration): egen pBlo = pctlile(pB), p(2.5)
2732bysort stratal2 (iteration): egen pBhi = pctlile(pB), p(97.5)
2733format %9.3f pBmn pBlo pBhi
2734label var pBmn "Percentage point difference based on interaction effects"
2735label var pBlo "Percentage point difference based on interaction effects"
2736label var pBhi "Percentage point difference based on interaction effects"

2737
2738* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2739drop iteration b* u* p pA pB

2740duplicates drop

    Duplicates in terms of all variables

    (11,988 observations deleted)

2741isid stratal2

2742
2743* Ranks
2744sort pmn

2745generate pmnrank = _n

2746order pmnrank, after(phi)

2747sort pAmn

```

```

2748generate pAmnrank = _n
2749order pAmnrank, after(pAhi)
2750sort pBmn
2751generate pBmnrank = _n
2752order pBmnrank, after(pBhi)

2753
2754* Sort the data
2755sort strata12

2756isid strata12

2757
2758* Compress and save the data
2759compress
      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)

2760save "m3B_s12results.dta", replace
      file m3B_s12results.dta saved

2761
2762* List strata with statistically significant interaction effects on the predicted in
> cidence
2763use "m3B_s12results.dta", clear

2764list strata12 pBmn pBlo pBhi if pBhi<0, noobs

2765list strata12 pBmn pBlo pBhi if pBlo>0, noobs

2766
2767
2768
2769*****
2770* MODEL 3A S18 - BINGE DRINKING, Null MODEL
2771*****
2772
2773*-----*
2774* FIT THE MODEL
2775*-----*
2776
2777* Load the data
2778use "analysisready2.dta", clear

2779sort strata18 aid

2780
2781* delete if missing dependent variable (so can record number)
2782drop if binge_12mo == .
      (157 observations deleted)

2783
2784* Fit model using PQL2

```

```

2785runmlwin binge_12mo 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
strata18	18	211	771.3	1572

Run time (seconds) = **1.83**
 Number of iterations = **6**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.170991	.1237447	-9.46	0.000	-1.413526	-.9284558

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18					
	var(cons)	.2641073	.091947	.0838945	.4443201

2786

2787* Fit model using MCMC

```

2788runmlwin binge_12mo cons , ///
> level2(strata18: cons, residuals(u, savechains("m3A_s18_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata18	18	211	771.3	1572

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **145**
 Deviance (dbar) = **15556.53**
 Deviance (thetabar) = **15538.86**
 Effective no. of pars (pd) = **17.67**
 Bayesian DIC = **15574.21**

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.155299	.1243195	171	0.000	-1.403659	-.9188746

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18 var(cons)	.2964781	.120901	899	.1462665	.5727996

```
2789rename u0 m1u
```

2790drop u0se

2791

2792* Present the regression coefficients as odds ratios

2793runmlwin, or

```
MLwiN 3.2 multilevel model                               Number of obs      =    13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Minimum	Average	Maximum
strata18	18	211	771.3	1572

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	145
Deviance (dbar)	=	15556.53
Deviance (thetabar)	=	15538.86
Effective no. of pars (pd)	=	17.67
Bayesian DIC	=	15574.21

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3175357	.0395461	171	0.000	.2456964	.3989678

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18					
var (cons)	.2964781	.120901	899	.1462665	.5727996

2794

2795* Calculate the ICC from the parameter point estimates

```
2796 scalar m1sigma2u = [RP2]var(cons)
```

```
2797 scalar m1sigma2e = pi^2/3
```

```
2798display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC = 0.083
```

2799

2800* Calculate the ICC from the chains

```
2801use "m3A s18 beta.dta", clear
```

2802rename RP2_var_cons_ sigma2u

2803generate sigma2e = _pi^2/3

2804generate icc = sigma2u/(sigma2u + sigma2e)

2805mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.081355	.028478	901	0.000	.0425672	.1482911

2806

2807

2808*****

2809* MODEL 3B_S18 - BINGE DRINKING, MAIN EFFECTS MODEL

2810*****

2811

2812*-----*

2813* FIT THE MODEL

2814*-----*

2815

2816* Load the data

2817use "analysisready2.dta", clear

2818sort strata18 aid

2819

2820* delete if missing dependent variable (so can record number)

2821drop if binge_12mo == .
(157 observations deleted)

2822

2823* Fit model using PQL2

2824runmlwin binge_12mo cons female latinx_race black_race hsless somecollege, ///

> 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
strata18	18	211	771.3	1572

Run time (seconds) = 2.22

Number of iterations = 18

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.7785118	.0420773	-18.50	0.000	-.8609818	-.6960418
female	-.3226349	.0397234	-8.12	0.000	-.4004913	-.2447784
latinx_race	-.1370219	.0529383	-2.59	0.010	-.240779	-.0332648
black_race	-1.055598	.0563395	-18.74	0.000	-1.166022	-.9451748
hsless	.2410985	.0490432	4.92	0.000	.1449756	.3372215
somecollege	.2245486	.0508842	4.41	0.000	.1248173	.3242798

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(const)	.0001343	.0019253	-.0036393	.0039079

2825

2826* Fit model using MCMC

```

2827runmlwin binge_12mo cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("m3B_s18_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
Binomial logit response model
Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	211	771.3	1572

Burnin = 5000
Chain = 50000
Thinning = 50
Run time (seconds) = 288
Deviance (dbar) = 15552.48
Deviance (thetabar) = 15543.26
Effective no. of pars (pd) = 9.22
Bayesian DIC = 15561.70

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.7710423	.0560445	780	0.000	-.8812082	-.6599396
female	-.3222032	.0518213	759	0.000	-.4248541	-.2202858
latinx_race	-.1279259	.064022	934	0.025	-.257317	-.0000218
black_race	-1.053851	.0649367	1176	0.000	-1.178972	-.9318651
hsless	.2200306	.0657484	888	0.000	.0812497	.3483017
somecollege	.2196364	.0657317	783	0.000	.0705348	.3491335

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(const)	.0037266	.0039893	692	.0004147	.0137207

2828rename u0 mlu

2829drop u0se

2830


```
2831* Present the regression coefficients as odds ratios
2832runmlwin, 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
strata18	18	211	771.3	1572

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	288
Deviance (dbar)	=	15552.48
Deviance (thetabar)	=	15543.26
Effective no. of pars (pd)	=	9.22
Bayesian DIC	=	15561.70

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.463015	.0266233	769	0.000	.4142821	.5168827
female	.7255215	.0377366	754	0.000	.6538652	.8022895
latinx_race	.8828813	.056356	943	0.025	.7731231	.9999782
black_race	.3498987	.0225054	1175	0.000	.3075949	.3938185
hsless	1.249818	.0827684	903	0.000	1.084642	1.41666
somecollege	1.246681	.0845531	781	0.000	1.073082	1.417838

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0037266	.0039893	692	.0004147	.0137207

```

2833
2834* Calculate the ICC from the parameter point estimates
2835scalar mlsigma2u = [RP2]var(cons)

2836scalar mlsigma2e = _pi^2/3

2837display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.001

2838
2839* Calculate the ICC from the chains
2840use "m3B_s18_beta.dta", clear

2841rename RP2_var_cons_ sigma2u

2842generate sigma2e = _pi^2/3

2843generate icc = sigma2u/(sigma2u + sigma2e)

2844mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.001147	.0012451	691	0.000	.000126	.0041533

```

2845
2846
2847*-----*
2848* PREPARE FIXED-PART PAREMETER CHAINS
2849*-----*
2850
2851use "m3B_s18_beta.dta", clear

2852drop deviance RP2_var_cons_ OD_bcons_1

2853rename FP1_ b_*

2854format %9.2f b_*

2855compress
      variable iteration was double now long
      (4,000 bytes saved)

2856save "m3B_s18_beta_prepped.dta", replace
      file m3B_s18_beta_prepped.dta saved

2857isid iteration

2858codebook iteration, compact

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

2859
2860
2861*-----*
2862* PREPARE STRATUM RANDOM EFFECTS CHAINS
2863*-----*
2864
2865use "m3B_s18_u.dta", clear

2866drop residual idnum

2867rename value u

2868format %9.2f u

2869sort stratal8 iteration

2870order stratal8 iteration

2871compress
      variable stratal8 was double now int
      variable iteration was double now long
      (180,000 bytes saved)

2872save "m3B_s18_u_prepped.dta", replace
      file m3B_s18_u_prepped.dta saved

2873isid stratal8 iteration

```

2874codebook iteration, compact

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

2875

2876

2877*-----*

2878* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

2879*-----*

2880

2881use "data18.dta", clear

2882isid strata18

2883cross using "m3B_s18_beta_prepped.dta"

2884isid strata18 iteration

2885sort strata18 iteration

2886merge 1:1 strata18 iteration using "m3B_s18_u_prepped.dta", nogenerate assert(match)

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

2887isid strata18 iteration

2888compress

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

2889save "m3B_s18data_prepped.dta", replace
file m3B_s18data_prepped.dta saved

2890

2891

2892*-----*

2893* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)

2894*-----*

2895

2896* Percentage p based on fixed and random part

2897use "m3B_s18data_prepped.dta", clear

2898gen cons = 1

2899generate 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 ///
> )
```

```

2900label var p "Percentage based on main effects and interactions"
2901format %9.3f p
2902
2903* Percentage p based only on the fixed-part
2904generate 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 ///
> )
2905label var pA "Percentage based only on main effects"
2906format %9.3f pA
2907
2908* Percentage pB calculated as the difference between p and pA
2909generate pB = p - pA
2910label var pB "Percentage point difference based on interaction effects"
2911format %9.3f pB
2912
2913* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
2914bysort strata18 (iteration): egen pmn = mean(p)
2915bysort strata18 (iteration): egen plo = pctlile(p), p(2.5)
2916bysort strata18 (iteration): egen phi = pctlile(p), p(97.5)
2917format %9.3f pmn plo phi
2918label var pmn "Percentage based on main effects and interactions"
2919label var plo "Percentage based on main effects and interactions"
2920label var phi "Percentage based on main effects and interactions"
2921
2922
2923bysort strata18 (iteration): egen pAmn = mean(pA)
2924bysort strata18 (iteration): egen pAlo = pctlile(pA), p(2.5)
2925bysort strata18 (iteration): egen pAhi = pctlile(pA), p(97.5)
2926format %9.3f pAmn pAlo pAhi
2927label var pAmn "Percentage based on main effects"
2928label var pAlo "Percentage based on main effects"
2929label var pAhi "Percentage based on main effects"
2930

```

```

2931 bysort strata18 (iteration): egen pBmn = mean(pB)
2932 bysort strata18 (iteration): egen pBlo = pctlile(pB), p(2.5)
2933 bysort strata18 (iteration): egen pBhi = pctlile(pB), p(97.5)
2934 format %9.3f pBmn pBlo pBhi
2935 label var pBmn "Percentage point difference based on interaction effects"
2936 label var pBlo "Percentage point difference based on interaction effects"
2937 label var pBhi "Percentage point difference based on interaction effects"
2938
2939 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
2940 drop iteration b* u* p pA pB
2941 duplicates drop
      Duplicates in terms of all variables
      (17,982 observations deleted)
2942 isid strata18
2943
2944 * Ranks
2945 sort pmn
2946 generate pmnrank = _n
2947 order pmnrank, after(phi)
2948 sort pAmn
2949 generate pAmnrank = _n
2950 order pAmnrank, after(pAhi)
2951 sort pBmn
2952 generate pBmnrank = _n
2953 order pBmnrank, after(pBhi)
2954
2955 * Sort the data
2956 sort strata18
2957 isid strata18
2958
2959 * Compress and save the data
2960 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)

```

```

2961save "m3B_sl8results.dta", replace
      file m3B_sl8results.dta saved

2962
2963* List strata with statistically significant interaction effects on the predicted in
  > cidence
2964use "m3B_sl8results.dta", clear

2965list strata18  pBmn pBlo pBhi if pBhi<0, noobs

2966list strata18  pBmn pBlo pBhi if pBlo>0, noobs

2967
2968
2969*****
2970* MODEL 3A_S36 - BINGE DRINKING, Null MODEL
2971*****
2972
2973*-----*
2974* FIT THE MODEL
2975*-----*
2976
2977* Load the data
2978use "analysisready2.dta", clear

2979sort strata36 aid

2980
2981* delete if missing dependent variable (so can record number)
2982drop if binge_12mo == .
      (157 observations deleted)

2983
2984* Fit model using PQL2
2985runmlwin binge_12mo 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
strata36	36	46	385.7	1079

Run time (seconds) = **1.85**
 Number of iterations = **5**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.153238	.0855123	-13.49	0.000	-1.320839	-.9856372

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36					
	var(cons)	.2349638	.0618157	.1138072	.3561204

2986

2987* Fit model using MCMC

2988runmlwin binge_12mo cons , ///

> level2(strata36: cons, residuals(u, savechains("m3A_s36_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	46	385.7	1079

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **145**
 Deviance (dbar) = **15556.73**
 Deviance (thetabar) = **15523.99**
 Effective no. of pars (pd) = **32.74**
 Bayesian DIC = **15589.46**

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.139997	.0846587	364	0.000	-1.310025	-.9784068

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36	var(cons)	.2489411	.0697832	1060	.1454258	.4157577

2989rename u0 mlu

2990drop u0se

2991

2992* Present the regression coefficients as odds ratios

2993runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	46	385.7	1079

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15556.73
Deviance (thetabar) =    15523.99
Effective no. of pars (pd) =    32.74
Bayesian DIC        =    15589.46

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3207475	.0267505	364	0.000	.2698132	.3759095

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36 var(cons)	.2489411	.0697832	1060	.1454258	.4157577

2994

2995* Calculate the ICC from the parameter point estimates

2996scalar mlsigma2u = [RP2]var(cons)

2997scalar mlsigma2e = _pi^2/3

2998display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.070

2999

3000* Calculate the ICC from the chains

3001use "m3A_s36_beta.dta", clear

3002rename RP2_var_cons_ sigma2u

3003generate sigma2e = _pi^2/3

3004generate icc = sigma2u/(sigma2u + sigma2e)

3005mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0704683	.0183619	1058	0.000	.0423329	.1121964

3006

3007

3008*****

3009* MODEL 3B_S36 - BINGE DRINKING, MAIN EFFECTS MODEL

3010*****

3011

3012*-----*

3013* FIT THE MODEL

3014*-----*

3015

3016* Load the data

3017use "analysisready2.dta", clear

3018sort strata36 aid

3019

3020* delete if missing dependent variable (so can record number)

3021drop if binge_12mo == .
(157 observations deleted)

3022

3023* Fit model using PQL2

```
3024runmlwin binge_12mo cons female latinx_race black_race hsless somecollege lowinc, //
> /
> 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
strata36	36	46	385.7	1079

Run time (seconds) = **2.01**
Number of iterations = **10**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.7975287	.0465983	-17.11	0.000	-.8888598	-.7061977
female	-.3241991	.0414372	-7.82	0.000	-.4054145	-.2429837
latinx_race	-.1447809	.0553155	-2.62	0.009	-.2531973	-.0363644
black_race	-1.067274	.0586788	-18.19	0.000	-1.182282	-.9522656
hsless	.2132188	.0532752	4.00	0.000	.1088014	.3176362
somecollege	.2142515	.0532495	4.02	0.000	.1098843	.3186186
lowinc	.0634505	.0452552	1.40	0.161	-.025248	.1521491

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.000971	.0028286	-.004573	.0065151

3025

3026* Fit model using MCMC

```
3027runmlwin binge_12mo cons female latinx_race black_race hsless somecollege lowinc, //
> /
> level2(strata36: cons, residuals(u, savechains("m3B_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata36	36	46	385.7	1079

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      320
Deviance (dbar)       =    15549.32
Deviance (thetabar)   =    15537.83
Effective no. of pars (pd) =    11.49
Bayesian DIC          =    15560.81

```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.7963557	.0526608	628	0.000	-.9021046	-.6917003
female	-.3240479	.0457434	968	0.000	-.4172088	-.2341072
latinx_race	-.1372603	.0615549	1087	0.010	-.2585887	-.0192776
black_race	-1.062947	.0640297	1037	0.000	-1.179221	-.9418373
hsless	.2060861	.0587873	723	0.000	.0862649	.3168699
somecollege	.2136143	.0593357	628	0.001	.0914358	.3323555
lowinc	.0602684	.0496983	950	0.108	-.0380137	.1580043

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.003507	.003373	787	.0004731	.0121073

3028rename u0 mlu

3029drop u0se

3030

3031* Present the regression coefficients as odds ratios

3032runmlwin, 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
strata36	36	46	385.7	1079

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      320
Deviance (dbar)       =    15549.32
Deviance (thetabar)   =    15537.83
Effective no. of pars (pd) =    11.49
Bayesian DIC          =    15560.81

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4517139	.0237671	623	0.000	.4057149	.5007239
female	.7247876	.0335632	970	0.000	.6588834	.791277
latinx_race	.8732511	.0553466	1086	0.010	.7721405	.9809071
black_race	.3446569	.0223676	1035	0.000	.3075183	.3899108
hsless	1.231008	.071421	735	0.000	1.090095	1.372824
somecollege	1.238997	.0748992	633	0.001	1.095747	1.394248
lowinc	1.062621	.0527964	948	0.108	.9626998	1.171171

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.003507	.003373	787	.0004731	.0121073

3033

3034* Calculate the ICC from the parameter point estimates

3035scalar mlsigma2u = [RP2]var(cons)

3036scalar mlsigma2e = _pi^2/3

3037display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)

ICC = 0.001

3038

3039* Calculate the ICC from the chains

3040use "m3B_s36_beta.dta", clear

3041rename RP2_var_cons_ sigma2u

3042generate sigma2e = _pi^2/3

3043generate icc = sigma2u/(sigma2u + sigma2e)

3044mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.001042	.0009306	787	0.000	.0001438	.0036667

3045

3046

3047*-----*

3048* PREPARE FIXED-PART PARAMETER CHAINS

3049*-----*

3050

3051use "m3B_s36_beta.dta", clear

3052drop deviance RP2_var_cons_ OD_bcons_1

3053rename FP1_* b_*

3054format %9.2f b_*

3055compress

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

3056save "m3B_s36_beta_prepped.dta", replace

file m3B_s36_beta_prepped.dta saved

3057isid iteration

3058codebook iteration, compact

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

```

3059
3060
3061*-----*
3062* PREPARE STRATUM RANDOM EFFECTS CHAINS
3063*-----*
3064
3065use "m3B_s36_u.dta", clear

3066drop residual idnum

3067rename value u

3068format %9.2f u

3069sort strata36 iteration

3070order strata36 iteration

3071compress
      variable strata36 was double now int
      variable iteration was double now long
      (360,000 bytes saved)

3072save "m3B_s36_u_prepped.dta", replace
      file m3B_s36_u_prepped.dta saved

3073isid strata36 iteration

3074codebook iteration, compact

```

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

```

3075
3076
3077*-----*
3078* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3079*-----*
3080
3081use "data36.dta", clear

3082isid strata36

3083cross using "m3B_s36_beta_prepped.dta"

3084isid strata36 iteration

3085sort strata36 iteration

3086merge 1:1 strata36 iteration using "m3B_s36_u_prepped.dta", nogenerate assert(match)

```

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

```

3087isid strata36 iteration

3088compress
      variable strata36 was double now int
      (216,000 bytes saved)

3089save "m3B_s36data_prepped.dta", replace
      file m3B_s36data_prepped.dta saved

3090
3091
3092*-----*
3093* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3094*-----*
3095
3096* Percentage p based on fixed and random part
3097use "m3B_s36data_prepped.dta", clear

3098gen cons = 1

3099generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      + u ///
> )

3100label var p "Percentage based on main effects and interactions"

3101format %9.3f p

3102
3103* Percentage p based only on the fixed-part
3104generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
> )

3105label var pA "Percentage based only on main effects"

3106format %9.3f pA

3107
3108* Percentage pB calculated as the difference between p and pA
3109generate pB = p - pA

3110label var pB "Percentage point difference based on interaction effects"

3111format %9.3f pB

3112

```

```

3113* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3114bysort strata36 (iteration): egen pmn = mean(p)

3115bysort strata36 (iteration): egen plo = pctlile(p), p(2.5)
3116bysort strata36 (iteration): egen phi = pctlile(p), p(97.5)

3117format %9.3f pmn plo phi

3118label var pmn "Percentage based on main effects and interactions"
3119label var plo "Percentage based on main effects and interactions"
3120label var phi "Percentage based on main effects and interactions"

3121
3122
3123bysort strata36 (iteration): egen pAmn = mean(pA)

3124bysort strata36 (iteration): egen pAlo = pctlile(pA), p(2.5)
3125bysort strata36 (iteration): egen pAhi = pctlile(pA), p(97.5)

3126format %9.3f pAmn pAlo pAhi

3127label var pAmn "Percentage based on main effects"
3128label var pAlo "Percentage based on main effects"
3129label var pAhi "Percentage based on main effects"

3130
3131bysort strata36 (iteration): egen pBmn = mean(pB)

3132bysort strata36 (iteration): egen pBlo = pctlile(pB), p(2.5)
3133bysort strata36 (iteration): egen pBhi = pctlile(pB), p(97.5)

3134format %9.3f pBmn pBlo pBhi

3135label var pBmn "Percentage point difference based on interaction effects"
3136label var pBlo "Percentage point difference based on interaction effects"
3137label var pBhi "Percentage point difference based on interaction effects"

3138
3139* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3140drop iteration b* u* p pA pB

3141duplicates drop

      Duplicates in terms of all variables

      (35,964 observations deleted)

3142isid strata36

3143
3144* Ranks

```

```

3145sort pmn
3146generate pmnrank = _n
3147order pmnrank, after(phi)
3148sort pAmn
3149generate pAmnrank = _n
3150order pAmnrank, after(pAhi)
3151sort pBmn
3152generate pBmnrank = _n
3153order pBmnrank, after(pBhi)

3154
3155* Sort the data
3156sort strata36

3157isid strata36

3158
3159* Compress and save the data
3160compress
      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)

3161save "m3B_s36results.dta", replace
      file m3B_s36results.dta saved

3162
3163* List strata with statistically significant interaction effects on the predicted in
      > cidence
3164use "m3B_s36results.dta", clear

3165list strata36  pBmn pBlo pBhi if pBhi<0, noobs

3166list strata36  pBmn pBlo pBhi if pBlo>0, noobs

3167
3168
3169*****
3170* MODEL 3A_S48 - BINGE DRINKING, Null MODEL
3171*****
3172
3173*-----*
3174* FIT THE MODEL
3175*-----*
3176
3177* Load the data
3178use "analysisready2.dta", clear

3179sort strata48 aid

```

```

3183
3184* Fit model using PQL2
3185runmlwin binge_12mo 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	Minimum	Observations per Group Average	Maximum
strata48	48	3	289.3	1079

```
Run time (seconds)      =      1.83
Number of iterations    =           5
```

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.173208	.0838332	-13.99	0.000	-1.337518	-1.008898

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48 var(cons)	.2639661	.0658438	.1349146	.3930175

```

3186
3187* Fit model using MCMC
3188runmlwin binge_12mo cons , ///
> level2(strata48: cons, residuals(u, savechains("m3A_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata48	48	3	289.3	1079


```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15511.39
Deviance (thetabar) =    15473.56
Effective no. of pars (pd) =    37.84
Bayesian DIC        =    15549.23

```

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.172565	.0872854	253	0.000	-1.344908	-1.006352

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.2784772	.0743833	959	.1687576	.4506079

```
3189rename u0 mlu
```

```
3190drop u0se
```

```
3191
```

```
3192* Present the regression coefficients as odds ratios
```

```
3193runmlwin, 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
strata48	48	3	289.3	1079

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15511.39
Deviance (thetabar) =    15473.56
Effective no. of pars (pd) =    37.84
Bayesian DIC        =    15549.23

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3109822	.0275542	251	0.000	.2605638	.3655502

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.2784772	.0743833	959	.1687576	.4506079

```

3194
3195* Calculate the ICC from the parameter point estimates
3196scalar mlsigma2u = [RP2]var(cons)

3197scalar mlsigma2e = _pi^2/3

3198display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.078

3199
3200* Calculate the ICC from the chains
3201use "m3A_s48_beta.dta", clear

3202rename RP2_var_cons_ sigma2u

3203generate sigma2e = _pi^2/3

3204generate icc = sigma2u/(sigma2u + sigma2e)

3205mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0773203	.0189468	950	0.000	.0487933	.120468

```

3206
3207
3208*****
3209* MODEL 3B S48 - BINGE DRINKING, MAIN EFFECTS MODEL
3210*****
3211
3212*-----*
3213* FIT THE MODEL
3214*-----*
3215
3216* Load the data
3217use "analysisready2.dta", clear

3218sort strata48 aid

3219
3220* delete if missing dependent variable (so can record number)
3221drop if binge_12mo == .
      (157 observations deleted)

3222
3223* Fit model using PQL2
3224runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c, ///
> level2(strata48: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata48	48	3	289.3	1079

Run time (seconds) = 2.12
 Number of iterations = 12

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.8012035	.0501658	-15.97	0.000	-.8995266	-.7028805
female	-.3283923	.0439819	-7.47	0.000	-.4145952	-.2421894
latinx_imm	-.7104834	.1242325	-5.72	0.000	-.9539747	-.4669921
latinx_non	-.0290337	.0607874	-0.48	0.633	-.1481749	.0901075
black	-1.067274	.0609244	-17.52	0.000	-1.186684	-.9478646
hsless	.2070365	.0562407	3.68	0.000	.0968067	.3172662
somecollege	.2091308	.0564739	3.70	0.000	.098444	.3198176
lowinc	.0794295	.0478099	1.66	0.097	-.0142762	.1731351

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var(cons)	.0022599	.0033592	-.0043239	.0088437

3225

3226* Fit model using MCMC

```

3227runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c, ///
> level2(strata48: cons, residuals(u, savechains("m3B_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13884

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	289.3	1079

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 352
 Deviance (dbar) = 15516.47
 Deviance (thetabar) = 15502.75
 Effective no. of pars (pd) = 13.72
 Bayesian DIC = 15530.19

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.8001277	.0561287	528	0.000	-.9122305	-.6892392
female	-.330242	.047875	1003	0.000	-.4305457	-.2456843
latinx_imm	-.7097359	.1277306	843	0.000	-.9667209	-.4624702
latinx_non	-.027469	.065745	1310	0.329	-.1637421	.1004262
black	-1.064197	.0649017	931	0.000	-1.196015	-.9359218
hsless	.2027916	.061378	721	0.001	.0723577	.3190986
somecollege	.2092127	.0601041	776	0.000	.0910842	.3265823
lowinc	.0783931	.0510489	964	0.068	-.0205254	.1813233

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var (cons)	.0046945	.0044342	435	.0004818	.0169314

```
3228rename u0 m1u
```

```
3229drop u0se
```

3230

3231* Present the regression coefficients as odds ratios

```
3232runmlwin, or
```

```
MLwiN 3.2 multilevel model                      Number of obs      =    13884
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Minimum	Observations per Group Average	Maximum
strata48	48	3	289.3	1079

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	352
Deviance (dbar)	=	15516.47
Deviance (thetabar)	=	15502.75
Effective no. of pars (pd)	=	13.72
Bayesian DIC	=	15530.19

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4500387	.0258251	525	0.000	.4016274	.5019578
female	.7187403	.0341213	1012	0.000	.6501542	.7821691
latinx_imm	.4941634	.065365	843	0.000	.3803282	.6297262
latinx_non	.9741276	.0631702	1337	0.329	.848961	1.105642
black	.3447491	.022269	927	0.000	.3023969	.3922242
hsless	1.22737	.0766973	723	0.001	1.07504	1.375887
somecollege	1.233286	.0732663	779	0.000	1.095361	1.386222
lowinc	1.084438	.0560468	967	0.068	.979684	1.198803

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata48					
var (cons)	.0046945	.0044342	435	.0004818	.0169314

3233

3234* Calculate the ICC from the parameter point estimates

```
3235 scalar mlsigma2u = [RP2]var(cons)
```

```
3236 scalar m1sigma2e = pi^2/3
```

```
3237display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.001
```

```
3238
```

```
3239* Calculate the ICC from the chains
```

```
3240use "m3B_s48_beta.dta", clear
```

```
3241rename RP2_var_cons_ sigma2u
```

```
3242generate sigma2e = _pi^2/3
```

```
3243generate icc = sigma2u/(sigma2u + sigma2e)
```

```
3244mcmcsum icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0014338	.0013728	434	0.000	.0001464	.0051202

```
3245
```

```
3246
```

```
3247*-----*
```

```
3248* PREPARE FIXED-PART PAREMETER CHAINS
```

```
3249*-----*
```

```
3250
```

```
3251use "m3B_s48_beta.dta", clear
```

```
3252drop deviance RP2_var_cons_ OD_bcons_1
```

```
3253rename FP1_ b_*
```

```
3254format %9.2f b_*
```

```
3255compress
```

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

```
3256save "m3B_s48_beta_prepped.dta", replace  
      file m3B_s48_beta_prepped.dta saved
```

```
3257isid iteration
```

```
3258codebook iteration, compact
```

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

```
3259
```

```
3260
```

```
3261*-----*
```

```
3262* PREPARE STRATUM RANDOM EFFECTS CHAINS
```

```
3263*-----*
```

```
3264
```

```
3265use "m3B_s48_u.dta", clear
```

3266drop residual idnum

3267rename value u

3268format %9.2f u

3269sort strata48 iteration

3270order strata48 iteration

3271compress
variable **strata48** was **double** now **int**
variable **iteration** was **double** now **long**
(480,000 bytes saved)

3272save "m3B_s48_u_prepped.dta", replace
file m3B_s48_u_prepped.dta saved

3273isid strata48 iteration

3274codebook iteration, compact

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

3275

3276

3277*-----*

3278* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

3279*-----*

3280

3281use "data48.dta", clear

3282isid strata48

3283cross using "m3B_s48_beta_prepped.dta"

3284isid strata48 iteration

3285sort strata48 iteration

3286merge 1:1 strata48 iteration using "m3B_s48_u_prepped.dta", nogenerate assert(match)

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

3287isid strata48 iteration

3288compress
variable **strata48** was **double** now **int**
(288,000 bytes saved)

3289save "m3B_s48data_prepped.dta", replace
file m3B_s48data_prepped.dta saved

```

3290
3291
3292*-----*
3293* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3294*-----*
3295
3296* Percentage p based on fixed and random part
3297use "m3B_s48data_prepped.dta", clear

3298gen cons = 1

3299generate 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 ///
> )

3300label var p "Percentage based on main effects and interactions"

3301format %9.3f p

3302
3303* Percentage p based only on the fixed-part
3304generate 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 ///
> )

3305label var pA "Percentage based only on main effects"

3306format %9.3f pA

3307
3308* Percentage pB calculated as the difference between p and pA
3309generate pB = p - pA

3310label var pB "Percentage point difference based on interaction effects"

3311format %9.3f pB

3312
3313* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3314bysort strata48 (iteration): egen pmn = mean(p)

3315bysort strata48 (iteration): egen plo = pctl(p), p(2.5)

3316bysort strata48 (iteration): egen phi = pctl(p), p(97.5)

```

```

3317format %9.3f pmn plo phi
3318label var pmn "Percentage based on main effects and interactions"
3319label var plo "Percentage based on main effects and interactions"
3320label var phi "Percentage based on main effects and interactions"

3321
3322
3323bysort strata48 (iteration): egen pAmn = mean(pA)
3324bysort strata48 (iteration): egen pAlo = pctlile(pA), p(2.5)
3325bysort strata48 (iteration): egen pAhi = pctlile(pA), p(97.5)
3326format %9.3f pAmn pAlo pAhi
3327label var pAmn "Percentage based on main effects"
3328label var pAlo "Percentage based on main effects"
3329label var pAhi "Percentage based on main effects"

3330
3331bysort strata48 (iteration): egen pBmn = mean(pB)
3332bysort strata48 (iteration): egen pBlo = pctlile(pB), p(2.5)
3333bysort strata48 (iteration): egen pBhi = pctlile(pB), p(97.5)
3334format %9.3f pBmn pBlo pBhi
3335label var pBmn "Percentage point difference based on interaction effects"
3336label var pBlo "Percentage point difference based on interaction effects"
3337label var pBhi "Percentage point difference based on interaction effects"

3338
3339* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3340drop iteration b* u* p pA pB

3341duplicates drop

    Duplicates in terms of all variables

    (47,952 observations deleted)

3342isid strata48

3343
3344* Ranks
3345sort pmn

3346generate pmnrank = _n

3347order pmnrank, after(phi)

3348sort pAmn

```



```

3349generate pAmnrank = _n
3350order pAmnrank, after(pAhi)
3351sort pBmn
3352generate pBmnrank = _n
3353order pBmnrank, after(pBhi)

3354
3355* Sort the data
3356sort strata48

3357isid strata48

3358
3359* Compress and save the data
3360compress
      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)

3361save "m3B_s48results.dta", replace
      file m3B_s48results.dta saved

3362
3363* List strata with statistically significant interaction effects on the predicted in
      > cidence
3364use "m3B_s48results.dta", clear

3365list strata48  pBmn pBlo pBhi if pBhi<0, noobs

3366list strata48  pBmn pBlo pBhi if pBlo>0, noobs

3367
3368
3369*****
3370* MODEL 3A_S96 - BINGE DRINKING, Null MODEL
3371*****
3372
3373*-----*
3374* FIT THE MODEL
3375*-----*
3376
3377* Load the data
3378use "analysisready2.dta", clear

3379sort strata96 aid

3380
3381* delete if missing dependent variable (so can record number)
3382drop if binge_12mo == .
      (157 observations deleted)

3383
3384* Fit model using PQL2
3385runmlwin binge_12mo 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
strata96	91	1	152.6	898

Run time (seconds) = **1.76**
 Number of iterations = **5**

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.152524	.0666205	-17.30	0.000	-1.283098	-1.02195

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.2592908	.0545459	.1523828	.3661988

3386

3387* Fit model using MCMC

3388runmlwin binge_12mo cons , ///

```
> level2(strata96: cons, residuals(u, savechains("m3A_s96_u.dta", replace))) ///  
> level1(aid:) ///  
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///  
> mcmc(burnin(5000) chain(50000) thinning(50) ///  
> savechains("m3A_s96_beta.dta", replace)) initsprevious ///  
> 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
strata96	91	1	152.6	898

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **145**
 Deviance (dbar) = **15476.94**
 Deviance (thetabar) = **15417.03**
 Effective no. of pars (pd) = **59.91**
 Bayesian DIC = **15536.86**

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.14807	.066458	536	0.000	-1.283153	-1.032724

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.2673697	.0579868	1049	.1741725	.3958144

3390drop u0se

3392* Present the regression coefficients as odds ratios

```
MLwiN 3.2 multilevel model
Binomial logit response model
Estimation algorithm: MCMC
```

13884

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	145
Deviance (dbar)	=	15476.94
Deviance (thetabar)	=	15417.03
Effective no. of pars (pd)	=	59.91
Bayesian DIC	=	15536.86

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata96					
var (cons)	.2673697	.0579868	1049	.1741725	.3958144

3395* Calculate the ICC from the parameter point estimates

```
3397 scalar m1sigma2e = pi^2/3
```

$$ICC = 0.075$$

3400* Calculate the ICC from the chains

```
3402 rename RP2 var cons sigma2u
```

```
3403 generate sigma2e = pi^2/3
```

```
3404 generate icc = sigma2u/(sigma2u + sigma2e)
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0751322	.0149744	1053	0.000	.0502802	.1073924

```

3406
3407
3408*****
3409* MODEL 3B S96 - BINGE DRINKING, MAIN EFFECTS MODEL
3410*****
3411
3412*-----*
3413* FIT THE MODEL
3414*-----*
3415
3416* Load the data
3417use "analysisready2.dta", clear

3418sort strata96 aid

3419
3420* delete if missing dependent variable (so can record number)
3421drop if binge_12mo == .
      (157 observations deleted)

3422
3423* Fit model using PQL2
3424runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowinc
      > c straight_no, ///
      > 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
strata96	91	1	152.6	898

Run time (seconds) = 2.16
 Number of iterations = 11

binge_12mo	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.8402442	.0677191	-12.41	0.000	-.9729711	-.7075172
female	-.3074227	.0568759	-5.41	0.000	-.4188974	-.195948
latinx_imm	-.6958178	.1367165	-5.09	0.000	-.9637772	-.4278585
latinx_non	-.0283406	.0730767	-0.39	0.698	-.1715682	.114887
black	-1.047911	.0732286	-14.31	0.000	-1.191437	-.904386
hsless	.217779	.0701103	3.11	0.002	.0803652	.3551927
somecollege	.236637	.0708617	3.34	0.001	.0977505	.3755234
lowinc	.0564216	.0594444	0.95	0.343	-.0600872	.1729303
straight_no	.1449697	.0683937	2.12	0.034	.0109204	.279019

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.0147646	.0074159	.0002298	.0292995

3425

3426* Fit model using MCMC

```

3427runmlwin binge_12mo cons female latinx_imm latinx_non black hsless somecollege lowin
> c straight_no, ///
> level2(strata96: cons, residuals(u, savechains("m3B_s96_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata96	91	1	152.6	898

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **381**
 Deviance (dbar) = **15489.71**
 Deviance (thetabar) = **15465.47**
 Effective no. of pars (pd) = **24.24**
 Bayesian DIC = **15513.94**

binge_12mo	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.8395911	.0640311	626	0.000	-.9632053	-.7187063
female	-.3120754	.0582233	675	0.000	-.4204488	-.1906624
latinx_imm	-.70353	.1372168	1282	0.000	-.9769814	-.4435601
latinx_non	-.0310681	.0724576	1210	0.341	-.1742958	.1149096
black	-1.051535	.0727028	937	0.000	-1.198889	-.9099776
hsless	.2195558	.0684656	1369	0.003	.0802488	.3545231
somecollege	.23528	.0702448	786	0.000	.09337	.3747372
lowinc	.0609225	.0602512	831	0.163	-.0663148	.1762252
straight_no	.145175	.0698981	734	0.027	-.001174	.2735899

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	.0145441	.0101602	313	.0016286	.040425

3428rename u0 mlu

3429drop u0se

3430

3431* Present the regression coefficients as odds ratios

3432runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13884**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata96	91	1	152.6	898

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      381
Deviance (dbar)     =    15489.71
Deviance (thetabar) =    15465.47
Effective no. of pars (pd) =    24.24
Bayesian DIC        =    15513.94

```

binge_12mo	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4325771	.0268994	630	0.000	.3816676	.4873824
female	.733188	.0436171	665	0.000	.656752	.8264116
latinx_imm	.5007778	.0679029	1278	0.000	.3764457	.6417479
latinx_non	.9742845	.0704561	1207	0.341	.8400484	1.121772
black	.3498634	.0256208	950	0.000	.3015291	.4025333
hsless	1.248043	.086383	1384	0.003	1.083557	1.425501
somecollege	1.269409	.0904024	769	0.000	1.097868	1.454609
lowinc	1.063232	.0646159	848	0.163	.9358363	1.192707
straight_no	1.158198	.0817913	731	0.027	.9988267	1.314676

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.0145441	.0101602	313	.0016286	.040425

```
3433
```

```
3434* Calculate the ICC from the parameter point estimates
```

```
3435scalar mlsigma2u = [RP2]var(cons)
```

```
3436scalar mlsigma2e = _pi^2/3
```

```
3437display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
```

```
ICC = 0.004
```

```
3438
```

```
3439* Calculate the ICC from the chains
```

```
3440use "m3B_s96_beta.dta", clear
```

```
3441rename RP2_var_cons_ sigma2u
```

```
3442generate sigma2e = _pi^2/3
```

```
3443generate icc = sigma2u/(sigma2u + sigma2e)
```

```
3444mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0044641	.0031096	312	0.000	.0004948	.0121386

```
3445
```

```
3446
```

```
3447*-----*
```

```
3448* PREPARE FIXED-PART PAREMETER CHAINS
```

```
3449*-----*
```

```

3450
3451use "m3B_s96_beta.dta", clear
3452drop deviance RP2_var_cons_ OD_bcons_1
3453rename FP1_* b_*
3454format %9.2f b_*
3455compress
      variable iteration was double now long
      (4,000 bytes saved)
3456save "m3B_s96_beta_prepped.dta", replace
      file m3B_s96_beta_prepped.dta saved
3457isid iteration

```

```

3458codebook iteration, compact

```

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

```

3459
3460
3461*-----*
3462* PREPARE STRATUM RANDOM EFFECTS CHAINS
3463*-----*
3464
3465use "m3B_s96_u.dta", clear
3466drop residual idnum
3467rename value u
3468format %9.2f u
3469sort strata96 iteration
3470order strata96 iteration
3471compress
      variable strata96 was double now int
      variable iteration was double now long
      (910,000 bytes saved)
3472save "m3B_s96_u_prepped.dta", replace
      file m3B_s96_u_prepped.dta saved
3473isid strata96 iteration
3474codebook iteration, compact

```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```

3475
3476
3477*-----*
3478* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3479*-----*
3480
3481use "data96_binge.dta", clear

3482isid strata96

3483cross using "m3B_s96_beta_prepped.dta"

3484isid strata96 iteration

3485sort strata96 iteration

3486merge 1:1 strata96 iteration using "m3B_s96_u_prepped.dta", nogenerate assert(match)

      Result                                # of obs.
      -----                                -
      not matched                           0
      matched                               91,000
      -----                                -

3487isid strata96 iteration

3488compress
      variable strata96 was double now int
      (546,000 bytes saved)

3489save "m3B_s96data_prepped.dta", replace
      file m3B_s96data_prepped.dta saved

3490
3491
3492*-----*
3493* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3494*-----*
3495
3496* Percentage p based on fixed and random part
3497use "m3B_s96data_prepped.dta", clear

3498gen cons = 1

3499generate 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 ///
> )

3500label var p "Percentage based on main effects and interactions"

3501format %9.3f p

```



```

3502
3503* Percentage p based only on the fixed-part
3504generate 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 ///
> )

3505label var pA "Percentage based only on main effects"

3506format %9.3f pA

3507
3508* Percentage pB calculated as the difference between p and pA
3509generate pB = p - pA

3510label var pB "Percentage point difference based on interaction effects"

3511format %9.3f pB

3512
3513* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3514bysort strata96 (iteration): egen pmn = mean(p)

3515bysort strata96 (iteration): egen plo = pctlile(p), p(2.5)

3516bysort strata96 (iteration): egen phi = pctlile(p), p(97.5)

3517format %9.3f pmn plo phi

3518label var pmn "Percentage based on main effects and interactions"

3519label var plo "Percentage based on main effects and interactions"

3520label var phi "Percentage based on main effects and interactions"

3521
3522
3523bysort strata96 (iteration): egen pAmn = mean(pA)

3524bysort strata96 (iteration): egen pAlo = pctlile(pA), p(2.5)

3525bysort strata96 (iteration): egen pAhi = pctlile(pA), p(97.5)

3526format %9.3f pAmn pAlo pAhi

3527label var pAmn "Percentage based on main effects"

3528label var pAlo "Percentage based on main effects"

3529label var pAhi "Percentage based on main effects"

3530
3531bysort strata96 (iteration): egen pBmn = mean(pB)

```

```

3532 bysort strata96 (iteration): egen pBlo = pctlile(pB), p(2.5)
3533 bysort strata96 (iteration): egen pBhi = pctlile(pB), p(97.5)
3534 format %9.3f pBmn pBlo pBhi
3535 label var pBmn "Percentage point difference based on interaction effects"
3536 label var pBlo "Percentage point difference based on interaction effects"
3537 label var pBhi "Percentage point difference based on interaction effects"
3538
3539 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3540 drop iteration b* u* p pA pB
3541 duplicates drop
      Duplicates in terms of all variables
      (90,909 observations deleted)
3542 isid strata96
3543
3544 * Ranks
3545 sort pmn
3546 generate pmnrank = _n
3547 order pmnrank, after(phi)
3548 sort pAmn
3549 generate pAmnrank = _n
3550 order pAmnrank, after(pAhi)
3551 sort pBmn
3552 generate pBmnrank = _n
3553 order pBmnrank, after(pBhi)
3554
3555 * Sort the data
3556 sort strata96
3557 isid strata96
3558
3559 * Compress and save the data
3560 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
      (1,092 bytes saved)
3561 save "m3B_s96results.dta", replace
      file m3B_s96results.dta saved

```

```

3562
3563* List strata with statistically significant interaction effects on the predicted in
> cidence
3564use "m3B_s96results.dta", clear

3565list strata96 pBmn pBlo pBhi if pBhi<0, noobs

3566list strata96 pBmn pBlo pBhi if pBlo>0, noobs

3567
3568     end of do-file

3569do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

3570
3571*****
3572*****
3573*****
3574*
3575*
3576* MODEL 4 - CIGARETTE USE, MAIN EFFECTS MODEL
3577*
3578*
3579*****
3580*****
3581*****
3582
3583*****
3584* MODEL 4A S6 - CIGARETTE USE, Null MODEL
3585*****
3586
3587*-----*
3588* FIT THE MODEL
3589*-----*
3590
3591* Load the data
3592use "analysisready2.dta", clear

3593sort strata6 aid

3594
3595* delete if missing dependent variable (so can record number)
3596drop if use_cig_30days == .
      (174 observations deleted)

3597
3598* Fit model using by PQL2
3599runmlwin use_cig_30days cons , ///
>   level2(strata6: cons) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>   rlgls 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
strata6	6	1144	2311.2	4266

Run time (seconds) = 1.81
 Number of iterations = 7

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.319055	.2298798	-5.74	0.000	-1.769612	-.8684993

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6				
var(cons)	.3126809	.1839716	-.0478968	.6732587

3600

3601* Fit model using by MCMC

3602runmlwin use_cig_30days cons , ///

```
> level2(strata6: cons, residuals(u, savechains("m4A_s6_u.dta", replace))) ///
```

```
> level1(aid:) ///
```

```
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
```

```
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13867

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1144	2311.2	4266

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 143
 Deviance (dbar) = 15349.27
 Deviance (thetabar) = 15343.43
 Effective no. of pars (pd) = 5.84
 Bayesian DIC = 15355.11

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.338353	.2829778	34	0.000	-2.022576	-.8709781

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.511081	.559699	465	.1204709	1.947975

3603rename u0 mlu

3605

3607runmlwin, or

```
Number of obs      =    13867
```

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	143
Deviance (dbar)	=	15349.27
Deviance (thetabar)	=	15343.43
Effective no. of pars (pd)	=	5.84
Bayesian DIC	=	15355.11

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata6 var (cons)	.511081	.559699	465	.1204709	1.947975

```
3619mcmcsun icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]
icc	.1240064	.0862755	313	0.000	.0353252 .371904

```

3620
3621
3622*****
3623* MODEL 4B S6 - CIGARETTE USE, MAIN EFFECTS MODEL
3624*****
3625
3626*-----*
3627* FIT THE MODEL
3628*-----*
3629
3630* Load the data
3631use "analysisready2.dta", clear

3632sort strata6 aid

3633
3634* delete if missing dependent variable (so can record number)
3635drop if use_cig_30days == .
      (174 observations deleted)

3636
3637* Fit model using by PQL2
3638runmlwin use_cig_30days cons female latinx_race black_race , ///
>   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
strata6	6	1144	2311.2	4266

```

Run time (seconds) =      2.26
Number of iterations =      24

```

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.6699834	.0959565	-6.98	0.000	-.8580547	-.4819121
female	-.0602347	.1020557	-0.59	0.555	-.2602601	.1397908
latinx_race	-.5954858	.1227306	-4.85	0.000	-.8360334	-.3549382
black_race	-1.233376	.1238167	-9.96	0.000	-1.476052	-.9906997

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6				
var(cons)	.0120257	.0089931	-.0056004	.0296518

```

3639
3640* Fit model using by MCMC

```

```

3641runmlwin use_cig_30days cons female latinx_race black_race , ///
> level2(strata6: cons, residuals(u, savechains("m4B_s6_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1144	2311.2	4266

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 228
 Deviance (dbar) = 15349.58
 Deviance (thetabar) = 15343.84
 Effective no. of pars (pd) = 5.74
 Bayesian DIC = 15355.32

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.6816948	.1223021	157	0.000	-.9845278	-.4485051
female	-.0503261	.1462163	153	0.332	-.3451506	.2575094
latinx_race	-.5755948	.1667926	278	0.006	-.8910254	-.1913389
black_race	-1.22917	.1816207	256	0.000	-1.575624	-.795722

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	.033859	.069771	309	.0014013	.1917125

```
3642rename u0 mlu
```

```
3643drop u0se
```

```
3644
```

```
3645* Present the regression coefficients as odds ratios
```

```
3646runmlwin, 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
strata6	6	1144	2311.2	4266

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      228
Deviance (dbar)     =    15349.58
Deviance (thetabar) =    15343.84
Effective no. of pars (pd) =    5.74
Bayesian DIC        =    15355.32

```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.5087185	.0621244	161	0.000	.3736156	.6385821
female	.9622237	.1437238	154	0.332	.7081138	1.293705
latinx_race	.5716525	.1043891	268	0.006	.410235	.8258566
black_race	.2977618	.0627317	236	0.000	.2068787	.4512557

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.033859	.069771	309	.0014013	.1917125

```
3647
```

```
3648* Calculate the ICC from the parameter point estimates
```

```
3649scalar mlsigma2u = [RP2]var(cons)
```

```
3650scalar mlsigma2e = _pi^2/3
```

```
3651display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.010
```

```
3652
```

```
3653* Calculate the ICC from the chains
```

```
3654use "m4B_s6_beta.dta", clear
```

```
3655rename RP2_var_cons_ sigma2u
```

```
3656generate sigma2e = _pi^2/3
```

```
3657generate icc = sigma2u/(sigma2u + sigma2e)
```

```
3658mcmcsun icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0100153	.0187744	295	0.000	.0004258	.0550647

```
3659
```

```
3660
```

```
3661*-----*
```

```
3662* PREPARE FIXED-PART PAREMETER CHAINS
```

```
3663*-----*
```

```
3664
```

```
3665use "m4B_s6_beta.dta", clear
```

```
3666drop deviance RP2_var_cons_ OD_bcons_1
```



```

3667rename FP1_ * b_*
3668format %9.2f b_*
3669compress
      variable iteration was double now long
      (4,000 bytes saved)
3670save "m4B_s6_beta_prepped.dta", replace
      (note: file m4B_s6_beta_prepped.dta not found)
      file m4B_s6_beta_prepped.dta saved

```

```
3671isid iteration
```

```
3672codebook iteration, compact
```

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

```

3673
3674
3675*-----*
3676* PREPARE STRATUM RANDOM EFFECTS CHAINS
3677*-----*
3678
3679use "m4B_s6_u.dta", clear

```

```
3680drop residual idnum
```

```
3681rename value u
```

```
3682format %9.2f u
```

```
3683sort strata6 iteration
```

```
3684order strata6 iteration
```

```

3685compress
      variable strata6 was double now byte
      variable iteration was double now long
      (66,000 bytes saved)

```

```

3686save "m4B_s6_u_prepped.dta", replace
      (note: file m4B_s6_u_prepped.dta not found)
      file m4B_s6_u_prepped.dta saved

```

```
3687isid strata6 iteration
```

```
3688codebook iteration, compact
```

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

```

3689
3690
3691*-----*
3692* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
3693*-----*
3694
3695use "data6.dta", clear

3696isid strata6

3697cross using "m4B_s6_beta_prepped.dta"

3698isid strata6 iteration

3699sort strata6 iteration

3700merge 1:1 strata6 iteration using "m4B_s6_u_prepped.dta", nogenerate assert(match)

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

3701isid strata6 iteration

3702compress
      variable strata6 was double now byte
      (42,000 bytes saved)

3703save "m4B_s6data_prepped.dta", replace
      (note: file m4B_s6data_prepped.dta not found)
      file m4B_s6data_prepped.dta saved

3704
3705
3706*-----*
3707* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
3708*-----*
3709
3710* Percentage p based on fixed and random part
3711use "m4B_s6data_prepped.dta", clear

3712gen cons = 1

3713generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      + u ///
> )

3714label var p "Percentage based on main effects and interactions"

3715format %9.3f p

3716
3717* Percentage p based only on the fixed-part
3718generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
> )

```

```

3719label var pA "Percentage based only on main effects"
3720format %9.3f pA
3721
3722* Percentage pB calculated as the difference between p and pA
3723generate pB = p - pA
3724label var pB "Percentage point difference based on interaction effects"
3725format %9.3f pB
3726
3727* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3728bysort strata6 (iteration): egen pmn = mean(p)
3729bysort strata6 (iteration): egen plo = pctlile(p), p(2.5)
3730bysort strata6 (iteration): egen phi = pctlile(p), p(97.5)
3731format %9.3f pmn plo phi
3732label var pmn "Percentage based on main effects and interactions"
3733label var plo "Percentage based on main effects and interactions"
3734label var phi "Percentage based on main effects and interactions"
3735
3736
3737bysort strata6 (iteration): egen pAmn = mean(pA)
3738bysort strata6 (iteration): egen pAlo = pctlile(pA), p(2.5)
3739bysort strata6 (iteration): egen pAhi = pctlile(pA), p(97.5)
3740format %9.3f pAmn pAlo pAhi
3741label var pAmn "Percentage based on main effects"
3742label var pAlo "Percentage based on main effects"
3743label var pAhi "Percentage based on main effects"
3744
3745bysort strata6 (iteration): egen pBmn = mean(pB)
3746bysort strata6 (iteration): egen pBlo = pctlile(pB), p(2.5)
3747bysort strata6 (iteration): egen pBhi = pctlile(pB), p(97.5)
3748format %9.3f pBmn pBlo pBhi
3749label var pBmn "Percentage point difference based on interaction effects"
3750label var pBlo "Percentage point difference based on interaction effects"
3751label var pBhi "Percentage point difference based on interaction effects"
3752

```

```

3753* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3754drop iteration b* u* p pA pB

3755duplicates drop

    Duplicates in terms of all variables

    (5,994 observations deleted)

3756isid strata6

3757
3758* Ranks
3759sort pmn

3760generate pmnrank = _n

3761order pmnrank, after(phi)

3762sort pAmn

3763generate pAmnrank = _n

3764order pAmnrank, after(pAhi)

3765sort pBmn

3766generate pBmnrank = _n

3767order pBmnrank, after(pBhi)

3768
3769* Sort the data
3770sort strata6

3771isid strata6

3772
3773* Compress and save the data
3774compress
    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)

3775save "m4B_s6results.dta", replace
    (note: file m4B_s6results.dta not found)
    file m4B_s6results.dta saved

3776
3777* List strata with statistically significant interaction effects on the predicted in
    > cidence
3778use "m4B_s6results.dta", clear

3779list strata6  pBmn pBlo pBhi if pBhi<0, noobs

3780list strata6  pBmn pBlo pBhi if pBlo>0, noobs

3781

```

```

3782
3783
3784*****
3785* MODEL 4A_S12 - CIGARETTE USE, Null MODEL
3786*****
3787
3788*-----*
3789* FIT THE MODEL
3790*-----*
3791
3792* Load the data
3793use "analysisready2.dta", clear

3794sort strata12 aid

```

```

3795
3796* delete if missing dependent variable (so can record number)
3797drop if use_cig_30days == .
    (174 observations deleted)

```

```

3798
3799* Fit model using by PQL2
3800runmlwin use_cig_30days cons , ///
    > level2(strata12: cons) ///
    > level1(aid:) ///
    > discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
    > rlgls 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
strata12	12	466	1155.6	2888

Run time (seconds) = **1.80**
 Number of iterations = **6**

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.276209	.1652427	-7.72	0.000	-1.600078	-.952339

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var(cons)	.3195679	.1341742	.0565913	.5825445

```

3801
3802* Fit model using by MCMC
3803runmlwin use_cig_30days cons , ///
    > level2(strata12: cons, residuals(u, savechains("m4A_s12_u.dta", replace))) ///
    > level1(aid:) ///
    > discrete(distribution(binomial) link(logit) denominator(denominator)) ///
    > mcmc(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
strata12	12	466	1155.6	2888

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	145
Deviance (dbar)	=	15288.51
Deviance (thetabar)	=	15276.88
Effective no. of pars (pd)	=	11.64
Bayesian DIC	=	15300.15

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.265901	.1824014	72	0.000	-1.573318	-.8211397

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12					
var(cons)	.3885975	.2125978	925	.1547399	.8528354

```
3804rename u0 m1u
```

3805drop use

3806

3807* Present the regression coefficients as odds ratios

```
3808runmlwin, or
```

```
MLwiN 3.2 multilevel model                Number of obs      =    13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Minimum	Average	Maximum
strata12	12	466	1155.6	2888

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	145
Deviance (dbar)	=	15288.51
Deviance (thetabar)	=	15276.88
Effective no. of pars (pd)	=	11.64
Bayesian DIC	=	15300.15

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2870902	.0559014	65	0.000	.2073561	.43993

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12 var (cons)	.3885975	.2125978	925	.1547399	.8528354

```

3809
3810* Calculate the ICC from the parameter point estimates
3811scalar mlsigma2u = [RP2]var(cons)

3812scalar mlsigma2e = _pi^2/3

3813display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.106

3814
3815* Calculate the ICC from the chains
3816use "m4A_sl2_beta.dta", clear

3817rename RP2_var_cons_ sigma2u

3818generate sigma2e = _pi^2/3

3819generate icc = sigma2u/(sigma2u + sigma2e)

3820mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1020217	.0440276	883	0.000	.0449223	.2058645

```

3821
3822
3823*****
3824* MODEL 4B S12 - CIGARETTE USE, MAIN EFFECTS MODEL
3825*****
3826
3827*-----*
3828* FIT THE MODEL
3829*-----*
3830
3831* Load the data
3832use "analysisready2.dta", clear

3833sort strata12 aid

3834
3835* delete if missing dependent variable (so can record number)
3836drop if use_cig_30days == .
      (174 observations deleted)

3837
3838* Fit model using by PQL2
3839runmlwin use_cig_30days cons female latinx_race black_race lowparentedu, ///
> level2(strata12: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata12	12	466	1155.6	2888

Run time (seconds) = 2.03
 Number of iterations = 13

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.712799	.1052597	-6.77	0.000	-.9191042	-.5064938
female	-.0603456	.0998834	-0.60	0.546	-.2561135	.1354223
latinx_race	-.656731	.1201605	-5.47	0.000	-.8922413	-.4212208
black_race	-1.268699	.1211599	-10.47	0.000	-1.506168	-1.03123
lowparentedu	.2078012	.0999771	2.08	0.038	.0118498	.4037527

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var(cons)	.0225041	.0121647	-.0013382	.0463464

3840

3841* Fit model using by MCMC

```
3842runmlwin use_cig_30days cons female latinx_race black_race lowparentedu, ///
> level2(strata12: cons, residuals(u, savechains("m4B_sl2_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m4B_sl2_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> nopause
```

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13867

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	466	1155.6	2888

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 263
 Deviance (dbar) = 15289.42
 Deviance (thetabar) = 15278.71
 Effective no. of pars (pd) = 10.71
 Bayesian DIC = 15300.13

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.7060091	.1174792	222	0.000	-.9174375	-.4644393
female	-.0600905	.1087781	281	0.304	-.2999169	.1446114
latinx_race	-.6628148	.1330756	468	0.000	-.9296183	-.3888304
black_race	-1.273615	.1317252	455	0.000	-1.547132	-1.014413
lowparentedu	.2008997	.1131737	363	0.054	-.0454081	.4205288

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0299527	.0263844	546	.0045866	.0865506

3843rename u0 mlu

3844drop u0se

3845

3846* Present the regression coefficients as odds ratios

3847runmlwin, 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
strata12	12	466	1155.6	2888

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **263**
 Deviance (dbar) = **15289.42**
 Deviance (thetabar) = **15278.71**
 Effective no. of pars (pd) = **10.71**
 Bayesian DIC = **15300.13**

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4970372	.0588514	217	0.000	.3995416	.6284874
female	.9496687	.1031112	287	0.304	.7408805	1.15559
latinx_race	.5179145	.0702307	491	0.000	.3947043	.6778493
black_race	.2818839	.0369243	475	0.000	.2128578	.3626153
lowparentedu	1.230117	.1394638	370	0.054	.9556077	1.522767

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(const)	.0299527	.0263844	546	.0045866	.0865506

3848

3849* Calculate the ICC from the parameter point estimates

3850scalar mlsigma2u = [RP2]var(const)

3851scalar mlsigma2e = _pi^2/3

3852display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.009

3853

3854* Calculate the ICC from the chains

3855use "m4B_sl2_beta.dta", clear

3856rename RP2_var_cons_ sigma2u

3857generate sigma2e = _pi^2/3

3858generate icc = sigma2u/(sigma2u + sigma2e)

3859mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0088826	.007525	542	0.000	.0013922	.0256338

3860

3861

3862*-----*

3863* PREPARE FIXED-PART PAREMETER CHAINS

3864*-----*

3865

3866use "m4B_s12_beta.dta", clear

3867drop deviance RP2_var_cons_ OD_bcons_1

3868rename FP1_* b_*

3869format %9.2f b_*

3870compress

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

3871save "m4B_s12_beta_prepped.dta", replace
file m4B_s12_beta_prepped.dta saved

3872isid iteration

3873codebook iteration, compact

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

3874

3875

3876*-----*

3877* PREPARE STRATUM RANDOM EFFECTS CHAINS

3878*-----*

3879

3880use "m4B_s12_u.dta", clear

3881drop residual idnum

3882rename value u

3883format %9.2f u

3884sort strata12 iteration

3885order strata12 iteration

3886compress

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

```
3887save "m4B_sl2_u_prepped.dta", replace
      file m4B_sl2_u_prepped.dta saved
```

```
3888isid stratal2 iteration
```

```
3889codebook iteration, compact
```

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

```
3890
```

```
3891
```

```
3892*-----*
```

```
3893* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
```

```
3894*-----*
```

```
3895
```

```
3896use "data12.dta", clear
```

```
3897isid stratal2
```

```
3898cross using "m4B_sl2_beta_prepped.dta"
```

```
3899isid stratal2 iteration
```

```
3900sort stratal2 iteration
```

```
3901merge 1:1 stratal2 iteration using "m4B_sl2_u_prepped.dta", nogenerate assert(match)
```

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

```
3902isid stratal2 iteration
```

```
3903compress
```

```
      variable stratal2 was double now int  
      (72,000 bytes saved)
```

```
3904save "m4B_sl2data_prepped.dta", replace
      file m4B_sl2data_prepped.dta saved
```

```
3905
```

```
3906
```

```
3907*-----*
```

```
3908* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
```

```
3909*-----*
```

```
3910
```

```
3911* Percentage p based on fixed and random part
```

```
3912use "m4B_sl2data_prepped.dta", clear
```

```
3913gen cons = 1
```

```
3914generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      + u ///
> )
```

```

3915label var p "Percentage based on main effects and interactions"
3916format %9.3f p
3917
3918* Percentage p based only on the fixed-part
3919generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      )
3920label var pA "Percentage based only on main effects"
3921format %9.3f pA
3922
3923* Percentage pB calculated as the difference between p and pA
3924generate pB = p - pA
3925label var pB "Percentage point difference based on interaction effects"
3926format %9.3f pB
3927
3928* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
3929bysort stratal2 (iteration): egen pmn = mean(p)
3930bysort stratal2 (iteration): egen plo = pctlile(p), p(2.5)
3931bysort stratal2 (iteration): egen phi = pctlile(p), p(97.5)
3932format %9.3f pmn plo phi
3933label var pmn "Percentage based on main effects and interactions"
3934label var plo "Percentage based on main effects and interactions"
3935label var phi "Percentage based on main effects and interactions"
3936
3937
3938bysort stratal2 (iteration): egen pAmn = mean(pA)
3939bysort stratal2 (iteration): egen pAlo = pctlile(pA), p(2.5)
3940bysort stratal2 (iteration): egen pAhi = pctlile(pA), p(97.5)
3941format %9.3f pAmn pAlo pAhi
3942label var pAmn "Percentage based on main effects"
3943label var pAlo "Percentage based on main effects"
3944label var pAhi "Percentage based on main effects"
3945
3946bysort stratal2 (iteration): egen pBmn = mean(pB)

```

```

3947 bysort strata12 (iteration): egen pBlo = pctlile(pB), p(2.5)
3948 bysort strata12 (iteration): egen pBhi = pctlile(pB), p(97.5)
3949 format %9.3f pBmn pBlo pBhi
3950 label var pBmn "Percentage point difference based on interaction effects"
3951 label var pBlo "Percentage point difference based on interaction effects"
3952 label var pBhi "Percentage point difference based on interaction effects"
3953
3954 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
3955 drop iteration b* u* p pA pB
3956 duplicates drop
      Duplicates in terms of all variables
      (11,988 observations deleted)
3957 isid strata12
3958
3959 * Ranks
3960 sort pmn
3961 generate pmnrank = _n
3962 order pmnrank, after(phi)
3963 sort pAmn
3964 generate pAmnrank = _n
3965 order pAmnrank, after(pAhi)
3966 sort pBmn
3967 generate pBmnrank = _n
3968 order pBmnrank, after(pBhi)
3969
3970 * Sort the data
3971 sort strata12
3972 isid strata12
3973
3974 * Compress and save the data
3975 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)
3976 save "m4B_s12results.dta", replace
      file m4B_s12results.dta saved

```

```
4000
4001* Fit model using PQL2
4002runmlwin use_cig_30days cons , ///
> level2(strata18: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rigns maxiterations(100) ///
> nopause
```

Level Variable	No. of Groups	Minimum	Average	Maximum
strata18	18	213	770.4	1574

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.30018	.1359112	-9.57	0.000	-1.566561	-1.033799

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var (cons)	.3195063	.1108553	.1022339	.5367788

4003

4004* Fit model using MCMC

4005runmlwin use_cig_30days cons , ///

> level2(strata18: cons, residuals(u, savechains("m4A_s18_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	213	770.4	1574

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **143**Deviance (dbar) = **15255.23**Deviance (thetabar) = **15237.73**Effective no. of pars (pd) = **17.50**Bayesian DIC = **15272.73**

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.291327	.1313808	118	0.000	-1.585158	-1.050978

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18						
	var(cons)	.3563805	.1432647	887	.1761143	.6976552

4006rename u0 mlu

4007drop u0se

4008

4009* Present the regression coefficients as odds ratios

4010runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	213	770.4	1574

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      143
Deviance (dbar)       =    15255.23
Deviance (thetabar)   =    15237.73
Effective no. of pars (pd) =    17.50
Bayesian DIC          =    15272.73

```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2772487	.0358381	133	0.000	.2049154	.3495958

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.3563805	.1432647	887	.1761143	.6976552

```

4011
4012* Calculate the ICC from the parameter point estimates
4013scalar mlsigma2u = [RP2]var(cons)

4014scalar mlsigma2e = _pi^2/3

4015display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.098

4016
4017* Calculate the ICC from the chains
4018use "m4A_s18_beta.dta", clear

4019rename RP2_var_cons_ sigma2u

4020generate sigma2e = _pi^2/3

4021generate icc = sigma2u/(sigma2u + sigma2e)

4022mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0971174	.0324652	902	0.000	.0508122	.1749595

```

4023
4024
4025*****
4026* MODEL 4B_S18 - CIGARETTE USE, MAIN EFFECTS MODEL
4027*****
4028
4029*-----*
4030* FIT THE MODEL
4031*-----*
4032
4033* Load the data
4034use "analysisready2.dta", clear

```


4036

```
4038 drop if use ciq 30days == .
```

(174 observations deleted)

```
4040* Fit model using PQL2
```

```
> level2(strata18: cons) ///
```

```
> level1(aid:) ///
```

```
> discrete(distribution(binomial) link(logit) denominator(denominator) pgl2) ///
```

```
> riqls maxiterations(100) ///
```

```
> nopause
```

Number of obs = 13867

Estimation algorithm: **RIGLS**, **PQL2**

```
Run time (seconds)      =      2.06
Number of iterations    =      12
```

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(cons)	.0275739	.0128143	.0024583	.0526896

4043* Fit model using MCMC

```
> level2(strata18: cons, residuals(u, savechains("m4B_s18 u.dta", replace))) ///
```

```
> level1(aid:) ///
```

```
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
```

```
> mcmc(burnin(5000) chain(50000) thinning(50) ///
```

```
> savechains("m4B_s18_beta.dta", replace)) initsprevious /// saving the beta & var
```

```
> lmer parameter estimates for the models
```

```
> nopause
```

Number of obs = 13867

Estimation algorithm: **MCMC**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	213	770.4	1574

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =     288
Deviance (dbar)       =    15257.23
Deviance (thetabar)   =    15242.10
Effective no. of pars (pd) =    15.13
Bayesian DIC          =    15272.35

```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.815725	.1392548	129	0.004	-1.026401	-.5460096
female	-.0625032	.1023652	345	0.272	-.2976248	.1241956
latinx_race	-.6061814	.1254851	417	0.000	-.855561	-.3335121
black_race	-1.262449	.1257108	394	0.000	-1.528364	-1.00356
hsless	.2955827	.1283788	220	0.021	.0148129	.5176078
somecollege	.1771839	.1354697	219	0.080	-.139393	.4090953

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0335442	.0277533	199	.0063512	.0962616

```
4045rename u0 mlu
```

```
4046drop u0se
```

```
4047
```

```
4048* Present the regression coefficients as odds ratios
```

```
4049runmlwin, 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
strata18	18	213	770.4	1574

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =     288
Deviance (dbar)       =    15257.23
Deviance (thetabar)   =    15242.10
Effective no. of pars (pd) =    15.13
Bayesian DIC          =    15272.35

```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4478603	.0773359	112	0.004	.3582941	.5792568
female	.9436453	.0939899	363	0.272	.7425799	1.132237
latinx_race	.5519403	.0709056	445	0.000	.4250447	.7164032
black_race	.2857446	.0358334	410	0.000	.2168902	.3665721
hsless	1.354254	.1687804	239	0.021	1.014923	1.678009
somecollege	1.202096	.1546689	259	0.080	.8698862	1.505456

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0335442	.0277533	199	.0063512	.0962616

```

4050
4051* Calculate the ICC from the parameter point estimates
4052scalar mlsigma2u = [RP2]var(cons)

4053scalar mlsigma2e = _pi^2/3

4054display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.010

4055
4056* Calculate the ICC from the chains
4057use "m4B_s18_beta.dta", clear

4058rename RP2_var_cons_ sigma2u

4059generate sigma2e = _pi^2/3

4060generate icc = sigma2u/(sigma2u + sigma2e)

4061mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0100886	.0078267	203	0.000	.0019268	.0284282

```

4062
4063
4064*-----*
4065* PREPARE FIXED-PART PARAMETER CHAINS
4066*-----*
4067
4068use "m4B_s18_beta.dta", clear

4069drop deviance RP2_var_cons_ OD_bcons_1

4070rename FP1_* b_*

4071format %9.2f b_*

4072compress
      variable iteration was double now long
      (4,000 bytes saved)

4073save "m4B_s18_beta_prepped.dta", replace
      file m4B_s18_beta_prepped.dta saved

4074isid iteration

4075codebook iteration, compact

```

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

```

4076
4077

```

```

4078*-----*
4079* PREPARE STRATUM RANDOM EFFECTS CHAINS
4080*-----*
4081
4082use "m4B_s18_u.dta", clear

4083drop residual idnum

4084rename value u

4085format %9.2f u

4086sort strata18 iteration

4087order strata18 iteration

4088compress
      variable strata18 was double now int
      variable iteration was double now long
      (180,000 bytes saved)

4089save "m4B_s18_u_prepped.dta", replace
      file m4B_s18_u_prepped.dta saved

4090isid strata18 iteration

4091codebook iteration, compact

```

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

```

4092
4093
4094*-----*
4095* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4096*-----*
4097
4098use "data18.dta", clear

4099isid strata18

4100cross using "m4B_s18_beta_prepped.dta"

4101isid strata18 iteration

4102sort strata18 iteration

4103merge 1:1 strata18 iteration using "m4B_s18_u_prepped.dta", nogenerate assert(match)

```

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

```

4104isid strata18 iteration

```

```

4105compress
      variable strata18 was double now int
      (108,000 bytes saved)

4106save "m4B_sl8data_prepped.dta", replace
      file m4B_sl8data_prepped.dta saved

4107
4108
4109*-----*
4110* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4111*-----*
4112
4113* Percentage p based on fixed and random part
4114use "m4B_sl8data_prepped.dta", clear

4115gen cons = 1

4116generate 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 ///
> )

4117label var p "Percentage based on main effects and interactions"

4118format %9.3f p

4119
4120* Percentage p based only on the fixed-part
4121generate 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 ///
> )

4122label var pA "Percentage based only on main effects"

4123format %9.3f pA

4124
4125* Percentage pB calculated as the difference between p and pA
4126generate pB = p - pA

4127label var pB "Percentage point difference based on interaction effects"

4128format %9.3f pB

4129
4130* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4131bysort strata18 (iteration): egen pmn = mean(p)

4132bysort strata18 (iteration): egen plo = pctl(p), p(2.5)

```

```

4133bysort strata18 (iteration): egen phi = pctlile(p), p(97.5)
4134format %9.3f pmn plo phi
4135label var pmn "Percentage based on main effects and interactions"
4136label var plo "Percentage based on main effects and interactions"
4137label var phi "Percentage based on main effects and interactions"

4138
4139
4140bysort strata18 (iteration): egen pAmn = mean(pA)
4141bysort strata18 (iteration): egen pAlo = pctlile(pA), p(2.5)
4142bysort strata18 (iteration): egen pAhi = pctlile(pA), p(97.5)
4143format %9.3f pAmn pAlo pAhi
4144label var pAmn "Percentage based on main effects"
4145label var pAlo "Percentage based on main effects"
4146label var pAhi "Percentage based on main effects"

4147
4148bysort strata18 (iteration): egen pBmn = mean(pB)
4149bysort strata18 (iteration): egen pBlo = pctlile(pB), p(2.5)
4150bysort strata18 (iteration): egen pBhi = pctlile(pB), p(97.5)
4151format %9.3f pBmn pBlo pBhi
4152label var pBmn "Percentage point difference based on interaction effects"
4153label var pBlo "Percentage point difference based on interaction effects"
4154label var pBhi "Percentage point difference based on interaction effects"

4155
4156* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4157drop iteration b* u* p pA pB

4158duplicates drop

    Duplicates in terms of all variables

    (17,982 observations deleted)

4159isid strata18

4160
4161* Ranks
4162sort pmn

4163generate pmnrank = _n

4164order pmnrank, after(phi)

```

```

4165sort pAmn
4166generate pAmnrank = _n
4167order pAmnrank, after(pAhi)
4168sort pBmn
4169generate pBmnrank = _n
4170order pBmnrank, after(pBhi)
4171
4172* Sort the data
4173sort strata18
4174isid strata18
4175
4176* Compress and save the data
4177compress
    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)
4178save "m4B_sl8results.dta", replace
    file m4B_sl8results.dta saved
4179
4180* List strata with statistically significant interaction effects on the predicted in
    > cidence
4181use "m4B_sl8results.dta", clear
4182list strata18 pBmn pBlo pBhi if pBhi<0, noobs
4183list strata18 pBmn pBlo pBhi if pBlo>0, noobs
4184
4185
4186*****
4187* MODEL 4A_S36 - CIGARETTE USE, Null MODEL
4188*****
4189
4190*-----*
4191* FIT THE MODEL
4192*-----*
4193
4194* Load the data
4195use "analysisready2.dta", clear
4196sort strata36 aid
4197
4198* delete if missing dependent variable (so can record number)
4199drop if use_cig_30days == .
    (174 observations deleted)
4200

```

```

4201* Fit model using PQL2
4202runmlwin use_cig_30days 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
strata36	36	46	385.2	1078

Run time (seconds) = **1.77**
 Number of iterations = **5**

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.299351	.1012523	-12.83	0.000	-1.497802	-1.1009

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36					
	var(cons)	.3353443	.0865529	.1657037	.5049848

```

4203
4204* Fit model using MCMC
4205runmlwin use_cig_30days cons , ///
> level2(strata36: cons, residuals(u, savechains("m4A_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata36	36	46	385.2	1078

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **145**
 Deviance (dbar) = **15242.45**
 Deviance (thetabar) = **15209.48**
 Effective no. of pars (pd) = **32.97**
 Bayesian DIC = **15275.42**

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.283093	.1081253	210	0.000	-1.496822	-1.076959

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata36 var (cons)	.3564006	.1002237	1393	.2118836	.5858895

```
4206rename u0 m1u
```

4207drop u0se

4208

4209* Present the regression coefficients as odds ratios

```
4210runmlwin, 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
strata36	36	46	385.2	1078	

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	145
Deviance (dbar)	=	15242.45
Deviance (thetabar)	=	15209.48
Effective no. of pars (pd)	=	32.97
Bayesian DIC	=	15275.42

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2791759	.0295495	213	0.000	.2238403	.3406299

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata36 var (cons)	.3564006	.1002237	1393	.2118836	.5858895

4211

4212* Calculate the ICC from the parameter point estimates

```
4213 scalar m1sigma2u = [RP2]var(cons)
```

```
4214 scalar m1sigma2e = pi^2/3
```

```
4215display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC = 0.098
```

4216

4217* Calculate the ICC from the chains

```
4218use "m4A s36 beta.dta", clear
```

```

4219rename RP2_var_cons_ sigma2u
4220generate sigma2e = _pi^2/3
4221generate icc = sigma2u/(sigma2u + sigma2e)
4222mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0971746	.0234028	1398	0.000	.0605079	.1511677

```

4223
4224
4225*****
4226* MODEL 4B_S36 - CIGARETTE USE, MAIN EFFECTS MODEL
4227*****
4228
4229*-----*
4230* FIT THE MODEL
4231*-----*
4232
4233* Load the data
4234use "analysisready2.dta", clear

4235sort strata36 aid

4236
4237* delete if missing dependent variable (so can record number)
4238drop if use_cig_30days == .
      (174 observations deleted)

4239
4240* Fit model using PQL2
4241runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege lowinc
> , ///
> level2(strata36: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata36	36	46	385.2	1078

Run time (seconds) = **2.10**
 Number of iterations = **10**

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.8843354	.0841193	-10.51	0.000	-1.049206	-.7194647
female	-.034046	.0698733	-0.49	0.626	-.1709952	.1029033
latinx_race	-.602152	.086612	-6.95	0.000	-.7719083	-.4323956
black_race	-1.303036	.087133	-14.95	0.000	-1.473813	-1.132258
hsless	.2813684	.0865436	3.25	0.001	.111746	.4509907
somecollege	.1852677	.0875399	2.12	0.034	.0136927	.3568427
lowinc	.1057606	.0724243	1.46	0.144	-.0361885	.2477096

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(const)	.021223	.009399	.0028013	.0396447

4242

4243* Fit model using MCMC

```

4244runmlwin use_cig_30days cons female latinx_race black_race hsless somecollege lowinc
> , ///
> level2(strata36: cons, residuals(u, savechains("m4B_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	46	385.2	1078

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 318
 Deviance (dbar) = 15243.74
 Deviance (thetabar) = 15222.97
 Effective no. of pars (pd) = 20.77
 Bayesian DIC = 15264.52

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.8882429	.091493	327	0.000	-1.052816	-.6953958
female	-.0308236	.0741798	510	0.328	-.1814055	.1133363
latinx_race	-.613086	.0912839	862	0.000	-.7907649	-.4377845
black_race	-1.306147	.0892174	876	0.000	-1.490152	-1.145581
hsless	.2867212	.0927243	457	0.002	.097403	.4699654
somecollege	.1894927	.0922819	471	0.027	-.0033878	.3631615
lowinc	.1089348	.0757499	560	0.084	-.0558518	.2554069

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(const)	.0226726	.0139478	523	.0041655	.0579257

4245rename u0 mlu

4246drop u0se

4247

4248* Present the regression coefficients as odds ratios

4249runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	46	385.2	1078

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **318**
 Deviance (dbar) = **15243.74**
 Deviance (thetabar) = **15222.97**
 Effective no. of pars (pd) = **20.77**
 Bayesian DIC = **15264.52**

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4136729	.0383662	321	0.000	.3489538	.4988771
female	.971972	.0703455	516	0.328	.8340971	1.120009
latinx_race	.5427302	.0494775	837	0.000	.4534978	.6454649
black_race	.270701	.023564	874	0.000	.2253384	.3180389
hsless	1.336267	.1254077	467	0.002	1.102305	1.599939
somecollege	1.213138	.1132793	475	0.027	.996618	1.43787
lowinc	1.117728	.0852314	569	0.084	.9456793	1.290987

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0226726	.0139478	523	.0041655	.0579257

4250

4251* Calculate the ICC from the parameter point estimates

4252scalar mlsigma2u = [RP2]var(cons)

4253scalar mlsigma2e = _pi^2/3

4254display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
 ICC = **0.007**

4255

4256* Calculate the ICC from the chains

4257use "m4B_s36_beta.dta", clear

4258rename RP2_var_cons_ sigma2u

4259generate sigma2e = _pi^2/3

4260generate icc = sigma2u/(sigma2u + sigma2e)

4261mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0068784	.0041228	523	0.000	.0012646	.0173026

4262

4263

4264*-----*

4265* PREPARE FIXED-PART PAREMETER CHAINS

4266*-----*

4267

4268use "m4B_s36_beta.dta", clear

4269drop deviance RP2_var_cons_ OD_bcons_1

4270rename FP1_* b_*

4271format %9.2f b_*

4272compress

variable **iteration** was **double** now **long**
(4,000 bytes saved)4273save "m4B_s36_beta_prepped.dta", replace
file m4B_s36_beta_prepped.dta saved

4274isid iteration

4275codebook iteration, compact

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

4276

4277

4278*-----*

4279* PREPARE STRATUM RANDOM EFFECTS CHAINS

4280*-----*

4281

4282use "m4B_s36_u.dta", clear

4283drop residual idnum

4284rename value u

4285format %9.2f u

4286sort strata36 iteration

4287order strata36 iteration

4288compress

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

4289save "m4B_s36_u_prepped.dta", replace
file m4B_s36_u_prepped.dta saved

4290isid strata36 iteration

4291codebook iteration, compact

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

4292

4293

4294*-----*

4295* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

4296*-----*

4297

4298use "data36.dta", clear

4299isid strata36

4300cross using "m4B_s36_beta_prepped.dta"

4301isid strata36 iteration

4302sort strata36 iteration

4303merge 1:1 strata36 iteration using "m4B_s36_u_prepped.dta", nogenerate assert(match)

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

4304isid strata36 iteration

4305compress

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

4306save "m4B_s36data_prepped.dta", replace
file m4B_s36data_prepped.dta saved

4307

4308

4309*-----*

4310* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)

4311*-----*

4312

4313* Percentage p based on fixed and random part

4314use "m4B_s36data_prepped.dta", clear

4315gen cons = 1

```
4316generate 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 ///
> )
```

```

4317label var p "Percentage based on main effects and interactions"
4318format %9.3f p
4319
4320* Percentage p based only on the fixed-part
4321generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      )
4322label var pA "Percentage based only on main effects"
4323format %9.3f pA
4324
4325* Percentage pB calculated as the difference between p and pA
4326generate pB = p - pA
4327label var pB "Percentage point difference based on interaction effects"
4328format %9.3f pB
4329
4330* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4331bysort strata36 (iteration): egen pmn = mean(p)
4332bysort strata36 (iteration): egen plo = pctl(p), p(2.5)
4333bysort strata36 (iteration): egen phi = pctl(p), p(97.5)
4334format %9.3f pmn plo phi
4335label var pmn "Percentage based on main effects and interactions"
4336label var plo "Percentage based on main effects and interactions"
4337label var phi "Percentage based on main effects and interactions"
4338
4339
4340bysort strata36 (iteration): egen pAmn = mean(pA)
4341bysort strata36 (iteration): egen pAlo = pctl(pA), p(2.5)
4342bysort strata36 (iteration): egen pAhi = pctl(pA), p(97.5)
4343format %9.3f pAmn pAlo pAhi
4344label var pAmn "Percentage based on main effects"
4345label var pAlo "Percentage based on main effects"
4346label var pAhi "Percentage based on main effects"

```

```

4347
4348 bysort strata36 (iteration): egen pBmn = mean(pB)
4349 bysort strata36 (iteration): egen pBlo = pctlile(pB), p(2.5)
4350 bysort strata36 (iteration): egen pBhi = pctlile(pB), p(97.5)
4351 format %9.3f pBmn pBlo pBhi
4352 label var pBmn "Percentage point difference based on interaction effects"
4353 label var pBlo "Percentage point difference based on interaction effects"
4354 label var pBhi "Percentage point difference based on interaction effects"
4355
4356 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4357 drop iteration b* u* p pA pB
4358 duplicates drop
      Duplicates in terms of all variables
      (35,964 observations deleted)
4359 isid strata36
4360
4361 * Ranks
4362 sort pmn
4363 generate pmnrank = _n
4364 order pmnrank, after(phi)
4365 sort pAmn
4366 generate pAmnrank = _n
4367 order pAmnrank, after(pAhi)
4368 sort pBmn
4369 generate pBmnrank = _n
4370 order pBmnrank, after(pBhi)
4371
4372 * Sort the data
4373 sort strata36
4374 isid strata36
4375
4376 * Compress and save the data
4377 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)

```



```
4378save "m4B_s36results.dta", replace
      file m4B_s36results.dta saved
```

```
4379
```

```
4380* List strata with statistically significant interaction effects on the predicted in
      > cidence
```

```
4381use "m4B_s36results.dta", clear
```

```
4382list strata36 pBmn pBlo pBhi if pBhi<0, noobs
```

strata36	pBmn	pBlo	pBhi
2111	-3.397	-7.861	-0.192

```
4383list strata36 pBmn pBlo pBhi if pBlo>0, noobs
```

```
4384
```

```
4385
```

```
4386*****
```

```
4387* MODEL 4A S48 - CIGARETTE USE, Null MODEL
```

```
4388*****
```

```
4389
```

```
4390*-----*
```

```
4391* FIT THE MODEL
```

```
4392*-----*
```

```
4393
```

```
4394* Load the data
```

```
4395use "analysisready2.dta", clear
```

```
4396sort strata48 aid
```

```
4397
```

```
4398* delete if missing dependent variable (so can record number)
```

```
4399drop if use_cig_30days == .
      (174 observations deleted)
```

```
4400
```

```
4401* Fit model using PQL2
```

```
4402runmlwin use_cig_30days 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
strata48	48	3	288.9	1078

Run time (seconds) = 1.83

Number of iterations = 5

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.39146	.1002489	-13.88	0.000	-1.587944	-1.194976

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var(const)	.3856149	.0935637	.2022334	.5689965

4403

4404* Fit model using MCMC

4405runmlwin use_cig_30days cons , ///

```

> level2(strata48: cons, residuals(u, savechains("m4A_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	288.9	1078

```

Burnin           =      5000
Chain            =     50000
Thinning         =       50
Run time (seconds) =     145
Deviance (dbar)  =    15196.53
Deviance (thetabar) =    15157.61
Effective no. of pars (pd) =    38.92
Bayesian DIC     =    15235.46

```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.38661	.1011705	248	0.000	-1.589951	-1.195363

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(const)	.405014	.1071373	931	.2550601	.6551814

4406rename u0 mlu

4407drop u0se

4408

4409* Present the regression coefficients as odds ratios

4410runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	288.9	1078

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15196.53
Deviance (thetabar) =    15157.61
Effective no. of pars (pd) =    38.92
Bayesian DIC        =    15235.46

```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2513623	.0253142	250	0.000	.2039356	.3025942

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.405014	.1071373	931	.2550601	.6551814

```

4411
4412* Calculate the ICC from the parameter point estimates
4413scalar mlsigma2u = [RP2]var(cons)

4414scalar mlsigma2e = _pi^2/3

4415display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.110

4416
4417* Calculate the ICC from the chains
4418use "m4A_s48_beta.dta", clear

4419rename RP2_var_cons_ sigma2u

4420generate sigma2e = _pi^2/3

4421generate icc = sigma2u/(sigma2u + sigma2e)

4422mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1088456	.0246203	940	0.000	.0719507	.1660768

```

4423
4424
4425*****
4426* MODEL 4B_S48 - CIGARETTE USE, MAIN EFFECTS MODEL
4427*****
4428
4429*-----*
4430* FIT THE MODEL
4431*-----*
4432
4433* Load the data
4434use "analysisready2.dta", clear

```

4435 sort strata48 aid

4436

4437* delete if missing dependent variable (so can record number)

4438 drop if use_cig_30days == .
(174 observations deleted)

4439

4440* Fit model using PQL2

```
4441 runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege 1
> owinc, ///
> 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
strata48	48	3	288.9	1078

Run time (seconds) = **2.12**
Number of iterations = **11**

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.9061703	.0754313	-12.01	0.000	-1.054013	-.7583277
female	-.0319923	.0627582	-0.51	0.610	-.1549961	.0910116
latinx_imm	-1.613915	.1728059	-9.34	0.000	-1.952608	-1.275221
latinx_non	-.4788815	.0816509	-5.86	0.000	-.6389143	-.3188486
black	-1.306101	.0802995	-16.27	0.000	-1.463485	-1.148717
hsless	.2867855	.0783902	3.66	0.000	.1331435	.4404275
somecollege	.1897769	.0797355	2.38	0.017	.0334981	.3460557
lowinc	.1423049	.0662571	2.15	0.032	.0124434	.2721664

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var(cons)	.0150487	.0075903	.000172	.0299254

4442

4443* Fit model using MCMC

```
4444 runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege 1
> owinc, ///
> level2(strata48: cons, residuals(u, savechains("m4B_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata48	48	3	288.9	1078

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 356
 Deviance (dbar) = 15197.53
 Deviance (thetabar) = 15177.59
 Effective no. of pars (pd) = 19.94
 Bayesian DIC = 15217.46

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.9106147	.080001	452	0.000	-1.064869	-.7462294
female	-.030678	.0637366	718	0.315	-.1619757	.082622
latinx_imm	-1.628296	.1717469	826	0.000	-1.980338	-1.30172
latinx_non	-.4866312	.0858149	760	0.000	-.6333761	-.3117067
black	-1.309324	.0797401	896	0.000	-1.473838	-1.150264
hsless	.2915291	.0849176	580	0.001	.1161938	.4494526
somecollege	.1933397	.0824989	706	0.016	.0187645	.3454348
lowinc	.1458273	.0640111	718	0.009	.0209598	.27488

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48						
	var(cons)	.0155474	.0106584	503	.0014521	.0403658

4445rename u0 mlu

4446drop u0se

4447

4448* Present the regression coefficients as odds ratios

4449runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**
 Number of obs = **13867**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	288.9	1078

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 356
 Deviance (dbar) = 15197.53
 Deviance (thetabar) = 15177.59
 Effective no. of pars (pd) = 19.94
 Bayesian DIC = 15217.46

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.4028446	.032711	454	0.000	.3447732	.474151
female	.9715788	.0610454	718	0.315	.8504619	1.086131
latinx_imm	.1995675	.0345201	838	0.000	.1380226	.2720636
latinx_non	.6189015	.0522896	757	0.000	.5307969	.7321962
black	.2715695	.0217453	894	0.000	.2290447	.3165531
hsless	1.344935	.1119849	577	0.001	1.123214	1.567454
somecollege	1.218646	.0983975	707	0.016	1.018942	1.412604

lowinc	1.161464	.0757271	716	0.009	1.021181	1.316373
--------	----------	----------	-----	-------	----------	----------

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.0155474	.0106584	503	.0014521	.0403658

```

4450
4451* Calculate the ICC from the parameter point estimates
4452scalar mlsigma2u = [RP2]var(cons)
4453scalar mlsigma2e = _pi^2/3
4454display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.005

```

```

4455
4456* Calculate the ICC from the chains
4457use "m4B_s48_beta.dta", clear
4458rename RP2_var_cons_ sigma2u
4459generate sigma2e = _pi^2/3
4460generate icc = sigma2u/(sigma2u + sigma2e)
4461mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0046803	.0030818	501	0.000	.0004412	.012121

```

4462
4463
4464*-----*
4465* PREPARE FIXED-PART PARAMETER CHAINS
4466*-----*
4467
4468use "m4B_s48_beta.dta", clear
4469drop deviance RP2_var_cons_ OD_bcons_1
4470rename FP1_* b_*
4471format %9.2f b_*
4472compress
      variable iteration was double now long
      (4,000 bytes saved)
4473save "m4B_s48_beta_prepped.dta", replace
      file m4B_s48_beta_prepped.dta saved
4474isid iteration
4475codebook iteration, compact

```

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

```

4476
4477
4478*-----*
4479* PREPARE STRATUM RANDOM EFFECTS CHAINS
4480*-----*
4481
4482use "m4B_s48_u.dta", clear

4483drop residual idnum

4484rename value u

4485format %9.2f u

4486sort strata48 iteration

4487order strata48 iteration

4488compress
      variable strata48 was double now int
      variable iteration was double now long
      (480,000 bytes saved)

4489save "m4B_s48_u_prepped.dta", replace
      file m4B_s48_u_prepped.dta saved

4490isid strata48 iteration

4491codebook iteration, compact

```

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

```

4492
4493
4494*-----*
4495* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4496*-----*
4497
4498use "data48.dta", clear

4499isid strata48

4500cross using "m4B_s48_beta_prepped.dta"

4501isid strata48 iteration

4502sort strata48 iteration

4503merge 1:1 strata48 iteration using "m4B_s48_u_prepped.dta", nogenerate assert(match)

```

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

```

4504isid strata48 iteration

4505compress
      variable strata48 was double now int
      (288,000 bytes saved)

4506save "m4B_s48data_prepped.dta", replace
      file m4B_s48data_prepped.dta saved

4507
4508
4509*-----*
4510* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4511*-----*
4512
4513* Percentage p based on fixed and random part
4514use "m4B_s48data_prepped.dta", clear

4515gen cons = 1

4516generate 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 ///
> )

4517label var p "Percentage based on main effects and interactions"

4518format %9.3f p

4519
4520* Percentage p based only on the fixed-part
4521generate 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 ///
>      )

4522label var pA "Percentage based only on main effects"

4523format %9.3f pA

4524
4525* Percentage pB calculated as the difference between p and pA
4526generate pB = p - pA

4527label var pB "Percentage point difference based on interaction effects"

4528format %9.3f pB

```



```

4529
4530* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4531bysort strata48 (iteration): egen pmn = mean(p)

4532bysort strata48 (iteration): egen plo = pctl(p), p(2.5)
4533bysort strata48 (iteration): egen phi = pctl(p), p(97.5)
4534format %9.3f pmn plo phi

4535label var pmn "Percentage based on main effects and interactions"
4536label var plo "Percentage based on main effects and interactions"
4537label var phi "Percentage based on main effects and interactions"

4538
4539
4540bysort strata48 (iteration): egen pAmn = mean(pA)
4541bysort strata48 (iteration): egen pAlo = pctl(pA), p(2.5)
4542bysort strata48 (iteration): egen pAhi = pctl(pA), p(97.5)
4543format %9.3f pAmn pAlo pAhi

4544label var pAmn "Percentage based on main effects"
4545label var pAlo "Percentage based on main effects"
4546label var pAhi "Percentage based on main effects"

4547
4548bysort strata48 (iteration): egen pBmn = mean(pB)
4549bysort strata48 (iteration): egen pBlo = pctl(pB), p(2.5)
4550bysort strata48 (iteration): egen pBhi = pctl(pB), p(97.5)
4551format %9.3f pBmn pBlo pBhi

4552label var pBmn "Percentage point difference based on interaction effects"
4553label var pBlo "Percentage point difference based on interaction effects"
4554label var pBhi "Percentage point difference based on interaction effects"

4555
4556* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4557drop iteration b* u* p pA pB

4558duplicates drop

    Duplicates in terms of all variables

    (47,952 observations deleted)

4559isid strata48

4560

```

```

4561* Ranks
4562sort pmn

4563generate pmnrank = _n

4564order pmnrank, after(phi)

4565sort pAmn

4566generate pAmnrank = _n

4567order pAmnrank, after(pAhi)

4568sort pBmn

4569generate pBmnrank = _n

4570order pBmnrank, after(pBhi)

4571
4572* Sort the data
4573sort strata48

4574isid strata48

4575
4576* Compress and save the data
4577compress
    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)

4578save "m4B_s48results.dta", replace
    file m4B_s48results.dta saved

4579
4580* List strata with statistically significant interaction effects on the predicted in
    > cidence
4581use "m4B_s48results.dta", clear

4582list strata48  pBmn pBlo pBhi if pBhi<0, noobs

4583list strata48  pBmn pBlo pBhi if pBlo>0, noobs

4584
4585
4586*****
4587* MODEL 4A_S96 - CIGARETTE USE, Null MODEL
4588*****
4589
4590*-----*
4591* FIT THE MODEL
4592*-----*
4593
4594* Load the data
4595use "analysisready2.dta", clear

4596sort strata96 aid

```

```

4597
4598* delete if missing dependent variable (so can record number)
4599drop if use_cig_30days == .
      (174 observations deleted)

4600
4601* Fit model using PQL2
4602runmlwin use_cig_30days cons , ///
>   level2(strata96: cons) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>   rlgls 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
strata96	91	1	152.4	896

```
Run time (seconds)      =      1.82
Number of iterations    =           6
```

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.290932	.0813894	-15.86	0.000	-1.450452	-1.131412

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var (cons)	.4176334	.0829303	.255093	.5801738

```

4603
4604* Fit model using MCMC
4605runmlwin use_cig_30days cons , ///
> level2(strata96: cons, residuals(u, savechains("m4A_s96_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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	Minimum	Observations per Group Average	Maximum
strata96	91	1	152.4	896

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15119.35
Deviance (thetabar) =    15055.24
Effective no. of pars (pd) =    64.11
Bayesian DIC        =    15183.47

```

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.285822	.0790744	340	0.000	-1.43327	-1.137746

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.4327085	.0891868	1083	.2905536	.6404361

```
4606rename u0 mlu
```

```
4607drop u0se
```

```
4608
```

```
4609* Present the regression coefficients as odds ratios
```

```
4610runmlwin, 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
strata96	91	1	152.4	896

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      145
Deviance (dbar)     =    15119.35
Deviance (thetabar) =    15055.24
Effective no. of pars (pd) =    64.11
Bayesian DIC        =    15183.47

```

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2771906	.0217259	334	0.000	.2385276	.3205406

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.4327085	.0891868	1083	.2905536	.6404361

```

4611
4612* Calculate the ICC from the parameter point estimates
4613scalar mlsigma2u = [RP2]var(cons)

4614scalar mlsigma2e = _pi^2/3

4615display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.116

4616
4617* Calculate the ICC from the chains
4618use "m4A_s96_beta.dta", clear

4619rename RP2_var_cons_ sigma2u

4620generate sigma2e = _pi^2/3

4621generate icc = sigma2u/(sigma2u + sigma2e)

4622mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1147824	.0215121	1068	0.000	.0811507	.1629482

```

4623
4624
4625*****
4626* MODEL 4B S96 - CIGARETTE USE, MAIN EFFECTS MODEL
4627*****
4628
4629*-----*
4630* FIT THE MODEL
4631*-----*
4632
4633* Load the data
4634use "analysisready2.dta", clear

4635sort strata96 aid

4636
4637* delete if missing dependent variable (so can record number)
4638drop if use_cig_30days == .
      (174 observations deleted)

4639
4640* Fit model using PQL2
4641runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege 1
      > owinc straight_no, ///
      > 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
strata96	91	1	152.4	896

Run time (seconds) = 2.13
 Number of iterations = 12

use_cig_30~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-.9742113	.0930179	-10.47	0.000	-1.156523	-.7918996
female	-.002154	.0755309	-0.03	0.977	-.1501919	.1458839
latinx_imm	-1.555946	.1881961	-8.27	0.000	-1.924804	-1.187089
latinx_non	-.4394252	.0941997	-4.66	0.000	-.6240533	-.2547971
black	-1.268135	.0942089	-13.46	0.000	-1.452781	-1.083489
hsless	.2803735	.0918479	3.05	0.002	.1003549	.4603921
somecollege	.2043043	.0931592	2.19	0.028	.0217155	.386893
lowinc	.0899806	.0775633	1.16	0.246	-.0620406	.2420019
straight_no	.3172006	.0832148	3.81	0.000	.1541026	.4802986

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	.0423948	.014292	.0143829	.0704067

4642

4643* Fit model using MCMC

```
4644runmlwin use_cig_30days cons female latinx_imm latinx_non black hsless somecollege 1
> owinc straight_no, ///
> level2(strata96: cons, residuals(u, savechains("m4B_s96_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13867

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata96	91	1	152.4	896

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 378
 Deviance (dbar) = 15124.52
 Deviance (thetabar) = 15088.77
 Effective no. of pars (pd) = 35.75
 Bayesian DIC = 15160.27

use_cig_30~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-.9705687	.091931	322	0.000	-1.153102	-.7722312
female	.000221	.0760964	657	0.494	-.1542085	.1532751
latinx_imm	-1.570745	.1891408	1161	0.000	-1.940921	-1.214976
latinx_non	-.4429101	.0942733	750	0.000	-.6279869	-.2636634
black	-1.268045	.0942629	816	0.000	-1.454721	-1.08365
hsless	.2801807	.0955393	509	0.003	.0800202	.4571921
somecollege	.2027478	.0937586	563	0.024	.0059508	.3802938
lowinc	.0881131	.0802761	522	0.140	-.0784899	.2315518
straight_no	.3143825	.0810625	757	0.000	.1480314	.4743929

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata96					
var(cons)	.0432887	.0189357	585	.0156792	.086985

```
4645rename u0 m1u
```

4646drop u0se

4647

4648* Present the regression coefficients as odds ratios

4649runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs      =    13867
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Minimum	Average	Maximum
strata96	91	1	152.4	896

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	378
Deviance (dbar)	=	15124.52
Deviance (thetabar)	=	15088.77
Effective no. of pars (pd)	=	35.75
Bayesian DIC	=	15160.27

use_cig_30~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.3808227	.0363131	320	0.000	.3156562	.4619813
female	1.001732	.0768209	640	0.494	.8570933	1.165646
latinx_imm	.2122108	.0401252	1164	0.000	.1435718	.296717
latinx_non	.6455377	.0609671	740	0.000	.533665	.7682321
black	.2825309	.0267483	805	0.000	.2334656	.3383583
hsless	1.329812	.1240585	522	0.003	1.083309	1.579632
somecollege	1.228699	.1167537	571	0.024	1.005969	1.462714
lowinc	1.095467	.0877475	526	0.140	.9245114	1.260555
straight_no	1.372647	.1134913	760	0.000	1.159549	1.607038

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata96 var (cons)	.0432887	.0189357	585	.0156792	.086985

4650

4651* Calculate the ICC from the parameter point estimates

```
4652 scalar m1sigma2u = [RP2]var(cons)
```

```
4653 scalar m1sigma2e = pi^2/3
```

```
4654display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC =      0.013
```

```
4655
```

```
4656* Calculate the ICC from the chains
```

```
4657use "m4B_s96_beta.dta", clear
```

```
4658rename RP2_var_cons_ sigma2u
```

```
4659generate sigma2e = _pi^2/3
```

```
4660generate icc = sigma2u/(sigma2u + sigma2e)
```

```
4661mcmcsum icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0129017	.0054772	584	0.000	.0047433	.0257592

```
4662
```

```
4663
```

```
4664*-----*
```

```
4665* PREPARE FIXED-PART PAREMETER CHAINS
```

```
4666*-----*
```

```
4667
```

```
4668use "m4B_s96_beta.dta", clear
```

```
4669drop deviance RP2_var_cons_ OD_bcons_1
```

```
4670rename FP1_ b_*
```

```
4671format %9.2f b_*
```

```
4672compress
```

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

```
4673save "m4B_s96_beta_prepped.dta", replace  
      file m4B_s96_beta_prepped.dta saved
```

```
4674isid iteration
```

```
4675codebook iteration, compact
```

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

```
4676
```

```
4677
```

```
4678*-----*
```

```
4679* PREPARE STRATUM RANDOM EFFECTS CHAINS
```

```
4680*-----*
```

```
4681
```

```
4682use "m4B_s96_u.dta", clear
```


4683drop residual idnum

4684rename value u

4685format %9.2f u

4686sort strata96 iteration

4687order strata96 iteration

4688compress
 variable **strata96** was **double** now **int**
 variable **iteration** was **double** now **long**
 (910,000 bytes saved)

4689save "m4B_s96_u_prepped.dta", replace
 file m4B_s96_u_prepped.dta saved

4690isid strata96 iteration

4691codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

4692

4693

4694*-----*

4695* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

4696*-----*

4697

4698use "data96_cig.dta", clear

4699isid strata96

4700cross using "m4B_s96_beta_prepped.dta"

4701isid strata96 iteration

4702sort strata96 iteration

4703merge 1:1 strata96 iteration using "m4B_s96_u_prepped.dta", nogenerate assert(match)

Result	# of obs.
not matched	0
matched	91,000

4704isid strata96 iteration

4705compress
 variable **strata96** was **double** now **int**
 (546,000 bytes saved)

4706save "m4B_s96data_prepped.dta", replace
 file m4B_s96data_prepped.dta saved

```

4707
4708
4709*-----*
4710* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4711*-----*
4712
4713* Percentage p based on fixed and random part
4714use "m4B_s96data_prepped.dta", clear

4715gen cons = 1

4716generate 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_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      +b_straight_no*straight_no ///
>      + u ///
> )

4717label var p "Percentage based on main effects and interactions"

4718format %9.3f p

4719
4720* Percentage p based only on the fixed-part
4721generate 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_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      +b_straight_no*straight_no ///
> )

4722label var pA "Percentage based only on main effects"

4723format %9.3f pA

4724
4725* Percentage pB calculated as the difference between p and pA
4726generate pB = p - pA

4727label var pB "Percentage point difference based on interaction effects"

4728format %9.3f pB

4729
4730* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4731bysort strata96 (iteration): egen pmn = mean(p)

4732bysort strata96 (iteration): egen plo = pctl(p), p(2.5)

```

```

4733bysort strata96 (iteration): egen phi = pctlile(p), p(97.5)
4734format %9.3f pmn plo phi
4735label var pmn "Percentage based on main effects and interactions"
4736label var plo "Percentage based on main effects and interactions"
4737label var phi "Percentage based on main effects and interactions"

4738
4739
4740bysort strata96 (iteration): egen pAmn = mean(pA)
4741bysort strata96 (iteration): egen pAlo = pctlile(pA), p(2.5)
4742bysort strata96 (iteration): egen pAhi = pctlile(pA), p(97.5)
4743format %9.3f pAmn pAlo pAhi
4744label var pAmn "Percentage based on main effects"
4745label var pAlo "Percentage based on main effects"
4746label var pAhi "Percentage based on main effects"

4747
4748bysort strata96 (iteration): egen pBmn = mean(pB)
4749bysort strata96 (iteration): egen pBlo = pctlile(pB), p(2.5)
4750bysort strata96 (iteration): egen pBhi = pctlile(pB), p(97.5)
4751format %9.3f pBmn pBlo pBhi
4752label var pBmn "Percentage point difference based on interaction effects"
4753label var pBlo "Percentage point difference based on interaction effects"
4754label var pBhi "Percentage point difference based on interaction effects"

4755
4756* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4757drop iteration b* u* p pA pB

4758duplicates drop

    Duplicates in terms of all variables

    (90,909 observations deleted)

4759isid strata96

4760
4761* Ranks
4762sort pmn

4763generate pmnrank = _n

4764order pmnrank, after(phi)

```

```

4765sort pAmn
4766generate pAmnrank = _n
4767order pAmnrank, after(pAhi)
4768sort pBmn
4769generate pBmnrank = _n
4770order pBmnrank, after(pBhi)
4771
4772* Sort the data
4773sort strata96
4774isid strata96
4775
4776* Compress and save the data
4777compress
    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)
4778save "m4B_s96results.dta", replace
    file m4B_s96results.dta saved
4779
4780* List strata with statistically significant interaction effects on the predicted in
    > cidence
4781use "m4B_s96results.dta", clear
4782list strata96 pBmn pBlo pBhi if pBhi<0, noobs

```

strata96	pBmn	pBlo	pBhi
22111	-4.882	-9.767	-0.148

```

4783list strata96 pBmn pBlo pBhi if pBlo>0, noobs

```

strata96	pBmn	pBlo	pBhi
28111	6.050	1.056	11.200
28200	6.935	0.072	14.351

```

4784
4785
4786    end of do-file
4787do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
4788

```

```

4789*****
4790*****
4791*****
4792*
4793*
4794* MODEL 5 - MARIJUANA USE, MAIN EFFECTS MODEL
4795*
4796*
4797*****
4798*****
4799*****
4800
4801*****
4802* MODEL 5A S6 - MARIJUANA USE, Null MODEL
4803*****
4804
4805*-----*
4806* FIT THE MODEL
4807*-----*
4808
4809* Load the data
4810use "analysisready2.dta", clear

4811sort strata6 aid

4812
4813* delete if missing dependent variable (so can record number)
4814drop if use_mj_30days == .
      (232 observations deleted)

4815
4816* Fit model using by PQL2
4817runmlwin use_mj_30days cons , ///
>   level2(strata6: cons) ///
>   level1(aid:) ///
>   discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
>   rlgls 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
strata6	6	1136	2301.5	4253

Run time (seconds) = **1.88**
 Number of iterations = **9**

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.842596	.0908516	-20.28	0.000	-2.020662	-1.66453

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.0447347	.0286305	-.0113801	.1008494

4818

4819* Fit model using by MCMC

4820runmlwin use_mj_30days cons , ///

> level2(strata6: cons, residuals(u, savechains("m5A_s6_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1136	2301.5	4253

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **138**Deviance (dbar) = **11148.93**Deviance (thetabar) = **11143.06**Effective no. of pars (pd) = **5.87**Bayesian DIC = **11154.80**

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.847859	.1133701	187	0.000	-2.085767	-1.620627

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6	var(cons)	.0741911	.0841216	799	.0145738	.2503014

4821rename u0 mlu

4822drop u0se

4823

4824* Present the regression coefficients as odds ratios

4825runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1136	2301.5	4253

```

Burnin                =      5000
Chain                  =     50000
Thinning                =       50
Run time (seconds)     =      138
Deviance (dbar)        =    11148.93
Deviance (thetabar)    =    11143.06
Effective no. of pars (pd) =    5.87
Bayesian DIC           =    11154.80

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1585303	.0176583	203	0.000	.1242118	.1977746

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0741911	.0841216	799	.0145738	.2503014

4826

4827* Calculate the ICC from the parameter point estimates

4828scalar mlsigma2u = [RP2]var(cons)

4829scalar mlsigma2e = _pi^2/3

4830display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
 ICC = 0.022

4831

4832* Calculate the ICC from the chains

4833use "m5A_s6_beta.dta", clear

4834rename RP2_var_cons_ sigma2u

4835generate sigma2e = _pi^2/3

4836generate icc = sigma2u/(sigma2u + sigma2e)

4837mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0215319	.0193618	782	0.000	.0044104	.0707032

4838

4839

4840*****

4841* MODEL 5B_S6 - MARIJUANA USE, MAIN EFFECTS MODEL

4842*****

4843

4844*-----*

4845* FIT THE MODEL

4846*-----*

4847

4848* Load the data

4849use "analysisready2.dta", clear

4850sort strata6 aid

4851

4852* delete if missing dependent variable (so can record number)

4853drop if use_mj_30days == .
(232 observations deleted)

4854

4855* Fit model using by PQL2

4856runmlwin use_mj_30days cons female latinx_race black_race , ///

> 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**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1136	2301.5	4253

Run time (seconds) = **2.23**

Number of iterations = **26**

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.600321	.108902	-14.70	0.000	-1.813765	-1.386877
female	-.3016098	.1149207	-2.62	0.009	-.5268503	-.0763693
latinx_race	-.0371443	.139913	-0.27	0.791	-.3113688	.2370801
black_race	-.2445511	.1380588	-1.77	0.077	-.5151414	.0260392

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.0151462	.0114529	-.007301	.0375934

4857

4858* Fit model using by MCMC

4859runmlwin use_mj_30days cons female latinx_race black_race , ///

> level2(strata6: cons, residuals(u, savechains("m5B_s6_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
strata6	6	1136	2301.5	4253


```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      220
Deviance (dbar)     =    11149.16
Deviance (thetabar) =    11143.21
Effective no. of pars (pd) =    5.95
Bayesian DIC        =    11155.11

```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.589486	.1385796	167	0.000	-1.881782	-1.260389
female	-.2968838	.1576341	210	0.031	-.6342698	.0268314
latinx_race	-.0478671	.1720629	325	0.374	-.4116729	.2837619
black_race	-.272024	.2313961	115	0.056	-.7677938	.0895525

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0451616	.1352512	141	.0010202	.2137867

```
4860rename u0 mlu
```

```
4861drop u0se
```

```
4862
```

```
4863* Present the regression coefficients as odds ratios
```

```
4864runmlwin, 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
strata6	6	1136	2301.5	4253

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      220
Deviance (dbar)     =    11149.16
Deviance (thetabar) =    11143.21
Effective no. of pars (pd) =    5.95
Bayesian DIC        =    11155.11

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2062294	.0302098	166	0.000	.1523188	.2835437
female	.7517852	.1266236	214	0.031	.5303226	1.027195
latinx_race	.9669237	.1659928	343	0.374	.662541	1.328117
black_race	.7778631	.1568675	184	0.056	.4640389	1.093685

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0451616	.1352512	141	.0010202	.2137867

```

4865
4866* Calculate the ICC from the parameter point estimates
4867scalar mlsigma2u = [RP2]var(cons)

4868scalar mlsigma2e = _pi^2/3

4869display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.014

4870
4871* Calculate the ICC from the chains
4872use "m5B_s6_beta.dta", clear

4873rename RP2_var_cons_ sigma2u

4874generate sigma2e = _pi^2/3

4875generate icc = sigma2u/(sigma2u + sigma2e)

4876mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.011871	.0241937	136	0.000	.00031	.061018

```

4877
4878
4879*-----*
4880* PREPARE FIXED-PART PARAMETER CHAINS
4881*-----*
4882
4883use "m5B_s6_beta.dta", clear

4884drop deviance RP2_var_cons_ OD_bcons_1

4885rename FP1_ b_*

4886format %9.2f b_*

4887compress
      variable iteration was double now long
      (4,000 bytes saved)

4888save "m5B_s6_beta_prepped.dta", replace
      (note: file m5B_s6_beta_prepped.dta not found)
      file m5B_s6_beta_prepped.dta saved

4889isid iteration

4890codebook iteration, compact

```

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

```

4891

```

```

4892
4893*-----*
4894* PREPARE STRATUM RANDOM EFFECTS CHAINS
4895*-----*
4896
4897use "m5B_s6_u.dta", clear

4898drop residual idnum

4899rename value u

4900format %9.2f u

4901sort strata6 iteration

4902order strata6 iteration

4903compress
      variable strata6 was double now byte
      variable iteration was double now long
      (66,000 bytes saved)

4904save "m5B_s6_u_prepped.dta", replace
      (note: file m5B_s6_u_prepped.dta not found)
      file m5B_s6_u_prepped.dta saved

4905isid strata6 iteration

4906codebook iteration, compact

```

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

```

4907
4908
4909*-----*
4910* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
4911*-----*
4912
4913use "data6.dta", clear

4914isid strata6

4915cross using "m5B_s6_beta_prepped.dta"

4916isid strata6 iteration

4917sort strata6 iteration

4918merge 1:1 strata6 iteration using "m5B_s6_u_prepped.dta", nogenerate assert(match)

```

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

```

4919isid strata6 iteration

4920compress
      variable strata6 was double now byte
      (42,000 bytes saved)

4921save "m5B_s6data_prepped.dta", replace
      (note: file m5B_s6data_prepped.dta not found)
      file m5B_s6data_prepped.dta saved

4922
4923
4924*-----*
4925* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
4926*-----*
4927
4928* Percentage p based on fixed and random part
4929use "m5B_s6data_prepped.dta", clear

4930gen cons = 1

4931generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      + u ///
> )

4932label var p "Percentage based on main effects and interactions"

4933format %9.3f p

4934
4935* Percentage p based only on the fixed-part
4936generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
> )

4937label var pA "Percentage based only on main effects"

4938format %9.3f pA

4939
4940* Percentage pB calculated as the difference between p and pA
4941generate pB = p - pA

4942label var pB "Percentage point difference based on interaction effects"

4943format %9.3f pB

4944
4945* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
4946bysort strata6 (iteration): egen pmn = mean(p)

4947bysort strata6 (iteration): egen plo = pctl(p), p(2.5)

```

```

4948bysort strata6 (iteration): egen phi = pctlile(p), p(97.5)
4949format %9.3f pmn plo phi
4950label var pmn "Percentage based on main effects and interactions"
4951label var plo "Percentage based on main effects and interactions"
4952label var phi "Percentage based on main effects and interactions"
4953
4954
4955bysort strata6 (iteration): egen pAmn = mean(pA)
4956bysort strata6 (iteration): egen pAlo = pctlile(pA), p(2.5)
4957bysort strata6 (iteration): egen pAhi = pctlile(pA), p(97.5)
4958format %9.3f pAmn pAlo pAhi
4959label var pAmn "Percentage based on main effects"
4960label var pAlo "Percentage based on main effects"
4961label var pAhi "Percentage based on main effects"
4962
4963bysort strata6 (iteration): egen pBmn = mean(pB)
4964bysort strata6 (iteration): egen pBlo = pctlile(pB), p(2.5)
4965bysort strata6 (iteration): egen pBhi = pctlile(pB), p(97.5)
4966format %9.3f pBmn pBlo pBhi
4967label var pBmn "Percentage point difference based on interaction effects"
4968label var pBlo "Percentage point difference based on interaction effects"
4969label var pBhi "Percentage point difference based on interaction effects"
4970
4971* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
4972drop iteration b* u* p pA pB
4973duplicates drop
      Duplicates in terms of all variables
      (5,994 observations deleted)
4974isid strata6
4975
4976* Ranks
4977sort pmn
4978generate pmnrank = _n
4979order pmnrank, after(phi)

```

```

4980sort pAmn
4981generate pAmnrank = _n
4982order pAmnrank, after(pAhi)
4983sort pBmn
4984generate pBmnrank = _n
4985order pBmnrank, after(pBhi)
4986
4987* Sort the data
4988sort strata6
4989isid strata6
4990
4991* Compress and save the data
4992compress
    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)
4993save "m5B_s6results.dta", replace
    (note: file m5B_s6results.dta not found)
    file m5B_s6results.dta saved
4994
4995* List strata with statistically significant interaction effects on the predicted in
    > cidence
4996use "m5B_s6results.dta", clear
4997list strata6 pBmn pBlo pBhi if pBhi<0, noobs
4998list strata6 pBmn pBlo pBhi if pBlo>0, noobs
4999
5000
5001
5002*****
5003* MODEL 5A_S12 - MARIJUANA USE, Null MODEL
5004*****
5005
5006*-----*
5007* FIT THE MODEL
5008*-----*
5009
5010* Load the data
5011use "analysisready2.dta", clear
5012sort strata12 aid
5013
5014* delete if missing dependent variable (so can record number)
5015drop if use_mj_30days == .
    (232 observations deleted)

```

5016

5017* Fit model using by PQL2

5018runmlwin use_mj_30days 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
strata12	12	465	1150.8	2877

Run time (seconds) = **1.82**Number of iterations = **8**

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.835134	.0624133	-29.40	0.000	-1.957462	-1.712806

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var(cons)	.0369813	.0190118	-.000281	.0742437

5019

5020* Fit model using by MCMC

5021runmlwin use_mj_30days cons , ///

> level2(strata12: cons, residuals(u, savechains("m5A_sl2_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("m5A_sl2_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
strata12	12	465	1150.8	2877

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **139**Deviance (dbar) = **11152.11**Deviance (thetabar) = **11142.13**Effective no. of pars (pd) = **9.97**Bayesian DIC = **11162.08**

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.833776	.0672581	643	0.000	-1.971436	-1.697009

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12					
var (cons)	.0450043	.0300078	1039	.0119504	.1315384

```
5022rename u0 m1u
```

5023drop u0se

5024

5025* Present the regression coefficients as odds ratios

5026runmlwin, 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
strata12	12	465	1150.8	2877

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	139
Deviance (dbar)	=	11152.11
Deviance (thetabar)	=	11142.13
Effective no. of pars (pd)	=	9.97
Bayesian DIC	=	11162.08

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1597999	.0108011	638	0.000	.1392568	.1832307

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12					
var (cons)	.0450043	.0300078	1039	.0119504	.1315384

5027

5028* Calculate the ICC from the parameter point estimates

```
5029 scalar m1sigma2u = [RP2]var(cons)
```

```
5030 scalar m1sigma2e = pi^2/3
```

```
5031display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC = 0.013
```

5032

5033* Calculate the ICC from the chains

```
5034use "m5A s12 beta.dta", clear
```


5035rename RP2_var_cons_ sigma2u

5036generate sigma2e = _pi^2/3

5037generate icc = sigma2u/(sigma2u + sigma2e)

5038mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0139974	.0092717	1039	0.000	.0036194	.0384457

5039

5040

5041*****

5042* MODEL 5B_S12 - MARIJUANA USE, MAIN EFFECTS MODEL

5043*****

5044

5045*-----*

5046* FIT THE MODEL

5047*-----*

5048

5049* Load the data

5050use "analysisready2.dta", clear

5051sort stratal2 aid

5052

5053* delete if missing dependent variable (so can record number)

5054drop if use_mj_30days == .

(232 observations deleted)

5055

5056* Fit model using by PQL2

5057runmlwin use_mj_30days cons female latinx_race black_race lowparentedu, ///

> level2(stratal2: 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
stratal2	12	465	1150.8	2877

Run time (seconds) = 2.17

Number of iterations = 19

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.600947	.0638471	-25.07	0.000	-1.726085	-1.475809
female	-.2826985	.0666753	-4.24	0.000	-.4133796	-.1520174
latinx_race	-.0291699	.0836905	-0.35	0.727	-.1932002	.1348604
black_race	-.2386136	.0799375	-2.98	0.003	-.3952883	-.0819389
lowparentedu	-.0198155	.0676628	-0.29	0.770	-.1524322	.1128011

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: stratal2				
var(cons)	.0047729	.0050995	-.005222	.0147677

5058

5059* Fit model using by MCMC

```

5060runmlwin use_mj_30days cons female latinx_race black_race lowparentedu, ///
> level2(strata12: cons, residuals(u, savechains("m5B_s12_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	465	1150.8	2877

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **756**
 Deviance (dbar) = **11152.23**
 Deviance (thetabar) = **11144.12**
 Effective no. of pars (pd) = **8.11**
 Bayesian DIC = **11160.34**

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.605661	.0692312	689	0.000	-1.751362	-1.473552
female	-.2809074	.0750112	853	0.000	-.4403986	-.1302787
latinx_race	-.024277	.0948575	913	0.378	-.1970522	.1740081
black_race	-.2333957	.091882	725	0.012	-.4141807	-.0522144
lowparentedu	-.0201978	.0747151	917	0.380	-.163393	.1186371

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0092267	.0131686	829	.0005566	.0457009

5061rename u0 mlu

5062drop u0se

5063

5064* Present the regression coefficients as odds ratios

5065runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	465	1150.8	2877

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      756
Deviance (dbar)       =    11152.23
Deviance (thetabar)   =    11144.12
Effective no. of pars (pd) =    8.11
Bayesian DIC          =    11160.34

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.2013254	.0138601	691	0.000	.1735375	.2291102
female	.7578957	.0572822	854	0.000	.6437799	.8778507
latinx_race	.9800347	.0971883	903	0.378	.8211479	1.190065
black_race	.7932997	.0753657	726	0.012	.6608816	.9491254
lowparentedu	.9813073	.0722945	919	0.380	.8492574	1.125961

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0092267	.0131686	829	.0005566	.0457009

```

5066
5067* Calculate the ICC from the parameter point estimates
5068scalar mlsigma2u = [RP2]var(cons)

5069scalar mlsigma2e = _pi^2/3

5070display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.003

5071
5072* Calculate the ICC from the chains
5073use "m5B_s12_beta.dta", clear

5074rename RP2_var_cons_ sigma2u

5075generate sigma2e = _pi^2/3

5076generate icc = sigma2u/(sigma2u + sigma2e)

5077mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0028021	.0035858	827	0.000	.0001692	.0137011

```

5078
5079
5080*-----*
5081* PREPARE FIXED-PART PAREMETER CHAINS
5082*-----*
5083
5084use "m5B_s12_beta.dta", clear

5085drop deviance RP2_var_cons_ OD_bcons_1

```

```

5086rename FP1_* b_*
5087format %9.2f b_*
5088compress
      variable iteration was double now long
      (4,000 bytes saved)
5089save "m5B_s12_beta_prepped.dta", replace
      file m5B_s12_beta_prepped.dta saved
5090isid iteration
5091codebook iteration, compact

```

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

```

5092
5093
5094*-----*
5095* PREPARE STRATUM RANDOM EFFECTS CHAINS
5096*-----*
5097
5098use "m5B_s12_u.dta", clear
5099drop residual idnum
5100rename value u
5101format %9.2f u
5102sort stratal2 iteration
5103order stratal2 iteration
5104compress
      variable stratal2 was double now int
      variable iteration was double now long
      (120,000 bytes saved)
5105save "m5B_s12_u_prepped.dta", replace
      file m5B_s12_u_prepped.dta saved
5106isid stratal2 iteration
5107codebook iteration, compact

```

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

```

5108

```

```

5109
5110*-----*
5111* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5112*-----*
5113
5114use "data12.dta", clear

5115isid strata12

5116cross using "m5B_sl2_beta_prepped.dta"

5117isid strata12 iteration

5118sort strata12 iteration

5119merge 1:1 strata12 iteration using "m5B_sl2_u_prepped.dta", nogenerate assert(match)

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

5120isid strata12 iteration

5121compress
      variable strata12 was double now int
      (72,000 bytes saved)

5122save "m5B_sl2data_prepped.dta", replace
      file m5B_sl2data_prepped.dta saved

5123
5124
5125*-----*
5126* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5127*-----*
5128
5129* Percentage p based on fixed and random part
5130use "m5B_sl2data_prepped.dta", clear

5131gen cons = 1

5132generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      + u ///
> )

5133label var p "Percentage based on main effects and interactions"

5134format %9.3f p

5135
5136* Percentage p based only on the fixed-part
5137generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
> )

```

```

5138label var pA "Percentage based only on main effects"
5139format %9.3f pA
5140
5141* Percentage pB calculated as the difference between p and pA
5142generate pB = p - pA
5143label var pB "Percentage point difference based on interaction effects"
5144format %9.3f pB
5145
5146* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5147bysort stratal2 (iteration): egen pmn = mean(p)
5148bysort stratal2 (iteration): egen plo = pctl(p), p(2.5)
5149bysort stratal2 (iteration): egen phi = pctl(p), p(97.5)
5150format %9.3f pmn plo phi
5151label var pmn "Percentage based on main effects and interactions"
5152label var plo "Percentage based on main effects and interactions"
5153label var phi "Percentage based on main effects and interactions"
5154
5155
5156bysort stratal2 (iteration): egen pAmn = mean(pA)
5157bysort stratal2 (iteration): egen pAlo = pctl(pA), p(2.5)
5158bysort stratal2 (iteration): egen pAhi = pctl(pA), p(97.5)
5159format %9.3f pAmn pAlo pAhi
5160label var pAmn "Percentage based on main effects"
5161label var pAlo "Percentage based on main effects"
5162label var pAhi "Percentage based on main effects"
5163
5164bysort stratal2 (iteration): egen pBmn = mean(pB)
5165bysort stratal2 (iteration): egen pBlo = pctl(pB), p(2.5)
5166bysort stratal2 (iteration): egen pBhi = pctl(pB), p(97.5)
5167format %9.3f pBmn pBlo pBhi
5168label var pBmn "Percentage point difference based on interaction effects"
5169label var pBlo "Percentage point difference based on interaction effects"
5170label var pBhi "Percentage point difference based on interaction effects"
5171

```

```

5172* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5173drop iteration b* u* p pA pB

5174duplicates drop

    Duplicates in terms of all variables

    (11,988 observations deleted)

5175isid strata12

5176
5177* Ranks
5178sort pmn

5179generate pmnrank = _n

5180order pmnrank, after(phi)

5181sort pAmn

5182generate pAmnrank = _n

5183order pAmnrank, after(pAhi)

5184sort pBmn

5185generate pBmnrank = _n

5186order pBmnrank, after(pBhi)

5187
5188* Sort the data
5189sort strata12

5190isid strata12

5191
5192* Compress and save the data
5193compress
    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)

5194save "m5B_s12results.dta", replace
    file m5B_s12results.dta saved

5195
5196* List strata with statistically significant interaction effects on the predicted in
    > cidence
5197use "m5B_s12results.dta", clear

5198list strata12  pBmn pBlo pBhi if pBhi<0, noobs

5199list strata12  pBmn pBlo pBhi if pBlo>0, noobs

5200
5201

```

```
5216
5217* Fit model using PQL2
5218runmlwin use_mj_30days cons , ///
> level2(strata18: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> r1gls 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
strata18	18	210	767.2	1568

```
Run time (seconds)      =      1.83
Number of iterations    =      7
```

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.832286	.0564369	-32.47	0.000	-1.9429	-1.721672

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var (cons)	.0425063	.0189843	.0052978	.0797148

```

5219
5220* Fit model using MCMC
5221runmlwin use_mj_30days cons , ///
> level2(strata18: cons, residuals(u, savechains("m5A_s18_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata18	18	210	767.2	1568

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	140
Deviance (dbar)	=	11147.00
Deviance (thetabar)	=	11133.19
Effective no. of pars (pd)	=	13.80
Bayesian DIC	=	11160.80

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.828694	.0610798	600	0.000	-1.945703	-1.714087

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18					
var(cons)	.0483788	.0261171	1216	.0164076	.1200348

```
5222rename u0 m1u
```

5223drop u0se

5224

5225* Present the regression coefficients as odds ratios

5226runmlwin, or

```
MLwiN 3.2 multilevel model                Number of obs      =    13809
Binomial logit response model
Estimation algorithm: MCMC
```

Level Variable	No. of Groups	Minimum	Observations per Group Average	Maximum
strata18	18	210	767.2	1568

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	140
Deviance (dbar)	=	11147.00
Deviance (thetabar)	=	11133.19
Effective no. of pars (pd)	=	13.80
Bayesian DIC	=	11160.80

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1605837	.0093424	599	0.000	.1428868	.180128

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18					
var(cons)	.0483788	.0261171	1216	.0164076	.1200348

```

5227
5228* Calculate the ICC from the parameter point estimates
5229scalar mlsigma2u = [RP2]var(cons)

```

```

5230scalar mlsigma2e = _pi^2/3

```

```

5231display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.014

```

```

5232
5233* Calculate the ICC from the chains
5234use "m5A_sl8_beta.dta", clear

```

```

5235rename RP2_var_cons_ sigma2u

```

```

5236generate sigma2e = _pi^2/3

```

```

5237generate icc = sigma2u/(sigma2u + sigma2e)

```

```

5238mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.014158	.0072903	1216	0.000	.0049625	.0352018

```

5239
5240
5241*****
5242* MODEL 5B S18 - MARIJUANA USE, MAIN EFFECTS MODEL
5243*****
5244
5245*-----*
5246* FIT THE MODEL
5247*-----*
5248
5249* Load the data
5250use "analysisready2.dta", clear

```

```

5251sort strata18 aid

```

```

5252
5253* delete if missing dependent variable (so can record number)
5254drop if use_mj_30days == .
    (232 observations deleted)

```

```

5255
5256* Fit model using PQL2
5257runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata18	18	210	767.2	1568

Run time (seconds) = 2.12
 Number of iterations = 15

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.666595	.075347	-22.12	0.000	-1.814273	-1.518918
female	-.2885805	.0675807	-4.27	0.000	-.4210363	-.1561247
latinx_race	-.027002	.08634	-0.31	0.754	-.1962253	.1422213
black_race	-.2426461	.0805688	-3.01	0.003	-.4005581	-.0847341
hsless	.0492854	.0830241	0.59	0.553	-.1134389	.2120097
somecollege	.1380348	.0857153	1.61	0.107	-.0299642	.3060338

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(cons)	.0077907	.0064007	-.0047544	.0203357

5258

5259* Fit model using MCMC

```
5260runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("m5B_sl8_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m5B_sl8_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> nopause
```

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13809

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	210	767.2	1568

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 284
 Deviance (dbar) = 11147.48
 Deviance (thetabar) = 11136.67
 Effective no. of pars (pd) = 10.81
 Bayesian DIC = 11158.29

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.666794	.0793448	410	0.000	-1.83527	-1.520285
female	-.2876641	.0741101	805	0.002	-.4332985	-.156091
latinx_race	-.0297887	.0897687	793	0.369	-.207222	.1466946
black_race	-.2452101	.0844181	708	0.005	-.4142951	-.0817308
hsless	.0512129	.0854847	656	0.263	-.1087996	.2320206
somecollege	.1377098	.0890321	702	0.046	-.0308878	.3236053

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.00998	.0112591	558	.0007643	.0403666

5261rename u0 mlu

5262drop u0se

5263

5264* Present the regression coefficients as odds ratios

5265runmlwin, 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
strata18	18	210	767.2	1568

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **284**
 Deviance (dbar) = **11147.48**
 Deviance (thetabar) = **11136.67**
 Effective no. of pars (pd) = **10.81**
 Bayesian DIC = **11158.29**

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1891067	.0150919	431	0.000	.1595704	.2186495
female	.7533179	.0552415	796	0.002	.6483669	.8554813
latinx_race	.9751874	.0886037	772	0.369	.8128392	1.158
black_race	.7824488	.0673513	710	0.005	.6608059	.92152
hsless	1.059713	.0945091	655	0.263	.8969103	1.261146
somecollege	1.154731	.1036111	686	0.046	.9695843	1.382102

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.00998	.0112591	558	.0007643	.0403666

5266

5267* Calculate the ICC from the parameter point estimates

5268scalar mlsigma2u = [RP2]var(cons)

5269scalar mlsigma2e = _pi^2/3

5270display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.003

5271

5272* Calculate the ICC from the chains

5273use "m5B_s18_beta.dta", clear

5274rename RP2_var_cons_ sigma2u

5275generate sigma2e = _pi^2/3

5276generate icc = sigma2u/(sigma2u + sigma2e)

5277mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0031815	.0039722	557	0.000	.0002323	.0121213

5278

5279

5280*-----*

5281* PREPARE FIXED-PART PARAMETER CHAINS

5282*-----*

5283

5284use "m5B_s18_beta.dta", clear

5285drop deviance RP2_var_cons_ OD_bcons_1

5286rename FP1_* b_*

5287format %9.2f b_*

5288compress

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

5289save "m5B_s18_beta_prepped.dta", replace
file m5B_s18_beta_prepped.dta saved

5290isid iteration

5291codebook iteration, compact

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

5292

5293

5294*-----*

5295* PREPARE STRATUM RANDOM EFFECTS CHAINS

5296*-----*

5297

5298use "m5B_s18_u.dta", clear

5299drop residual idnum

5300rename value u

5301format %9.2f u

5302sort strata18 iteration

5303order strata18 iteration

```

5304compress
      variable strata18 was double now int
      variable iteration was double now long
      (180,000 bytes saved)

```

```

5305save "m5B_s18_u_prepped.dta", replace
      file m5B_s18_u_prepped.dta saved

```

```

5306isid strata18 iteration

```

```

5307codebook iteration, compact

```

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

```

5308
5309
5310*-----*
5311* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5312*-----*
5313
5314use "data18.dta", clear
5315isid strata18
5316cross using "m5B_s18_beta_prepped.dta"
5317isid strata18 iteration
5318sort strata18 iteration
5319merge 1:1 strata18 iteration using "m5B_s18_u_prepped.dta", nogenerate assert(match)

```

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

```

5320isid strata18 iteration

```

```

5321compress
      variable strata18 was double now int
      (108,000 bytes saved)

```

```

5322save "m5B_s18data_prepped.dta", replace
      file m5B_s18data_prepped.dta saved

```

```

5323
5324
5325*-----*
5326* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5327*-----*
5328
5329* Percentage p based on fixed and random part
5330use "m5B_s18data_prepped.dta", clear

```

```

5331gen cons = 1
5332generate 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 ///
> )
5333label var p "Percentage based on main effects and interactions"
5334format %9.3f p
5335
5336* Percentage p based only on the fixed-part
5337generate 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 ///
> )
5338label var pA "Percentage based only on main effects"
5339format %9.3f pA
5340
5341* Percentage pB calculated as the difference between p and pA
5342generate pB = p - pA
5343label var pB "Percentage point difference based on interaction effects"
5344format %9.3f pB
5345
5346* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5347bysort strata18 (iteration): egen pmn = mean(p)
5348bysort strata18 (iteration): egen plo = pctlile(p), p(2.5)
5349bysort strata18 (iteration): egen phi = pctlile(p), p(97.5)
5350format %9.3f pmn plo phi
5351label var pmn "Percentage based on main effects and interactions"
5352label var plo "Percentage based on main effects and interactions"
5353label var phi "Percentage based on main effects and interactions"
5354
5355
5356bysort strata18 (iteration): egen pAmn = mean(pA)
5357bysort strata18 (iteration): egen pAlo = pctlile(pA), p(2.5)

```

```

5358bysort strata18 (iteration): egen pAhi = pctlile(pA), p(97.5)
5359format %9.3f pAmn pAlo pAhi
5360label var pAmn "Percentage based on main effects"
5361label var pAlo "Percentage based on main effects"
5362label var pAhi "Percentage based on main effects"

5363
5364bysort strata18 (iteration): egen pBmn = mean(pB)
5365bysort strata18 (iteration): egen pBlo = pctlile(pB), p(2.5)
5366bysort strata18 (iteration): egen pBhi = pctlile(pB), p(97.5)
5367format %9.3f pBmn pBlo pBhi
5368label var pBmn "Percentage point difference based on interaction effects"
5369label var pBlo "Percentage point difference based on interaction effects"
5370label var pBhi "Percentage point difference based on interaction effects"

5371
5372* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5373drop iteration b* u* p pA pB

5374duplicates drop

    Duplicates in terms of all variables

    (17,982 observations deleted)

5375isid strata18

5376
5377* Ranks
5378sort pmn

5379generate pmnrank = _n

5380order pmnrank, after(phi)

5381sort pAmn

5382generate pAmnrank = _n

5383order pAmnrank, after(pAhi)

5384sort pBmn

5385generate pBmnrank = _n

5386order pBmnrank, after(pBhi)

5387
5388* Sort the data
5389sort strata18

```



```

5390isid strata18

5391
5392* Compress and save the data
5393compress
    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)

5394save "m5B_sl8results.dta", replace
    file m5B_sl8results.dta saved

5395
5396* List strata with statistically significant interaction effects on the predicted in
    > cidence
5397use "m5B_sl8results.dta", clear

5398list strata18 pBmn pBlo pBhi if pBhi<0, noobs

5399list strata18 pBmn pBlo pBhi if pBlo>0, noobs

5400
5401
5402*****
5403* MODEL 5A_S36 - MARIJUANA USE, Null MODEL
5404*****
5405
5406*-----*
5407* FIT THE MODEL
5408*-----*
5409
5410* Load the data
5411use "analysisready2.dta", clear

5412sort strata36 aid

5413
5414* delete if missing dependent variable (so can record number)
5415drop if use_mj_30days == .
    (232 observations deleted)

5416
5417* Fit model using PQL2
5418runmlwin use_mj_30days 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
strata36	36	45	383.6	1075

```

Run time (seconds) =      1.83
Number of iterations =      7

```

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.823986	.0436411	-41.80	0.000	-1.909521	-1.738451

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.0372838	.0152529	.0073887	.067179

5419

5420* Fit model using MCMC

5421runmlwin use_mj_30days cons , ///

```

> level2(strata36: cons, residuals(u, savechains("m5A_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	45	383.6	1075

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **140**
 Deviance (dbar) = **11148.43**
 Deviance (thetabar) = **11127.71**
 Effective no. of pars (pd) = **20.72**
 Bayesian DIC = **11169.16**

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.824264	.04373	893	0.000	-1.908555	-1.734702

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0394484	.0179817	960	.0124936	.0794645

5422rename u0 mlu

5423drop u0se

5424

5425* Present the regression coefficients as odds ratios

5426runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	45	383.6	1075

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      140
Deviance (dbar)       =    11148.43
Deviance (thetabar)   =    11127.71
Effective no. of pars (pd) =    20.72
Bayesian DIC          =    11169.16

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1615688	.0070527	896	0.000	.1482945	.1764527

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0394484	.0179817	960	.0124936	.0794645

5427

5428* Calculate the ICC from the parameter point estimates

5429scalar mlsigma2u = [RP2]var(cons)

5430scalar mlsigma2e = _pi^2/3

5431display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
 ICC = 0.012

5432

5433* Calculate the ICC from the chains

5434use "m5A_s36_beta.dta", clear

5435rename RP2_var_cons_ sigma2u

5436generate sigma2e = _pi^2/3

5437generate icc = sigma2u/(sigma2u + sigma2e)

5438mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0117704	.0053453	960	0.000	.0037832	.0235846

5439

5440

5441*****

5442* MODEL 5B_S36 - MARIJUANA USE, MAIN EFFECTS MODEL

5443*****

5444

5445*-----*

5446* FIT THE MODEL

5447*-----*

5448

5449* Load the data

5450use "analysisready2.dta", clear

5451sort strata36 aid

5452

5453* delete if missing dependent variable (so can record number)

5454drop if use_mj_30days == .
(232 observations deleted)

5455

5456* Fit model using PQL2

5457runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege lowinc,
> ///
> 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
strata36	36	45 383.6 1075

Run time (seconds) = 2.19
Number of iterations = 16

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.69058	.0611123	-27.66	0.000	-1.810358	-1.570802
female	-.2717076	.0538314	-5.05	0.000	-.3772153	-.1662
latinx_race	-.0409199	.0733227	-0.56	0.577	-.1846299	.10279
black_race	-.2618419	.0678637	-3.86	0.000	-.3948522	-.1288315
hsless	.0084533	.068784	0.12	0.902	-.126361	.1432675
somecollege	.1058148	.0681712	1.55	0.121	-.0277983	.2394278
lowinc	.0816652	.0586805	1.39	0.164	-.0333465	.1966769

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.0028116	.0050503	-.0070869	.01271

5458

5459* Fit model using MCMC

5460runmlwin use_mj_30days cons female latinx_race black_race hsless somecollege lowinc,
> ///
> level2(strata36: cons, residuals(u, savechains("m5B_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata36	36	45 383.6 1075

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      312
Deviance (dbar)       =    11147.32
Deviance (thetabar)   =    11134.98
Effective no. of pars (pd) =    12.34
Bayesian DIC          =    11159.66

```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.692962	.0676712	746	0.000	-1.844283	-1.561363
female	-.2743655	.057708	883	0.000	-.3921935	-.1682609
latinx_race	-.035436	.078747	1078	0.308	-.1812625	.1188922
black_race	-.2627438	.0726904	1131	0.000	-.398327	-.1202681
hsless	.0106651	.0743612	822	0.463	-.127722	.1650899
somecollege	.1102789	.0734465	881	0.068	-.0357464	.2546579
lowinc	.0805612	.0631767	1415	0.094	-.0445788	.2029892

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0063304	.0066572	446	.000515	.0256223

5461rename u0 mlu

5462drop u0se

5463

5464* Present the regression coefficients as odds ratios

5465runmlwin, 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
strata36	36	45	383.6	1075

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      312
Deviance (dbar)       =    11147.32
Deviance (thetabar)   =    11134.98
Effective no. of pars (pd) =    12.34
Bayesian DIC          =    11159.66

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1845462	.0124845	747	0.000	.1581387	.2098498
female	.7606286	.0425246	893	0.000	.6755734	.8451333
latinx_race	.9653701	.0755186	1068	0.308	.8342166	1.126249
black_race	.7718661	.0553156	1122	0.000	.6714425	.8866827
hsless	1.012665	.0768456	812	0.463	.880098	1.179499
somecollege	1.11878	.0834513	876	0.068	.964885	1.29002
lowinc	1.087443	.0683722	1422	0.094	.9564003	1.225059

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0063304	.0066572	446	.000515	.0256223

```

5466
5467* Calculate the ICC from the parameter point estimates
5468scalar mlsigma2u = [RP2]var(cons)

5469scalar mlsigma2e = _pi^2/3

5470display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.002

```

```

5471
5472* Calculate the ICC from the chains
5473use "m5B_s36_beta.dta", clear

5474rename RP2_var_cons_ sigma2u

5475generate sigma2e = _pi^2/3

5476generate icc = sigma2u/(sigma2u + sigma2e)

5477mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0019587	.0020282	446	0.000	.0001565	.0077281

```

5478
5479
5480*-----*
5481* PREPARE FIXED-PART PARAMETER CHAINS
5482*-----*
5483
5484use "m5B_s36_beta.dta", clear

5485drop deviance RP2_var_cons_ OD_bcons_1

5486rename FP1_* b_*

5487format %9.2f b_*

5488compress
      variable iteration was double now long
      (4,000 bytes saved)

5489save "m5B_s36_beta_prepped.dta", replace
      file m5B_s36_beta_prepped.dta saved

5490isid iteration

5491codebook iteration, compact

```

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

```

5492
5493
5494*-----*
5495* PREPARE STRATUM RANDOM EFFECTS CHAINS
5496*-----*
5497
5498use "m5B_s36_u.dta", clear

5499drop residual idnum

5500rename value u

5501format %9.2f u

5502sort strata36 iteration

5503order strata36 iteration

5504compress
      variable strata36 was double now int
      variable iteration was double now long
      (360,000 bytes saved)

5505save "m5B_s36_u_prepped.dta", replace
      file m5B_s36_u_prepped.dta saved

5506isid strata36 iteration

5507codebook iteration, compact

```

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

```

5508
5509
5510*-----*
5511* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5512*-----*
5513
5514use "data36.dta", clear

5515isid strata36

5516cross using "m5B_s36_beta_prepped.dta"

5517isid strata36 iteration

5518sort strata36 iteration

5519merge 1:1 strata36 iteration using "m5B_s36_u_prepped.dta", nogenerate assert(match)

```

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

```

5520isid strata36 iteration

5521compress
      variable strata36 was double now int
      (216,000 bytes saved)

5522save "m5B_s36data_prepped.dta", replace
      file m5B_s36data_prepped.dta saved

5523
5524
5525*-----*
5526* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5527*-----*
5528
5529* Percentage p based on fixed and random part
5530use "m5B_s36data_prepped.dta", clear

5531gen cons = 1

5532generate 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 ///
> )

5533label var p "Percentage based on main effects and interactions"

5534format %9.3f p

5535
5536* Percentage p based only on the fixed-part
5537generate 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 ///
> )

5538label var pA "Percentage based only on main effects"

5539format %9.3f pA

5540
5541* Percentage pB calculated as the difference between p and pA
5542generate pB = p - pA

5543label var pB "Percentage point difference based on interaction effects"

5544format %9.3f pB

5545

```



```

5546* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5547bysort strata36 (iteration): egen pmn = mean(p)

5548bysort strata36 (iteration): egen plo = pctlile(p), p(2.5)
5549bysort strata36 (iteration): egen phi = pctlile(p), p(97.5)

5550format %9.3f pmn plo phi

5551label var pmn "Percentage based on main effects and interactions"
5552label var plo "Percentage based on main effects and interactions"
5553label var phi "Percentage based on main effects and interactions"

5554
5555
5556bysort strata36 (iteration): egen pAmn = mean(pA)

5557bysort strata36 (iteration): egen pAlo = pctlile(pA), p(2.5)
5558bysort strata36 (iteration): egen pAhi = pctlile(pA), p(97.5)

5559format %9.3f pAmn pAlo pAhi

5560label var pAmn "Percentage based on main effects"
5561label var pAlo "Percentage based on main effects"
5562label var pAhi "Percentage based on main effects"

5563
5564bysort strata36 (iteration): egen pBmn = mean(pB)

5565bysort strata36 (iteration): egen pBlo = pctlile(pB), p(2.5)
5566bysort strata36 (iteration): egen pBhi = pctlile(pB), p(97.5)

5567format %9.3f pBmn pBlo pBhi

5568label var pBmn "Percentage point difference based on interaction effects"
5569label var pBlo "Percentage point difference based on interaction effects"
5570label var pBhi "Percentage point difference based on interaction effects"

5571
5572* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5573drop iteration b* u* p pA pB

5574duplicates drop

    Duplicates in terms of all variables

    (35,964 observations deleted)

5575isid strata36

5576
5577* Ranks

```

```

5578sort pmn
5579generate pmnrank = _n
5580order pmnrank, after(phi)
5581sort pAmn
5582generate pAmnrank = _n
5583order pAmnrank, after(pAhi)
5584sort pBmn
5585generate pBmnrank = _n
5586order pBmnrank, after(pBhi)

5587
5588* Sort the data
5589sort strata36

5590isid strata36

5591
5592* Compress and save the data
5593compress
      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)

5594save "m5B_s36results.dta", replace
      file m5B_s36results.dta saved

5595
5596* List strata with statistically significant interaction effects on the predicted in
      > cidence
5597use "m5B_s36results.dta", clear

5598list strata36 pBmn pBlo pBhi if pBhi<0, noobs

5599list strata36 pBmn pBlo pBhi if pBlo>0, noobs

5600
5601
5602*****
5603* MODEL 5A_S48 - MARIJUANA USE, Null MODEL
5604*****
5605
5606*-----*
5607* FIT THE MODEL
5608*-----*
5609
5610* Load the data
5611use "analysisready2.dta", clear

5612sort strata48 aid

```

```

5613
5614* delete if missing dependent variable (so can record number)
5615drop if use_mj_30days == .
      (232 observations deleted)

5616
5617* Fit model using PQL2
5618runmlwin use_mj_30days 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
strata48	48	3	287.7	1075

```
Run time (seconds)      =      1.87
Number of iterations    =      9
```

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.870291	.0592751	-31.55	0.000	-1.986468	-1.754114

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var (cons)	.0998499	.0311941	.0387106	.1609892

```

5619
5620* Fit model using MCMC
5621runmlwin use_mj_30days cons , ///
> level2(strata48: cons, residuals(u, savechains("m5A_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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	Minimum	Observations per Group Average	Maximum
strata48	48	3	287.7	1075

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      140
Deviance (dbar)     =    11102.01
Deviance (thetabar) =    11072.73
Effective no. of pars (pd) =    29.28
Bayesian DIC        =    11131.29

```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.867715	.0611491	684	0.000	-1.988662	-1.750782

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.1052072	.043267	730	.0423397	.2106022

```
5622rename u0 mlu
```

```
5623drop u0se
```

```
5624
```

```
5625* Present the regression coefficients as odds ratios
```

```
5626runmlwin, 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
strata48	48	3	287.7	1075

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      140
Deviance (dbar)     =    11102.01
Deviance (thetabar) =    11072.73
Effective no. of pars (pd) =    29.28
Bayesian DIC        =    11131.29

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1550768	.009406	681	0.000	.1368784	.1736381

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.1052072	.043267	730	.0423397	.2106022

```

5627
5628* Calculate the ICC from the parameter point estimates
5629scalar mlsigma2u = [RP2]var(cons)

5630scalar mlsigma2e = _pi^2/3

5631display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.031

```

```

5632
5633* Calculate the ICC from the chains
5634use "m5A_s48_beta.dta", clear

5635rename RP2_var_cons_ sigma2u

5636generate sigma2e = _pi^2/3

5637generate icc = sigma2u/(sigma2u + sigma2e)

5638mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0307639	.0121661	725	0.000	.0127062	.060164

```

5639
5640
5641*****
5642* MODEL 5B S48 - MARIJUANA USE, MAIN EFFECTS MODEL
5643*****
5644
5645*-----*
5646* FIT THE MODEL
5647*-----*
5648
5649* Load the data
5650use "analysisready2.dta", clear

5651sort strata48 aid

5652
5653* delete if missing dependent variable (so can record number)
5654drop if use_mj_30days == .
    (232 observations deleted)

5655
5656* Fit model using PQL2
5657runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
> winc, ///
> 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
strata48	48	3	287.7	1075

Run time (seconds) = 2.13
 Number of iterations = 12

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.698441	.0547285	-31.03	0.000	-1.805707	-1.591176
female	-.2706021	.049265	-5.49	0.000	-.3671597	-.1740445
latinx_imm	-1.267196	.2177024	-5.82	0.000	-1.693885	-.8405072
latinx_non	.1225729	.0707152	1.73	0.083	-.0160263	.2611722
black	-.270063	.0634996	-4.25	0.000	-.39452	-.1456061
hsless	.0045703	.0635551	0.07	0.943	-.1199954	.1291359
somecollege	.093069	.0626547	1.49	0.137	-.0297319	.2158699
lowinc	.1114961	.0543808	2.05	0.040	.0049116	.2180806

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48					
	var(cons)	0	0	0	0

5658

5659* Fit model using MCMC

```
5660runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
> winc, ///
> level2(strata48: cons, residuals(u, savechains("m5B_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13809

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	287.7	1075

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 352
 Deviance (dbar) = 11095.37
 Deviance (thetabar) = 11083.01
 Effective no. of pars (pd) = 12.36
 Bayesian DIC = 11107.73

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.701364	.0637203	798	0.000	-1.834016	-1.576068
female	-.2753248	.0567928	837	0.000	-.3803111	-.1519146
latinx_imm	-1.279695	.2234222	1004	0.000	-1.734797	-.8660152
latinx_non	.1313869	.0785415	1060	0.040	-.0203853	.2878116
black	-.2684478	.0707291	915	0.000	-.4031049	-.1333174
hsless	.0095831	.0714676	1087	0.421	-.1295324	.1476394
somecollege	.0996066	.0702364	925	0.064	-.0389518	.2287275
lowinc	.1071462	.0612218	1081	0.050	-.0151917	.2227449

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var (cons)	.0047667	.0051481	356	.0003674	.0171285

```
5661rename u0 m1u
```

5662drop u0se

5663

5664* Present the regression coefficients as odds ratios

```
5665runmlwin, or
```

```
MLwiN 3.2 multilevel model
Binomial logit response model
Estimation algorithm: MCMC
```

Number of obs = 13809

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	287.7	1075

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	352
Deviance (dbar)	=	11095.37
Deviance (thetabar)	=	11083.01
Effective no. of pars (pd)	=	12.36
Bayesian DIC	=	11107.73

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1826402	.0117879	802	0.000	.1597706	.2067865
female	.7627445	.0429879	825	0.000	.6836487	.8590617
latinx_imm	.2860216	.0629731	970	0.000	.1764361	.4206244
latinx_non	1.139542	.0891889	1057	0.040	.9798211	1.333506
black	.7669495	.0546304	913	0.000	.668242	.8751874
hsless	1.014893	.0719035	1068	0.421	.8785061	1.159095
somecollege	1.106084	.0747934	933	0.064	.9617971	1.256999
lowinc	1.115633	.0685437	1073	0.050	.9849231	1.249502

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata48					
var(cons)	.0047667	.0051481	356	.0003674	.0171285

5666

5667* Calculate the ICC from the parameter point estimates

```
5668 scalar m1sigma2u = [RP2]var(cons)
```

```
5669 scalar m1sigma2e = pi^2/3
```

```
5670display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC =      0.001
```

```
5671
```

```
5672* Calculate the ICC from the chains
```

```
5673use "m5B_s48_beta.dta", clear
```

```
5674rename RP2_var_cons_ sigma2u
```

```
5675generate sigma2e = _pi^2/3
```

```
5676generate icc = sigma2u/(sigma2u + sigma2e)
```

```
5677mcmcsu icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0013874	.0014427	356	0.000	.0001117	.0051795

```
5678
```

```
5679
```

```
5680*-----*
```

```
5681* PREPARE FIXED-PART PAREMETER CHAINS
```

```
5682*-----*
```

```
5683
```

```
5684use "m5B_s48_beta.dta", clear
```

```
5685drop deviance RP2_var_cons_ OD_bcons_1
```

```
5686rename FP1_ b_*
```

```
5687format %9.2f b_*
```

```
5688compress
```

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

```
5689save "m5B_s48_beta_prepped.dta", replace  
      file m5B_s48_beta_prepped.dta saved
```

```
5690isid iteration
```

```
5691codebook iteration, compact
```

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

```
5692
```

```
5693
```

```
5694*-----*
```

```
5695* PREPARE STRATUM RANDOM EFFECTS CHAINS
```

```
5696*-----*
```

```
5697
```

```
5698use "m5B_s48_u.dta", clear
```


5699drop residual idnum

5700rename value u

5701format %9.2f u

5702sort strata48 iteration

5703order strata48 iteration

5704compress
variable **strata48** was **double** now **int**
variable **iteration** was **double** now **long**
(480,000 bytes saved)

5705save "m5B_s48_u_prepped.dta", replace
file m5B_s48_u_prepped.dta saved

5706isid strata48 iteration

5707codebook iteration, compact

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

5708

5709

5710*-----*

5711* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

5712*-----*

5713

5714use "data48.dta", clear

5715isid strata48

5716cross using "m5B_s48_beta_prepped.dta"

5717isid strata48 iteration

5718sort strata48 iteration

5719merge 1:1 strata48 iteration using "m5B_s48_u_prepped.dta", nogenerate assert(match)

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

5720isid strata48 iteration

5721compress
variable **strata48** was **double** now **int**
(288,000 bytes saved)

5722save "m5B_s48data_prepped.dta", replace
file m5B_s48data_prepped.dta saved

```

5723
5724
5725*-----*
5726* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5727*-----*
5728
5729* Percentage p based on fixed and random part
5730use "m5B_s48data_prepped.dta", clear

5731gen cons = 1

5732generate 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 ///
> )

5733label var p "Percentage based on main effects and interactions"

5734format %9.3f p

5735
5736* Percentage p based only on the fixed-part
5737generate 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 ///
> )

5738label var pA "Percentage based only on main effects"

5739format %9.3f pA

5740
5741* Percentage pB calculated as the difference between p and pA
5742generate pB = p - pA

5743label var pB "Percentage point difference based on interaction effects"

5744format %9.3f pB

5745
5746* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5747bysort strata48 (iteration): egen pmn = mean(p)

5748bysort strata48 (iteration): egen plo = pctl(p), p(2.5)

5749bysort strata48 (iteration): egen phi = pctl(p), p(97.5)

```

```

5750format %9.3f pmn plo phi
5751label var pmn "Percentage based on main effects and interactions"
5752label var plo "Percentage based on main effects and interactions"
5753label var phi "Percentage based on main effects and interactions"

5754
5755
5756bysort strata48 (iteration): egen pAmn = mean(pA)
5757bysort strata48 (iteration): egen pAlo = pctlile(pA), p(2.5)
5758bysort strata48 (iteration): egen pAhi = pctlile(pA), p(97.5)
5759format %9.3f pAmn pAlo pAhi
5760label var pAmn "Percentage based on main effects"
5761label var pAlo "Percentage based on main effects"
5762label var pAhi "Percentage based on main effects"

5763
5764bysort strata48 (iteration): egen pBmn = mean(pB)
5765bysort strata48 (iteration): egen pBlo = pctlile(pB), p(2.5)
5766bysort strata48 (iteration): egen pBhi = pctlile(pB), p(97.5)
5767format %9.3f pBmn pBlo pBhi
5768label var pBmn "Percentage point difference based on interaction effects"
5769label var pBlo "Percentage point difference based on interaction effects"
5770label var pBhi "Percentage point difference based on interaction effects"

5771
5772* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5773drop iteration b* u* p pA pB

5774duplicates drop

    Duplicates in terms of all variables

    (47,952 observations deleted)

5775isid strata48

5776
5777* Ranks
5778sort pmn

5779generate pmnrank = _n

5780order pmnrank, after(phi)

5781sort pAmn

```

```

5782generate pAmnrank = _n
5783order pAmnrank, after(pAhi)
5784sort pBmn
5785generate pBmnrank = _n
5786order pBmnrank, after(pBhi)

5787
5788* Sort the data
5789sort strata48

5790isid strata48

5791
5792* Compress and save the data
5793compress
      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)

5794save "m5B_s48results.dta", replace
      file m5B_s48results.dta saved

5795
5796* List strata with statistically significant interaction effects on the predicted in
> cidence
5797use "m5B_s48results.dta", clear

5798list strata48 pBmn pBlo pBhi if pBhi<0, noobs

5799list strata48 pBmn pBlo pBhi if pBlo>0, noobs

5800
5801
5802*****
5803* MODEL 5A_S96 - MARIJUANA USE, Null MODEL
5804*****
5805
5806*-----*
5807* FIT THE MODEL
5808*-----*
5809
5810* Load the data
5811use "analysisready2.dta", clear

5812sort strata96 aid

5813
5814* delete if missing dependent variable (so can record number)
5815drop if use_mj_30days == .
      (232 observations deleted)

5816
5817* Fit model using PQL2
5818runmlwin use_mj_30days 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
strata96	91	1	151.7	890

Run time (seconds) = **1.90**
 Number of iterations = **6**

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.828765	.0558543	-32.74	0.000	-1.938238	-1.719293

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	.1363895	.0359321	.0659639	.2068152

5819

5820* Fit model using MCMC

5821runmlwin use_mj_30days cons , ///

```
> level2(strata96: cons, residuals(u, savechains("m5A_s96_u.dta", replace))) ///  
> level1(aid:) ///  
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///  
> mcmc(burnin(5000) chain(50000) thinning(50) ///  
> savechains("m5A_s96_beta.dta", replace)) initsprevious ///  
> 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
strata96	91	1	151.7	890

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **143**
 Deviance (dbar) = **11032.55**
 Deviance (thetabar) = **10988.02**
 Effective no. of pars (pd) = **44.53**
 Bayesian DIC = **11077.08**

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.826033	.0572733	739	0.000	-1.944055	-1.710621

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	.1401426	.0400551	917	.0744172	.2302026

5822rename u0 mlu

5823drop u0se

5824

5825* Present the regression coefficients as odds ratios

5826runmlwin, 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
strata96	91	1	151.7	890

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **143**
 Deviance (dbar) = **11032.55**
 Deviance (thetabar) = **10988.02**
 Effective no. of pars (pd) = **44.53**
 Bayesian DIC = **11077.08**

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1613533	.0094837	741	0.000	.1431224	.1807535

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	.1401426	.0400551	917	.0744172	.2302026

5827

5828* Calculate the ICC from the parameter point estimates

5829scalar mlsigma2u = [RP2]var(cons)

5830scalar mlsigma2e = _pi^2/3

5831display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.041

5832

5833* Calculate the ICC from the chains

5834use "m5A_s96_beta.dta", clear

5835rename RP2_var_cons_ sigma2u

5836generate sigma2e = _pi^2/3

5837generate icc = sigma2u/(sigma2u + sigma2e)

5838mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0401432	.0109161	913	0.000	.0221198	.0653971

```

5839
5840
5841*****
5842* MODEL 5B_S96 - MARIJUANA USE, MAIN EFFECTS MODEL
5843*****
5844
5845*-----*
5846* FIT THE MODEL
5847*-----*
5848
5849* Load the data
5850use "analysisready2.dta", clear

5851sort strata96 aid

5852
5853* delete if missing dependent variable (so can record number)
5854drop if use_mj_30days == .
      (232 observations deleted)

5855
5856* Fit model using PQL2
5857runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
      > winc straight_no, ///
      > level2(strata96: cons) ///
      > level1(aid:) ///
      > discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
      > rlgls 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
strata96	91	1	151.7	890

```

Run time (seconds) =      2.22
Number of iterations =      14

```

use_mj_30d~s	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-1.776839	.0775507	-22.91	0.000	-1.928835	-1.624842
female	-.292162	.0660941	-4.42	0.000	-.4217042	-.1626199
latinx_imm	-1.231088	.228475	-5.39	0.000	-1.678891	-.7832856
latinx_non	.133598	.0862325	1.55	0.121	-.0354146	.3026105
black	-.2474618	.0797146	-3.10	0.002	-.4036996	-.0912241
hsless	.0375556	.0814446	0.46	0.645	-.1220729	.197184
somecollege	.1177475	.0813146	1.45	0.148	-.0416262	.2771212
lowinc	.0945217	.0689754	1.37	0.171	-.0406676	.229711
straight_no	.4133094	.0778116	5.31	0.000	.2608015	.5658173

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.0166552	.0098393	-.0026296	.0359399

5858

5859* Fit model using MCMC

```
5860runmlwin use_mj_30days cons female latinx_imm latinx_non black hsless somecollege lo
> winc straight_no, ///
> level2(strata96: cons, residuals(u, savechains("m5B_s96_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata96	91	1	151.7	890

```
Burnin = 5000
Chain = 50000
Thinning = 50
Run time (seconds) = 375
Deviance (dbar) = 11043.24
Deviance (thetabar) = 11022.75
Effective no. of pars (pd) = 20.49
Bayesian DIC = 11063.73
```

use_mj_30d~s	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-1.765628	.0743973	654	0.000	-1.919093	-1.612964
female	-.3046642	.0652729	570	0.000	-.4232893	-.1778456
latinx_imm	-1.260535	.2275665	1088	0.000	-1.732205	-.8700609
latinx_non	.126932	.0831034	994	0.053	-.0235277	.2897177
black	-.2528295	.0762497	986	0.001	-.4050801	-.1056376
hsless	.0293744	.0782485	881	0.364	-.1271586	.1839085
somecollege	.110759	.0784574	851	0.085	-.0482713	.2550021
lowinc	.0998922	.06709	993	0.077	-.0394547	.2287564
straight_no	.4196324	.0782881	683	0.000	.2728828	.5660329

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96						
	var(cons)	.0141306	.0130822	208	.0008535	.0456572

5861rename u0 mlu

5862drop u0se

5863

5864* Present the regression coefficients as odds ratios

5865runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13809**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata96	91	1	151.7	890


```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      375
Deviance (dbar)     =    11043.24
Deviance (thetabar) =    11022.75
Effective no. of pars (pd) =    20.49
Bayesian DIC        =    11063.73

```

use_mj_30d~s	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1719355	.0130455	670	0.000	.1467401	.1992961
female	.7394239	.0468511	555	0.000	.6548891	.8370716
latinx_imm	.2890067	.0623859	1071	0.000	.1768939	.4189261
latinx_non	1.139876	.0909199	957	0.053	.9767469	1.33605
black	.7792467	.0589825	977	0.001	.6669234	.899751
hsless	1.031021	.0817901	862	0.364	.880594	1.201906
somecollege	1.118651	.0871725	847	0.085	.9528753	1.290465
lowinc	1.106517	.0749559	1015	0.077	.9613135	1.257036
straight_no	1.526336	.1214297	689	0.000	1.313746	1.761266

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.0141306	.0130822	208	.0008535	.0456572

5866

5867* Calculate the ICC from the parameter point estimates

5868scalar mlsigma2u = [RP2]var(cons)

5869scalar mlsigma2e = _pi^2/3

5870display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)

ICC = 0.004

5871

5872* Calculate the ICC from the chains

5873use "m5B_s96_beta.dta", clear

5874rename RP2_var_cons_ sigma2u

5875generate sigma2e = _pi^2/3

5876generate icc = sigma2u/(sigma2u + sigma2e)

5877mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0042079	.0038633	207	0.000	.0002594	.0136882

5878

5879

5880*-----*

5881* PREPARE FIXED-PART PARAMETER CHAINS

5882*-----*

```

5883
5884use "m5B_s96_beta.dta", clear

5885drop deviance RP2_var_cons_ OD_bcons_1

5886rename FP1_* b_*

5887format %9.2f b_*

5888compress
      variable iteration was double now long
      (4,000 bytes saved)

5889save "m5B_s96_beta_prepped.dta", replace
      file m5B_s96_beta_prepped.dta saved

5890isid iteration

```

```

5891codebook iteration, compact

```

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

```

5892
5893
5894*-----*
5895* PREPARE STRATUM RANDOM EFFECTS CHAINS
5896*-----*
5897
5898use "m5B_s96_u.dta", clear

5899drop residual idnum

5900rename value u

5901format %9.2f u

5902sort strata96 iteration

5903order strata96 iteration

5904compress
      variable strata96 was double now int
      variable iteration was double now long
      (910,000 bytes saved)

5905save "m5B_s96_u_prepped.dta", replace
      file m5B_s96_u_prepped.dta saved

5906isid strata96 iteration

5907codebook iteration, compact

```

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

```

5908
5909
5910*-----*
5911* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
5912*-----*
5913
5914use "data96_mj.dta", clear

5915isid strata96

5916cross using "m5B_s96_beta_prepped.dta"

5917isid strata96 iteration

5918sort strata96 iteration

5919merge 1:1 strata96 iteration using "m5B_s96_u_prepped.dta", nogenerate assert(match)

      Result                                # of obs.
      -----                                -
      not matched                           0
      matched                               91,000
      -----                                -

5920isid strata96 iteration

5921compress
      variable strata96 was double now int
      (546,000 bytes saved)

5922save "m5B_s96data_prepped.dta", replace
      file m5B_s96data_prepped.dta saved

5923
5924
5925*-----*
5926* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
5927*-----*
5928
5929* Percentage p based on fixed and random part
5930use "m5B_s96data_prepped.dta", clear

5931gen cons = 1

5932generate 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 ///
> )

5933label var p "Percentage based on main effects and interactions"

5934format %9.3f p

```

```

5935
5936* Percentage p based only on the fixed-part
5937generate 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 ///
> )
5938label var pA "Percentage based only on main effects"
5939format %9.3f pA
5940
5941* Percentage pB calculated as the difference between p and pA
5942generate pB = p - pA
5943label var pB "Percentage point difference based on interaction effects"
5944format %9.3f pB
5945
5946* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
5947bysort strata96 (iteration): egen pmn = mean(p)
5948bysort strata96 (iteration): egen plo = pctlile(p), p(2.5)
5949bysort strata96 (iteration): egen phi = pctlile(p), p(97.5)
5950format %9.3f pmn plo phi
5951label var pmn "Percentage based on main effects and interactions"
5952label var plo "Percentage based on main effects and interactions"
5953label var phi "Percentage based on main effects and interactions"
5954
5955
5956bysort strata96 (iteration): egen pAmn = mean(pA)
5957bysort strata96 (iteration): egen pAlo = pctlile(pA), p(2.5)
5958bysort strata96 (iteration): egen pAhi = pctlile(pA), p(97.5)
5959format %9.3f pAmn pAlo pAhi
5960label var pAmn "Percentage based on main effects"
5961label var pAlo "Percentage based on main effects"
5962label var pAhi "Percentage based on main effects"
5963
5964bysort strata96 (iteration): egen pBmn = mean(pB)

```

```

5965 bysort strata96 (iteration): egen pBlo = pctlile(pB), p(2.5)
5966 bysort strata96 (iteration): egen pBhi = pctlile(pB), p(97.5)
5967 format %9.3f pBmn pBlo pBhi
5968 label var pBmn "Percentage point difference based on interaction effects"
5969 label var pBlo "Percentage point difference based on interaction effects"
5970 label var pBhi "Percentage point difference based on interaction effects"
5971
5972 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
5973 drop iteration b* u* p pA pB
5974 duplicates drop
      Duplicates in terms of all variables
      (90,909 observations deleted)
5975 isid strata96
5976
5977 * Ranks
5978 sort pmn
5979 generate pmnrank = _n
5980 order pmnrank, after(phi)
5981 sort pAmn
5982 generate pAmnrank = _n
5983 order pAmnrank, after(pAhi)
5984 sort pBmn
5985 generate pBmnrank = _n
5986 order pBmnrank, after(pBhi)
5987
5988 * Sort the data
5989 sort strata96
5990 isid strata96
5991
5992 * Compress and save the data
5993 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
      (1,092 bytes saved)
5994 save "m5B_s96results.dta", replace
      file m5B_s96results.dta saved

```

```

5995
5996* List strata with statistically significant interaction effects on the predicted in
> cidence
5997use "m5B_s96results.dta", clear

5998list strata96 pBmn pBlo pBhi if pBhi<0, noobs

5999list strata96 pBmn pBlo pBhi if pBlo>0, noobs

6000
6001
6002
    end of do-file

6003do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

6004
6005*****
6006*****
6007*****
6008*
6009*
6010* MODEL 6 - OTHER DRUG, MAIN EFFECTS MODEL
6011*
6012*
6013*****
6014*****
6015*****
6016
6017*****
6018* MODEL 6A_S6 - OTHER DRUG, Null MODEL
6019*****
6020
6021*-----*
6022* FIT THE MODEL
6023*-----*
6024
6025* Load the data
6026use "analysisready2.dta", clear

6027sort strata6 aid

6028
6029* delete if missing dependent variable (so can record number)
6030drop if drugs_w1 == .
    (137 observations deleted)

6031
6032* Fit model using by PQL2
6033runmlwin drugs_w1 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
strata6	6	1147	2317.3	4276

Run time (seconds) = 1.78
 Number of iterations = 7

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.746889	.366642	-7.49	0.000	-3.465494	-2.028284

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.7847053	.4636244	-.1239818	1.693392

6034

6035* Fit model using by MCMC

6036runmlwin drugs_w1 cons , ///

```
> level2(strata6: cons, residuals(u, savechains("m6A_s6_u.dta", replace))) ///  
> level1(aid:) ///  
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///  
> mcmc(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
strata6	6	1147	2317.3	4276

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 2758
 Deviance (dbar) = 7916.71
 Deviance (thetabar) = 7910.57
 Effective no. of pars (pd) = 6.14
 Bayesian DIC = 7922.85

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.764629	.3617622	41	0.000	-3.426483	-2.06939

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	1.191067	1.281992	598	.2962848	4.336471

6037rename u0 mlu

6038drop u0se

6039

6040* Present the regression coefficients as odds ratios

6041runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13904**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1147	2317.3	4276

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **2758**
 Deviance (dbar) = **7916.71**
 Deviance (thetabar) = **7910.57**
 Effective no. of pars (pd) = **6.14**
 Bayesian DIC = **7922.85**

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0672983	.0247488	45	0.000	.032501	.1262628

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	1.191067	1.281992	598	.2962848	4.336471

6042

6043* Calculate the ICC from the parameter point estimates

6044scalar mlsigma2u = [RP2]var(cons)

6045scalar mlsigma2e = $\pi^2/3$

6046display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.266

6047

6048* Calculate the ICC from the chains

6049use "m6A_s6_beta.dta", clear

6050rename RP2_var_cons_ sigma2u

6051generate sigma2e = $\pi^2/3$

6052generate icc = sigma2u/(sigma2u + sigma2e)

6053mcmcsun icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.2366469	.1229407	555	0.000	.0826191	.5686173


```

6054
6055*****
6056* MODEL 6B_S6 - OTHER DRUG, MAIN EFFECTS MODEL
6057*****
6058
6059*-----*
6060* FIT THE MODEL
6061*-----*
6062
6063* Load the data
6064use "analysisready2.dta", clear
6065sort strata6 aid
6066
6067* delete if missing dependent variable (so can record number)
6068drop if drugs_wl == .
        (137 observations deleted)

```

```
6069
6070* Fit model using by PQL2
6071runmlwin drugs wl cons female latinx_race black_race , ///
> level2(strata6: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata6	6	1147	2317.3	4276

```
Run time (seconds)      =      2.49
Number of iterations    =      30
```

drugs_wl	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.007587	.1420053	-14.14	0.000	-2.285912	-1.729261
female	-.1774025	.155559	-1.14	0.254	-.4822925	.1274876
latinx_race	-.0844602	.1772249	-0.48	0.634	-.4318145	.2628942
black_race	-1.740611	.2035433	-8.55	0.000	-2.139549	-1.341674

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6				
var (cons)	.025464	.0204235	-.0145653	.0654933

```
6072
6073* Fit model using by MCMC
6074runmlwin drugs_wl cons female latinx_race black_race , ///
> level2(strata6: cons, residuals(u, savechains("m6B_s6_u.dta", replace))) ///
> levell1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata6	6	1147	2317.3	4276

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 872
 Deviance (dbar) = 7917.30
 Deviance (thetabar) = 7911.45
 Effective no. of pars (pd) = 5.86
 Bayesian DIC = 7923.16

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.019897	.2263699	59	0.000	-2.529382	-1.485833
female	-.1130267	.3129345	33	0.175	-.5561061	.9557506
latinx_race	-.071734	.4202678	71	0.306	-.8752014	.7826033
black_race	-1.784457	.370492	131	0.000	-2.720672	-1.060008

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6						
	var(cons)	.1732251	.6679861	49	.001027	1.411492

6075rename u0 mlu

6076drop u0se

6077

6078* Present the regression coefficients as odds ratios

6079runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 13904

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata6	6	1147	2317.3	4276

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 872
 Deviance (dbar) = 7917.30
 Deviance (thetabar) = 7911.45
 Effective no. of pars (pd) = 5.86
 Bayesian DIC = 7923.16

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1364166	.0322073	72	0.000	.0797083	.2263137
female	.9548445	.54327	33	0.175	.5734376	2.600633
latinx_race	1.034813	.8158503	79	0.306	.4167782	2.187159
black_race	.1785657	.061128	175	0.000	.0658394	.3464533

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.1732251	.6679861	49	.001027	1.411492

```

6080
6081* Calculate the ICC from the parameter point estimates
6082scalar m1sigma2u = [RP2]var(cons)

6083scalar m1sigma2e = _pi^2/3

6084display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
  ICC =      0.050

```

```

6085
6086* Calculate the ICC from the chains
6087use "m6B_s6_beta.dta", clear

6088rename RP2_var_cons_ sigma2u

6089generate sigma2e = _pi^2/3

6090generate icc = sigma2u/(sigma2u + sigma2e)

6091mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0350982	.0811666	38	0.000	.0003121	.3002283

```

6092
6093
6094*-----*
6095* PREPARE FIXED-PART PAREMETER CHAINS
6096*-----*
6097
6098use "m6B_s6_beta.dta", clear

6099drop deviance RP2_var_cons_ OD_bcons_1

6100rename FP1_* b_*

6101format %9.2f b_*

6102compress
  variable iteration was double now long
  (4,000 bytes saved)

6103save "m6B_s6_beta_prepped.dta", replace
  (note: file m6B_s6_beta_prepped.dta not found)
  file m6B_s6_beta_prepped.dta saved

6104isid iteration

6105codebook iteration, compact

```

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

```

6106
6107
6108*-----*
6109* PREPARE STRATUM RANDOM EFFECTS CHAINS
6110*-----*
6111
6112use "m6B_s6_u.dta", clear

6113drop residual idnum

6114rename value u

6115format %9.2f u

6116sort strata6 iteration

6117order strata6 iteration

6118compress
      variable strata6 was double now byte
      variable iteration was double now long
      (66,000 bytes saved)

6119save "m6B_s6_u_prepped.dta", replace
      (note: file m6B_s6_u_prepped.dta not found)
      file m6B_s6_u_prepped.dta saved

6120isid strata6 iteration

6121codebook iteration, compact

```

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

```

6122
6123
6124*-----*
6125* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6126*-----*
6127
6128use "data6.dta", clear

6129isid strata6

6130cross using "m6B_s6_beta_prepped.dta"

6131isid strata6 iteration

6132sort strata6 iteration

6133merge 1:1 strata6 iteration using "m6B_s6_u_prepped.dta", nogenerate assert(match)

```

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

```

6134isid strata6 iteration

6135compress
      variable strata6 was double now byte
      (42,000 bytes saved)

6136save "m6B_s6data_prepped.dta", replace
      (note: file m6B_s6data_prepped.dta not found)
      file m6B_s6data_prepped.dta saved

6137
6138
6139*-----*
6140* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6141*-----*
6142
6143* Percentage p based on fixed and random part
6144use "m6B_s6data_prepped.dta", clear

6145gen cons = 1

6146generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      + u ///
> )

6147label var p "Percentage based on main effects and interactions"

6148format %9.3f p

6149
6150* Percentage p based only on the fixed-part
6151generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
> )

6152label var pA "Percentage based only on main effects"

6153format %9.3f pA

6154
6155* Percentage pB calculated as the difference between p and pA
6156generate pB = p - pA

6157label var pB "Percentage point difference based on interaction effects"

6158format %9.3f pB

6159
6160* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6161bysort strata6 (iteration): egen pmn = mean(p)

6162bysort strata6 (iteration): egen plo = pctl(p), p(2.5)

```

```

6163bysort strata6 (iteration): egen phi = pctlile(p), p(97.5)
6164format %9.3f pmn plo phi
6165label var pmn "Percentage based on main effects and interactions"
6166label var plo "Percentage based on main effects and interactions"
6167label var phi "Percentage based on main effects and interactions"

6168
6169
6170bysort strata6 (iteration): egen pAmn = mean(pA)
6171bysort strata6 (iteration): egen pAlo = pctlile(pA), p(2.5)
6172bysort strata6 (iteration): egen pAhi = pctlile(pA), p(97.5)
6173format %9.3f pAmn pAlo pAhi
6174label var pAmn "Percentage based on main effects"
6175label var pAlo "Percentage based on main effects"
6176label var pAhi "Percentage based on main effects"

6177
6178bysort strata6 (iteration): egen pBmn = mean(pB)
6179bysort strata6 (iteration): egen pBlo = pctlile(pB), p(2.5)
6180bysort strata6 (iteration): egen pBhi = pctlile(pB), p(97.5)
6181format %9.3f pBmn pBlo pBhi
6182label var pBmn "Percentage point difference based on interaction effects"
6183label var pBlo "Percentage point difference based on interaction effects"
6184label var pBhi "Percentage point difference based on interaction effects"

6185
6186* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6187drop iteration b* u* p pA pB

6188duplicates drop

    Duplicates in terms of all variables

    (5,994 observations deleted)

6189isid strata6

6190
6191* Ranks
6192sort pmn

6193generate pmnrank = _n

6194order pmnrank, after(phi)

```

```

6195sort pAmn
6196generate pAmnrank = _n
6197order pAmnrank, after(pAhi)
6198sort pBmn
6199generate pBmnrank = _n
6200order pBmnrank, after(pBhi)

6201
6202* Sort the data
6203sort strata6
6204isid strata6

6205
6206* Compress and save the data
6207compress
    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)

6208save "m6B_s6results.dta", replace
    (note: file m6B_s6results.dta not found)
    file m6B_s6results.dta saved

6209
6210* List strata with statistically significant interaction effects on the predicted in
    > cidence
6211use "m6B_s6results.dta", clear

6212list strata6 pBmn pBlo pBhi if pBhi<0, noobs
6213list strata6 pBmn pBlo pBhi if pBlo>0, noobs

6214
6215
6216*****
6217* MODEL 6A_S12 - OTHER DRUG, Null MODEL
6218*****
6219
6220*-----*
6221* FIT THE MODEL
6222*-----*
6223
6224* Load the data
6225use "analysisready2.dta", clear

6226sort strata12 aid

6227
6228* delete if missing dependent variable (so can record number)
6229drop if drugs_w1 == .
    (137 observations deleted)

```

6230

6231* Fit model using by PQL2

```

6232runmlwin drugs_w1 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
strata12	12	466	1158.7	2893

Run time (seconds) = **1.85**
 Number of iterations = **8**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.69366	.2462898	-10.94	0.000	-3.17638	-2.210941

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var(cons)	.6986544	.2963143	.117889	1.27942

6233

6234* Fit model using by MCMC

```

6235runmlwin drugs_w1 cons , ///
> level2(strata12: cons, residuals(u, savechains("m6A_sl2_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m6A_sl2_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
strata12	12	466	1158.7	2893

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **160**
 Deviance (dbar) = **7916.49**
 Deviance (thetabar) = **7904.85**
 Effective no. of pars (pd) = **11.63**
 Bayesian DIC = **7928.12**

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.653699	.2588228	83	0.000	-3.11288	-2.060767

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12 var (cons)	.850186	.4725475	659	.3327703	1.9751

```
6236rename u0 m1u
```

6237drop u0se

6238

6239* Present the regression coefficients as odds ratios

6240runmlwin, 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
strata12	12	466	1158.7	2893

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	160
Deviance (dbar)	=	7916.49
Deviance (thetabar)	=	7904.85
Effective no. of pars (pd)	=	11.63
Bayesian DIC	=	7928.12

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.072915	.0200081	71	0.000	.0444727	.1273565

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12					
var (cons)	.850186	.4725475	659	.3327703	1.9751

6241

6242* Calculate the ICC from the parameter point estimates

```
6243 scalar m1sigma2u = [RP2]var(cons)
```

```
6244 scalar m1sigma2e = pi^2/3
```

```
6245display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC = 0.205
```

6246

6247* Calculate the ICC from the chains

```
6248use "m6A s12 beta.dta", clear
```

6249rename RP2_var_cons_ sigma2u

6250generate sigma2e = _pi^2/3

6251generate icc = sigma2u/(sigma2u + sigma2e)

6252mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1943085	.0743402	639	0.000	.0918585	.375138

6253

6254

6255*****

6256* MODEL 6B_S12 - OTHER DRUG, MAIN EFFECTS MODEL

6257*****

6258

6259*-----*

6260* FIT THE MODEL

6261*-----*

6262

6263* Load the data

6264use "analysisready2.dta", clear

6265sort stratal2 aid

6266

6267* delete if missing dependent variable (so can record number)

6268drop if drugs_w1 == .
(137 observations deleted)

6269

6270* Fit model using by PQL2

6271runmlwin drugs_w1 cons female latinx_race black_race lowparentedu, ///

> level2(stratal2: 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
stratal2	12	466	1158.7	2893

Run time (seconds) = 2.30

Number of iterations = 26

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.047689	.0858265	-23.86	0.000	-2.215906	-1.879472
female	-.1094226	.0916025	-1.19	0.232	-.2889602	.070115
latinx_race	-.0895429	.1034695	-0.87	0.387	-.2923393	.1132535
black_race	-1.738411	.1432159	-12.14	0.000	-2.019109	-1.457713
lowparentedu	.0369218	.0924813	0.40	0.690	-.1443382	.2181818

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: stratal2				
var(cons)	.0091605	.0089484	-.0083781	.026699

6273* Fit model using bv MCMC

```
MLwiN 3.2 multilevel model                Number of obs      =    13904
Binomial logit response model
Estimation algorithm: MCMC
```

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	275
Deviance (dbar)	=	7919.01
Deviance (thetabar)	=	7910.72
Effective no. of pars (pd)	=	8.29
Bayesian DIC	=	7927.29

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12 var(cons)	.0204146	.0332715	477	.0006708	.1158727

6276drop use

6279runmlwin, or

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata12	12	466	1158.7	2893

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      275
Deviance (dbar)     =     7919.01
Deviance (thetabar) =     7910.72
Effective no. of pars (pd) =    8.29
Bayesian DIC        =     7927.29

```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1298013	.0135106	418	0.000	.1061413	.1601062
female	.892914	.1044246	466	0.138	.6688108	1.08103
latinx_race	.9169413	.1195462	444	0.195	.7255383	1.169627
black_race	.1755854	.0268853	1015	0.000	.1265005	.2279795
lowparentedu	1.058898	.1322447	504	0.332	.852441	1.35761

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0204146	.0332715	477	.0006708	.1158727

```

6280
6281* Calculate the ICC from the parameter point estimates
6282scalar mlsigma2u = [RP2]var(cons)

6283scalar mlsigma2e = _pi^2/3

6284display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.006

```

```

6285
6286* Calculate the ICC from the chains
6287use "m6B_s12_beta.dta", clear

6288rename RP2_var_cons_ sigma2u

6289generate sigma2e = _pi^2/3

6290generate icc = sigma2u/(sigma2u + sigma2e)

6291mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0063716	.0120408	444	0.000	.0002038	.0340227

```

6292
6293
6294*-----*
6295* PREPARE FIXED-PART PAREMETER CHAINS
6296*-----*
6297
6298use "m6B_s12_beta.dta", clear

6299drop deviance RP2_var_cons_ OD_bcons_1

```

```

6300rename FP1_ * b_*
6301format %9.2f b_*
6302compress
      variable iteration was double now long
      (4,000 bytes saved)
6303save "m6B_s12_beta_prepped.dta", replace
      file m6B_s12_beta_prepped.dta saved
6304isid iteration
6305codebook iteration, compact

```

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

```

6306
6307
6308*-----*
6309* PREPARE STRATUM RANDOM EFFECTS CHAINS
6310*-----*
6311
6312use "m6B_s12_u.dta", clear
6313drop residual idnum
6314rename value u
6315format %9.2f u
6316sort stratal2 iteration
6317order stratal2 iteration
6318compress
      variable stratal2 was double now int
      variable iteration was double now long
      (120,000 bytes saved)
6319save "m6B_s12_u_prepped.dta", replace
      file m6B_s12_u_prepped.dta saved
6320isid stratal2 iteration
6321codebook iteration, compact

```

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

```

6322

```

```

6323
6324*-----*
6325* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6326*-----*
6327
6328use "data12.dta", clear

6329isid strata12

6330cross using "m6B_sl2_beta_prepped.dta"

6331isid strata12 iteration

6332sort strata12 iteration

6333merge 1:1 strata12 iteration using "m6B_sl2_u_prepped.dta", nogenerate assert(match)

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

6334isid strata12 iteration

6335compress
      variable strata12 was double now int
      (72,000 bytes saved)

6336save "m6B_sl2data_prepped.dta", replace
      file m6B_sl2data_prepped.dta saved

6337
6338
6339*-----*
6340* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6341*-----*
6342
6343* Percentage p based on fixed and random part
6344use "m6B_sl2data_prepped.dta", clear

6345gen cons = 1

6346generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      + u ///
> )

6347label var p "Percentage based on main effects and interactions"

6348format %9.3f p

6349
6350* Percentage p based only on the fixed-part
6351generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
> )

```

```

6352label var pA "Percentage based only on main effects"
6353format %9.3f pA
6354
6355* Percentage pB calculated as the difference between p and pA
6356generate pB = p - pA
6357label var pB "Percentage point difference based on interaction effects"
6358format %9.3f pB
6359
6360* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6361bysort stratal2 (iteration): egen pmn = mean(p)
6362bysort stratal2 (iteration): egen plo = pctlile(p), p(2.5)
6363bysort stratal2 (iteration): egen phi = pctlile(p), p(97.5)
6364format %9.3f pmn plo phi
6365label var pmn "Percentage based on main effects and interactions"
6366label var plo "Percentage based on main effects and interactions"
6367label var phi "Percentage based on main effects and interactions"
6368
6369
6370bysort stratal2 (iteration): egen pAmn = mean(pA)
6371bysort stratal2 (iteration): egen pAlo = pctlile(pA), p(2.5)
6372bysort stratal2 (iteration): egen pAhi = pctlile(pA), p(97.5)
6373format %9.3f pAmn pAlo pAhi
6374label var pAmn "Percentage based on main effects"
6375label var pAlo "Percentage based on main effects"
6376label var pAhi "Percentage based on main effects"
6377
6378bysort stratal2 (iteration): egen pBmn = mean(pB)
6379bysort stratal2 (iteration): egen pBlo = pctlile(pB), p(2.5)
6380bysort stratal2 (iteration): egen pBhi = pctlile(pB), p(97.5)
6381format %9.3f pBmn pBlo pBhi
6382label var pBmn "Percentage point difference based on interaction effects"
6383label var pBlo "Percentage point difference based on interaction effects"
6384label var pBhi "Percentage point difference based on interaction effects"
6385

```

```

6386* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6387drop iteration b* u* p pA pB

6388duplicates drop

    Duplicates in terms of all variables

    (11,988 observations deleted)

6389isid strata12

6390
6391* Ranks
6392sort pmn

6393generate pmnrank = _n

6394order pmnrank, after(phi)

6395sort pAmn

6396generate pAmnrank = _n

6397order pAmnrank, after(pAhi)

6398sort pBmn

6399generate pBmnrank = _n

6400order pBmnrank, after(pBhi)

6401
6402* Sort the data
6403sort strata12

6404isid strata12

6405
6406* Compress and save the data
6407compress
    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)

6408save "m6B_s12results.dta", replace
    file m6B_s12results.dta saved

6409
6410* List strata with statistically significant interaction effects on the predicted in
    > cidence
6411use "m6B_s12results.dta", clear

6412list strata12  pBmn pBlo pBhi if pBhi<0, noobs

6413list strata12  pBmn pBlo pBhi if pBlo>0, noobs

6414
6415

```



```

6416
6417
6418*****
6419* MODEL 6A_S18 - OTHER DRUG, Null MODEL
6420*****
6421
6422*-----*
6423* FIT THE MODEL
6424*-----*
6425
6426* Load the data
6427use "analysisready2.dta", clear

6428sort strata18 aid

```

```

6429
6430* delete if missing dependent variable (so can record number)
6431drop if drugs_w1 == .
      (137 observations deleted)

```

```

6432
6433* Fit model using PQL2
6434runmlwin drugs_w1 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
strata18	18	212	772.4	1579

Run time (seconds) = **1.84**
 Number of iterations = **8**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.699977	.2093798	-12.90	0.000	-3.110354	-2.289601

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18					
	var(cons)	.7440294	.2616452	.2312142	1.256844

```

6435
6436* Fit model using MCMC
6437runmlwin drugs_w1 cons , ///
      > level2(strata18: cons, residuals(u, savechains("m6A_s18_u.dta", replace))) ///
      > level1(aid:) ///
      > discrete(distribution(binomial) link(logit) denominator(denominator)) ///
      > mcmc(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
strata18	18	212	772.4	1579

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 154
 Deviance (dbar) = 7911.79
 Deviance (thetabar) = 7894.46
 Effective no. of pars (pd) = 17.33
 Bayesian DIC = 7929.12

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.673371	.2183506	105	0.000	-3.143827	-2.25025

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.8500915	.3663809	976	.3783339	1.762502

6438rename u0 mlu

6439drop u0se

6440

6441* Present the regression coefficients as odds ratios

6442runmlwin, 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
strata18	18	212	772.4	1579

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 154
 Deviance (dbar) = 7911.79
 Deviance (thetabar) = 7894.46
 Effective no. of pars (pd) = 17.33
 Bayesian DIC = 7929.12

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0707597	.0156446	107	0.000	.0431175	.1053729

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.8500915	.3663809	976	.3783339	1.762502

```

6443
6444* Calculate the ICC from the parameter point estimates
6445scalar mlsigma2u = [RP2]var(cons)

6446scalar mlsigma2e = _pi^2/3

6447display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.205

```

```

6448
6449* Calculate the ICC from the chains
6450use "m6A_sl8_beta.dta", clear

6451rename RP2_var_cons_ sigma2u

6452generate sigma2e = _pi^2/3

6453generate icc = sigma2u/(sigma2u + sigma2e)

6454mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1990239	.0633882	944	0.000	.1031388	.3488465

```

6455
6456
6457*****
6458* MODEL 6B S18 - OTHER DRUG, MAIN EFFECTS MODEL
6459*****
6460
6461*-----*
6462* FIT THE MODEL
6463*-----*
6464
6465* Load the data
6466use "analysisready2.dta", clear

6467sort strata18 aid

6468
6469* delete if missing dependent variable (so can record number)
6470drop if drugs_w1 == .
      (137 observations deleted)

6471
6472* Fit model using PQL2
6473runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata18	18	212	772.4	1579

Run time (seconds) = 2.35
 Number of iterations = 25

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.092076	.0973628	-21.49	0.000	-2.282904	-1.901249
female	-.1049581	.0892543	-1.18	0.240	-.2798933	.0699771
latinx_race	-.081577	.1032374	-0.79	0.429	-.2839185	.1207646
black_race	-1.749733	.1412989	-12.38	0.000	-2.026674	-1.472792
hsless	.0791742	.1095481	0.72	0.470	-.1355362	.2938845
somecollege	.0892807	.1139315	0.78	0.433	-.1340209	.3125824

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(cons)	.0123948	.0101859	-.0075691	.0323588

6474

6475* Fit model using MCMC

```
6476runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("m6B_sl8_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m6B_sl8_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
strata18	18	212	772.4	1579

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 299
 Deviance (dbar) = 7916.06
 Deviance (thetabar) = 7905.72
 Effective no. of pars (pd) = 10.34
 Bayesian DIC = 7926.40

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.094864	.1192459	306	0.000	-2.312981	-1.848637
female	-.1100583	.1154536	402	0.131	-.3631037	.0788612
latinx_race	-.0861427	.1210932	581	0.184	-.3256321	.1541558
black_race	-1.763177	.1544068	746	0.000	-2.058181	-1.466734
hsless	.0951464	.1207446	499	0.191	-.1253976	.3539582
somecollege	.0941655	.1272954	533	0.193	-.1633841	.3469057

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0212849	.0329251	304	.0007086	.0963951

```
6477rename u0 mlu
```

```
6478drop u0se
```

```
6479
```

```
6480* Present the regression coefficients as odds ratios
```

```
6481runmlwin, 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
strata18	18	212	772.4	1579

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      299
Deviance (dbar)       =     7916.06
Deviance (thetabar)   =     7905.72
Effective no. of pars (pd) =    10.34
Bayesian DIC          =     7926.40

```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1239617	.0158701	281	0.000	.0989658	.1574516
female	.9019469	.0977549	448	0.131	.6955161	1.082054
latinx_race	.9213099	.110963	610	0.184	.7220709	1.166673
black_race	.1740219	.0265302	813	0.000	.1276861	.2306777
hsless	1.110128	.1447614	462	0.191	.8821461	1.424696
somecollege	1.110378	.1415941	533	0.193	.849265	1.414684

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0212849	.0329251	304	.0007086	.0963951

```
6482
```

```
6483* Calculate the ICC from the parameter point estimates
```

```
6484scalar mlsigma2u = [RP2]var(cons)
```

```
6485scalar mlsigma2e = _pi^2/3
```

```
6486display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC =      0.006
```

```
6487
```

```
6488* Calculate the ICC from the chains
```

```
6489use "m6B_s18_beta.dta", clear
```

```
6490rename RP2_var_cons_ sigma2u
```

6491generate sigma2e = $\pi^2/3$

6492generate icc = sigma2u/(sigma2u + sigma2e)

6493mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0062762	.0094772	304	0.000	.0002154	.0284665

6494

6495

6496*-----*

6497* PREPARE FIXED-PART PAREMETER CHAINS

6498*-----*

6499

6500use "m6B_s18_beta.dta", clear

6501drop deviance RP2_var_cons_ OD_bcons_1

6502rename FP1_* b_*

6503format %9.2f b_*

6504compress

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

6505save "m6B_s18_beta_prepped.dta", replace
file m6B_s18_beta_prepped.dta saved

6506isid iteration

6507codebook iteration, compact

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

6508

6509

6510*-----*

6511* PREPARE STRATUM RANDOM EFFECTS CHAINS

6512*-----*

6513

6514use "m6B_s18_u.dta", clear

6515drop residual idnum

6516rename value u

6517format %9.2f u

6518sort strata18 iteration

6519order strata18 iteration

```

6520compress
      variable strata18 was double now int
      variable iteration was double now long
      (180,000 bytes saved)

```

```

6521save "m6B_s18_u_prepped.dta", replace
      file m6B_s18_u_prepped.dta saved

```

```

6522isid strata18 iteration

```

```

6523codebook iteration, compact

```

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

```

6524

```

```

6525

```

```

6526*-----*

```

```

6527* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

```

```

6528*-----*

```

```

6529

```

```

6530use "data18.dta", clear

```

```

6531isid strata18

```

```

6532cross using "m6B_s18_beta_prepped.dta"

```

```

6533isid strata18 iteration

```

```

6534sort strata18 iteration

```

```

6535merge 1:1 strata18 iteration using "m6B_s18_u_prepped.dta", nogenerate assert(match)

```

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

```

6536isid strata18 iteration

```

```

6537compress
      variable strata18 was double now int
      (108,000 bytes saved)

```

```

6538save "m6B_s18data_prepped.dta", replace
      file m6B_s18data_prepped.dta saved

```

```

6539

```

```

6540

```

```

6541*-----*

```

```

6542* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)

```

```

6543*-----*

```

```

6544

```

```

6545* Percentage p based on fixed and random part

```

```

6546use "m6B_s18data_prepped.dta", clear

```

```

6547gen cons = 1

6548generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>      + u ///
>    )

6549label var p "Percentage based on main effects and interactions"

6550format %9.3f p

6551
6552* Percentage p based only on the fixed-part
6553generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>    )

6554label var pA "Percentage based only on main effects"

6555format %9.3f pA

6556
6557* Percentage pB calculated as the difference between p and pA
6558generate pB = p - pA

6559label var pB "Percentage point difference based on interaction effects"

6560format %9.3f pB

6561
6562* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6563bysort strata18 (iteration): egen pmn = mean(p)

6564bysort strata18 (iteration): egen plo = pctlile(p), p(2.5)

6565bysort strata18 (iteration): egen phi = pctlile(p), p(97.5)

6566format %9.3f pmn plo phi

6567label var pmn "Percentage based on main effects and interactions"

6568label var plo "Percentage based on main effects and interactions"

6569label var phi "Percentage based on main effects and interactions"

6570
6571
6572bysort strata18 (iteration): egen pAmn = mean(pA)

6573bysort strata18 (iteration): egen pAlo = pctlile(pA), p(2.5)

```



```

6574bysort strata18 (iteration): egen pAhi = pctlile(pA), p(97.5)
6575format %9.3f pAmn pAlo pAhi
6576label var pAmn "Percentage based on main effects"
6577label var pAlo "Percentage based on main effects"
6578label var pAhi "Percentage based on main effects"

6579
6580bysort strata18 (iteration): egen pBmn = mean(pB)
6581bysort strata18 (iteration): egen pBlo = pctlile(pB), p(2.5)
6582bysort strata18 (iteration): egen pBhi = pctlile(pB), p(97.5)
6583format %9.3f pBmn pBlo pBhi
6584label var pBmn "Percentage point difference based on interaction effects"
6585label var pBlo "Percentage point difference based on interaction effects"
6586label var pBhi "Percentage point difference based on interaction effects"

6587
6588* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6589drop iteration b* u* p pA pB

6590duplicates drop

    Duplicates in terms of all variables

    (17,982 observations deleted)

6591isid strata18

6592
6593* Ranks
6594sort pmn

6595generate pmnrank = _n

6596order pmnrank, after(phi)

6597sort pAmn

6598generate pAmnrank = _n

6599order pAmnrank, after(pAhi)

6600sort pBmn

6601generate pBmnrank = _n

6602order pBmnrank, after(pBhi)

6603
6604* Sort the data
6605sort strata18

```

```

6606isid strata18

6607
6608* Compress and save the data
6609compress
    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)

6610save "m6B_sl8results.dta", replace
    file m6B_sl8results.dta saved

6611
6612* List strata with statistically significant interaction effects on the predicted in
    > cidence
6613use "m6B_sl8results.dta", clear

6614list strata18 pBmn pBlo pBhi if pBhi<0, noobs

6615list strata18 pBmn pBlo pBhi if pBlo>0, noobs

6616
6617
6618*****
6619* MODEL 6A_S36 - OTHER DRUG, Null MODEL
6620*****
6621
6622*-----*
6623* FIT THE MODEL
6624*-----*
6625
6626* Load the data
6627use "analysisready2.dta", clear

6628sort strata36 aid

6629
6630* delete if missing dependent variable (so can record number)
6631drop if drugs_w1 == .
    (137 observations deleted)

6632
6633* Fit model using PQL2
6634runmlwin drugs_w1 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
strata36	36	47	386.2	1081

Run time (seconds) = **1.83**
 Number of iterations = **8**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.672464	.1530127	-17.47	0.000	-2.972363	-2.372564

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(const)	.7368675	.1953068	.3540732	1.119662

6635

6636* Fit model using MCMC

6637runmlwin drugs_w1 cons , ///

```

> level2(strata36: cons, residuals(u, savechains("m6A_s36_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m6A_s36_beta.dta", replace)) initsprevious

```

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13904**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	47	386.2	1081

```

Burnin           = 5000
Chain            = 50000
Thinning         = 50
Run time (seconds) = 198
Deviance (dbar)  = 7900.76
Deviance (thetabar) = 7868.86
Effective no. of pars (pd) = 31.90
Bayesian DIC     = 7932.65

```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.671788	.1607599	234	0.000	-2.991245	-2.36546

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(const)	.8037365	.2554167	813	.4361008	1.358618

6638rename u0 mlu

6639drop u0se

6640

6641* Present the regression coefficients as odds ratios

6642runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13904**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata36	36	47	386.2	1081

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      198
Deviance (dbar)       =     7900.76
Deviance (thetabar)   =     7868.86
Effective no. of pars (pd) =    31.90
Bayesian DIC          =     7932.65

```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0699004	.0112432	239	0.000	.0502249	.0939061

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.8037365	.2554167	813	.4361008	1.358618

```

6643
6644* Calculate the ICC from the parameter point estimates
6645scalar mlsigma2u = [RP2]var(cons)

6646scalar mlsigma2e = _pi^2/3

6647display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.196

6648
6649* Calculate the ICC from the chains
6650use "m6A_s36_beta.dta", clear

6651rename RP2_var_cons_ sigma2u

6652generate sigma2e = _pi^2/3

6653generate icc = sigma2u/(sigma2u + sigma2e)

6654mcmcsun icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1939973	.0466274	810	0.000	.1170436	.292271

```

6655
6656
6657*****
6658* MODEL 6B_S36 - OTHER DRUG, MAIN EFFECTS MODEL
6659*****
6660
6661*-----*
6662* FIT THE MODEL
6663*-----*
6664
6665* Load the data
6666use "analysisready2.dta", clear

```

```
6667sort strata36 aid
```

```
6668
```

```
6669* delete if missing dependent variable (so can record number)
```

```
6670drop if drugs_w1 == .
      (137 observations deleted)
```

```
6671
```

```
6672* Fit model using PQL2
```

```
6673runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
```

```
> 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
strata36	36	47	386.2	1081

Run time (seconds) = **2.21**

Number of iterations = **17**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.131002	.1011947	-21.06	0.000	-2.32934	-1.932664
female	-.0890574	.0870399	-1.02	0.306	-.2596525	.0815378
latinx_race	-.0765824	.1028176	-0.74	0.456	-.2781011	.1249364
black_race	-1.797813	.1428565	-12.58	0.000	-2.077807	-1.51782
hsless	.0317347	.1083992	0.29	0.770	-.1807239	.2441932
somecollege	.0563507	.1096892	0.51	0.607	-.1586362	.2713376
lowinc	.1212305	.0911472	1.33	0.184	-.0574147	.2998757

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.0204064	.0130841	-.005238	.0460509

```
6674
```

```
6675* Fit model using MCMC
```

```
6676runmlwin drugs_w1 cons female latinx_race black_race hsless somecollege lowinc, ///
```

```
> level2(strata36: cons, residuals(u, savechains("m6B_s36_u.dta", replace))) ///
```

```
> level1(aid:) ///
```

```
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
```

```
> mcmc(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
strata36	36	47	386.2	1081

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      317
Deviance (dbar)     =    7908.45
Deviance (thetabar) =    7894.06
Effective no. of pars (pd) =    14.39
Bayesian DIC        =    7922.83

```

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.14253	.0958307	533	0.000	-2.325958	-1.961506
female	-.0811496	.0879041	770	0.161	-.2648589	.0721831
latinx_race	-.0918397	.1051023	805	0.178	-.2865867	.1236361
black_race	-1.80459	.1431268	741	0.000	-2.103156	-1.547902
hsless	.0366273	.1078234	722	0.360	-.1766031	.250284
somecollege	.0655168	.1057662	764	0.259	-.1387594	.2651867
lowinc	.1278069	.0895971	995	0.063	-.0382539	.3051528

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0193254	.0234925	335	.0006355	.0756138

```
6677rename u0 mlu
```

```
6678drop u0se
```

```
6679
```

```
6680* Present the regression coefficients as odds ratios
```

```
6681runmlwin, 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
strata36	36	47	386.2	1081

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      317
Deviance (dbar)     =    7908.45
Deviance (thetabar) =    7894.06
Effective no. of pars (pd) =    14.39
Bayesian DIC        =    7922.83

```

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1177765	.0112179	540	0.000	.0976898	.1406464
female	.9255686	.0790222	787	0.161	.7673142	1.074852
latinx_race	.9138942	.0984665	780	0.178	.750822	1.131604
black_race	.1655784	.0226453	771	0.000	.1220706	.2126938
hsless	1.045243	.1159317	699	0.360	.8381124	1.284391
somecollege	1.072911	.1132626	772	0.259	.8704375	1.303674
lowinc	1.144832	.1032423	998	0.063	.9624685	1.356832

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0193254	.0234925	335	.0006355	.0756138

```

6682
6683* Calculate the ICC from the parameter point estimates
6684scalar mlsigma2u = [RP2]var(cons)

6685scalar mlsigma2e = _pi^2/3

6686display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
  ICC =      0.006

```

```

6687
6688* Calculate the ICC from the chains
6689use "m6B_s36_beta.dta", clear

6690rename RP2_var_cons_ sigma2u

6691generate sigma2e = _pi^2/3

6692generate icc = sigma2u/(sigma2u + sigma2e)

6693mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0056451	.0064458	332	0.000	.0001931	.0224674

```

6694
6695
6696*-----*
6697* PREPARE FIXED-PART PAREMETER CHAINS
6698*-----*
6699
6700use "m6B_s36_beta.dta", clear

6701drop deviance RP2_var_cons_ OD_bcons_1

6702rename FP1_* b_*

6703format %9.2f b_*

6704compress
  variable iteration was double now long
  (4,000 bytes saved)

6705save "m6B_s36_beta_prepped.dta", replace
  file m6B_s36_beta_prepped.dta saved

6706isid iteration

6707codebook iteration, compact

```

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

```

6708
6709
6710*-----*
6711* PREPARE STRATUM RANDOM EFFECTS CHAINS
6712*-----*
6713
6714use "m6B_s36_u.dta", clear

6715drop residual idnum

6716rename value u

6717format %9.2f u

6718sort strata36 iteration

6719order strata36 iteration

6720compress
      variable strata36 was double now int
      variable iteration was double now long
      (360,000 bytes saved)

6721save "m6B_s36_u_prepped.dta", replace
      file m6B_s36_u_prepped.dta saved

6722isid strata36 iteration

6723codebook iteration, compact

```

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

```

6724
6725
6726*-----*
6727* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
6728*-----*
6729
6730use "data36.dta", clear

6731isid strata36

6732cross using "m6B_s36_beta_prepped.dta"

6733isid strata36 iteration

6734sort strata36 iteration

6735merge 1:1 strata36 iteration using "m6B_s36_u_prepped.dta", nogenerate assert(match)

```

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


```

6736isid strata36 iteration

6737compress
      variable strata36 was double now int
      (216,000 bytes saved)

6738save "m6B_s36data_prepped.dta", replace
      file m6B_s36data_prepped.dta saved

6739
6740
6741*-----*
6742* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
6743*-----*
6744
6745* Percentage p based on fixed and random part
6746use "m6B_s36data_prepped.dta", clear

6747gen cons = 1

6748generate 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 ///
> )

6749label var p "Percentage based on main effects and interactions"

6750format %9.3f p

6751
6752* Percentage p based only on the fixed-part
6753generate 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 ///
> )

6754label var pA "Percentage based only on main effects"

6755format %9.3f pA

6756
6757* Percentage pB calculated as the difference between p and pA
6758generate pB = p - pA

6759label var pB "Percentage point difference based on interaction effects"

6760format %9.3f pB

6761

```

```

6762* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6763bysort strata36 (iteration): egen pmn = mean(p)

6764bysort strata36 (iteration): egen plo = pctlile(p), p(2.5)
6765bysort strata36 (iteration): egen phi = pctlile(p), p(97.5)
6766format %9.3f pmn plo phi

6767label var pmn "Percentage based on main effects and interactions"
6768label var plo "Percentage based on main effects and interactions"
6769label var phi "Percentage based on main effects and interactions"

6770
6771
6772bysort strata36 (iteration): egen pAmn = mean(pA)
6773bysort strata36 (iteration): egen pAlo = pctlile(pA), p(2.5)
6774bysort strata36 (iteration): egen pAhi = pctlile(pA), p(97.5)
6775format %9.3f pAmn pAlo pAhi

6776label var pAmn "Percentage based on main effects"
6777label var pAlo "Percentage based on main effects"
6778label var pAhi "Percentage based on main effects"

6779
6780bysort strata36 (iteration): egen pBmn = mean(pB)
6781bysort strata36 (iteration): egen pBlo = pctlile(pB), p(2.5)
6782bysort strata36 (iteration): egen pBhi = pctlile(pB), p(97.5)
6783format %9.3f pBmn pBlo pBhi

6784label var pBmn "Percentage point difference based on interaction effects"
6785label var pBlo "Percentage point difference based on interaction effects"
6786label var pBhi "Percentage point difference based on interaction effects"

6787
6788* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6789drop iteration b* u* p pA pB

6790duplicates drop

    Duplicates in terms of all variables

    (35,964 observations deleted)

6791lisid strata36

6792
6793* Ranks

```

```

6794sort pmn
6795generate pmnrank = _n
6796order pmnrank, after(phi)
6797sort pAmn
6798generate pAmnrank = _n
6799order pAmnrank, after(pAhi)
6800sort pBmn
6801generate pBmnrank = _n
6802order pBmnrank, after(pBhi)

6803
6804* Sort the data
6805sort strata36

6806isid strata36

6807
6808* Compress and save the data
6809compress
      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)

6810save "m6B_s36results.dta", replace
      file m6B_s36results.dta saved

6811
6812* List strata with statistically significant interaction effects on the predicted in
      > cidence
6813use "m6B_s36results.dta", clear

6814list strata36 pBmn pBlo pBhi if pBhi<0, noobs

6815list strata36 pBmn pBlo pBhi if pBlo>0, noobs

6816
6817
6818*****
6819* MODEL 6A_S48 - OTHER DRUG, Null MODEL
6820*****
6821
6822*-----*
6823* FIT THE MODEL
6824*-----*
6825
6826* Load the data
6827use "analysisready2.dta", clear

6828sort strata48 aid

```

6829

6830* delete if missing dependent variable (so can record number)

6831drop if drugs_w1 == .
(137 observations deleted)

6832

6833* Fit model using PQL2

6834runmlwin drugs_w1 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
strata48	48	3	289.7	1081

Run time (seconds) = **1.83**Number of iterations = **8**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.726934	.1444908	-18.87	0.000	-3.010131	-2.443737

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48					
	var(cons)	.7537052	.19174	.3779017	1.129509

6835

6836* Fit model using MCMC

6837runmlwin drugs_w1 cons , ///

> level2(strata48: cons, residuals(u, savechains("m6A_s48_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(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
strata48	48	3	289.7	1081

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **243**Deviance (dbar) = **7871.56**Deviance (thetabar) = **7835.27**Effective no. of pars (pd) = **36.29**Bayesian DIC = **7907.85**

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.727757	.1404357	252	0.000	-2.995296	-2.452728

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.8083649	.2340501	671	.4580891	1.382069

6838rename u0 mlu

6839drop u0se

6840

6841* Present the regression coefficients as odds ratios

6842runmlwin, 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
strata48	48	3	289.7	1081

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **243**
 Deviance (dbar) = **7871.56**
 Deviance (thetabar) = **7835.27**
 Effective no. of pars (pd) = **36.29**
 Bayesian DIC = **7907.85**

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0660614	.0092681	246	0.000	.050022	.0860585

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.8083649	.2340501	671	.4580891	1.382069

6843

6844* Calculate the ICC from the parameter point estimates

6845scalar mlsigma2u = [RP2]var(cons)

6846scalar mlsigma2e = _pi^2/3

6847display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
 ICC = **0.197**

6848

6849* Calculate the ICC from the chains

```

6850use "m6A_s48_beta.dta", clear
6851rename RP2_var_cons_ sigma2u
6852generate sigma2e = _pi^2/3
6853generate icc = sigma2u/(sigma2u + sigma2e)
6854mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.1958936	.0448181	663	0.000	.1222237	.2958234

```

6855
6856
6857*****
6858* MODEL 6B_S48 - OTHER DRUG, MAIN EFFECTS MODEL
6859*****
6860
6861*-----*
6862* FIT THE MODEL
6863*-----*
6864
6865* Load the data
6866use "analysisready2.dta", clear
6867sort strata48 aid
6868
6869* delete if missing dependent variable (so can record number)
6870drop if drugs_w1 == .
    (137 observations deleted)
6871
6872* Fit model using PQL2
6873runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc,
> ///
> 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
strata48	48	3	289.7	1081

Run time (seconds) = **2.35**
 Number of iterations = **18**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.15556	.0842237	-25.59	0.000	-2.320635	-1.990484
female	-.0752312	.0736373	-1.02	0.307	-.2195576	.0690952
latinx_imm	-1.210315	.2518073	-4.81	0.000	-1.703848	-.7167815
latinx_non	.0516982	.0925517	0.56	0.576	-.1296998	.2330962
black	-1.796019	.1336066	-13.44	0.000	-2.057883	-1.534155
hsless	.0238968	.0931236	0.26	0.797	-.1586222	.2064158
somecollege	.0615408	.0936222	0.66	0.511	-.1219549	.2450364
lowinc	.1601014	.0784214	2.04	0.041	.0063983	.3138046

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var (cons)	.0086029	.0089487	-.0089362	.026142

6874

```
6875* Fit model using MCMC
```

```
6876runmlwin drugs w1 cons female latinx imm latinx non black hsless somecollege lowinc,
```

```
> level2(strata48: cons, residuals(u, savechains("m6B_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata48	48	3	289.7	1081

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	1178
Deviance (dbar)	=	7879.03
Deviance (thetabar)	=	7865.64
Effective no. of pars (pd)	=	13.39
Bayesian DIC	=	7892.42

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.158405	.0895616	693	0.000	-2.334335	-1.983706
female	-.0789115	.0784395	1118	0.144	-.2321997	.0681356
latinx_imm	-1.243864	.257371	1059	0.000	-1.781692	-.8071125
latinx_non	.0523853	.0964516	913	0.295	-.1277253	.2399495
black	-1.807078	.1359958	980	0.000	-2.083593	-1.550862
hsless	.0290229	.0979279	715	0.384	-.1621889	.2241868
somecollege	.0587397	.0979595	837	0.278	-.1307666	.2598023
lowinc	.1628575	.0831807	836	0.033	-.0069907	.3157942

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata48					
var (cons)	.0125462	.0154784	340	.000697	.0519004

```
6877rename u0 m1u
```

6878drop use

6879

6880* Present the regression coefficients as odds ratios

6881runmlwin, or

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = **13904**

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata48	48	3	289.7	1081

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **1178**
 Deviance (dbar) = **7879.03**
 Deviance (thetabar) = **7865.64**
 Effective no. of pars (pd) = **13.39**
 Bayesian DIC = **7892.42**

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1159061	.0102544	703	0.000	.0968749	.1375585
female	.9258725	.0708554	1123	0.144	.7927879	1.07051
latinx_imm	.2935515	.071847	1057	0.000	.168353	.4461444
latinx_non	1.060345	.1020039	874	0.295	.8800952	1.271185
black	.1658346	.0226011	981	0.000	.1244821	.212065
hsless	1.031858	.1015959	708	0.384	.8502806	1.251305
somecollege	1.066695	.1087551	833	0.278	.8719034	1.296674
lowinc	1.179464	.0977704	827	0.033	.9930337	1.371348

Random-effects Parameters		Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48						
	var(cons)	.0125462	.0154784	340	.000697	.0519004

6882

6883* Calculate the ICC from the parameter point estimates

6884scalar m1sigma2u = [RP2]var(cons)

6885scalar m1sigma2e = _pi^2/3

6886display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)

ICC = 0.004

6887

6888* Calculate the ICC from the chains

6889use "m6B_s48_beta.dta", clear

6890rename RP2_var_cons_ sigma2u

6891generate sigma2e = _pi^2/3

6892generate icc = sigma2u/(sigma2u + sigma2e)

6893mcmcsum icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0037403	.0045265	337	0.000	.0002118	.0155308

6894

6895

6896*-----*

6897* PREPARE FIXED-PART PAREMETER CHAINS

6898*-----*

6899

6900use "m6B_s48_beta.dta", clear

6901drop deviance RP2_var_cons_ OD_bcons_1

6902rename FP1_* b_*

6903format %9.2f b_*

6904compress

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

6905save "m6B_s48_beta_prepped.dta", replace
file m6B_s48_beta_prepped.dta saved

6906isid iteration

6907codebook iteration, compact

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

6908

6909

6910*-----*

6911* PREPARE STRATUM RANDOM EFFECTS CHAINS

6912*-----*

6913

6914use "m6B_s48_u.dta", clear

6915drop residual idnum

6916rename value u

6917format %9.2f u

6918sort strata48 iteration

6919order strata48 iteration

6920compress

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

```
6921save "m6B_s48_u_prepped.dta", replace
      file m6B_s48_u_prepped.dta saved
```

```
6922isid strata48 iteration
```

```
6923codebook iteration, compact
```

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

```
6924
```

```
6925
```

```
6926*-----*
```

```
6927* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
```

```
6928*-----*
```

```
6929
```

```
6930use "data48.dta", clear
```

```
6931isid strata48
```

```
6932cross using "m6B_s48_beta_prepped.dta"
```

```
6933isid strata48 iteration
```

```
6934sort strata48 iteration
```

```
6935merge 1:1 strata48 iteration using "m6B_s48_u_prepped.dta", nogenerate assert(match)
```

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

```
6936isid strata48 iteration
```

```
6937compress
```

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

```
6938save "m6B_s48data_prepped.dta", replace
      file m6B_s48data_prepped.dta saved
```

```
6939
```

```
6940
```

```
6941*-----*
```

```
6942* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
```

```
6943*-----*
```

```
6944
```

```
6945* Percentage p based on fixed and random part
```

```
6946use "m6B_s48data_prepped.dta", clear
```

```
6947gen cons = 1
```

```
6948generate 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_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      + u ///
> )
```

```

6949label var p "Percentage based on main effects and interactions"
6950format %9.3f p
6951
6952* Percentage p based only on the fixed-part
6953generate 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 ///
> )
6954label var pA "Percentage based only on main effects"
6955format %9.3f pA
6956
6957* Percentage pB calculated as the difference between p and pA
6958generate pB = p - pA
6959label var pB "Percentage point difference based on interaction effects"
6960format %9.3f pB
6961
6962* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
6963bysort strata48 (iteration): egen pmn = mean(p)
6964bysort strata48 (iteration): egen plo = pctlile(p), p(2.5)
6965bysort strata48 (iteration): egen phi = pctlile(p), p(97.5)
6966format %9.3f pmn plo phi
6967label var pmn "Percentage based on main effects and interactions"
6968label var plo "Percentage based on main effects and interactions"
6969label var phi "Percentage based on main effects and interactions"
6970
6971
6972bysort strata48 (iteration): egen pAmn = mean(pA)
6973bysort strata48 (iteration): egen pAlo = pctlile(pA), p(2.5)
6974bysort strata48 (iteration): egen pAhi = pctlile(pA), p(97.5)
6975format %9.3f pAmn pAlo pAhi
6976label var pAmn "Percentage based on main effects"
6977label var pAlo "Percentage based on main effects"
6978label var pAhi "Percentage based on main effects"

```

```

6979
6980 bysort strata48 (iteration): egen pBmn = mean(pB)
6981 bysort strata48 (iteration): egen pBlo = pctlile(pB), p(2.5)
6982 bysort strata48 (iteration): egen pBhi = pctlile(pB), p(97.5)
6983 format %9.3f pBmn pBlo pBhi
6984 label var pBmn "Percentage point difference based on interaction effects"
6985 label var pBlo "Percentage point difference based on interaction effects"
6986 label var pBhi "Percentage point difference based on interaction effects"
6987
6988 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
6989 drop iteration b* u* p pA pB
6990 duplicates drop
      Duplicates in terms of all variables
      (47,952 observations deleted)
6991 isid strata48
6992
6993 * Ranks
6994 sort pmn
6995 generate pmnrank = _n
6996 order pmnrank, after(phi)
6997 sort pAmn
6998 generate pAmnrank = _n
6999 order pAmnrank, after(pAhi)
7000 sort pBmn
7001 generate pBmnrank = _n
7002 order pBmnrank, after(pBhi)
7003
7004 * Sort the data
7005 sort strata48
7006 isid strata48
7007
7008 * Compress and save the data
7009 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
      (576 bytes saved)

```

```

7010save "m6B_s48results.dta", replace
      file m6B_s48results.dta saved

7011
7012* List strata with statistically significant interaction effects on the predicted in
      > cidence
7013use "m6B_s48results.dta", clear

7014list strata48  pBmn pBlo pBhi if pBhi<0, noobs

7015list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7016
7017
7018*****
7019* MODEL 6A S96 - OTHER DRUG, Null MODEL
7020*****
7021
7022*-----*
7023* FIT THE MODEL
7024*-----*
7025
7026* Load the data
7027use "analysisready2.dta", clear

7028sort strata96 aid

7029
7030* delete if missing dependent variable (so can record number)
7031drop if drugs_w1 == .
      (137 observations deleted)

7032
7033* Fit model using PQL2
7034runmlwin drugs_w1 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
strata96	91	1	152.8	897

Run time (seconds) = **1.85**
 Number of iterations = **8**

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.612089	.1206761	-21.65	0.000	-2.84861	-2.375568

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	.8555855	.1779258	.5068573	1.204314

```
7036* Fit model using MCMC
```

```
7037runmlwin drugs w1 cons , ///
```

```
MLwiN 3.2 multilevel model                Number of obs      =    13904
Binomial logit response model
Estimation algorithm: MCMC
```

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	175
Deviance (dbar)	=	7795.86
Deviance (thetabar)	=	7735.48
Effective no. of pars (pd)	=	60.37
Bayesian DIC	=	7856.23

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96 var (cons)	.9129917	.2216089	723	.562025	1.463289

```
7039drop u0se
```

7041* Present the regression coefficients as odds ratios

```
7042runmlwin, or
```

Level Variable	No. of Groups	Minimum	Average	Maximum
strata96	91	1	152.8	897

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	175
Deviance (dbar)	=	7795.86
Deviance (thetabar)	=	7735.48
Effective no. of pars (pd)	=	60.37
Bayesian DIC	=	7856.23

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.073845	.0096047	307	0.000	.0560104	.0931539

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.9129917	.2216089	723	.562025	1.463289

7043

7044* Calculate the ICC from the parameter point estimates

7045scalar mlsigma2u = [RP2]var(cons)

7046scalar mlsigma2e = _pi^2/3

7047display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)

ICC = 0.217

7048

7049* Calculate the ICC from the chains

7050use "m6A_s96_beta.dta", clear

7051rename RP2_var_cons_ sigma2u

7052generate sigma2e = _pi^2/3

7053generate icc = sigma2u/(sigma2u + sigma2e)

7054mcmcsu icc, variables

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.2167297	.0409795	714	0.000	.1459087	.3078562

7055

7056

7057*****

7058* MODEL 6B_S96 - OTHER DRUG, MAIN EFFECTS MODEL

7059*****

7060

7061*-----*

7062* FIT THE MODEL

7063*-----*

7064

7065* Load the data

7066use "analysisready2.dta", clear

7067sort strata96 aid

7068

7069* delete if missing dependent variable (so can record number)

7070drop if drugs_w1 == .
(137 observations deleted)

7071

7072* Fit model using PQL2

7073runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc

> straight_no, ///

> 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
strata96	91	1	152.8	897

Run time (seconds) = 2.30
 Number of iterations = 15

drugs_w1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.228611	.1084391	-20.55	0.000	-2.441148	-2.016074
female	-.1221542	.0918322	-1.33	0.183	-.302142	.0578335
latinx_imm	-1.189555	.2662582	-4.47	0.000	-1.711411	-.6676982
latinx_non	.0498602	.108004	0.46	0.644	-.1618236	.2615441
black	-1.824054	.1477642	-12.34	0.000	-2.113666	-1.534441
hsless	.0475846	.1118441	0.43	0.671	-.1716259	.2667951
somecollege	.074837	.1133563	0.66	0.509	-.1473372	.2970111
lowinc	.1416117	.0945271	1.50	0.134	-.043658	.3268815
straight_no	.5319608	.1015898	5.24	0.000	.3328483	.7310732

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96					
	var(cons)	.0377208	.0185975	.0012704	.0741712

7074

7075* Fit model using MCMC

```
7076runmlwin drugs_w1 cons female latinx_imm latinx_non black hsless somecollege lowinc
> straight_no, ///
> level2(strata96: cons, residuals(u, savechains("m6B_s96_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(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
strata96	91	1	152.8	897

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 552
 Deviance (dbar) = 7812.78
 Deviance (thetabar) = 7788.69
 Effective no. of pars (pd) = 24.10
 Bayesian DIC = 7836.88

drugs_w1	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.22865	.1054311	539	0.000	-2.434228	-2.00571
female	-.1282957	.0891838	692	0.080	-.2921587	.0459168
latinx_imm	-1.218432	.2634931	913	0.000	-1.770868	-.7270337
latinx_non	.0388372	.1063387	1162	0.348	-.1698242	.243217
black	-1.832127	.1532845	860	0.000	-2.133925	-1.557085
hsless	.0494279	.1061111	776	0.297	-.163598	.2617252
somecollege	.0803858	.1074105	649	0.219	-.1434451	.2934886
lowinc	.1480752	.0921121	838	0.056	-.0322621	.3229168
straight_no	.5375595	.1055302	682	0.000	.3254837	.7304021

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96 var (cons)	.035497	.0320698	255	.0012556	.1201113

```
7077rename u0 m1u
```

```
7078drop u0se
```

7079

7080* Present the regression coefficients as odds ratios

```
7081runmlwin, 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
strata96	91	1	152.8	897

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	552
Deviance (dbar)	=	7812.78
Deviance (thetabar)	=	7788.69
Effective no. of pars (pd)	=	24.10
Bayesian DIC	=	7836.88

drugs_w1	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.1078445	.0115211	530	0.000	.0876654	.1345647
female	.8833946	.0791133	694	0.080	.7466501	1.046987
latinx_imm	.3084445	.0797537	951	0.000	.1701851	.483341
latinx_non	1.042751	.1086712	1186	0.348	.8438133	1.275345
black	.1631614	.0241992	880	0.000	.1183718	.2107496
hsless	1.059453	.1125807	773	0.297	.8490833	1.29917
somecollege	1.094268	.1193765	657	0.219	.8663683	1.341098
lowinc	1.16274	.1052417	845	0.056	.9682528	1.38115
straight_no	1.725046	.1788964	695	0.000	1.3847	2.075915

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var (cons)	.035497	.0320698	255	.0012556	.1201113

7082

7083* Calculate the ICC from the parameter point estimates

```
7084 scalar m1sigma2u = [RP2]var(cons)
```

```

7085scalar mlsigma2e = _pi^2/3
7086display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.011
7087
7088* Calculate the ICC from the chains
7089use "m6B_s96_beta.dta", clear
7090rename RP2_var_cons_ sigma2u
7091generate sigma2e = _pi^2/3
7092generate icc = sigma2u/(sigma2u + sigma2e)
7093mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0106702	.0095584	251	0.000	.0003815	.0352235

```

7094
7095
7096*-----*
7097* PREPARE FIXED-PART PAREMETER CHAINS
7098*-----*
7099
7100use "m6B_s96_beta.dta", clear
7101drop deviance RP2_var_cons_ OD_bcons_1
7102rename FP1_* b_*
7103format %9.2f b_*
7104compress
      variable iteration was double now long
      (4,000 bytes saved)
7105save "m6B_s96_beta_prepped.dta", replace
      file m6B_s96_beta_prepped.dta saved
7106isid iteration
7107codebook iteration, compact

```

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

```

7108
7109
7110*-----*
7111* PREPARE STRATUM RANDOM EFFECTS CHAINS
7112*-----*
7113

```

7114use "m6B_s96_u.dta", clear

7115drop residual idnum

7116rename value u

7117format %9.2f u

7118sort strata96 iteration

7119order strata96 iteration

7120compress
 variable **strata96** was **double** now **int**
 variable **iteration** was **double** now **long**
 (910,000 bytes saved)

7121save "m6B_s96_u_prepped.dta", replace
 file m6B_s96_u_prepped.dta saved

7122isid strata96 iteration

7123codebook iteration, compact

Variable	Obs	Unique	Mean	Min	Max	Label
iteration	91000	1000	24976	1	49951	Iteration

7124

7125

7126*-----*

7127* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

7128*-----*

7129

7130use "data96_drugs.dta", clear

7131isid strata96

7132cross using "m6B_s96_beta_prepped.dta"

7133isid strata96 iteration

7134sort strata96 iteration

7135merge 1:1 strata96 iteration using "m6B_s96_u_prepped.dta", nogenerate assert(match)

Result	# of obs.
not matched	0
matched	91,000

7136isid strata96 iteration

7137compress
 variable **strata96** was **double** now **int**
 (546,000 bytes saved)

```

7138save "m6B_s96data_prepped.dta", replace
      file m6B_s96data_prepped.dta saved

7139
7140
7141*-----*
7142* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
7143*-----*
7144
7145* Percentage p based on fixed and random part
7146use "m6B_s96data_prepped.dta", clear

7147gen cons = 1

7148generate 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 ///
> )

7149label var p "Percentage based on main effects and interactions"

7150format %9.3f p

7151
7152* Percentage p based only on the fixed-part
7153generate 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 ///
> )

7154label var pA "Percentage based only on main effects"

7155format %9.3f pA

7156
7157* Percentage pB calculated as the difference between p and pA
7158generate pB = p - pA

7159label var pB "Percentage point difference based on interaction effects"

7160format %9.3f pB

7161
7162* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
7163bysort strata96 (iteration): egen pmn = mean(p)

```

```

7164 bysort strata96 (iteration): egen plo = pctlile(p), p(2.5)
7165 bysort strata96 (iteration): egen phi = pctlile(p), p(97.5)
7166 format %9.3f pmn plo phi
7167 label var pmn "Percentage based on main effects and interactions"
7168 label var plo "Percentage based on main effects and interactions"
7169 label var phi "Percentage based on main effects and interactions"
7170
7171
7172 bysort strata96 (iteration): egen pAmn = mean(pA)
7173 bysort strata96 (iteration): egen pAlo = pctlile(pA), p(2.5)
7174 bysort strata96 (iteration): egen pAhi = pctlile(pA), p(97.5)
7175 format %9.3f pAmn pAlo pAhi
7176 label var pAmn "Percentage based on main effects"
7177 label var pAlo "Percentage based on main effects"
7178 label var pAhi "Percentage based on main effects"
7179
7180 bysort strata96 (iteration): egen pBmn = mean(pB)
7181 bysort strata96 (iteration): egen pBlo = pctlile(pB), p(2.5)
7182 bysort strata96 (iteration): egen pBhi = pctlile(pB), p(97.5)
7183 format %9.3f pBmn pBlo pBhi
7184 label var pBmn "Percentage point difference based on interaction effects"
7185 label var pBlo "Percentage point difference based on interaction effects"
7186 label var pBhi "Percentage point difference based on interaction effects"
7187
7188 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
7189 drop iteration b* u* p pA pB
7190 duplicates drop
       Duplicates in terms of all variables
       (90,909 observations deleted)
7191 isid strata96
7192
7193 * Ranks
7194 sort pmn
7195 generate pmnrank = _n

```

```

7196order pmnrank, after(phi)
7197sort pAmn
7198generate pAmnrank = _n
7199order pAmnrank, after(pAhi)
7200sort pBmn
7201generate pBmnrank = _n
7202order pBmnrank, after(pBhi)

7203
7204* Sort the data
7205sort strata96

7206isid strata96

7207
7208* Compress and save the data
7209compress
      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)

7210save "m6B_s96results.dta", replace
      file m6B_s96results.dta saved

7211
7212* List strata with statistically significant interaction effects on the predicted in
> cidence
7213use "m6B_s96results.dta", clear

7214list strata96  pBmn pBlo pBhi if pBhi<0, noobs

7215list strata96  pBmn pBlo pBhi if pBlo>0, noobs

7216
7217
7218      end of do-file

7219do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

7220
7221
7222
7223*****
7224*****
7225*****
7226*
7227*
7228* REPRINT FROM ABOVE:
7229* LIST STRATA WITH STATISTICALLY SIGNIFICANT INTERACTION EFFECTS
7230* AFTER ADJUSTMENT FOR ADDITIVE MAIN EFFECTS.
7231*

```

```

7232*
7233*****
7234*****
7235*****
7236
7237***          MODEL 1: BMI MODELS          ***
7238use "m1B_s6results.dta", clear

7239list strata6  REmn RElo REhi if REhi<0, noobs

7240list strata6  REmn RElo REhi if RElo>0, noobs

7241
7242use "m1B_s12results.dta", clear

7243list strata12  REmn RElo REhi if REhi<0, noobs

7244list strata12  REmn RElo REhi if RElo>0, noobs

7245
7246use "m1B_s18results.dta", clear

7247list strata18  REmn RElo REhi if REhi<0, noobs

```

strata18	REmn	RElo	REhi
121	-0.804	-1.554	-0.084

```

7248list strata18  REmn RElo REhi if RElo>0, noobs

7249
7250use "m1B_s36results.dta", clear

7251list strata36  REmn RElo REhi if REhi<0, noobs

```

strata36	REmn	RElo	REhi
1211	-0.798	-1.369	-0.271
1221	-0.637	-1.224	-0.060

```

7252list strata36  REmn RElo REhi if RElo>0, noobs

```

strata36	REmn	RElo	REhi
2220	0.671	0.045	1.407

```

7253
7254use "m1B_s48results.dta", clear

7255list strata48  REmn RElo REhi if REhi<0, noobs

```

strata48	REmn	RElo	REhi
1311	-0.827	-1.368	-0.264
1321	-0.646	-1.266	-0.063

7256list strata48 REmn RElo REhi if RElo>0, noobs

strata48	REmn	RElo	REhi
2320	0.689	0.026	1.355

7257

7258use "m1B_s96results.dta", clear

7259list strata96 REmn RElo REhi if REhi<0, noobs

strata96	REmn	RElo	REhi
13111	-0.828	-1.365	-0.317
13211	-0.675	-1.270	-0.134
28300	-0.682	-1.298	-0.104

7260list strata96 REmn RElo REhi if RElo>0, noobs

strata96	REmn	RElo	REhi
18201	0.503	0.034	1.013
23201	0.692	0.001	1.434
23310	1.099	0.267	2.056

7261

7262

7263

7264*** MODEL 2: CESD MODELS

7265use "m2B_s6results.dta", clear

7266list strata6 REmn RElo REhi if REhi<0, noobs

7267list strata6 REmn RElo REhi if RElo>0, noobs

7268

7269use "m2B_s12results.dta", clear

7270list strata12 REmn RElo REhi if REhi<0, noobs

7271list strata12 REmn RElo REhi if RElo>0, noobs

7272

7273use "m2B_s18results.dta", clear

7274list strata18 REmn RElo REhi if REhi<0, noobs

7275list strata18 REmn RElo REhi if RElo>0, noobs

7276

7277use "m2B_s36results.dta", clear

7278list strata36 REmn RElo REhi if REhi<0, noobs


```
7279list strata36 REmn RElo REhi if RElo>0, noobs
```

```
7280
```

```
7281use "m2B_s48results.dta", clear
```

```
7282list strata48 REmn RElo REhi if REhi<0, noobs
```

```
7283list strata48 REmn RElo REhi if RElo>0, noobs
```

```
7284
```

```
7285use "m2B_s96results.dta", clear
```

```
7286list strata96 REmn RElo REhi if REhi<0, noobs
```

```
7287list strata96 REmn RElo REhi if RElo>0, noobs
```

```
7288
```

```
7289
```

```
7290
```

```
7291*** MODEL 3: BINGE MODELS
```

```
***
```

```
7292use "m3B_s6results.dta", clear
```

```
7293list strata6 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7294list strata6 pBmn pBlo pBhi if pBlo>0, noobs
```

```
7295
```

```
7296use "m3B_s12results.dta", clear
```

```
7297list strata12 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7298list strata12 pBmn pBlo pBhi if pBlo>0, noobs
```

```
7299
```

```
7300use "m3B_s18results.dta", clear
```

```
7301list strata18 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7302list strata18 pBmn pBlo pBhi if pBlo>0, noobs
```

```
7303
```

```
7304use "m3B_s36results.dta", clear
```

```
7305list strata36 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7306list strata36 pBmn pBlo pBhi if pBlo>0, noobs
```

```
7307
```

```
7308use "m3B_s48results.dta", clear
```

```
7309list strata48 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7310list strata48 pBmn pBlo pBhi if pBlo>0, noobs
```

```
7311
```

```
7312use "m3B_s96results.dta", clear
```

```
7313list strata96 pBmn pBlo pBhi if pBhi<0, noobs
```

```
7314list strata96 pBmn pBlo pBhi if pBlo>0, noobs
```

```

7315
7316
7317
7318***                MODEL 4: CIGARETTE MODELS                ***
7319use "m4B_s6results.dta", clear

7320list strata6  pBmn pBlo pBhi if pBhi<0, noobs
7321list strata6  pBmn pBlo pBhi if pBlo>0, noobs

7322
7323use "m4B_s12results.dta", clear

7324list strata12  pBmn pBlo pBhi if pBhi<0, noobs
7325list strata12  pBmn pBlo pBhi if pBlo>0, noobs

7326
7327use "m4B_s18results.dta", clear

7328list strata18  pBmn pBlo pBhi if pBhi<0, noobs
7329list strata18  pBmn pBlo pBhi if pBlo>0, noobs

7330
7331use "m4B_s36results.dta", clear

7332list strata36  pBmn pBlo pBhi if pBhi<0, noobs

```

strata36	pBmn	pBlo	pBhi
2111	-3.397	-7.861	-0.192

```

7333list strata36  pBmn pBlo pBhi if pBlo>0, noobs

7334
7335use "m4B_s48results.dta", clear

7336list strata48  pBmn pBlo pBhi if pBhi<0, noobs
7337list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7338
7339use "m4B_s96results.dta", clear

7340list strata96  pBmn pBlo pBhi if pBhi<0, noobs

```

strata96	pBmn	pBlo	pBhi
22111	-4.882	-9.767	-0.148

```

7341list strata96  pBmn pBlo pBhi if pBlo>0, noobs

```

strata96	pBmn	pBlo	pBhi
28111	6.050	1.056	11.200
28200	6.935	0.072	14.351

```

7342
7343
7344
7345***                                MODEL 5: MARIJUANA MODELS                ***
7346use "m5B_s6results.dta", clear

7347list strata6  pBmn pBlo pBhi if pBhi<0, noobs
7348list strata6  pBmn pBlo pBhi if pBlo>0, noobs

7349
7350use "m5B_s12results.dta", clear

7351list strata12  pBmn pBlo pBhi if pBhi<0, noobs
7352list strata12  pBmn pBlo pBhi if pBlo>0, noobs

7353
7354use "m5B_s18results.dta", clear

7355list strata18  pBmn pBlo pBhi if pBhi<0, noobs
7356list strata18  pBmn pBlo pBhi if pBlo>0, noobs

7357
7358use "m5B_s36results.dta", clear

7359list strata36  pBmn pBlo pBhi if pBhi<0, noobs
7360list strata36  pBmn pBlo pBhi if pBlo>0, noobs

7361
7362use "m5B_s48results.dta", clear

7363list strata48  pBmn pBlo pBhi if pBhi<0, noobs
7364list strata48  pBmn pBlo pBhi if pBlo>0, noobs

7365
7366use "m5B_s96results.dta", clear

7367list strata96  pBmn pBlo pBhi if pBhi<0, noobs
7368list strata96  pBmn pBlo pBhi if pBlo>0, noobs

7369
7370
7371
7372***                                MODEL 6: DRUG MODELS                ***
7373use "m6B_s6results.dta", clear

7374list strata6  pBmn pBlo pBhi if pBhi<0, noobs
7375list strata6  pBmn pBlo pBhi if pBlo>0, noobs

7376
7377use "m6B_s12results.dta", clear

7378list strata12  pBmn pBlo pBhi if pBhi<0, noobs

```

```
7379list strata12  pBmn pBlo pBhi if pBlo>0, noobs
7380
7381use "m6B_s18results.dta", clear
7382list strata18  pBmn pBlo pBhi if pBhi<0, noobs
7383list strata18  pBmn pBlo pBhi if pBlo>0, noobs
7384
7385use "m6B_s36results.dta", clear
7386list strata36  pBmn pBlo pBhi if pBhi<0, noobs
7387list strata36  pBmn pBlo pBhi if pBlo>0, noobs
7388
7389use "m6B_s48results.dta", clear
7390list strata48  pBmn pBlo pBhi if pBhi<0, noobs
7391list strata48  pBmn pBlo pBhi if pBlo>0, noobs
7392
7393use "m6B_s96results.dta", clear
7394list strata96  pBmn pBlo pBhi if pBhi<0, noobs
7395list strata96  pBmn pBlo pBhi if pBlo>0, noobs
7396
7397    end of do-file
7398do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"
7399
7400
7401* Close log file
7402capture log close
```

```

73. drop if selectfromlist == 0
    (13,943 observations deleted)

74. keep strata96 female latinx_imm latinx_non black hsless somecollege lowinc straight_
    > no

75. save "data96_fairpoorhealth.dta", replace
    file data96_fairpoorhealth.dta saved

76. tab strata96, nofreq /* how many strata96 remain after dropping outcome */

77. display r(r)
    92

78.
    end of do-file

79. do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

80.
81. * fairpoorhealth
82. use "analysisready2.dta", clear

83. drop if fairpoorhealth == .
    (6 observations deleted)

84. tab strata12, nofreq

85. display r(r)
    12

86. tab strata18, nofreq

87. display r(r)
    18

88. tab strata36, nofreq

89. display r(r)
    36

90. tab strata48, nofreq

91. display r(r)
    48

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

93. display r(r)
    92

94.
    end of do-file

95. do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

96.
97.
98. *****
99. *****

```

```

100 *****
101 *
102 *
103 * MODEL 7 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
104 *
105 *
106 *****
107 *****
108 *****
109 *****
110 *****
111 * MODEL 7A S6 - FAIR OR POOR HEALTH, Null MODEL
112 *****
113
114 *-----*
115 * FIT THE MODEL
116 *-----*
117
118 * Load the data
119 use "analysisready2.dta", clear

120 sort strata6 aid

121
122 * delete if missing dependent variable (so can record number)
123 drop if fairpoorhealth == .
    (6 observations deleted)

124
125 * Fit model using by PQL2
126 runmlwin fairpoorhealth 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
strata6	6	1165	2339.2	4295

Run time (seconds) = **2.20**
 Number of iterations = **9**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.559142	.123101	-20.79	0.000	-2.800416	-2.317869

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6					
	var(cons)	.0827328	.0525452	-.020254	.1857196

```

127
128 * Fit model using by MCMC
129 runmlwin fairpoorhealth cons , ///
> level2(strata6: cons, residuals(u, savechains("m7A_s6_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7A_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
> ance parameter estimates for the models
> 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
strata6	6	1165	2339.2	4295

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **140**
 Deviance (dbar) = **7051.76**
 Deviance (thetabar) = **7045.99**
 Effective no. of pars (pd) = **5.77**
 Bayesian DIC = **7057.53**

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.551053	.1486457	313	0.000	-2.851741	-2.264105

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.1363018	.1669913	1040	.0289579	.4974884

```
130 rename u0 mlu
```

```
131 drop u0se
```

```
132
133 * Present the regression coefficients as odds ratios
134 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
strata6	6	1165	2339.2	4295

```

Burnin                =      5000
Chain                  =     50000
Thinning                =       50
Run time (seconds)     =      140
Deviance (dbar)        =     7051.76
Deviance (thetabar)    =     7045.99
Effective no. of pars (pd) =    5.77
Bayesian DIC           =     7057.53

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.078787	.012047	310	0.000	.0577437	.103923

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.1363018	.1669913	1040	.0289579	.4974884

```

135
136 * Calculate the ICC from the parameter point estimates
137 scalar mlsigma2u = [RP2]var(cons)

138 scalar mlsigma2e = _pi^2/3

139 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.040

140
141 * Calculate the ICC from the chains
142 use "m7A_s6_beta.dta", clear

143 rename RP2_var_cons_ sigma2u

144 generate sigma2e = _pi^2/3

145 generate icc = sigma2u/(sigma2u + sigma2e)

146 mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0383665	.0357046	1024	0.000	.0087254	.131355

```

147
148
149 *****
150 * MODEL 7B_S6 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
151 *****
152
153 *-----*
154 * FIT THE MODEL
155 *-----*
156
157 * Load the data
158 use "analysisready2.dta", clear

```



```
159 sort strata6 aid
```

```
160
```

```
161 * delete if missing dependent variable (so can record number)
```

```
162 drop if fairpoorhealth == .
      (6 observations deleted)
```

```
163
```

```
164 * Fit model using by PQL2
```

```
165 runmlwin fairpoorhealth cons female latinx_race black_race , ///
```

```
> 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
strata6	6	1165	2339.2	4295

Run time (seconds) = **2.39**

Number of iterations = **31**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.968785	.1182813	-25.10	0.000	-3.200612	-2.736958
female	.39734	.1234921	3.22	0.001	.1552999	.6393801
latinx_race	.394958	.1503367	2.63	0.009	.1003034	.6896125
black_race	.2569087	.1473048	1.74	0.081	-.0318034	.5456207

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata6				
var(cons)	.0150207	.0130587	-.0105738	.0406153

```
166
```

```
167 * Fit model using by MCMC
```

```
168 runmlwin fairpoorhealth cons female latinx_race black_race , ///
```

```
> level2(strata6: cons, residuals(u, savechains("m7B_s6_u.dta", replace))) ///
```

```
> level1(aid:) ///
```

```
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
```

```
> mcmc(burnin(5000) chain(50000) thinning(50) ///
```

```
> savechains("m7B_s6_beta.dta", replace)) initsprevious /// saving the beta & vari
```

```
> ance parameter estimates for the models
```

```
> 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
strata6	6	1165	2339.2	4295

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      221
Deviance (dbar)     =     7052.10
Deviance (thetabar) =     7046.46
Effective no. of pars (pd) =    5.64
Bayesian DIC        =     7057.75

```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.97119	.1700004	165	0.000	-3.32794	-2.620122
female	.3966858	.1885724	193	0.022	.0371051	.856696
latinx_race	.3908928	.2349442	246	0.045	-.1218949	.9025893
black_race	.262542	.2142716	266	0.083	-.1618374	.6877454

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0538278	.1459658	350	.000932	.3360802

```
169 rename u0 mlu
```

```
170 drop u0se
```

```
171
```

```
172 * Present the regression coefficients as odds ratios
```

```
173 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
strata6	6	1165	2339.2	4295

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      221
Deviance (dbar)     =     7052.10
Deviance (thetabar) =     7046.46
Effective no. of pars (pd) =    5.64
Bayesian DIC        =     7057.75

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0520181	.009259	151	0.000	.0358669	.0727941
female	1.514097	.3082703	175	0.022	1.037803	2.35537
latinx_race	1.518981	.3584282	274	0.045	.8852446	2.465995
black_race	1.330529	.2927247	284	0.083	.8505797	1.989226

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata6					
var(cons)	.0538278	.1459658	350	.000932	.3360802

```

174
175 * Calculate the ICC from the parameter point estimates
176 scalar mlsigma2u = [RP2]var(cons)

177 scalar mlsigma2e = _pi^2/3

178 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.016

```

```

179
180 * Calculate the ICC from the chains
181 use "m7B_s6_beta.dta", clear

182 rename RP2_var_cons_ sigma2u

183 generate sigma2e = _pi^2/3

184 generate icc = sigma2u/(sigma2u + sigma2e)

185 mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0152091	.0274483	325	0.000	.0002832	.0926871

```

186
187
188 *-----*
189 * PREPARE FIXED-PART PARAMETER CHAINS
190 *-----*
191
192 use "m7B_s6_beta.dta", clear

193 drop deviance RP2_var_cons_ OD_bcons_1

194 rename FP1_* b_*

195 format %9.2f b_*

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

197 save "m7B_s6_beta_prepped.dta", replace
    file m7B_s6_beta_prepped.dta saved

198 isid iteration

199 codebook iteration, compact

```

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

```

200
201

```

```

202 *-----*
203 * PREPARE STRATUM RANDOM EFFECTS CHAINS
204 *-----*
205
206 use "m7B_s6_u.dta", clear

207 drop residual idnum

208 rename value u

209 format %9.2f u

210 sort strata6 iteration

211 order strata6 iteration

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

213 save "m7B_s6_u_prepped.dta", replace
    file m7B_s6_u_prepped.dta saved

214 isid strata6 iteration

215 codebook iteration, compact

```

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

```

216
217
218 *-----*
219 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
220 *-----*
221
222 use "data6.dta", clear

223 isid strata6

224 cross using "m7B_s6_beta_prepped.dta"

225 isid strata6 iteration

226 sort strata6 iteration

227 merge 1:1 strata6 iteration using "m7B_s6_u_prepped.dta", nogenerate assert(match)

```

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

```

228 isid strata6 iteration

```

```

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

230 save "m7B_s6data_prepped.dta", replace
    file m7B_s6data_prepped.dta saved

231
232
233 *-----*
234 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
235 *-----*
236
237 * Percentage p based on fixed and random part
238 use "m7B_s6data_prepped.dta", clear

239 gen cons = 1

240 generate p = 100*invlogit( ///
>         b_cons*cons ///
>         +b_female*female ///
>         +b_latinx_race*latinx_race ///
>         +b_black_race*black_race ///
>         + u ///
>     )

241 label var p "Percentage based on main effects and interactions"

242 format %9.3f p

243
244 * Percentage p based only on the fixed-part
245 generate pA = 100*invlogit( ///
>         b_cons*cons ///
>         +b_female*female ///
>         +b_latinx_race*latinx_race ///
>         +b_black_race*black_race ///
>     )

246 label var pA "Percentage based only on main effects"

247 format %9.3f pA

248
249 * Percentage pB calculated as the difference between p and pA
250 generate pB = p - pA

251 label var pB "Percentage point difference based on interaction effects"

252 format %9.3f pB

253
254 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
255 bysort strata6 (iteration): egen pmn = mean(p)

256 bysort strata6 (iteration): egen plo = pctlile(p), p(2.5)

257 bysort strata6 (iteration): egen phi = pctlile(p), p(97.5)

258 format %9.3f pmn plo phi

```

```

259 label var pmn "Percentage based on main effects and interactions"
260 label var plo "Percentage based on main effects and interactions"
261 label var phi "Percentage based on main effects and interactions"
262
263
264 bysort strata6 (iteration): egen pAmn = mean(pA)
265 bysort strata6 (iteration): egen pAlo = pctlile(pA), p(2.5)
266 bysort strata6 (iteration): egen pAhi = pctlile(pA), p(97.5)
267 format %9.3f pAmn pAlo pAhi
268 label var pAmn "Percentage based on main effects"
269 label var pAlo "Percentage based on main effects"
270 label var pAhi "Percentage based on main effects"
271
272 bysort strata6 (iteration): egen pBmn = mean(pB)
273 bysort strata6 (iteration): egen pBlo = pctlile(pB), p(2.5)
274 bysort strata6 (iteration): egen pBhi = pctlile(pB), p(97.5)
275 format %9.3f pBmn pBlo pBhi
276 label var pBmn "Percentage point difference based on interaction effects"
277 label var pBlo "Percentage point difference based on interaction effects"
278 label var pBhi "Percentage point difference based on interaction effects"
279
280 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
281 drop iteration b* u* p pA pB
282 duplicates drop
283
284     Duplicates in terms of all variables
285     (5,994 observations deleted)
286
287 isid strata6
288
289 * Ranks
290 sort pmn
291
292 generate pmnrank = _n
293
294 order pmnrank, after(phi)
295
296 sort pAmn
297
298 generate pAmnrank = _n

```

```

291 order pAmnrank, after(pAhi)
292 sort pBmn
293 generate pBmnrank = _n
294 order pBmnrank, after(pBhi)

295
296 * Sort the data
297 sort strata6

298 isid strata6

299
300 * Compress and save the data
301 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)

302 save "m7B_s6results.dta", replace
    file m7B_s6results.dta saved

303
304 * List strata with statistically significant interaction effects on the predicted in
    > cidence
305 use "m7B_s6results.dta", clear

306 list strata6 pBmn pBlo pBhi if pBhi<0, noobs
307 list strata6 pBmn pBlo pBhi if pBlo>0, noobs

308
309
310
311 *****
312 * MODEL 7A S12 - FAIR OR POOR HEALTH, Null MODEL
313 *****
314
315 *-----*
316 * FIT THE MODEL
317 *-----*
318
319 * Load the data
320 use "analysisready2.dta", clear

321 sort strata12 aid

322
323 * delete if missing dependent variable (so can record number)
324 drop if fairpoorhealth == .
    (6 observations deleted)

325
326 * Fit model using by PQL2
327 runmlwin fairpoorhealth 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
stratal2	12	472	1169.6	2904

Run time (seconds) = **1.80**
 Number of iterations = **7**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.532177	.1054333	-24.02	0.000	-2.738823	-2.325532

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: stratal2				
var(cons)	.1165936	.0544097	.0099526	.2232347

```

328
329 * Fit model using by MCMC
330 runmlwin fairpoorhealth cons , ///
> level2(stratal2: cons, residuals(u, savechains("m7A_s12_u.dta", replace))) ///
> levell1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7A_s12_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> 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
stratal2	12	472	1169.6	2904

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **139**
 Deviance (dbar) = **6995.94**
 Deviance (thetabar) = **6984.80**
 Effective no. of pars (pd) = **11.13**
 Bayesian DIC = **7007.07**

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.52697	.114664	411	0.000	-2.75633	-2.304127

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: stratal2					
var(cons)	.1417726	.0804857	975	.050181	.3284279


```
331 rename u0 mlu
```

```
332 drop u0se
```

```
333
```

```
334 * Present the regression coefficients as odds ratios
```

```
335 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
strata12	12	472	1169.6	2904

```
Burnin                      =        5000
Chain                       =        50000
Thinning                   =        50
Run time (seconds)        =        139
Deviance (dbar)           =        6995.94
Deviance (thetabar)       =        6984.80
Effective no. of pars (pd) =        11.13
Bayesian DIC               =        7007.07
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0803943	.0090922	423	0.000	.0635245	.0998459

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.1417726	.0804857	975	.050181	.3284279

```
336
```

```
337 * Calculate the ICC from the parameter point estimates
```

```
338 scalar mlsigma2u = [RP2]var(cons)
```

```
339 scalar mlsigma2e = _pi^2/3
```

```
340 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =        0.041
```

```
341
```

```
342 * Calculate the ICC from the chains
```

```
343 use "m7A_s12_beta.dta", clear
```

```
344 rename RP2_var_cons_ sigma2u
```

```
345 generate sigma2e = _pi^2/3
```

```
346 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
347 mcmcsun icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0399715	.0204359	979	0.000	.015024	.0907686

```

348
349
350 *****
351 * MODEL 7B_S12 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
352 *****
353
354 *-----*
355 * FIT THE MODEL
356 *-----*
357
358 * Load the data
359 use "analysisready2.dta", clear

360 sort strata12 aid

361
362 * delete if missing dependent variable (so can record number)
363 drop if fairpoorhealth == .
    (6 observations deleted)

364
365 * Fit model using by PQL2
366 runmlwin fairpoorhealth cons female latinx_race black_race lowparentedu, ///
    > 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
strata12	12	472	1169.6	2904

```

Run time (seconds) =      2.12
Number of iterations =      15

```

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-3.120573	.1098138	-28.42	0.000	-3.335804	-2.905342
female	.3972591	.1042408	3.81	0.000	.192951	.6015673
latinx_race	.2718171	.1281843	2.12	0.034	.0205806	.5230537
black_race	.220172	.1225987	1.80	0.073	-.020117	.460461
lowparentedu	.4509396	.1040595	4.33	0.000	.2469866	.6548926

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata12				
var(cons)	.0168354	.0127898	-.0082322	.0419029

367

```

368 * Fit model using by MCMC
369 runmlwin fairpoorhealth cons female latinx_race black_race lowparentedu, ///
> level2(stratal2: cons, residuals(u, savechains("m7B_sl2_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7B_sl2_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> 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
strata12	12	472 1169.6 2904

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	254
Deviance (dbar)	=	6996.34
Deviance (thetabar)	=	6987.40
Effective no. of pars (pd)	=	8.95
Bayesian DIC	=	7005.29

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Intervall]	
cons	-3.119833	.1132769	488	0.000	-3.345104	-2.866735
female	.3910775	.1100802	643	0.001	.1534112	.6125909
latinx_race	.2676194	.1341399	802	0.021	.0136332	.5298682
black_race	.2172731	.1318433	552	0.044	-.0323272	.4577969
lowparentedu	.4605575	.1144731	563	0.000	.243573	.6869152

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata12					
var(cons)	.0225671	.0284338	540	.0010276	.0885545

```
370 rename u0 m1u
```

```
371 drop u0se
```

372

```
373 * Present the regression coefficients as odds ratios
```

374 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
strata12	12	472	1169.6	2904

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      254
Deviance (dbar)     =    6996.34
Deviance (thetabar) =    6987.40
Effective no. of pars (pd) =    8.95
Bayesian DIC        =    7005.29

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0444967	.0052967	471	0.000	.0352565	.0568844
female	1.487122	.1660185	676	0.001	1.165804	1.845207
latinx_race	1.313218	.1796106	818	0.021	1.013727	1.698709
black_race	1.256759	.1587873	608	0.044	.9681897	1.580588
lowparentedu	1.59982	.1850868	485	0.000	1.2758	1.987575

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata12					
var(cons)	.0225671	.0284338	540	.0010276	.0885545

```

375
376 * Calculate the ICC from the parameter point estimates
377 scalar mlsigma2u = [RP2]var(cons)

378 scalar mlsigma2e = _pi^2/3

379 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.007

380
381 * Calculate the ICC from the chains
382 use "m7B_s12_beta.dta", clear

383 rename RP2_var_cons_ sigma2u

384 generate sigma2e = _pi^2/3

385 generate icc = sigma2u/(sigma2u + sigma2e)

386 mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0065641	.0079269	544	0.000	.0003122	.0262118

```

387
388
389 *-----*
390 * PREPARE FIXED-PART PAREMETER CHAINS
391 *-----*
392
393 use "m7B_s12_beta.dta", clear

394 drop deviance RP2_var_cons_ OD_bcons_1

```

```

395 rename FP1_ * b_*
396 format %9.2f b_*
397 compress
    variable iteration was double now long
    (4,000 bytes saved)
398 save "m7B_s12_beta_prepped.dta", replace
    file m7B_s12_beta_prepped.dta saved
399 isid iteration
400 codebook iteration, compact

```

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

```

401
402
403 *-----*
404 * PREPARE STRATUM RANDOM EFFECTS CHAINS
405 *-----*
406
407 use "m7B_s12_u.dta", clear
408 drop residual idnum
409 rename value u
410 format %9.2f u
411 sort stratal2 iteration
412 order stratal2 iteration
413 compress
    variable stratal2 was double now int
    variable iteration was double now long
    (120,000 bytes saved)
414 save "m7B_s12_u_prepped.dta", replace
    file m7B_s12_u_prepped.dta saved
415 isid stratal2 iteration
416 codebook iteration, compact

```

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

```

417

```

```

418
419 *-----*
420 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
421 *-----*
422
423 use "data12.dta", clear

424 isid strata12

425 cross using "m7B_sl2_beta_prepped.dta"

426 isid strata12 iteration

427 sort strata12 iteration

428 merge 1:1 strata12 iteration using "m7B_sl2_u_prepped.dta", nogenerate assert(match)

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

429 isid strata12 iteration

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

431 save "m7B_sl2data_prepped.dta", replace
      file m7B_sl2data_prepped.dta saved

432
433
434 *-----*
435 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
436 *-----*
437
438 * Percentage p based on fixed and random part
439 use "m7B_sl2data_prepped.dta", clear

440 gen cons = 1

441 generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
>      + u ///
> )

442 label var p "Percentage based on main effects and interactions"

443 format %9.3f p

444
445 * Percentage p based only on the fixed-part
446 generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_lowparentedu*lowparentedu ///
> )

```

```
447 label var pA "Percentage based only on main effects"
448 format %9.3f pA
449
450 * Percentage pB calculated as the difference between p and pA
451 generate pB = p - pA
452 label var pB "Percentage point difference based on interaction effects"
453 format %9.3f pB
454
455 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
456 bysort strata12 (iteration): egen pmn = mean(p)
457 bysort strata12 (iteration): egen plo = pctlile(p), p(2.5)
458 bysort strata12 (iteration): egen phi = pctlile(p), p(97.5)
459 format %9.3f pmn plo phi
460 label var pmn "Percentage based on main effects and interactions"
461 label var plo "Percentage based on main effects and interactions"
462 label var phi "Percentage based on main effects and interactions"
463
464
465 bysort strata12 (iteration): egen pAmn = mean(pA)
466 bysort strata12 (iteration): egen pAlo = pctlile(pA), p(2.5)
467 bysort strata12 (iteration): egen pAhi = pctlile(pA), p(97.5)
468 format %9.3f pAmn pAlo pAhi
469 label var pAmn "Percentage based on main effects"
470 label var pAlo "Percentage based on main effects"
471 label var pAhi "Percentage based on main effects"
472
473 bysort strata12 (iteration): egen pBmn = mean(pB)
474 bysort strata12 (iteration): egen pBlo = pctlile(pB), p(2.5)
475 bysort strata12 (iteration): egen pBhi = pctlile(pB), p(97.5)
476 format %9.3f pBmn pBlo pBhi
477 label var pBmn "Percentage point difference based on interaction effects"
478 label var pBlo "Percentage point difference based on interaction effects"
479 label var pBhi "Percentage point difference based on interaction effects"
480
```

```

481 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
482 drop iteration b* u* p pA pB

483 duplicates drop

    Duplicates in terms of all variables

    (11,988 observations deleted)

484 isid strata12

485
486 * Ranks
487 sort pmn

488 generate pmnrank = _n
489 order pmnrank, after(phi)
490 sort pAmn

491 generate pAmnrank = _n
492 order pAmnrank, after(pAhi)
493 sort pBmn

494 generate pBmnrank = _n
495 order pBmnrank, after(pBhi)

496
497 * Sort the data
498 sort strata12

499 isid strata12

500
501 * Compress and save the data
502 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)

503 save "m7B_s12results.dta", replace
    file m7B_s12results.dta saved

504
505 * List strata with statistically significant interaction effects on the predicted in
    > cidence
506 use "m7B_s12results.dta", clear

507 list strata12  pBmn pBlo pBhi if pBhi<0, noobs
508 list strata12  pBmn pBlo pBhi if pBlo>0, noobs

509
510

```



```

525
526 * Fit model using PQL2
527 runmlwin fairpoorhealth cons , ///
    > level2(stratal8: cons) ///
    > level1(aid:) ///
    > discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
    > rlgls maxiterations(100) ///
    > nopause

MLwiN 3.2 multilevel model                                Number of obs      =      14035
Binomial logit response model
Estimation algorithm: RIGLS, PQL2

```

Run time (seconds) = 1.89						
Number of iterations = 6						
fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.60314	.0992095	-26.24	0.000	-2.797587	-2.408693

```

528
529 * Fit model using MCMC
530 runmlwin fairpoorhealth cons , ///
> level2(strata18: cons, residuals(u, savechains("m7A_s18_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7A_s18_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> 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
strata18	18	215	779.7	1582

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	140
Deviance (dbar)	=	6978.55
Deviance (thetabar)	=	6962.98
Effective no. of pars (pd)	=	15.57
Bayesian DIC	=	6994.12

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.601528	.1063459	515	0.000	-2.820074	-2.387372

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18 var(cons)	.1679849	.0764902	1116	.069722	.350561

```
531 rename u0 m1u
```

532 drop u0se

533

534 * Present the regression coefficients as odds ratios

```
535 runmlwin, or
```

```
MLwiN 3.2 multilevel model
Binomial logit response model
Estimation algorithm: MCMC
```

Number of obs = 14035

Level Variable	No. of Groups	Minimum	Observations per Group Average	Maximum
strata18	18	215	779.7	1582

```

Burnin              =          5000
Chain               =         50000
Thinning            =           50
Run time (seconds) =          140
Deviance (dbar)    =        6978.55
Deviance (thetabar) =        6962.98
Effective no. of pars (pd) =        15.57
Bayesian DIC       =        6994.12

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0747158	.0079797	507	0.000	.0596015	.0918708

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata18					
var(cons)	.1679849	.0764902	1116	.069722	.350561

```

536
537 * Calculate the ICC from the parameter point estimates
538 scalar mlsigma2u = [RP2]var(cons)

539 scalar mlsigma2e = _pi^2/3

540 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.049

541
542 * Calculate the ICC from the chains
543 use "m7A_sl8_beta.dta", clear

544 rename RP2_var_cons_ sigma2u

545 generate sigma2e = _pi^2/3

546 generate icc = sigma2u/(sigma2u + sigma2e)

547 mcmcsu m icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0480087	.0209499	1094	0.000	.0207531	.0962966

```

548
549
550 *****
551 * MODEL 7B_S18 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
552 *****
553
554 *-----*
555 * FIT THE MODEL
556 *-----*
557
558 * Load the data
559 use "analysisready2.dta", clear

560 sort strata18 aid

561
562 * delete if missing dependent variable (so can record number)
563 drop if fairpoorhealth == .
    (6 observations deleted)

564
565 * Fit model using PQL2
566 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator) pql2) ///
> rlgls 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
strata18	18	215	779.7	1582

Run time (seconds) = 2.02
 Number of iterations = 14

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-3.314495	.1253991	-26.43	0.000	-3.560272	-3.068717
female	.4028667	.1029943	3.91	0.000	.2010016	.6047318
latinx_race	.3013838	.1289384	2.34	0.019	.0486692	.5540985
black_race	.2503174	.1199133	2.09	0.037	.0152917	.4853432
hsless	.6204917	.1269566	4.89	0.000	.3716614	.869322
somecollege	.3288849	.134303	2.45	0.014	.0656559	.5921139

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata18				
var(cons)	.0227112	.0149741	-.0066375	.0520599

567

568 * Fit model using MCMC

```
569 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege, ///
> level2(strata18: cons, residuals(u, savechains("m7B_sl8_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7B_sl8_beta.dta", replace)) initsprevious /// saving the beta & var
> iance parameter estimates for the models
> nopause
```

MLwiN 3.2 multilevel model
 Binomial logit response model
 Estimation algorithm: **MCMC**

Number of obs = 14035

Level Variable	No. of Groups	Observations per Group		
		Minimum	Average	Maximum
strata18	18	215	779.7	1582

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 288
 Deviance (dbar) = 6981.21
 Deviance (thetabar) = 6969.66
 Effective no. of pars (pd) = 11.56
 Bayesian DIC = 6992.77

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.310172	.1365471	333	0.000	-3.581577	-3.051585
female	.4003106	.1045944	680	0.000	.1864995	.619791
latinx_race	.2797972	.141535	486	0.029	-.0063986	.5449351
black_race	.2437928	.1248819	562	0.026	-.0003685	.4821025
hsless	.6323408	.1342736	572	0.000	.354294	.8881136
somecollege	.3322648	.1332407	627	0.013	.0720199	.5934613

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0248664	.0302265	443	.0012789	.0940999

```
570 rename u0 mlu
```

```
571 drop u0se
```

```
572
```

```
573 * Present the regression coefficients as odds ratios
```

```
574 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
strata18	18	215	779.7	1582

```
Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      288
Deviance (dbar)     =    6981.21
Deviance (thetabar) =    6969.66
Effective no. of pars (pd) =    11.56
Bayesian DIC        =    6992.77
```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0370269	.0056604	280	0.000	.0278318	.0472839
female	1.499542	.1614482	673	0.000	1.205024	1.85854
latinx_race	1.329069	.1863851	556	0.029	.9936221	1.724497
black_race	1.284092	.156165	594	0.026	.9996316	1.619476
hsless	1.890779	.255857	579	0.000	1.425174	2.430545
somecollege	1.40518	.1835954	661	0.013	1.074677	1.810243

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata18					
var(cons)	.0248664	.0302265	443	.0012789	.0940999

```
575
```

```
576 * Calculate the ICC from the parameter point estimates
```

```
577 scalar m1sigma2u = [RP2]var(cons)
```

```
578 scalar m1sigma2e = _pi^2/3
```

```
579 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
      ICC =      0.008
```

```
580
```

```
581 * Calculate the ICC from the chains
```

```
582 use "m7B_s18_beta.dta", clear
```

```
583 rename RP2_var_cons_ sigma2u
```

```

584 generate sigma2e = _pi^2/3
585 generate icc = sigma2u/(sigma2u + sigma2e)
586 mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0074042	.0084654	445	0.000	.0003886	.0278076

```

587
588
589 *-----*
590 * PREPARE FIXED-PART PAREMETER CHAINS
591 *-----*
592
593 use "m7B_sl8_beta.dta", clear
594 drop deviance RP2_var_cons_ OD_bcons_1
595 rename FP1_* b_*
596 format %9.2f b_*
597 compress
   variable iteration was double now long
   (4,000 bytes saved)
598 save "m7B_sl8_beta_prepped.dta", replace
   file m7B_sl8_beta_prepped.dta saved
599 isid iteration
600 codebook iteration, compact

```

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

```

601
602
603 *-----*
604 * PREPARE STRATUM RANDOM EFFECTS CHAINS
605 *-----*
606
607 use "m7B_sl8_u.dta", clear
608 drop residual idnum
609 rename value u
610 format %9.2f u
611 sort strata18 iteration
612 order strata18 iteration

```

```

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

```

```

614 save "m7B_s18_u_prepped.dta", replace
    file m7B_s18_u_prepped.dta saved

```

```

615 isid strata18 iteration

```

```

616 codebook iteration, compact

```

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

```

617
618
619 *-----*
620 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
621 *-----*
622
623 use "data18.dta", clear
624 isid strata18
625 cross using "m7B_s18_beta_prepped.dta"
626 isid strata18 iteration
627 sort strata18 iteration
628 merge 1:1 strata18 iteration using "m7B_s18_u_prepped.dta", nogenerate assert(match)

```

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

```

629 isid strata18 iteration

```

```

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

```

```

631 save "m7B_s18data_prepped.dta", replace
    file m7B_s18data_prepped.dta saved

```

```

632
633
634 *-----*
635 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
636 *-----*
637
638 * Percentage p based on fixed and random part
639 use "m7B_s18data_prepped.dta", clear

```

```

640 gen cons = 1

641 generate p = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
>      + u ///
> )

642 label var p "Percentage based on main effects and interactions"

643 format %9.3f p

644
645 * Percentage p based only on the fixed-part
646 generate pA = 100*invlogit( ///
>      b_cons*cons ///
>      +b_female*female ///
>      +b_latinx_race*latinx_race ///
>      +b_black_race*black_race ///
>      +b_hsless*hsless ///
>      +b_somcollege*somcollege ///
> )

647 label var pA "Percentage based only on main effects"

648 format %9.3f pA

649
650 * Percentage pB calculated as the difference between p and pA
651 generate pB = p - pA

652 label var pB "Percentage point difference based on interaction effects"

653 format %9.3f pB

654
655 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
656 bysort strata18 (iteration): egen pmn = mean(p)

657 bysort strata18 (iteration): egen plo = pctlile(p), p(2.5)

658 bysort strata18 (iteration): egen phi = pctlile(p), p(97.5)

659 format %9.3f pmn plo phi

660 label var pmn "Percentage based on main effects and interactions"

661 label var plo "Percentage based on main effects and interactions"

662 label var phi "Percentage based on main effects and interactions"

663
664
665 bysort strata18 (iteration): egen pAmn = mean(pA)

666 bysort strata18 (iteration): egen pAlo = pctlile(pA), p(2.5)

```



```

667 bysort strata18 (iteration): egen pAhi = pctlile(pA), p(97.5)
668 format %9.3f pAmn pAlo pAhi
669 label var pAmn "Percentage based on main effects"
670 label var pAlo "Percentage based on main effects"
671 label var pAhi "Percentage based on main effects"
672
673 bysort strata18 (iteration): egen pBmn = mean(pB)
674 bysort strata18 (iteration): egen pBlo = pctlile(pB), p(2.5)
675 bysort strata18 (iteration): egen pBhi = pctlile(pB), p(97.5)
676 format %9.3f pBmn pBlo pBhi
677 label var pBmn "Percentage point difference based on interaction effects"
678 label var pBlo "Percentage point difference based on interaction effects"
679 label var pBhi "Percentage point difference based on interaction effects"
680
681 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
682 drop iteration b* u* p pA pB
683 duplicates drop
        Duplicates in terms of all variables
        (17,982 observations deleted)
684 isid strata18
685
686 * Ranks
687 sort pmn
688 generate pmnrank = _n
689 order pmnrank, after(phi)
690 sort pAmn
691 generate pAmnrank = _n
692 order pAmnrank, after(pAhi)
693 sort pBmn
694 generate pBmnrank = _n
695 order pBmnrank, after(pBhi)
696
697 * Sort the data
698 sort strata18

```

```

699 isid strata18

700
701 * Compress and save the data
702 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)

703 save "m7B_sl8results.dta", replace
    file m7B_sl8results.dta saved

704
705 * List strata with statistically significant interaction effects on the predicted in
    > cidence
706 use "m7B_sl8results.dta", clear

707 list strata18 pBmn pBlo pBhi if pBhi<0, noobs
708 list strata18 pBmn pBlo pBhi if pBlo>0, noobs

709
710
711 *****
712 * MODEL 7A_S36 - FAIR OR POOR HEALTH, Null MODEL
713 *****
714
715 *-----*
716 * FIT THE MODEL
717 *-----*
718
719 * Load the data
720 use "analysisready2.dta", clear

721 sort strata36 aid

722
723 * delete if missing dependent variable (so can record number)
724 drop if fairpoorhealth == .
    (6 observations deleted)

725
726 * Fit model using PQL2
727 runmlwin fairpoorhealth 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
strata36	36	47	389.9	1083

Run time (seconds) = **1.81**
 Number of iterations = **7**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.635406	.0770223	-34.22	0.000	-2.786367	-2.484445

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(const)	.1468662	.0488786	.0510659	.2426666

728

729 * Fit model using MCMC

730 runmlwin fairpoorhealth cons , ///

> level2(strata36: cons, residuals(u, savechains("m7A_s36_u.dta", replace))) ///

> level1(aid:) ///

> discrete(distribution(binomial) link(logit) denominator(denominator)) ///

> mcmc(burnin(5000) chain(50000) thinning(50) ///

> savechains("m7A_s36_beta.dta", replace) initsprevious /// saving the beta & va

> riance parameter estimates for the models

> 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
strata36	36	47	389.9	1083

Burnin = **5000**Chain = **50000**Thinning = **50**Run time (seconds) = **141**Deviance (dbar) = **6967.36**Deviance (thetabar) = **6941.94**Effective no. of pars (pd) = **25.42**Bayesian DIC = **6992.79**

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.633819	.0772721	825	0.000	-2.77745	-2.478826

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(const)	.1572395	.0540123	1344	.0779029	.289062

731 rename u0 mlu

732 drop u0se

733

734 * Present the regression coefficients as odds ratios

735 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
strata36	36	47	389.9	1083

```

Burnin                =      5000
Chain                  =     50000
Thinning                =       50
Run time (seconds)     =      141
Deviance (dbar)        =     6967.36
Deviance (thetabar)    =     6941.94
Effective no. of pars (pd) =    25.42
Bayesian DIC           =     6992.79

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0720776	.0054859	818	0.000	.0621969	.0838416

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.1572395	.0540123	1344	.0779029	.289062

```

736
737 * Calculate the ICC from the parameter point estimates
738 scalar mlsigma2u = [RP2]var(cons)

739 scalar mlsigma2e = _pi^2/3

740 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.046

```

```

741
742 * Calculate the ICC from the chains
743 use "m7A_s36_beta.dta", clear

744 rename RP2_var_cons_ sigma2u

745 generate sigma2e = _pi^2/3

746 generate icc = sigma2u/(sigma2u + sigma2e)

747 mcmcsu icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0455031	.0144775	1337	0.000	.0231319	.0807677

```

748
749
750 *****
751 * MODEL 7B_S36 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
752 *****
753
754 *-----*
755 * FIT THE MODEL
756 *-----*
757
758 * Load the data
759 use "analysisready2.dta", clear

```

```
760 sort strata36 aid
```

```
761
```

```
762 * delete if missing dependent variable (so can record number)
```

```
763 drop if fairpoorhealth == .  
      (6 observations deleted)
```

```
764
```

```
765 * Fit model using PQL2
```

```
766 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege lowinc  
> , ///  
>   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
strata36	36	47	389.9	1083

Run time (seconds) = **2.03**
Number of iterations = **10**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-3.43054	.1089744	-31.48	0.000	-3.644126	-3.216954
female	.3984185	.0844217	4.72	0.000	.232955	.5638821
latinx_race	.2416638	.1086382	2.22	0.026	.0287369	.4545907
black_race	.2170082	.0992746	2.19	0.029	.0224337	.4115828
hsless	.5517027	.1070268	5.15	0.000	.341934	.7614713
somecollege	.3009789	.1109458	2.71	0.007	.083529	.5184287
lowinc	.2763062	.0914131	3.02	0.003	.0971399	.4554726

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata36				
var(cons)	.0145591	.0124835	-.0099081	.0390263

```
767
```

```
768 * Fit model using MCMC
```

```
769 runmlwin fairpoorhealth cons female latinx_race black_race hsless somecollege lowinc  
> , ///  
>   level2(strata36: cons, residuals(u, savechains("m7B_s36_u.dta", replace))) ///  
>   level1(aid:) ///  
>   discrete(distribution(binomial) link(logit) denominator(denominator)) ///  
>   mcmc(burnin(5000) chain(50000) thinning(50) ///  
>   savechains("m7B_s36_beta.dta", replace)) initsprevious /// saving the beta & va  
> riance parameter estimates for the models  
>   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
strata36	36	47	389.9	1083

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      321
Deviance (dbar)       =    6968.87
Deviance (thetabar)   =    6955.66
Effective no. of pars (pd) =    13.21
Bayesian DIC          =    6982.08

```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.429899	.1091856	594	0.000	-3.634411	-3.208717
female	.3965239	.0852998	945	0.000	.2226717	.5714619
latinx_race	.2248005	.1093585	743	0.018	.0156185	.4427718
black_race	.2054929	.0987506	828	0.015	.0229268	.3975654
hsless	.557307	.1072432	770	0.000	.3531723	.7655785
somecollege	.3012033	.1123134	761	0.007	.0755151	.5138795
lowinc	.2810698	.0910272	1034	0.002	.1051495	.4478233

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0144375	.0141448	459	.0009838	.0505634

```
770 rename u0 mlu
```

```
771 drop u0se
```

```
772
```

```
773 * Present the regression coefficients as odds ratios
```

```
774 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
strata36	36	47	389.9	1083

```

Burnin                =      5000
Chain                 =     50000
Thinning              =       50
Run time (seconds)    =      321
Deviance (dbar)       =    6968.87
Deviance (thetabar)   =    6955.66
Effective no. of pars (pd) =    13.21
Bayesian DIC          =    6982.08

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0326487	.0035561	601	0.000	.0263995	.0404084
female	1.490826	.1299264	926	0.000	1.24941	1.770854
latinx_race	1.255315	.1398669	731	0.018	1.015741	1.557017
black_race	1.232518	.1201039	816	0.015	1.023192	1.488197
hsless	1.756762	.1902781	764	0.000	1.423576	2.150238
somecollege	1.35615	.149953	758	0.007	1.07844	1.671764
lowinc	1.330863	.1200707	1040	0.002	1.110877	1.564902

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata36					
var(cons)	.0144375	.0141448	459	.0009838	.0505634

```

775
776 * Calculate the ICC from the parameter point estimates
777 scalar mlsigma2u = [RP2]var(cons)

778 scalar mlsigma2e = _pi^2/3

779 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
ICC = 0.004

```

```

780
781 * Calculate the ICC from the chains
782 use "m7B_s36_beta.dta", clear

783 rename RP2_var_cons_ sigma2u

784 generate sigma2e = _pi^2/3

785 generate icc = sigma2u/(sigma2u + sigma2e)

786 mcmcsu mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0042967	.0041242	458	0.000	.0002989	.0151368

```

787
788
789 *-----*
790 * PREPARE FIXED-PART PARAMETER CHAINS
791 *-----*
792
793 use "m7B_s36_beta.dta", clear

794 drop deviance RP2_var_cons_ OD_bcons_1

795 rename FP1_* b_*

796 format %9.2f b_*

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

798 save "m7B_s36_beta_prepped.dta", replace
    file m7B_s36_beta_prepped.dta saved

799 isid iteration

800 codebook iteration, compact

```

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

```

801
802
803 *-----*
804 * PREPARE STRATUM RANDOM EFFECTS CHAINS
805 *-----*
806
807 use "m7B_s36_u.dta", clear

808 drop residual idnum

809 rename value u

810 format %9.2f u

811 sort strata36 iteration

812 order strata36 iteration

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

814 save "m7B_s36_u_prepped.dta", replace
    file m7B_s36_u_prepped.dta saved

815 isid strata36 iteration

816 codebook iteration, compact

```

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

```

817
818
819 *-----*
820 * MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
821 *-----*
822
823 use "data36.dta", clear

824 isid strata36

825 cross using "m7B_s36_beta_prepped.dta"

826 isid strata36 iteration

827 sort strata36 iteration

828 merge 1:1 strata36 iteration using "m7B_s36_u_prepped.dta", nogenerate assert(match)

```

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


```

829 isid strata36 iteration

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

831 save "m7B_s36data_prepped.dta", replace
    file m7B_s36data_prepped.dta saved

832
833
834 *-----*
835 * CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
836 *-----*
837
838 * Percentage p based on fixed and random part
839 use "m7B_s36data_prepped.dta", clear

840 gen cons = 1

841 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 ///
> )

842 label var p "Percentage based on main effects and interactions"

843 format %9.3f p

844
845 * Percentage p based only on the fixed-part
846 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 ///
> )

847 label var pA "Percentage based only on main effects"

848 format %9.3f pA

849
850 * Percentage pB calculated as the difference between p and pA
851 generate pB = p - pA

852 label var pB "Percentage point difference based on interaction effects"

853 format %9.3f pB

854

```

```

855 * Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
856 bysort strata36 (iteration): egen pmn = mean(p)

857 bysort strata36 (iteration): egen plo = pctlile(p), p(2.5)
858 bysort strata36 (iteration): egen phi = pctlile(p), p(97.5)
859 format %9.3f pmn plo phi

860 label var pmn "Percentage based on main effects and interactions"
861 label var plo "Percentage based on main effects and interactions"
862 label var phi "Percentage based on main effects and interactions"

863
864
865 bysort strata36 (iteration): egen pAmn = mean(pA)
866 bysort strata36 (iteration): egen pAlo = pctlile(pA), p(2.5)
867 bysort strata36 (iteration): egen pAhi = pctlile(pA), p(97.5)
868 format %9.3f pAmn pAlo pAhi

869 label var pAmn "Percentage based on main effects"
870 label var pAlo "Percentage based on main effects"
871 label var pAhi "Percentage based on main effects"

872
873 bysort strata36 (iteration): egen pBmn = mean(pB)
874 bysort strata36 (iteration): egen pBlo = pctlile(pB), p(2.5)
875 bysort strata36 (iteration): egen pBhi = pctlile(pB), p(97.5)
876 format %9.3f pBmn pBlo pBhi

877 label var pBmn "Percentage point difference based on interaction effects"
878 label var pBlo "Percentage point difference based on interaction effects"
879 label var pBhi "Percentage point difference based on interaction effects"

880
881 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
882 drop iteration b* u* p pA pB

883 duplicates drop

      Duplicates in terms of all variables

      (35,964 observations deleted)

884 isid strata36

885
886 * Ranks

```

```

887 sort pmn
888 generate pmnrank = _n
889 order pmnrank, after(phi)
890 sort pAmn
891 generate pAmnrank = _n
892 order pAmnrank, after(pAhi)
893 sort pBmn
894 generate pBmnrank = _n
895 order pBmnrank, after(pBhi)

896
897 * Sort the data
898 sort strata36

899 isid strata36

900
901 * Compress and save the data
902 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)

903 save "m7B_s36results.dta", replace
    file m7B_s36results.dta saved

904
905 * List strata with statistically significant interaction effects on the predicted in
    > cidence
906 use "m7B_s36results.dta", clear

907 list strata36 pBmn pBlo pBhi if pBhi<0, noobs

908 list strata36 pBmn pBlo pBhi if pBlo>0, noobs

909
910
911 *****
912 * MODEL 7A_S48 - FAIR OR POOR HEALTH, Null MODEL
913 *****
914
915 *-----*
916 * FIT THE MODEL
917 *-----*
918
919 * Load the data
920 use "analysisready2.dta", clear

921 sort strata48 aid

```

```

922
923 * delete if missing dependent variable (so can record number)
924 drop if fairpoorhealth == .
    (6 observations deleted)

925
926 * Fit model using PQL2
927 runmlwin fairpoorhealth 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
strata48	48	3	292.4	1083

Run time (seconds) = **1.88**
 Number of iterations = **7**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.630237	.0733918	-35.84	0.000	-2.774082	-2.486391

Random-effects Parameters		Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48					
	var(cons)	.1431767	.0473073	.0504561	.2358973

```

928
929 * Fit model using MCMC
930 runmlwin fairpoorhealth cons , ///
    > level2(strata48: cons, residuals(u, savechains("m7A_s48_u.dta", replace))) ///
    > level1(aid:) ///
    > discrete(distribution(binomial) link(logit) denominator(denominator)) ///
    > mcmc(burnin(5000) chain(50000) thinning(50) ///
    >   savechains("m7A_s48_beta.dta", replace)) initsprevious  /// saving the beta & va
    > riance parameter estimates for the models
    > 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
strata48	48	3	292.4	1083

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      142
Deviance (dbar)     =    6964.95
Deviance (thetabar) =    6937.63
Effective no. of pars (pd) =    27.32
Bayesian DIC        =    6992.28

```

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.63337	.0769367	779	0.000	-2.79239	-2.479271

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.1518755	.050624	1002	.0785893	.2697704

```
931 rename u0 mlu
```

```
932 drop u0se
```

```
933
```

```
934 * Present the regression coefficients as odds ratios
```

```
935 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
strata48	48	3	292.4	1083

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      142
Deviance (dbar)     =    6964.95
Deviance (thetabar) =    6937.63
Effective no. of pars (pd) =    27.32
Bayesian DIC        =    6992.28

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0719438	.0056542	784	0.000	.0612746	.0838043

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata48					
var(cons)	.1518755	.050624	1002	.0785893	.2697704

```

936
937 * Calculate the ICC from the parameter point estimates
938 scalar mlsigma2u = [RP2]var(cons)

939 scalar mlsigma2e = _pi^2/3

940 display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
    ICC =      0.044

941
942 * Calculate the ICC from the chains
943 use "m7A_s48_beta.dta", clear

944 rename RP2_var_cons_ sigma2u

945 generate sigma2e = _pi^2/3

946 generate icc = sigma2u/(sigma2u + sigma2e)

947 mcmcsu mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0432811	.0130543	997	0.000	.0233309	.0757859

```

948
949
950 *****
951 * MODEL 7B S48 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
952 *****
953
954 *-----*
955 * FIT THE MODEL
956 *-----*
957
958 * Load the data
959 use "analysisready2.dta", clear

960 sort strata48 aid

961
962 * delete if missing dependent variable (so can record number)
963 drop if fairpoorhealth == .
    (6 observations deleted)

964
965 * Fit model using PQL2
966 runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege 1
    > owinc, ///
    > 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
strata48	48	3	292.4	1083

Run time (seconds) = 2.05
 Number of iterations = 9

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-3.428241	.1049385	-32.67	0.000	-3.633917	-3.222566
female	.3894538	.0805752	4.83	0.000	.2315292	.5473783
latinx_imm	-.1310752	.2041413	-0.64	0.521	-.5311848	.2690343
latinx_non	.2970178	.108852	2.73	0.006	.0836717	.5103638
black	.2091569	.095672	2.19	0.029	.0216432	.3966707
hsless	.5505593	.103246	5.33	0.000	.3482009	.7529177
somecollege	.2972943	.1075249	2.76	0.006	.0865494	.5080393
lowinc	.2912711	.0887779	3.28	0.001	.1172695	.4652726

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata48				
var(cons)	.0112721	.0115558	-.0113768	.0339209

```

967
968 * Fit model using MCMC
969 runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege 1
> owinc, ///
> level2(strata48: cons, residuals(u, savechains("m7B_s48_u.dta", replace))) ///
> level1(aid:) ///
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///
> mcmc(burnin(5000) chain(50000) thinning(50) ///
> savechains("m7B_s48_beta.dta", replace)) initsprevious /// saving the beta & va
> riance parameter estimates for the models
> 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
strata48	48	3	292.4	1083

Burnin = 5000
 Chain = 50000
 Thinning = 50
 Run time (seconds) = 357
 Deviance (dbar) = 6966.99
 Deviance (thetabar) = 6953.55
 Effective no. of pars (pd) = 13.44
 Bayesian DIC = 6980.42

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-3.432918	.1069416	566	0.000	-3.647586	-3.235895
female	.3918743	.079759	793	0.000	.2482224	.5456146
latinx_imm	-.1492986	.2041391	1032	0.239	-.5377237	.2336863
latinx_non	.2887389	.1115089	865	0.005	.0680467	.5075805
black	.2037281	.0993062	909	0.020	.0105446	.4091838
hsless	.5565889	.1007431	781	0.000	.3677429	.7527641
somecollege	.2980962	.1066107	792	0.003	.10636	.5076343
lowinc	.2932919	.0912287	728	0.001	.1041341	.4735181

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]
Level 2: strata48				
var(cons)	.0114339	.0117352	387	.0005556 .0406762

```
970 rename u0 m1u
```

```
971 drop u0se
```

972

973 * Present the regression coefficients as odds ratios

```
974 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
strata48	48	3	292.4	1083

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	357
Deviance (dbar)	=	6966.99
Deviance (thetabar)	=	6953.55
Effective no. of pars (pd)	=	13.44
Bayesian DIC	=	6980.42

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0325496	.0033807	560	0.000	.0260539	.039325
female	1.480691	.1177182	791	0.000	1.281745	1.725669
latinx_imm	.8814649	.1776147	1034	0.239	.5840765	1.263248
latinx_non	1.337839	.1543085	842	0.005	1.070415	1.661267
black	1.232133	.1248552	893	0.020	1.0106	1.505588
hsless	1.753484	.1751424	787	0.000	1.444471	2.12286
somecollege	1.351619	.1442185	794	0.003	1.112222	1.661356
lowinc	1.348002	.1265406	745	0.001	1.109749	1.605633

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int.]	
Level 2: strata48 var(cons)	.0114339	.0117352	387	.0005556	.0406762

975

```
976 * Calculate the ICC from the parameter point estimates
```

```
977 scalar m1sigma2u = [RP2]var(cons)
```

```
978 scalar m1sigma2e = pi^2/3
```



```
979 display "ICC = " %9.3f m1sigma2u/(m1sigma2u + m1sigma2e)
    ICC =      0.003
```

```
980
```

```
981 * Calculate the ICC from the chains
```

```
982 use "m7B_s48_beta.dta", clear
```

```
983 rename RP2_var_cons_ sigma2u
```

```
984 generate sigma2e = _pi^2/3
```

```
985 generate icc = sigma2u/(sigma2u + sigma2e)
```

```
986 mcmcsu mcmcsum icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0034529	.0035665	385	0.000	.0001689	.0122131

```
987
```

```
988
```

```
989 *-----*
```

```
990 * PREPARE FIXED-PART PARAMETER CHAINS
```

```
991 *-----*
```

```
992
```

```
993 use "m7B_s48_beta.dta", clear
```

```
994 drop deviance RP2_var_cons_ OD_bcons_1
```

```
995 rename FP1_* b_*
```

```
996 format %9.2f b_*
```

```
997 compress
```

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

```
998 save "m7B_s48_beta_prepped.dta", replace
    file m7B_s48_beta_prepped.dta saved
```

```
999 isid iteration
```

```
1000 codebook iteration, compact
```

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

```
1001
```

```
1002
```

```
1003 *-----*
```

```
1004 * PREPARE STRATUM RANDOM EFFECTS CHAINS
```

```
1005 *-----*
```

```
1006
```

```
1007 use "m7B_s48_u.dta", clear
```

1008drop residual idnum

1009rename value u

1010format %9.2f u

1011sort strata48 iteration

1012order strata48 iteration

1013compress
variable **strata48** was **double** now **int**
variable **iteration** was **double** now **long**
(480,000 bytes saved)

1014save "m7B_s48_u_prepped.dta", replace
file m7B_s48_u_prepped.dta saved

1015isid strata48 iteration

1016codebook iteration, compact

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

1017

1018

1019*-----*

1020* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER

1021*-----*

1022

1023use "data48.dta", clear

1024isid strata48

1025cross using "m7B_s48_beta_prepped.dta"

1026isid strata48 iteration

1027sort strata48 iteration

1028merge 1:1 strata48 iteration using "m7B_s48_u_prepped.dta", nogenerate assert(match)

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

1029isid strata48 iteration

1030compress
variable **strata48** was **double** now **int**
(288,000 bytes saved)

1031save "m7B_s48data_prepped.dta", replace
file m7B_s48data_prepped.dta saved

```

1032
1033
1034*-----*
1035* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
1036*-----*
1037
1038* Percentage p based on fixed and random part
1039use "m7B_s48data_prepped.dta", clear

1040gen cons = 1

1041generate 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_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
>      + u ///
> )

1042label var p "Percentage based on main effects and interactions"

1043format %9.3f p

1044
1045* Percentage p based only on the fixed-part
1046generate 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_somcollege*somcollege ///
>      +b_lowinc*lowinc ///
> )

1047label var pA "Percentage based only on main effects"

1048format %9.3f pA

1049
1050* Percentage pB calculated as the difference between p and pA
1051generate pB = p - pA

1052label var pB "Percentage point difference based on interaction effects"

1053format %9.3f pB

1054
1055* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1056bysort strata48 (iteration): egen pmn = mean(p)

1057bysort strata48 (iteration): egen plo = pctl(p), p(2.5)

1058bysort strata48 (iteration): egen phi = pctl(p), p(97.5)

```

```

1059format %9.3f pmn plo phi
1060label var pmn "Percentage based on main effects and interactions"
1061label var plo "Percentage based on main effects and interactions"
1062label var phi "Percentage based on main effects and interactions"
1063
1064
1065bysort strata48 (iteration): egen pAmn = mean(pA)
1066bysort strata48 (iteration): egen pAlo = pctlile(pA), p(2.5)
1067bysort strata48 (iteration): egen pAhi = pctlile(pA), p(97.5)
1068format %9.3f pAmn pAlo pAhi
1069label var pAmn "Percentage based on main effects"
1070label var pAlo "Percentage based on main effects"
1071label var pAhi "Percentage based on main effects"
1072
1073bysort strata48 (iteration): egen pBmn = mean(pB)
1074bysort strata48 (iteration): egen pBlo = pctlile(pB), p(2.5)
1075bysort strata48 (iteration): egen pBhi = pctlile(pB), p(97.5)
1076format %9.3f pBmn pBlo pBhi
1077label var pBmn "Percentage point difference based on interaction effects"
1078label var pBlo "Percentage point difference based on interaction effects"
1079label var pBhi "Percentage point difference based on interaction effects"
1080
1081* Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1082drop iteration b* u* p pA pB
1083duplicates drop
      Duplicates in terms of all variables
      (47,952 observations deleted)
1084isid strata48
1085
1086* Ranks
1087sort pmn
1088generate pmnrank = _n
1089order pmnrank, after(phi)
1090sort pAmn

```

```

1091generate pAmnrank = _n
1092order pAmnrank, after(pAhi)
1093sort pBmn
1094generate pBmnrank = _n
1095order pBmnrank, after(pBhi)

1096
1097* Sort the data
1098sort strata48

1099isid strata48

1100
1101* Compress and save the data
1102compress
      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)

1103save "m7B_s48results.dta", replace
      file m7B_s48results.dta saved

1104
1105* List strata with statistically significant interaction effects on the predicted in
      > cidence
1106use "m7B_s48results.dta", clear

1107list strata48 pBmn pBlo pBhi if pBhi<0, noobs

1108list strata48 pBmn pBlo pBhi if pBlo>0, noobs

1109
1110
1111*****
1112* MODEL 7A_S96 - FAIR OR POOR HEALTH, Null MODEL
1113*****
1114
1115*-----*
1116* FIT THE MODEL
1117*-----*
1118
1119* Load the data
1120use "analysisready2.dta", clear

1121sort strata96 aid

1122
1123* delete if missing dependent variable (so can record number)
1124drop if fairpoorhealth == .
      (6 observations deleted)

1125
1126* Fit model using PQL2
1127runmlwin fairpoorhealth 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
strata96	92	1	152.6	900

Run time (seconds) = **1.84**
 Number of iterations = **7**

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-2.590313	.0639742	-40.49	0.000	-2.7157	-2.464926

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.1484329	.0452324	.0597791	.2370867

1128

1129* Fit model using MCMC

1130runmlwin fairpoorhealth cons , ///

```
> level2(strata96: cons, residuals(u, savechains("m7A_s96_u.dta", replace))) ///  
> level1(aid:) ///  
> discrete(distribution(binomial) link(logit) denominator(denominator)) ///  
> mcmc(burnin(5000) chain(50000) thinning(50) ///  
> savechains("m7A_s96_beta.dta", replace)) initsprevious ///  
> riance parameter estimates for the models  
> 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
strata96	92	1	152.6	900

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **141**
 Deviance (dbar) = **6963.52**
 Deviance (thetabar) = **6926.07**
 Effective no. of pars (pd) = **37.46**
 Bayesian DIC = **7000.98**

fairpoorhe~h	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	-2.589294	.0632664	906	0.000	-2.708341	-2.470414

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.1517092	.0458699	1169	.0820854	.2585249

```
1131rename u0 mlu
```

```
1132drop u0se
```

```
1133
```

```
1134* Present the regression coefficients as odds ratios
```

```
1135runmlwin, 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
strata96	92	1	152.6	900

Burnin = **5000**
 Chain = **50000**
 Thinning = **50**
 Run time (seconds) = **141**
 Deviance (dbar) = **6963.52**
 Deviance (thetabar) = **6926.07**
 Effective no. of pars (pd) = **37.46**
 Bayesian DIC = **7000.98**

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0752746	.0048254	905	0.000	.0666473	.0845499

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.1517092	.0458699	1169	.0820854	.2585249

```
1136
```

```
1137* Calculate the ICC from the parameter point estimates
```

```
1138scalar mlsigma2u = [RP2]var(cons)
```

```
1139scalar mlsigma2e = _pi^2/3
```

```
1140display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)  

ICC =        0.044
```

```
1141
```

```
1142* Calculate the ICC from the chains
```

```
1143use "m7A_s96_beta.dta", clear
```

```
1144rename RP2_var_cons_ sigma2u
```

```
1145generate sigma2e = _pi^2/3
```

```
1146generate icc = sigma2u/(sigma2u + sigma2e)
```

```
1147mcmcsun icc, variables
```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0441363	.0127896	1173	0.000	.0243436	.0728569

```

1148
1149
1150*****
1151* MODEL 7B S96 - FAIR OR POOR HEALTH, MAIN EFFECTS MODEL
1152*****
1153
1154*-----*
1155* FIT THE MODEL
1156*-----*
1157
1158* Load the data
1159use "analysisready2.dta", clear

1160sort strata96 aid

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

1164
1165* Fit model using PQL2
1166runmlwin fairpoorhealth cons female latinx_imm latinx_non black hsless somecollege 1
      > owinc straight_no, ///
      > 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
strata96	92	1	152.6	900

Run time (seconds) = 2.05
Number of iterations = 9

fairpoorhe~h	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cons	-3.446016	.0991024	-34.77	0.000	-3.640253	-3.251779
female	.3567853	.0767727	4.65	0.000	.2063137	.507257
latinx_imm	-.1288684	.1988357	-0.65	0.517	-.5185792	.2608425
latinx_non	.278472	.1019709	2.73	0.006	.0786128	.4783312
black	.2038034	.0887992	2.30	0.022	.0297601	.3778466
hsless	.5647113	.0969145	5.83	0.000	.3747623	.7546602
somecollege	.3048765	.1014787	3.00	0.003	.1059818	.5037711
lowinc	.2906137	.0838623	3.47	0.001	.1262466	.4549808
straight_no	.2171891	.0950828	2.28	0.022	.0308304	.4035479

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Level 2: strata96				
var(cons)	.0079875	.0115049	-.0145618	.0305367


```
MLwiN 3.2 multilevel model                Number of obs      =    14035
Binomial logit response model
Estimation algorithm: MCMC
```

Burnin	=	5000
Chain	=	50000
Thinning	=	50
Run time (seconds)	=	370
Deviance (dbar)	=	6963.91
Deviance (thetabar)	=	6950.17
Effective no. of pars (pd)	=	13.75
Bayesian DIC	=	6977.66

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var (cons)	.0082359	.0085343	242	.0005222	.032169

```
1171drop u0se
```

```
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
strata96	92	1	152.6	900

```

Burnin              =      5000
Chain               =     50000
Thinning            =       50
Run time (seconds)  =      370
Deviance (dbar)     =    6963.91
Deviance (thetabar) =    6950.17
Effective no. of pars (pd) =    13.75
Bayesian DIC        =    6977.66

```

fairpoorhe~h	Odds Ratio	Std. Dev.	ESS	P	[95% Cred. Interval]	
cons	.0317522	.0031767	607	0.000	.0257937	.038353
female	1.433737	.1123299	1039	0.000	1.238299	1.670506
latinx_imm	.8747202	.1709166	1163	0.217	.574622	1.272679
latinx_non	1.315683	.1305442	787	0.001	1.057561	1.585458
black	1.222706	.1125183	731	0.014	1.015167	1.477215
hsless	1.782787	.174754	941	0.000	1.480671	2.146438
somecollege	1.368663	.1354302	757	0.001	1.11861	1.637665
lowinc	1.350739	.1146102	868	0.001	1.129977	1.582787
straight_no	1.242828	.1209996	1047	0.013	1.022525	1.495467

Random-effects Parameters	Mean	Std. Dev.	ESS	[95% Cred. Int]	
Level 2: strata96					
var(cons)	.0082359	.0085343	242	.0005222	.032169

```

1175
1176* Calculate the ICC from the parameter point estimates
1177scalar mlsigma2u = [RP2]var(cons)

1178scalar mlsigma2e = _pi^2/3

1179display "ICC = " %9.3f mlsigma2u/(mlsigma2u + mlsigma2e)
      ICC =      0.002

1180
1181* Calculate the ICC from the chains
1182use "m7B_s96_beta.dta", clear

1183rename RP2_var_cons_ sigma2u

1184generate sigma2e = _pi^2/3

1185generate icc = sigma2u/(sigma2u + sigma2e)

1186mcmcsum icc, variables

```

	Mean	Std. Dev.	ESS	P	[95% Cred. Interval]	
icc	.0025	.0026553	241	0.000	.0001587	.0096835

```

1187
1188
1189*-----*
1190* PREPARE FIXED-PART PAREMETER CHAINS
1191*-----*

```

```

1192
1193use "m7B_s96_beta.dta", clear

1194drop deviance RP2_var_cons_ OD_bcons_1

1195rename FP1_* b_*

1196format %9.2f b_*

1197compress
      variable iteration was double now long
      (4,000 bytes saved)

1198save "m7B_s96_beta_prepped.dta", replace
      file m7B_s96_beta_prepped.dta saved

1199isid iteration

```

```
1200codebook iteration, compact
```

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

```

1201
1202
1203*-----*
1204* PREPARE STRATUM RANDOM EFFECTS CHAINS
1205*-----*
1206
1207use "m7B_s96_u.dta", clear

1208drop residual idnum

1209rename value u

1210format %9.2f u

1211sort strata96 iteration

1212order strata96 iteration

1213compress
      variable strata96 was double now int
      variable iteration was double now long
      (920,000 bytes saved)

1214save "m7B_s96_u_prepped.dta", replace
      file m7B_s96_u_prepped.dta saved

1215isid strata96 iteration

1216codebook iteration, compact

```

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

```

1217
1218
1219*-----*
1220* MERGE DATA, FIXED-PART PARAMETER AND RANDOM EFFECT CHAINS TOGETHER
1221*-----*
1222
1223use "data96_fairpoorhealth.dta", clear

1224isid strata96

1225cross using "m7B_s96_beta_prepped.dta"

1226isid strata96 iteration

1227sort strata96 iteration

1228merge 1:1 strata96 iteration using "m7B_s96_u_prepped.dta", nogenerate assert(match)

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

1229isid strata96 iteration

1230compress
      variable strata96 was double now int
      (552,000 bytes saved)

1231save "m7B_s96data_prepped.dta", replace
      file m7B_s96data_prepped.dta saved

1232
1233
1234*-----*
1235* CALCULATE PERCENTAGES OF INTEREST (p = pA + pB)
1236*-----*
1237
1238* Percentage p based on fixed and random part
1239use "m7B_s96data_prepped.dta", clear

1240gen cons = 1

1241generate 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 ///
> )

1242label var p "Percentage based on main effects and interactions"

1243format %9.3f p

```

```

1244
1245* Percentage p based only on the fixed-part
1246generate 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 ///
> )

1247label var pA "Percentage based only on main effects"

1248format %9.3f pA

1249
1250* Percentage pB calculated as the difference between p and pA
1251generate pB = p - pA

1252label var pB "Percentage point difference based on interaction effects"

1253format %9.3f pB

1254
1255* Calculate the mean, 2.5th and 97.5th percentiles of the MCMC chains
1256bysort strata96 (iteration): egen pmn = mean(p)

1257bysort strata96 (iteration): egen plo = pctlile(p), p(2.5)

1258bysort strata96 (iteration): egen phi = pctlile(p), p(97.5)

1259format %9.3f pmn plo phi

1260label var pmn "Percentage based on main effects and interactions"

1261label var plo "Percentage based on main effects and interactions"

1262label var phi "Percentage based on main effects and interactions"

1263
1264
1265bysort strata96 (iteration): egen pAmn = mean(pA)

1266bysort strata96 (iteration): egen pAlo = pctlile(pA), p(2.5)

1267bysort strata96 (iteration): egen pAhi = pctlile(pA), p(97.5)

1268format %9.3f pAmn pAlo pAhi

1269label var pAmn "Percentage based on main effects"

1270label var pAlo "Percentage based on main effects"

1271label var pAhi "Percentage based on main effects"

1272
1273bysort strata96 (iteration): egen pBmn = mean(pB)

```

```

1274 bysort strata96 (iteration): egen pBlo = pctlile(pB), p(2.5)
1275 bysort strata96 (iteration): egen pBhi = pctlile(pB), p(97.5)
1276 format %9.3f pBmn pBlo pBhi
1277 label var pBmn "Percentage point difference based on interaction effects"
1278 label var pBlo "Percentage point difference based on interaction effects"
1279 label var pBhi "Percentage point difference based on interaction effects"
1280
1281 * Drop chains and just keep their summaries (mean, 2.5th and 97.5th)
1282 drop iteration b* u* p pA pB
1283 duplicates drop
      Duplicates in terms of all variables
      (91,908 observations deleted)
1284 isid strata96
1285
1286 * Ranks
1287 sort pmn
1288 generate pmnrank = _n
1289 order pmnrank, after(phi)
1290 sort pAmn
1291 generate pAmnrank = _n
1292 order pAmnrank, after(pAhi)
1293 sort pBmn
1294 generate pBmnrank = _n
1295 order pBmnrank, after(pBhi)
1296
1297 * Sort the data
1298 sort strata96
1299 isid strata96
1300
1301 * Compress and save the data
1302 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
      (1,104 bytes saved)
1303 save "m7B_s96results.dta", replace
      file m7B_s96results.dta saved

```

```

1304
1305* List strata with statistically significant interaction effects on the predicted in
> cidence
1306use "m7B_s96results.dta", clear

1307list strata96 pBmn pBlo pBhi if pBhi<0, noobs

1308list strata96 pBmn pBlo pBhi if pBlo>0, noobs

1309
1310
1311
    end of do-file

1312do "C:\Users\cevans\AppData\Local\Temp\STD00000000.tmp"

1313
1314
1315***                                MODEL 7: FAIR OR POOR HEALTH MODELS                                ***
1316use "m7B_s6results.dta", clear

1317list strata6 pBmn pBlo pBhi if pBhi<0, noobs

1318list strata6 pBmn pBlo pBhi if pBlo>0, noobs

1319
1320use "m7B_s12results.dta", clear

1321list strata12 pBmn pBlo pBhi if pBhi<0, noobs

1322list strata12 pBmn pBlo pBhi if pBlo>0, noobs

1323
1324use "m7B_s18results.dta", clear

1325list strata18 pBmn pBlo pBhi if pBhi<0, noobs

1326list strata18 pBmn pBlo pBhi if pBlo>0, noobs

1327
1328use "m7B_s36results.dta", clear

1329list strata36 pBmn pBlo pBhi if pBhi<0, noobs

1330list strata36 pBmn pBlo pBhi if pBlo>0, noobs

1331
1332use "m7B_s48results.dta", clear

1333list strata48 pBmn pBlo pBhi if pBhi<0, noobs

1334list strata48 pBmn pBlo pBhi if pBlo>0, noobs

1335
1336use "m7B_s96results.dta", clear

1337list strata96 pBmn pBlo pBhi if pBhi<0, noobs

1338list strata96 pBmn pBlo pBhi if pBlo>0, noobs

1339
1340
1341
1342* Close log file
1343capture log close

```