

PICK Pilot Mixed Methods Evaluation

Revised Quantitative Analyses and Results

27 June 2018

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1 Revised MLM Analyses

1.1 Analytic Plan

- Step 1: Test whether Time (i.e., Post Assessment compared to Retrospective Pre-Program Assessment) has a significant effect on the 4 outcomes (tested simultaneously) even after controlling for demographic covariates.
 - Compare
 - * Model 1 with only demographic variables.
 - * Model 2 with demographic variables and Time
- Step 2: If Step 1 is significant, test whether the effect of time varies significantly by outcome (controlling for demographic covariates).
 - Compare
 - * Model 3 with demographic variables, Time, and Outcome Level
 - * Model 4 with demographic variables, Time, Outcome Level, and an interaction between Time and Outcome Level.
- Step 3: Test whether the effect of Time varies by Dosage and Prior Exposure to relationship education. * Model 5 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, and Dosage and Prior Exposure * Model 6 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, Dosage and Prior Exposure, and an interaction between Time and Dosage and Time and Prior Exposure.
- Step 4: Test whether the effect of Time varies by demographic variables using a Bonferroni correction.
 - Model 6 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, and, finally, Dosage and Exposure and their respective interactions with Time.
 - Model 7.X with all predictors from Model 6 and an interaction between Time and a given demographic covariate.

1.2 Calculating ICC

- If ICC is low enough, multilevel modeling is not needed.

1.2.1 Variance Between Respondents at Retrospective Pre-Assessment

- Indicates how much variance in retrospective pre-scores is between respondents vs. within respondents (i.e., across outcomes). About a quarter of the variance is between respondents. So retrospective pre-scores vary both between respondents and within respondents (across outcomes).

Linear mixed model

Family: gaussian (identity)

Formula: Score ~ Time + (1 | ID)

ICC (ID): 0.287794

1.2.2 Variance Between Respondents *within domain (outcome level)* at Retrospective Pre-Assessment

- Indicates how much variance in retrospective pre-scores is between respondents vs. within respondents (i.e., across outcomes). About a quarter of the variance is between respondents. So retrospective pre-scores vary both between respondents and within respondents (across outcomes).

1.2.3 ICC in a Specific Domain

- Indicates how much variance in retrospective pre-scores is between respondents vs. within respondents within a specific domain (i.e., outcome). About a quarter of the variance is between respondents. So retrospective pre-scores vary both between respondents and within respondents.

Linear mixed model

Family: gaussian (identity)

Formula: Score ~ Time * Domain + (1 | ID)

ICC (ID): 0.312200

1.3 Step 1: Test whether Time (i.e., Post Assessment compared to Retrospective Pre-Program Assessment) has a significant effect on the 4 outcomes (tested simultaneously) even after controlling for demographic covariates.

- Compare
 - Model 0 with no predictors
 - Model 1 with only demographic variables.
 - Model 2 with demographic variables and Time

1.3.1 Model Comparison

1.3.1.1 Effect of Demographics

The effect of demographic covariates was not significant ($\chi^2 = 8.213$, $df = 9$, $p = .513$).

1.3.1.2 Effect of Time Controlling for Demographics

The effect of Time was significant ($\chi^2 = 750.954$, $df = 1$, $p < .001$), indicating that on average respondents increased in knowledge and skills.

1.4 Step 2: If Step 1 is significant, test whether the effect of time varies significantly by outcome (controlling for demographic covariates).

- Compare
 - Model 3 with demographic variables, Time, and Outcome Level
 - Model 4 with demographic variables, Time, Outcome Level, and an interaction between Time and Outcome Level.

Linear mixed model fit by maximum likelihood ['lmerMod']

Formula:

Score ~ Age_Decades + Ethnic_Code + Education_3cat + FinancialWorry_cat +
Gender + Divorced_Dichotomous + Time + Domain + Time:Domain +
(1 | ID)

Data: PICK_clean_longlong2

AIC	BIC	logLik	deviance	df.resid
1488.0	1582.1	-725.0	1450.0	1023

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.9267	-0.6820	-0.0031	0.6746	2.9848

Random effects:

Groups	Name	Variance	Std.Dev.
ID	(Intercept)	0.0836	0.289
Residual		0.1951	0.442

Number of obs: 1042, groups: ID, 134

Fixed effects:

	Estimate	Std. Error	t value
(Intercept)	3.25551	0.13848	23.51
Age_Decades	0.03514	0.02956	1.19
Ethnic_CodeHispanic/Latino	0.00951	0.08218	0.12
Ethnic_CodeOther	-0.08575	0.08378	-1.02
Education_3catSome college	-0.05585	0.07598	-0.74
Education_3catTech./College/Grad Degree	-0.03147	0.07375	-0.43
FinancialWorry_catOften	0.08516	0.08541	1.00
FinancialWorry_catAlmost all the time	0.05627	0.07945	0.71
GenderFemale	0.08000	0.07743	1.03
Divorced_DichotomousDivorced	-0.06711	0.06491	-1.03
TimePost	0.98307	0.05468	17.98
DomainPartner_Selection	-0.13311	0.05470	-2.43
DomainPast_Rel_Behav	0.18082	0.05520	3.28
DomainRel_Behav_Attit	0.33205	0.05506	6.03
TimePost:DomainPartner_Selection	0.23118	0.07721	2.99
TimePost:DomainPast_Rel_Behav	-0.07560	0.07757	-0.97
TimePost:DomainRel_Behav_Attit	-0.13818	0.07751	-1.78

Correlation matrix not shown by default, as $p = 17 > 12$.
Use `print(summary(Model.4.ML), correlation=TRUE)` or
`vcov(summary(Model.4.ML))` if you need it

1.4.1 Model Comparison

1.4.1.1 Effect of Outcome Level

The effect of outcomes level was significant ($\chi^2 = 64.225$, $df = 3$, $p < .001$), indicating that the domains (averaged jointly across Retrospective Pre and Post) differed significantly.

1.4.1.2 Effect of Time X Domain

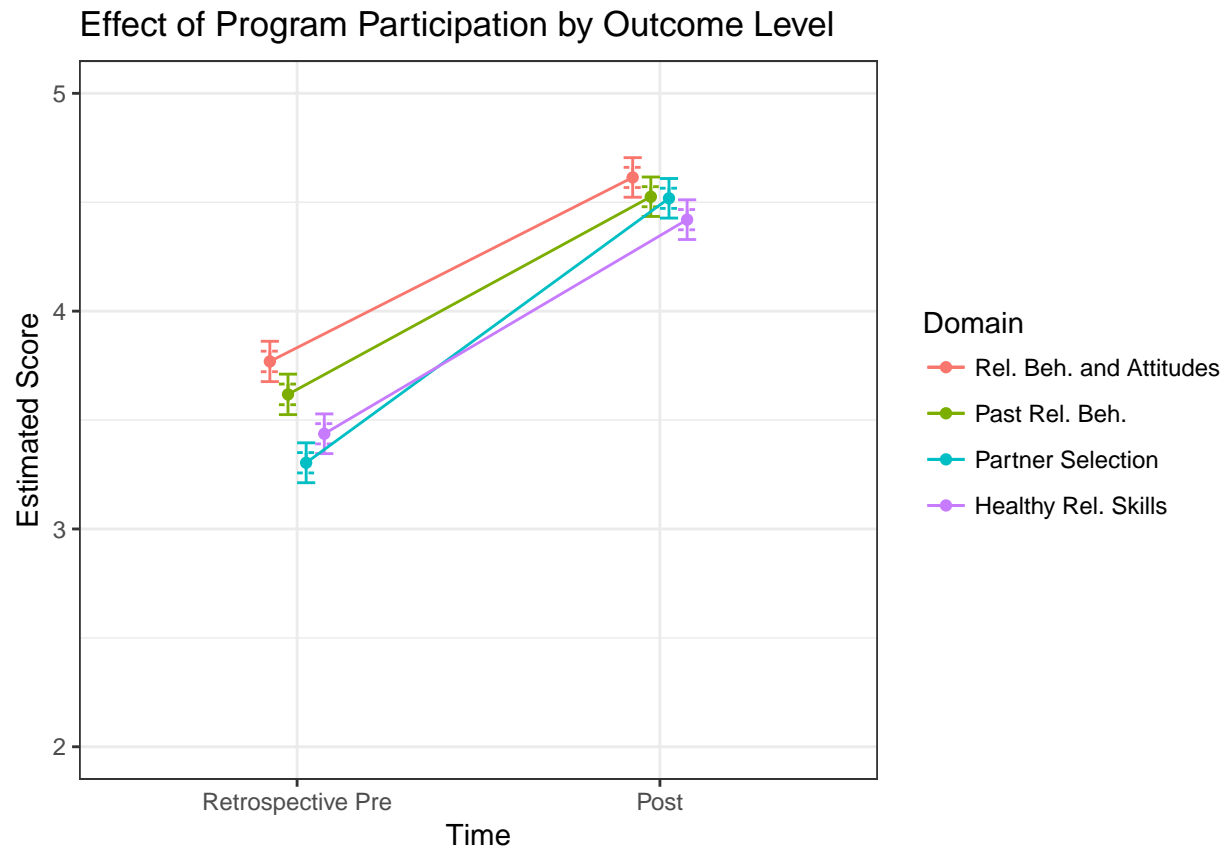
The effect of Time varied significantly by outcome level ($\chi^2 = 25.701$, $df = 3$, $p < .001$), indicating that the average effect of program participation varied by outcome.

1.4.1.3 Effect of Outcome Level and Time X Outcome Level

Accounting for outcome level and allowing the effect of time to vary by outcome level significantly improved model fit ($\chi^2 = 89.926$, $df = 6$, $p < .001$).

1.4.2 Plotting the Effect of Time X Outcome “Level”

- Plot indicates a different pattern of significant differences at pre and post?



1.4.3 Determining which Outcomes are Significantly Different at Each Timepoint

- Ask Sarah for reference: kenward-roger (p.34 text)
- Any pair that does not share a Group Number is significantly different (see <http://www.tandfonline.com/doi/pdf/10.1198/1061860043515>)
- The outcomes differ by question type: Agreement vs. Importance.

Time = RPre:

Domain	emmean	SE	df	lower.CL	upper.CL	.group
Partner_Selection	3.365207	0.05500938	265.03	3.256896	3.473518	1
Healthy_Rel_Skills	3.381842	0.05494712	264.24	3.273652	3.490032	1
Past_Rel_Behav	3.523673	0.05516325	268.10	3.415065	3.632282	2
Rel_Behav_Attit	3.643319	0.05513555	267.58	3.534764	3.751874	3

Time = Post:

Domain	emmean	SE	df	lower.CL	upper.CL	.group
Partner_Selection	4.353432	0.05505417	265.92	4.245035	4.461830	1
Healthy_Rel_Skills	4.370067	0.05504316	266.13	4.261692	4.478442	1
Past_Rel_Behav	4.511899	0.05505033	266.22	4.403509	4.620288	2
Rel_Behav_Attit	4.631544	0.05507741	266.73	4.523103	4.739986	3

Results are averaged over the levels of: Ethnic_Code, Education_3cat, FinancialWorry_cat, Gender

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

P value adjustment: tukey method for comparing a family of 4 estimates

significance level used: alpha = 0.05

1.4.4 Determining for which Outcomes the Effect of Time is Significantly Different from 0 and Different from Other Outcomes.

Outcome	Slope	t	vs. 1	t	vs. 2	t	vs. 3	t
1. Rel. Skills	0.98	17.98	—	—	—	—	—	—
2. Partner Sel.	1.21	22.22	0.23	2.99	—	—	—	—
3. Past Rel. Beh.	0.91	16.48	-0.08	-0.97	-0.31	-3.96	—	—
4. Rel. Beh. Att.	0.84	15.35	-0.14	-1.78	-0.37	-4.76	-0.06	-0.81

1.5 Step 3: Test whether the effect of Time varies by Dosage and Prior Exposure to relationship education.

- Compare
 - Model 5 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, and Dosage and Prior Exposure.
 - Model 6 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, Dosage and Prior Exposure, and an interaction between Time and Dosage and Time and Prior Exposure.

1.5.1 Model Comparison:

1.5.1.1 Effect of Dosage and Prior Exposure

The effect of Dosage and Prior Exposure was significant ($\chi^2 = 6.487$, $df = 3$, $p = .090$).

1.5.1.2 Effect of Time X Prior Exposure

The include of Time varied significantly by Prior Exposure ($\chi^2 = 5.269$, $df = 1$, $p = .022$).

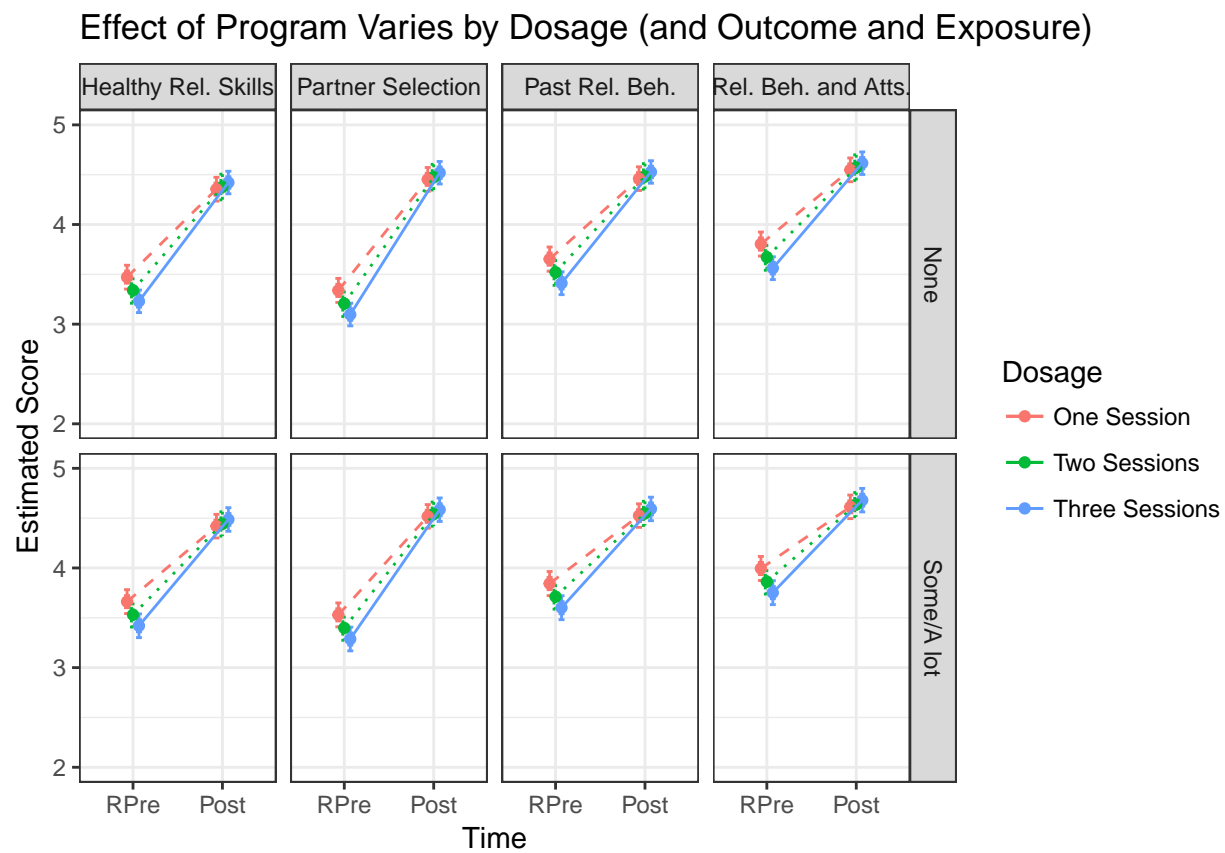
1.5.1.3 Effect of Time X Dosage

The effect of Time varied by Dosage ($\chi^2 = 23.570$, $df = 2$, $p < .001$).

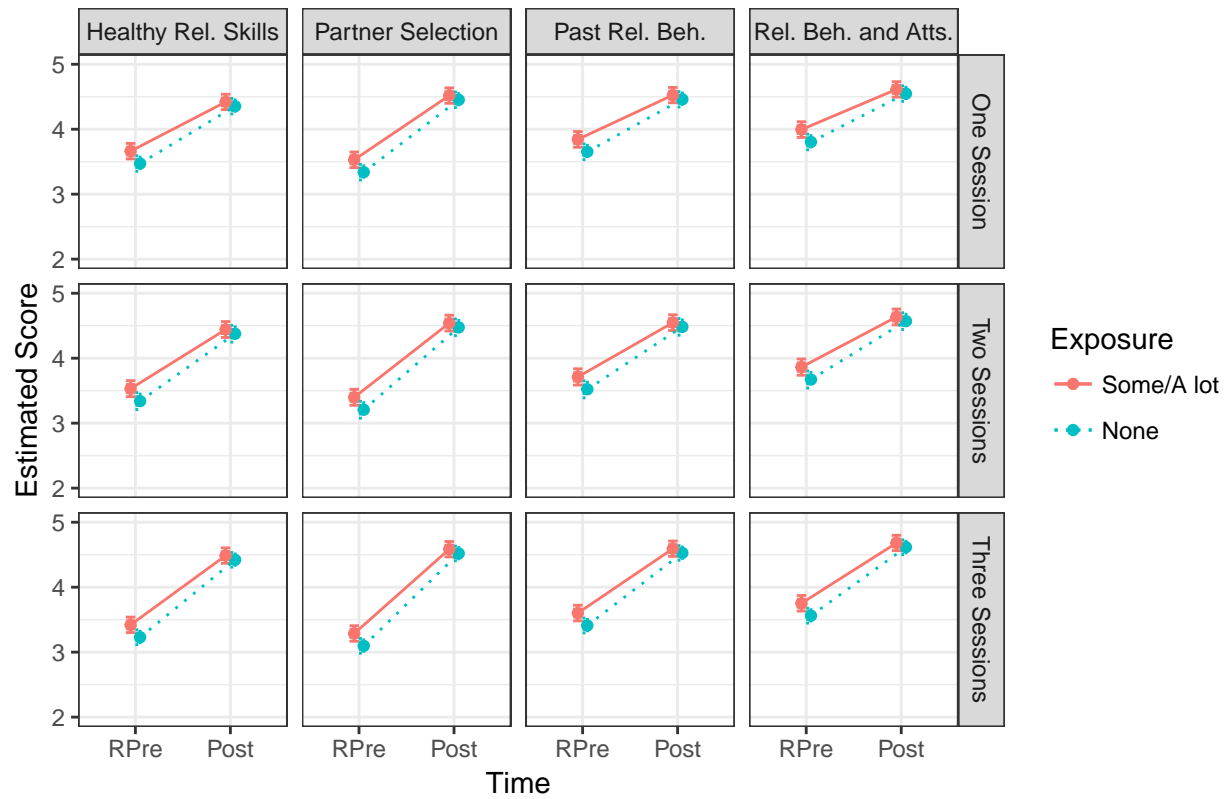
1.5.1.4 Effect of Time X Prior Exposure and Time X Dosage

The addition of prior exposure, dosage, and their respective interactions with time as predictors significantly improved model fit ($\chi^2 = 35.996$, $df = 6$, $p < .001$).

1.5.2 Plotting the Effects of Prior Exposure and Dosage

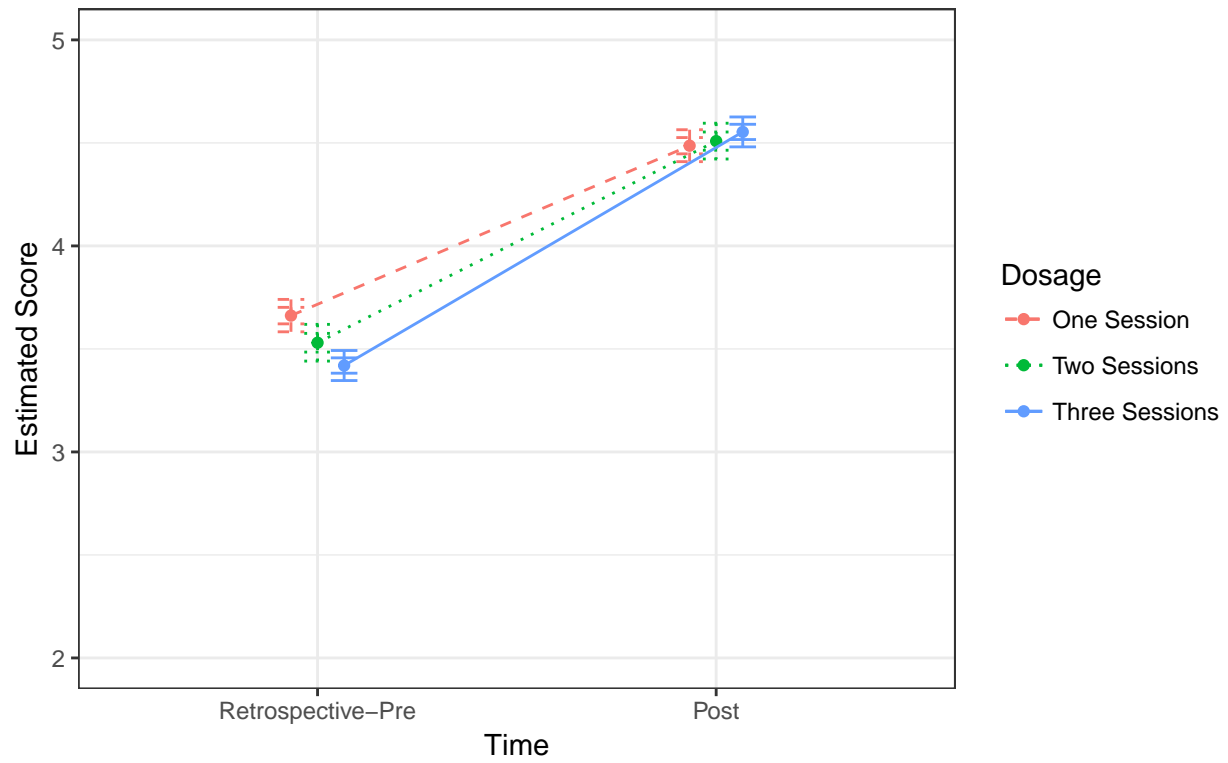


Effect of Program Varies by Dosage (and Exposure and Outcome)



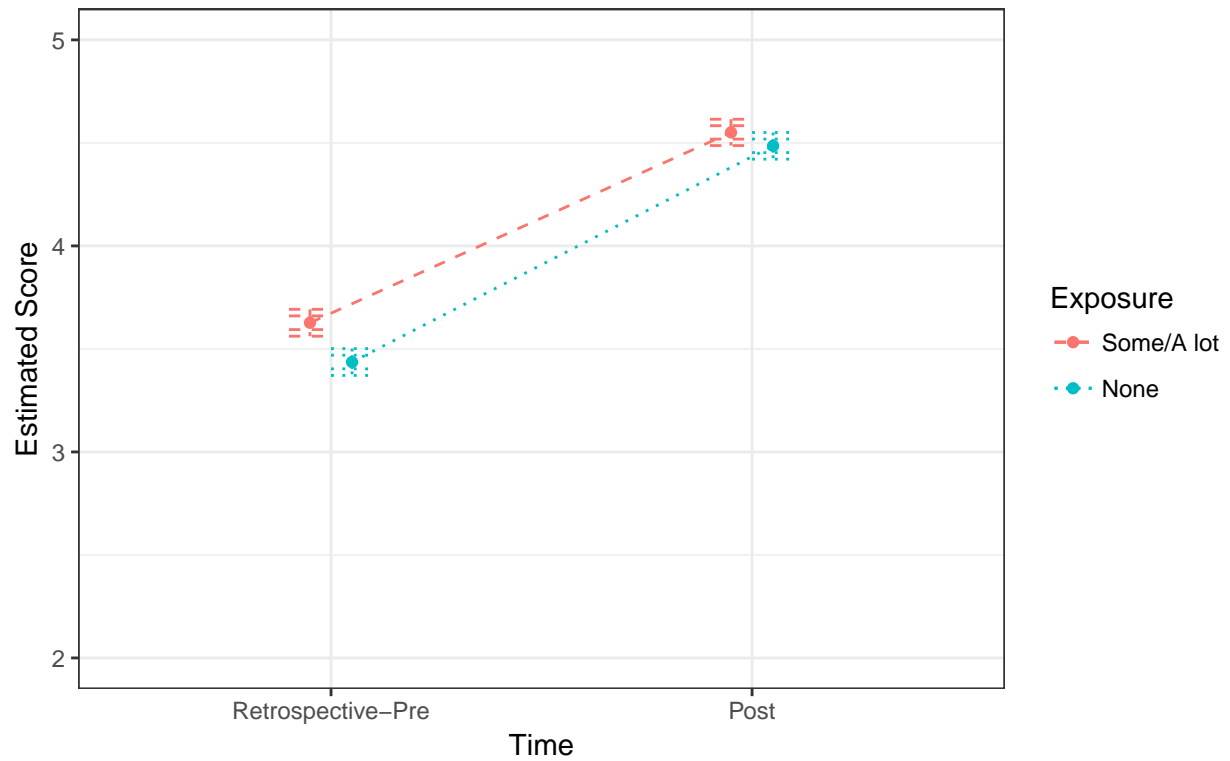
Effect of Program Varies by Dosage (and Exposure and Outcome)

Effect Shown is for Relationships Skills and No Prior Relationship Education



Effect of Program Varies by Prior Exposure (and Dosage and Outcome)

Effect Shown is for Relationships Skills and No Prior Relationship Education



1.5.2.1 Examining How Respondents Scores Differed by Prior Exposure at Each Time Point

- Those who had previous experience with relationship education rated themselves higher at Retrospective Pre, but not Post.
- The ceiling effect is clearly shown.
- **Are these analyses appropriate given the interaction?**

Time = RPre:

Prior_RshpEducation_collapsed	emmean	SE	df	lower.CL
None	3.397533	0.05798408	192.83	3.283168
Some/A lot	3.588192	0.06090494	188.86	3.468050
upper.CL	.group			
3.511897	1			
3.708333	2			

Time = Post:

Prior_RshpEducation_collapsed	emmean	SE	df	lower.CL
None	4.438963	0.05800058	192.80	4.324566
Some/A lot	4.504163	0.06061756	186.03	4.384576
upper.CL	.group			
4.553361	1			
4.623749	1			

Results are averaged over the levels of: Ethnic_Code, Education_3cat, FinancialWorry_cat, Gender
Degrees-of-freedom method: kenward-roger
Confidence level used: 0.95
significance level used: alpha = 0.05

1.5.2.2 Examining How Respondents Scores Differed by Dosage Level at Each Time Point

- Those who attended all 3 sessions rated their prior knowledge as lower...you don't know what you don't know...
- The ceiling effect is clearly shown.

Time = RPre:

Number_Attended	emmean	SE	df	lower.CL	upper.CL	.group
Three Sessions	3.375194	0.06502780	190.90	3.246929	3.503460	1
Two Sessions	3.485879	0.07061905	209.25	3.346663	3.625095	12
One Session	3.617513	0.06887567	195.97	3.481681	3.753346	2

Time = Post:

Number_Attended	emmean	SE	df	lower.CL	upper.CL	.group
One Session	4.441879	0.06848364	191.90	4.306802	4.576956	1
Two Sessions	4.464058	0.07020403	205.56	4.325646	4.602470	1
Three Sessions	4.508752	0.06494341	189.93	4.380649	4.636855	1

Results are averaged over the levels of: Ethnic_Code, Education_3cat, FinancialWorry_cat, Gender

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

P value adjustment: tukey method for comparing a family of 3 estimates

significance level used: alpha = 0.05

1.5.2.3 Determining for which Dosage Levels the Effect of Time is Significantly Different from 0 and Different from Other Dosage Levels.

- The simple slopes are for when Relationship Skills is the outcome and the participant has no prior relationship education.
- The difference between simple slopes for dosage levels will be consistent across combinations of outcomes and dosage.
- To know which simple slopes are significantly different from 0 would require testing by changing the base categories of outcome, dosage, and exposure.

Outcome	Slope	t	vs. 1	t	vs. 2	t
1. Att. 1 Sess.	0.883	12.504	—	—	—	—
2. Att. 2 Sess.	1.037	13.376	0.154	2.184	—	—
3. Att. 3 Sess.	1.192	17.523	0.309	4.882	0.155	2.264

1.6 Step 4: Test whether the effect of Time varies by demographic variables using a Bonferroni correction, $p = .05/6 = 0.00833$.

- Compare
 - Model 6 with demographic variables, Time, Outcome Level, an interaction between Time and Outcome Level, and, finally, Dosage and Exposure and their respective interactions with Time.
 - Model 7.X with all predictors from Model 6 and an interaction between Time and a given demographic covariate.

1.6.1 Testing Whether Time Varies by Demographic Covariates

1.6.1.0.1 Age (Continuous)

The effect of Time did not vary by Age ($\chi^2 = 0.918$, $df = 1$, $p = .338$).

1.6.1.0.2 Race/Ethnicity

The effect of Time varied by Race/Ethnicity ($\chi^2 = 20.550$, $df = 2$, $p < .001$).

1.6.1.0.3 Education

The effect of Time did not vary by Education level ($\chi^2 = 4.713$, $df = 2$, $p = .095$).

1.6.1.0.4 Financial Worry

The effect of Time did not vary by Financial Worry ($\chi^2 = 0.193$, $df = 2$, $p = .908$).

1.6.1.0.5 Gender

The effect of Time did not vary by gender when using Bonferroni correction ($\chi^2 = 5.933$, $df = 1$, $p = .015$).

1.6.1.0.6 Divorce history

The effect of Time did not vary by divorce history ($\chi^2 = 0.606$, $df = 1$, $p = .436$).

1.7 Diagnostics

1.7.1 The model

Linear mixed model fit by REML ['lmerMod']

Formula:

```
Score ~ Age_Decades + Ethnic_Code + Education_3cat + FinancialWorry_cat +  
      Gender + Divorced_Dichotomous + Time + Domain + Time:Domain +  
      Prior_RshpEducation_collapsed + Number_Attended + Time:Prior_RshpEducation_collapsed +  
      Time:Number_Attended + Time:Ethnic_Code + (1 | ID)  
Data: PICK_clean_longlong2
```

REML criterion at convergence: 1491.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.1420	-0.6861	0.0152	0.6496	2.9748

Random effects:

Groups	Name	Variance	Std.Dev.
ID	(Intercept)	0.0897	0.299
Residual		0.1874	0.433

Number of obs: 1042, groups: ID, 134

Fixed effects:

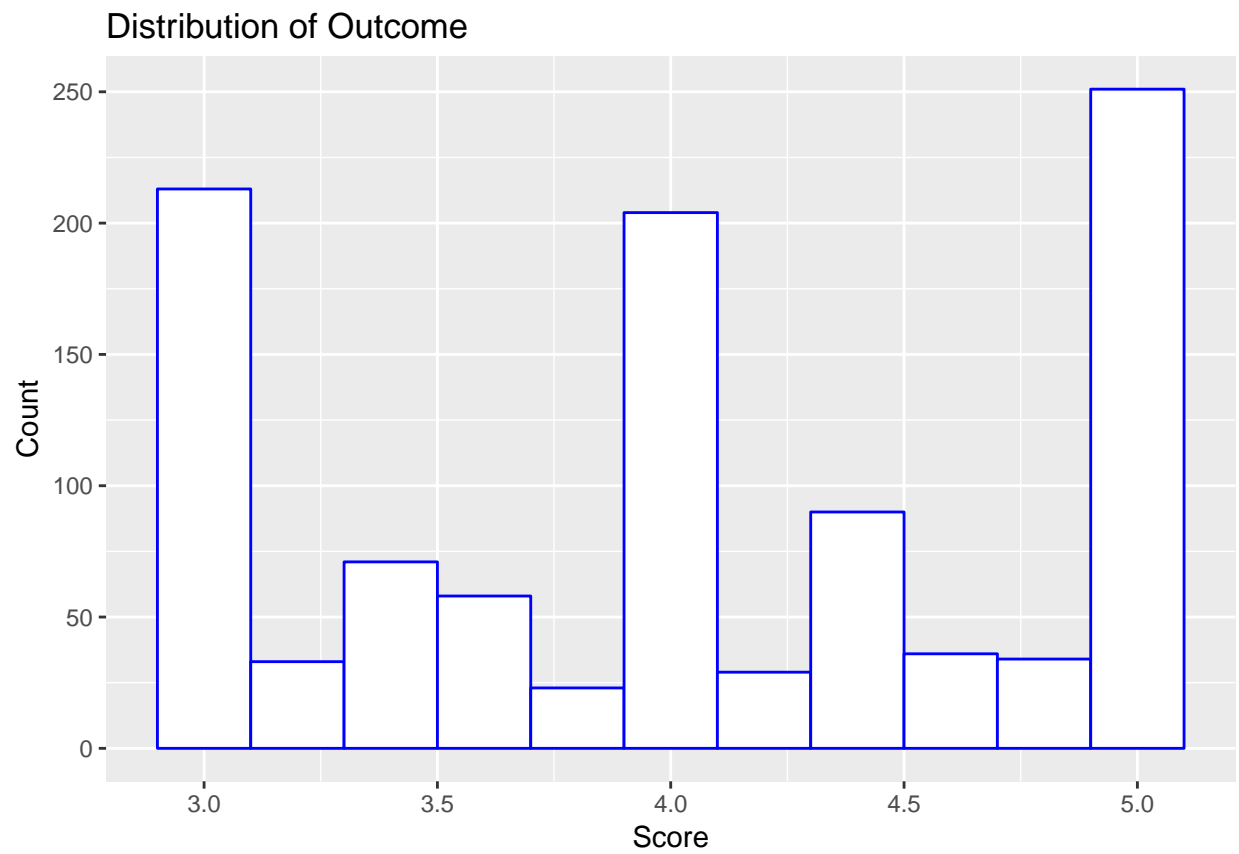
	Estimate	Std. Error
(Intercept)	3.2643	0.1572
Age_Decades	0.0377	0.0303
Ethnic_CodeHispanic/Latino	-0.0526	0.0929
Ethnic_CodeOther	0.0718	0.0966
Education_3catSome college	-0.0599	0.0779
Education_3catTech./College/Grad Degree	-0.0584	0.0776
FinancialWorry_catOften	0.0877	0.0880
FinancialWorry_catAlmost all the time	0.0584	0.0814
GenderFemale	0.0644	0.0805
Divorced_DichotomousDivorced	-0.0566	0.0666
TimePost	0.9376	0.0763
DomainPartner_Selection	-0.1322	0.0536
DomainPast_Rel_Behav	0.1809	0.0541
DomainRel_Behav_Attit	0.3312	0.0540
Prior_RshpEducation_collapsedSome/A lot	0.1999	0.0685
Number_AttendedTwo Sessions	-0.1109	0.0863
Number_AttendedThree Sessions	-0.2219	0.0791
TimePost:DomainPartner_Selection	0.2317	0.0757
TimePost:DomainPast_Rel_Behav	-0.0725	0.0760
TimePost:DomainRel_Behav_Attit	-0.1358	0.0760
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.1470	0.0556

TimePost:Number_AttendedTwo Sessions	0.1152	0.0706
TimePost:Number_AttendedThree Sessions	0.2720	0.0641
Ethnic_CodeHispanic/Latino:TimePost	0.1392	0.0749
Ethnic_CodeOther:TimePost	-0.2910	0.0797
	t value	
(Intercept)	20.76	
Age_Decades	1.25	
Ethnic_CodeHispanic/Latino	-0.57	
Ethnic_CodeOther	0.74	
Education_3catSome college	-0.77	
Education_3catTech./College/Grad Degree	-0.75	
FinancialWorry_catOften	1.00	
FinancialWorry_catAlmost all the time	0.72	
GenderFemale	0.80	
Divorced_DichotomousDivorced	-0.85	
TimePost	12.29	
DomainPartner_Selection	-2.47	
DomainPast_Rel_Behav	3.34	
DomainRel_Behav_Attit	6.14	
Prior_RshpEducation_collapsedSome/A lot	2.92	
Number_AttendedTwo Sessions	-1.29	
Number_AttendedThree Sessions	-2.81	
TimePost:DomainPartner_Selection	3.06	
TimePost:DomainPast_Rel_Behav	-0.95	
TimePost:DomainRel_Behav_Attit	-1.79	
TimePost:Prior_RshpEducation_collapsedSome/A lot	-2.64	
TimePost:Number_AttendedTwo Sessions	1.63	
TimePost:Number_AttendedThree Sessions	4.25	
Ethnic_CodeHispanic/Latino:TimePost	1.86	
Ethnic_CodeOther:TimePost	-3.65	

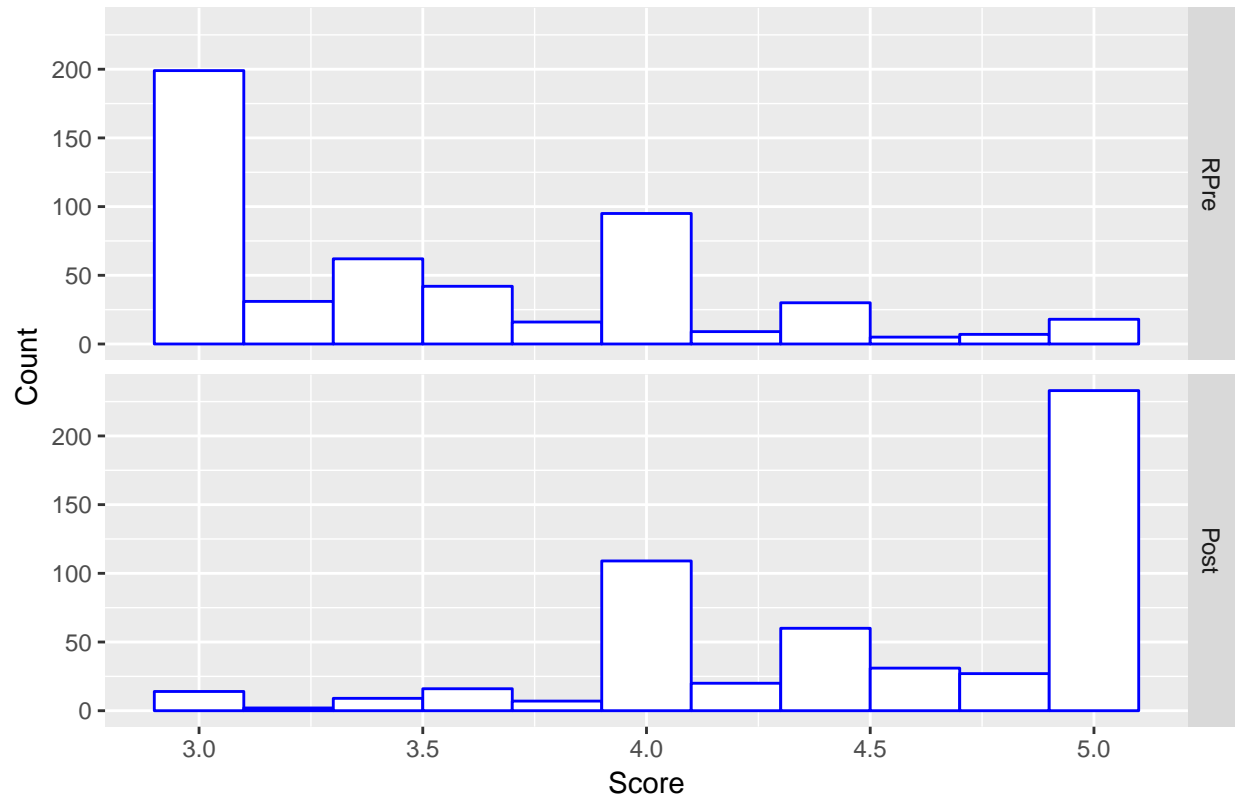
Correlation matrix not shown by default, as $p = 25 > 12$.
 Use `print(summary(Model.8.REML), correlation=TRUE)` or
`vcov(summary(Model.8.REML))` if you need it

1.7.2 Distribution of Outcome

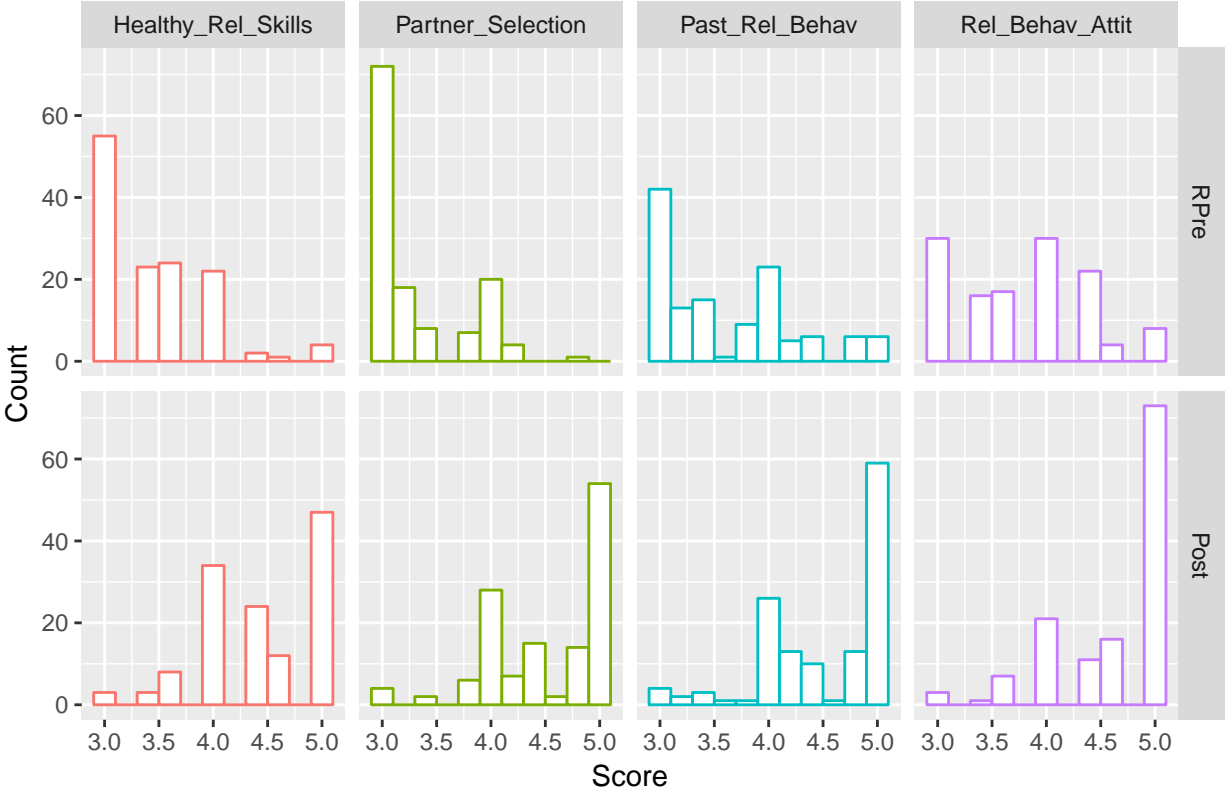
- Not an assumption, but could indicate need for a different link function.



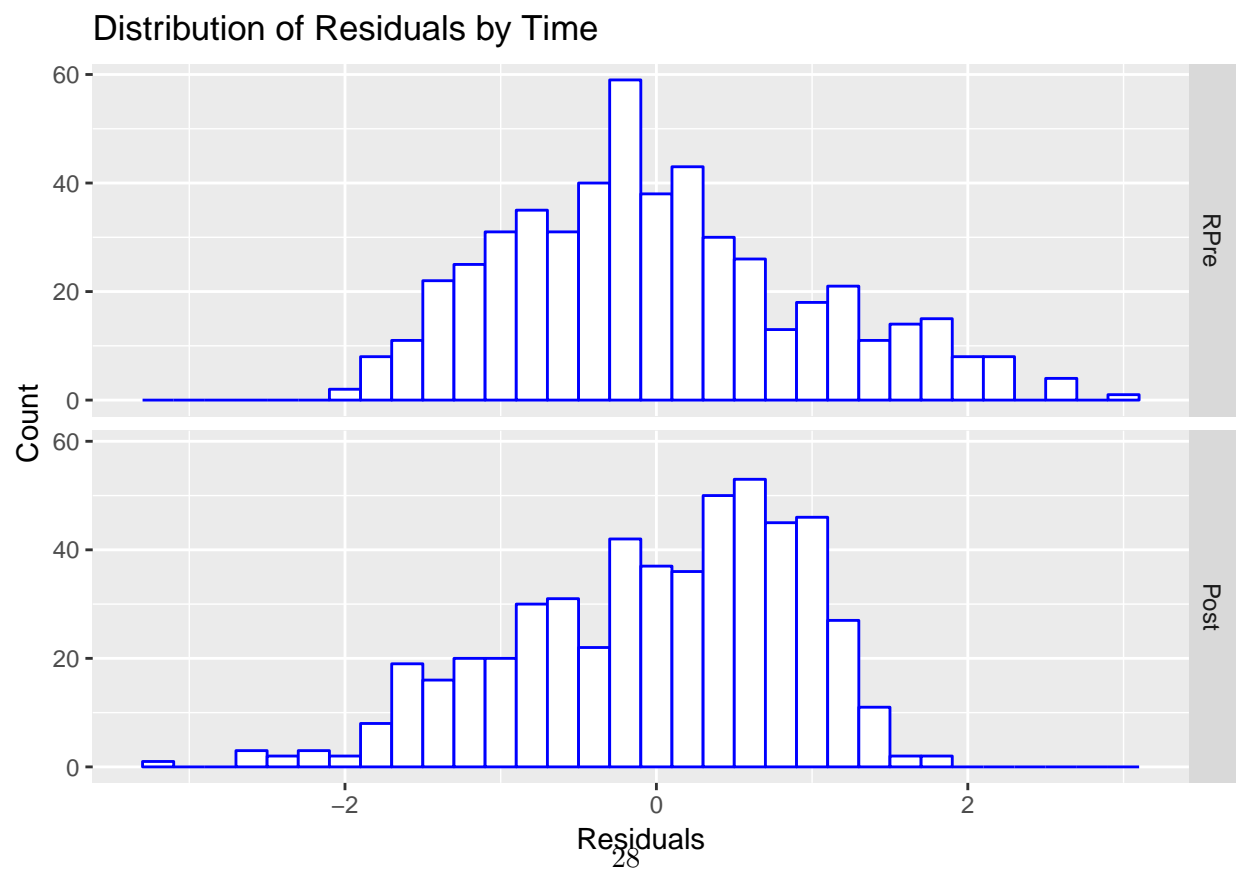
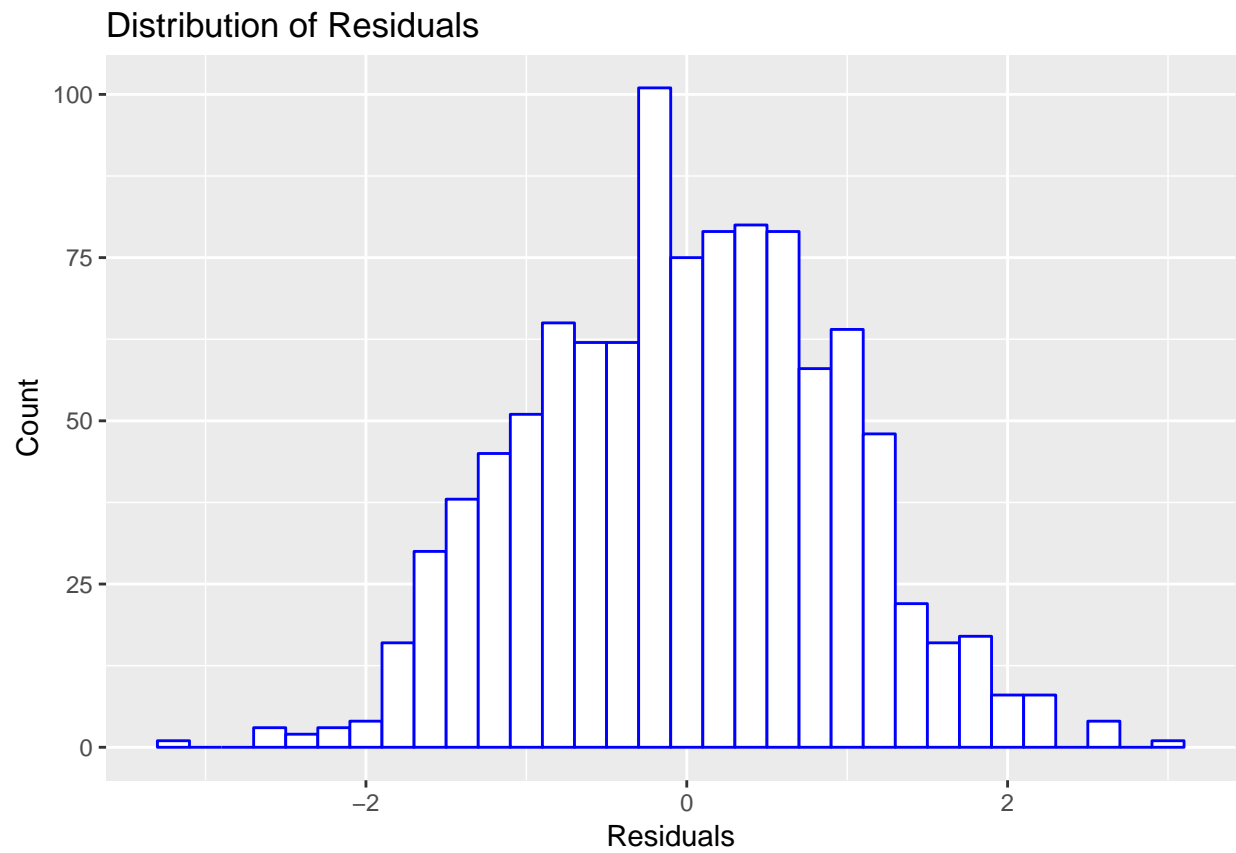
Distribution of Outcome by Time



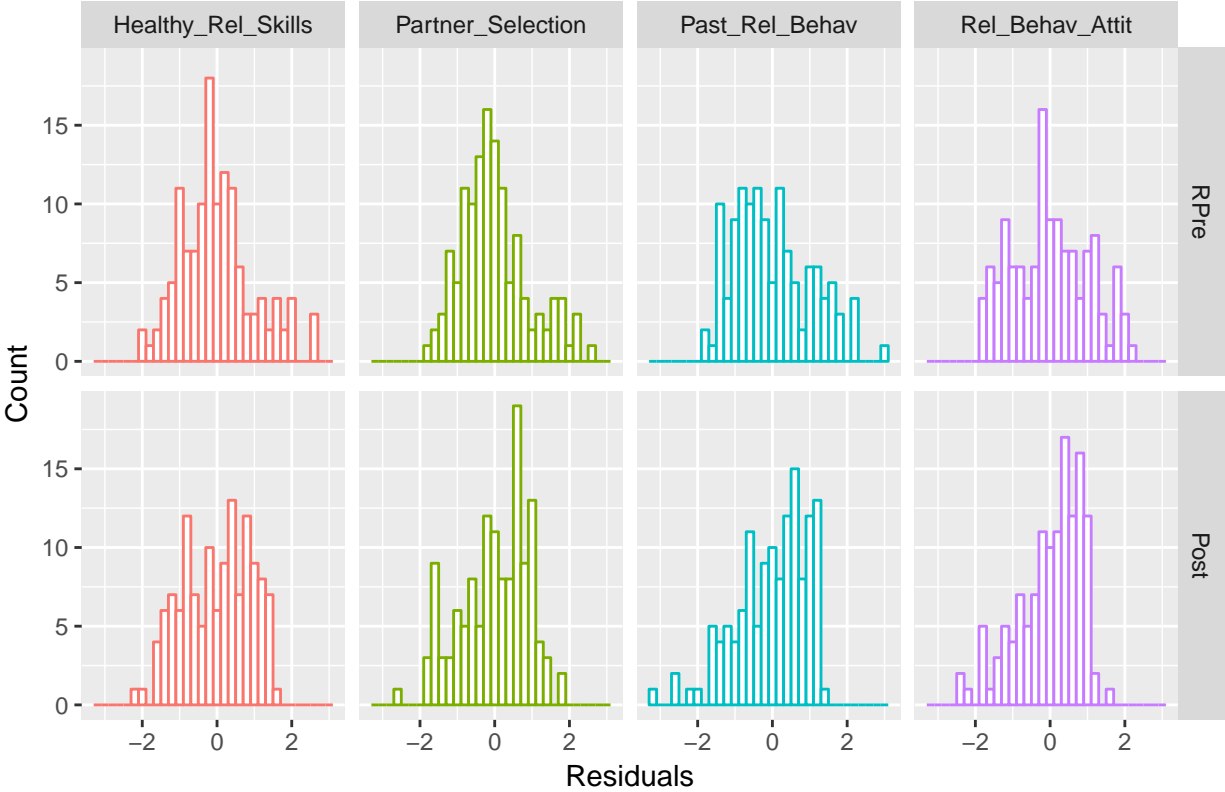
Distribution of Outcome by Time and Domain



1.7.3 Normality of Residuals

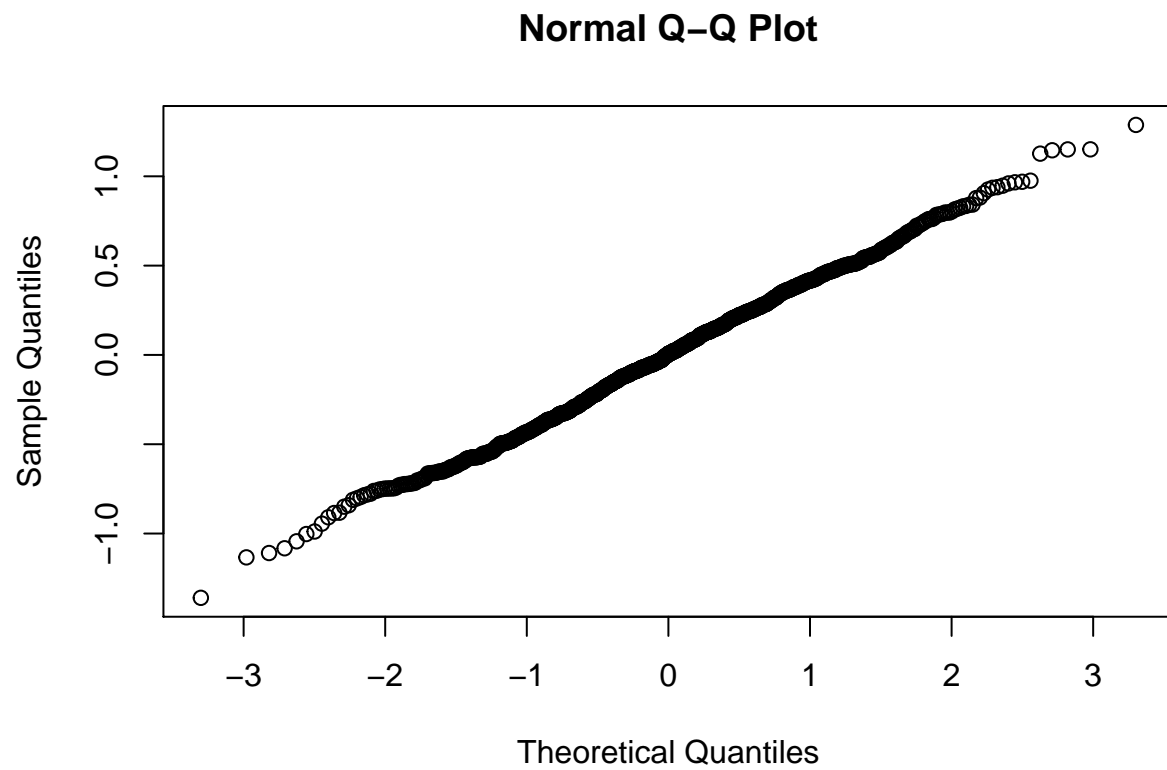


Distribution of Residuals by Time and Domain



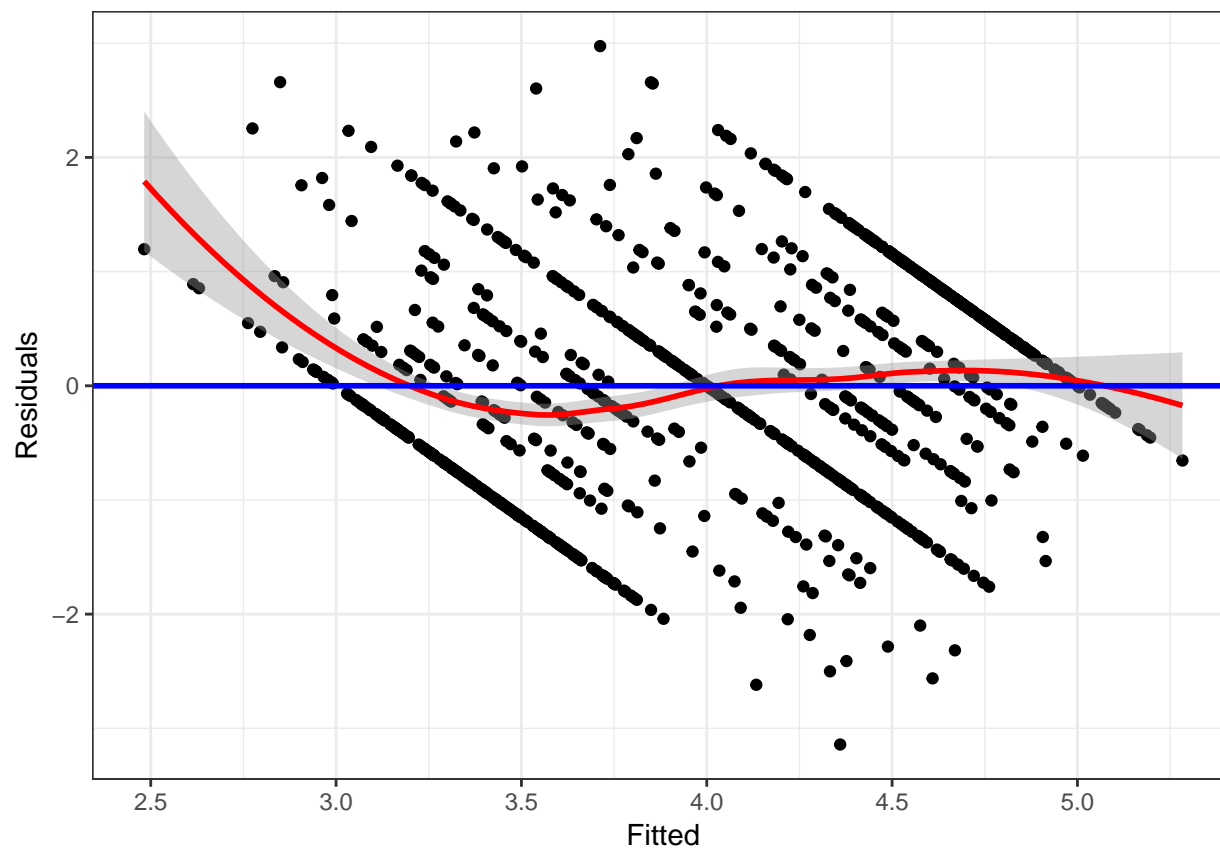
1.7.3.1 Q-Q Plot

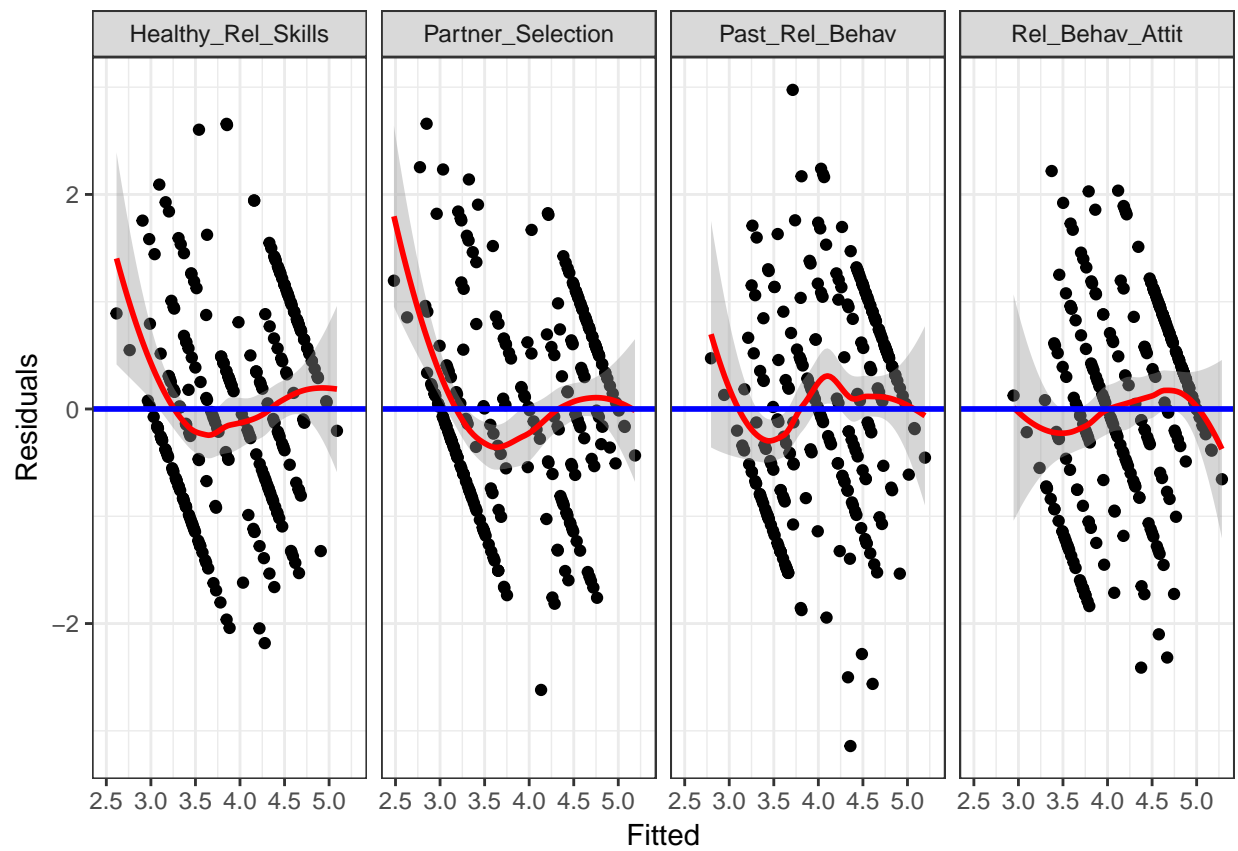
```
qqnorm(residuals(Model.8.REML))
```



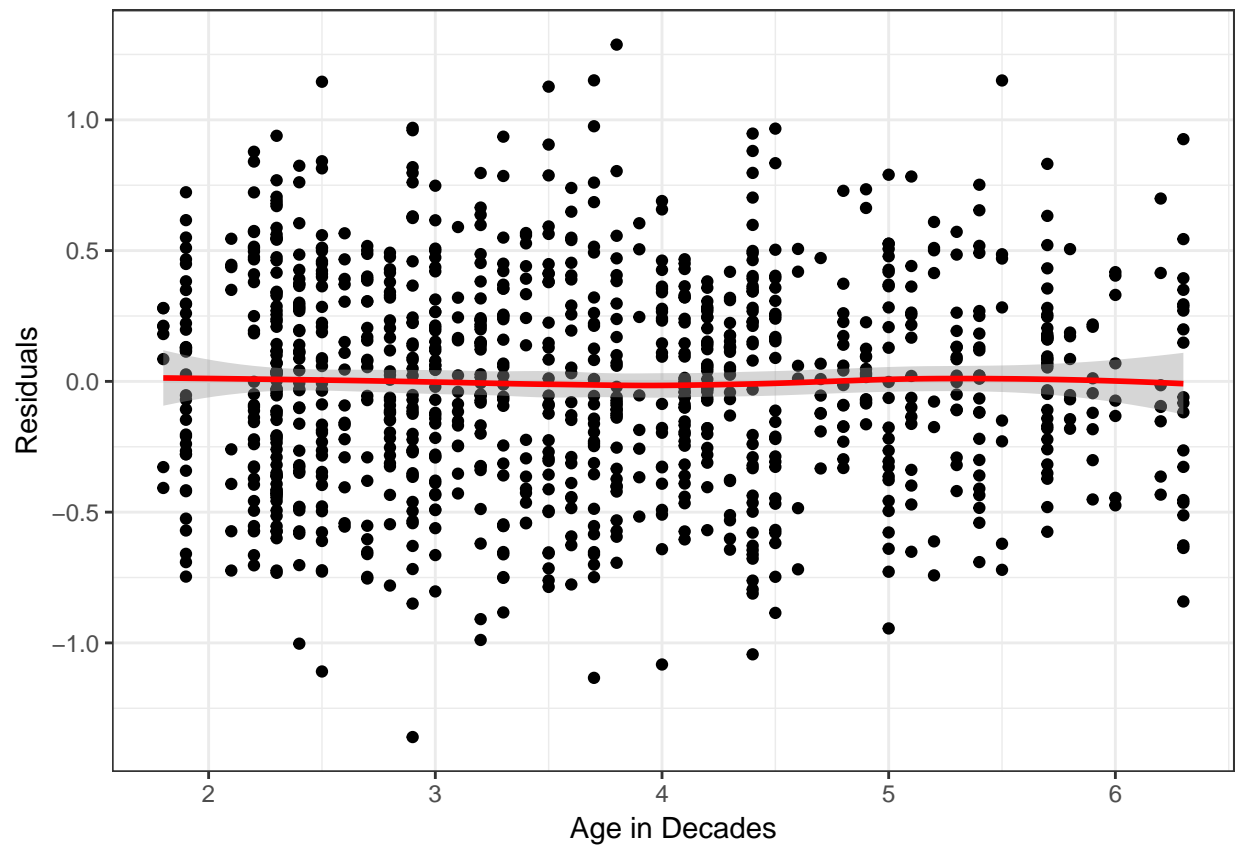
1.7.4 Assumptions of Model Form

- Underestimating those on the low end, overestimating those on the very high end.





1.7.5 Linearity in each continuous variable



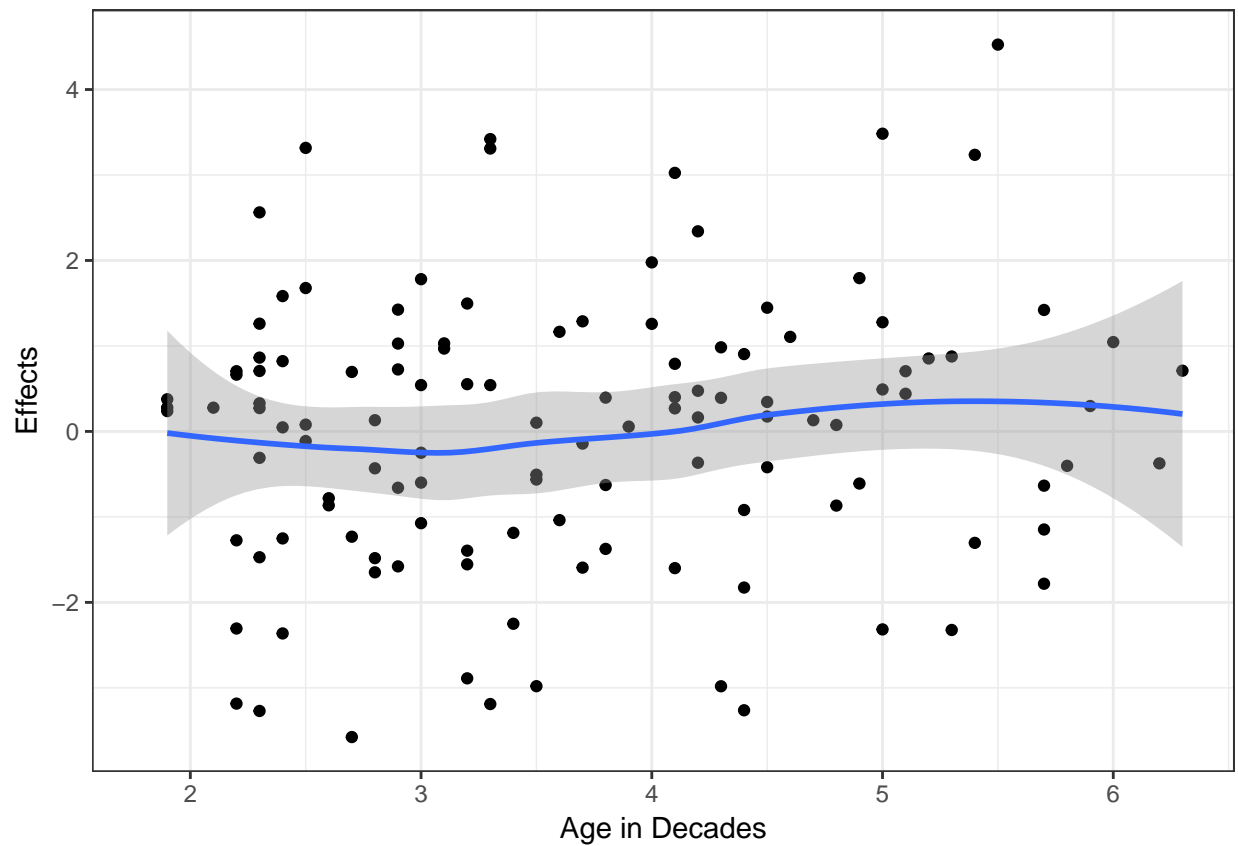
1.7.6 Independence

Warning: Column `Group.1` joining factors with different levels, coercing to character vector

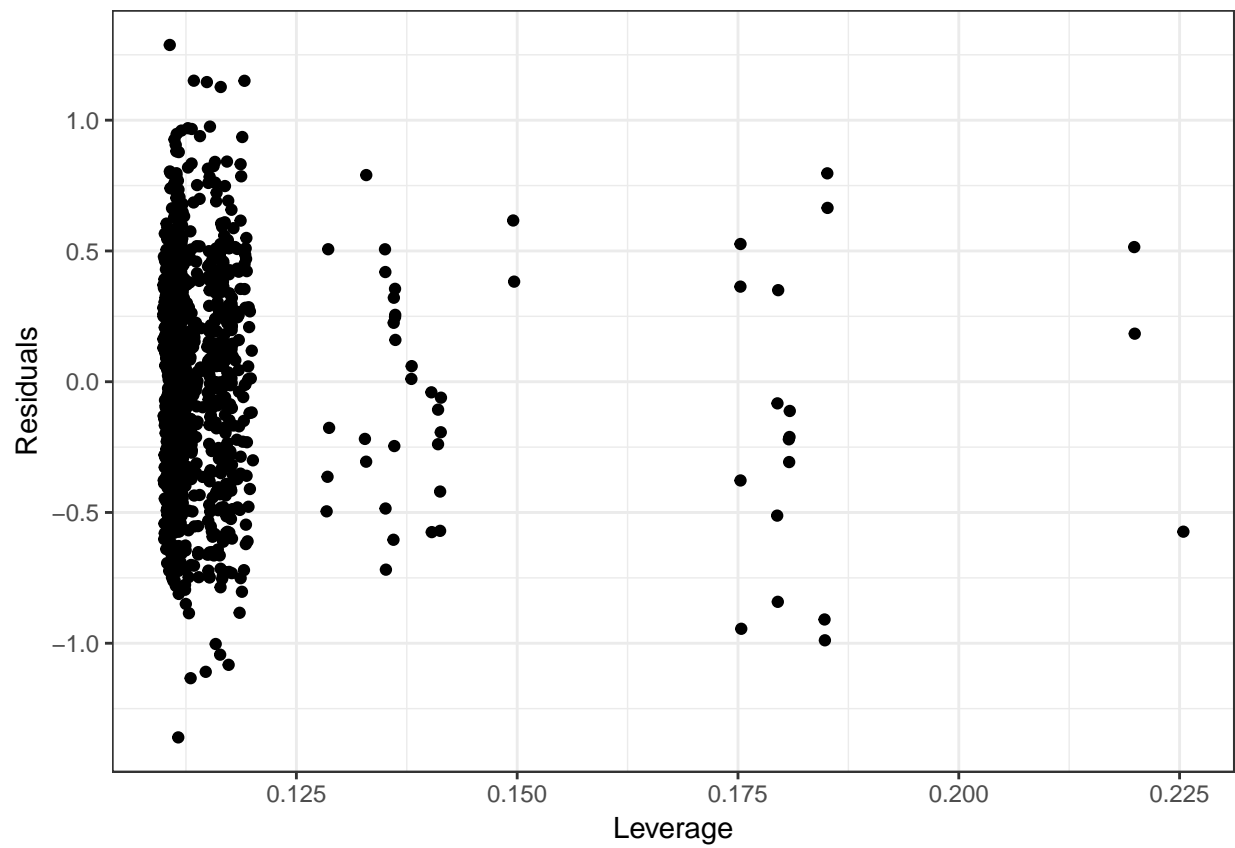
```
      Age_Decades  effects
Age_Decades  1.0000000 0.1170135
effects      0.1170135 1.0000000
```

Warning: Removed 13 rows containing non-finite values (stat_smooth).

Warning: Removed 13 rows containing missing values (geom_point).



1.7.7 Influential Cases



1.7.7.1 Influential Cases

	Score	Age_Decades	Ethnic_Code
281	3.333333	5.0	Caucasian
283	4.000000	5.0	Caucasian
285	4.750000	5.0	Caucasian
287	5.000000	5.0	Caucasian
306	4.000000	2.2	Other
309	3.666667	2.2	Other
312	4.000000	2.2	Other
417	4.000000	4.5	Hispanic/Latino
419	4.000000	4.5	Hispanic/Latino
421	4.000000	4.5	Hispanic/Latino
423	4.000000	4.5	Hispanic/Latino
530	4.000000	3.2	Hispanic/Latino
532	4.000000	3.2	Hispanic/Latino
533	3.500000	3.2	Hispanic/Latino
535	3.666667	3.2	Hispanic/Latino
1033	4.333333	6.3	Caucasian
1035	4.000000	6.3	Caucasian
1037	3.250000	6.3	Caucasian
1039	3.666667	6.3	Caucasian
	Education_3cat		
281	Tech./College/Grad Degree		
283	Tech./College/Grad Degree		
285	Tech./College/Grad Degree		
287	Tech./College/Grad Degree		
306	Tech./College/Grad Degree		
309	Tech./College/Grad Degree		
312	Tech./College/Grad Degree		
417	High school graduate/GED/No degree		
419	High school graduate/GED/No degree		
421	High school graduate/GED/No degree		
423	High school graduate/GED/No degree		
530	High school graduate/GED/No degree		
532	High school graduate/GED/No degree		
533	High school graduate/GED/No degree		
535	High school graduate/GED/No degree		
1033	Some college		
1035	Some college		
1037	Some college		
1039	Some college		
	FinancialWorry_cat	Gender	Divorced_Dichotomous Time
281		Often Female	Divorced Post
283		Often Female	Divorced Post
285		Often Female	Divorced Post
287		Often Female	Divorced Post
306	Never, Once in a While, Hardly Ever	Female	Never Divorced RPre

309	Never, Once in a While, Hardly Ever Female	Never Divorced Post
312	Never, Once in a While, Hardly Ever Female	Never Divorced RPre
417	Never, Once in a While, Hardly Ever Female	Divorced Post
419	Never, Once in a While, Hardly Ever Female	Divorced Post
421	Never, Once in a While, Hardly Ever Female	Divorced Post
423	Never, Once in a While, Hardly Ever Female	Divorced Post
530	Almost all the time Female	Never Divorced RPre
532	Almost all the time Female	Never Divorced RPre
533	Almost all the time Female	Never Divorced Post
535	Almost all the time Female	Never Divorced Post
1033	Almost all the time Female	Divorced Post
1035	Almost all the time Female	Divorced Post
1037	Almost all the time Female	Divorced Post
1039	Almost all the time Female	Divorced Post
	Domain Prior_RshpEducation_collapsed	Number_Attended ID
281	Healthy_Rel_Skills	Some/A lot Two Sessions 102
283	Partner_Selection	Some/A lot Two Sessions 102
285	Past_Rel_Behav	Some/A lot Two Sessions 102
287	Rel_Behav_Attit	Some/A lot Two Sessions 102
306	Healthy_Rel_Skills	None One Session 118
309	Past_Rel_Behav	None One Session 118
312	Rel_Behav_Attit	None One Session 118
417	Healthy_Rel_Skills	Some/A lot One Session 151
419	Partner_Selection	Some/A lot One Session 151
421	Past_Rel_Behav	Some/A lot One Session 151
423	Rel_Behav_Attit	Some/A lot One Session 151
530	Healthy_Rel_Skills	Some/A lot Two Sessions 181
532	Partner_Selection	Some/A lot Two Sessions 181
533	Past_Rel_Behav	Some/A lot Two Sessions 181
535	Rel_Behav_Attit	Some/A lot Two Sessions 181
1033	Healthy_Rel_Skills	Some/A lot Two Sessions 398
1035	Partner_Selection	Some/A lot Two Sessions 398
1037	Past_Rel_Behav	Some/A lot Two Sessions 398
1039	Rel_Behav_Attit	Some/A lot Two Sessions 398

1.7.7.2 Descriptive Statistics (for Reference)

Score	Age_Decades	Ethnic_Code
Min. :3.000	Min. :1.800	Caucasian :714
1st Qu.:3.333	1st Qu.:2.700	Hispanic/Latino:174
Median :4.000	Median :3.500	Other :154
Mean :4.036	Mean :3.676	
3rd Qu.:4.750	3rd Qu.:4.500	
Max. :5.000	Max. :6.300	

Education_3cat
High school graduate/GED/No degree:446
Some college :232
Tech./College/Grad Degree :364

FinancialWorry_cat	Gender
Never, Once in a While, Hardly Ever:197	Male :182
Often :350	Female:860
Almost all the time :495	

Divorced_Dichotomous	Time	Domain
Never Divorced:505	RPre:514	Healthy_Rel_Skills:262
Divorced :537	Post:528	Partner_Selection :262
		Past_Rel_Behav :259
		Rel_Behav_Attit :259

Prior_RshpEducation_collapsed	Number_Attended	ID
None :519	One Session :357	2 : 8
Some/A lot:523	Two Sessions :279	5 : 8
	Three Sessions:406	10 : 8
		13 : 8
		21 : 8
		27 : 8
		(Other):994

1.7.7.3 Effect on Estimates of Removing High Leverage Values

	effect	change
(Intercept)	3.26433809	-0.093062694
Age_Decades	0.03772270	0.022273763
Ethnic_CodeHispanic/Latino	-0.05259565	0.008333907
Ethnic_CodeOther	0.07184316	-0.019526130
Education_3catSome college	-0.05991287	0.000857894
Education_3catTech./College/Grad Degree	-0.05836746	-0.040643131
FinancialWorry_catOften	0.08768024	-0.027173059
FinancialWorry_catAlmost all the time	0.05843453	-0.010280583
GenderFemale	0.06439720	0.022206903
Divorced_DichotomousDivorced	-0.05663017	0.008579930
TimePost	0.93759338	-0.008913268
DomainPartner_Selection	-0.13216573	0.002966763
DomainPast_Rel_Behav	0.18090115	0.009428785
DomainRel_Behav_Attit	0.33116869	0.007970773
Prior_RshpEducation_collapsedSome/A lot	0.19986447	0.027561839
Number_AttendedTwo Sessions	-0.11087196	0.017358737
Number_AttendedThree Sessions	-0.22187369	0.002287423
TimePost:DomainPartner_Selection	0.23170854	-0.003529432
TimePost:DomainPast_Rel_Behav	-0.07254340	0.002848578
TimePost:DomainRel_Behav_Attit	-0.13576524	-0.003963073
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.14702910	0.021050612
TimePost:Number_AttendedTwo Sessions	0.11521914	0.022527294
TimePost:Number_AttendedThree Sessions	0.27204611	-0.007994361
Ethnic_CodeHispanic/Latino:TimePost	0.13917667	0.048843755
Ethnic_CodeOther:TimePost	-0.29103987	0.018022530
	se	multiples
(Intercept)	0.15723692	0.59186288
Age_Decades	0.03027876	0.73562340
Ethnic_CodeHispanic/Latino	0.09285317	0.08975360
Ethnic_CodeOther	0.09659615	0.20214191
Education_3catSome college	0.07790572	0.01101195
Education_3catTech./College/Grad Degree	0.07759462	0.52378803
FinancialWorry_catOften	0.08797700	0.30886548
FinancialWorry_catAlmost all the time	0.08136534	0.12635089
GenderFemale	0.08045071	0.27603117
Divorced_DichotomousDivorced	0.06660664	0.12881492
TimePost	0.07629350	0.11682867
DomainPartner_Selection	0.05360674	0.05534311
DomainPast_Rel_Behav	0.05408925	0.17431900
DomainRel_Behav_Attit	0.05395982	0.14771682
Prior_RshpEducation_collapsedSome/A lot	0.06846301	0.40257998
Number_AttendedTwo Sessions	0.08626923	0.20121586
Number_AttendedThree Sessions	0.07905419	0.02893487
TimePost:DomainPartner_Selection	0.07566042	0.04664833
TimePost:DomainPast_Rel_Behav	0.07602423	0.03746935

TimePost:DomainRel_Behav_Attit	0.07595758	0.05217481
TimePost:Prior_RshpEducation_collapsedSome/A lot	0.05561189	0.37852720
TimePost:Number_AttendedTwo Sessions	0.07063653	0.31891849
TimePost:Number_AttendedThree Sessions	0.06408622	0.12474384
Ethnic_CodeHispanic/Latino:TimePost	0.07485869	0.65247941
Ethnic_CodeOther:TimePost	0.07970070	0.22612761

1.7.8 Frequencies of Outcomes Variables at Item Level

1.7.8.1 Perceived Knowledge About Relationship Skills

1.7.8.1.1 Retro-Pre

Value	Healthy Rel.	Communicate	Confl. Mng.
1	13	4	9
2	22	21	17
3	47	49	52
4	43	49	41
5	6	7	6
Valid Total	131	130	125
—	—	—	—
Missing	3	4	9
Total	134	134	134

1.7.8.1.2 Post

Value	Healthy Rel.	Communicate	Confl. Mng.
1	0	0	1
2	0	1	2
3	5	6	15
4	55	59	58
5	71	64	58
Valid Total	131	130	134
—	—	—	—
Missing	3	4	0
Total	134	134	134

1.7.8.2 Perceived Knowledge About Partner Selection

1.7.8.2.1 Retro-Pre

Value	Right Partner	Learn Partner	Pace Rel.	Warning Signs
1	18	18	19	15
2	25	26	29	29
3	56	47	47	40
4	29	37	32	41
5	2	2	3	4
Valid Total	130	130	130	129
—	—	—	—	—
Missing	4	4	4	5
Total	134	134	134	134

1.7.8.2.2 Post

Value	Right Partner	Learn Partner	Pace Rel.	Warning Signs
1	0	1	0	0
2	2	1	1	2
3	10	5	7	3
4	54	44	46	48
5	65	81	79	79
Valid Total	131	132	133	132
—	—	—	—	—
Missing	3	2	1	2
Total	134	134	134	134

1.7.8.3 Perceived Importance of Knowledge About a Potential Partner's Relationships Patterns

1.7.8.3.1 Retro-Pre

Value	Ln. Grow. Up	Past Rels.	Get Along Pars.	Friendships
1	7	7	6	6
2	16	19	16	21
3	45	42	41	40
4	44	41	35	36
5	14	16	27	23
Valid Total	126	125	125	126
—	—	—	—	—
Missing	8	9	9	8
Total	134	134	134	134

1.7.8.3.2 Post

Value	Ln. Grow. Up	Past Rels.	Get Along Pars.	Friendships
1	0	2	1	2
2	0	3	0	0
3	11	5	11	6
4	46	36	41	45
5	75	87	80	79
Valid Total	132	133	133	132
—	—	—	—	—
Missing	2	1	1	2
Total	134	134	134	134

1.7.8.4 Perceived Importance of Knowledge About a Potential Partner's Relationship Behavior and Attitudes

1.7.8.4.1 Retro-Pre

Value	Fights	Feelings Hurt	Right and Wrong
1	8	5	2
2	13	15	9
3	35	31	34
4	47	56	57
5	24	19	25
Valid Total	127	126	127
—	—	—	—
Missing	7	8	7
Total	134	134	134

1.7.8.4.2 Post

Value	Fights	Feelings Hurt	Right and Wrong
1	2	1	0
2	2	0	1
3	8	5	6
4	35	37	30
5	84	89	95
Valid Total	131	132	132
—	—	—	—
Missing	3	2	2
Total	134	134	134

1.7.9 Frequencies of Change in Outcomes Variables at Scale Level

- Collapsing Categories for Display of Frequencies, but not for Analyses

Value	Rel. Skills	Prtnr. Sel.	Past Rel. Beh.	Rel. Beh. Att.
[-1,0]	15	12	17	23
(0,1]	51	36	55	64
(1,2]	43	45	34	26
(2,3]	12	20	16	9
(3,4]	7	16	3	3
Valid Total	128	129	125	125
—	—	—	—	—
Missing	1	0	4	4
Total	129	129	129	129

1.8 Final Model

1.8.1 Testing Significance of Predictors

1.8.1.1 Final Model Estimates

Linear mixed model fit by maximum likelihood ['lmerMod']

Formula:

```
Score ~ Age_Decades + Ethnic_Code + Education_3cat + FinancialWorry_cat +  
  Gender + Divorced_Dichotomous + Time + Domain + Time:Domain +  
  Prior_RshpEducation_collapsed + Number_Attended + Time:Prior_RshpEducation_collapsed +  
  Time:Number_Attended + Time:Ethnic_Code + (1 | ID)
```

Data: PICK_clean_longlong2

AIC	BIC	logLik	deviance	df.resid
1447.5	1581.1	-696.7	1393.5	1015

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.170	-0.693	0.009	0.662	2.995

Random effects:

Groups	Name	Variance	Std.Dev.
ID	(Intercept)	0.0788	0.281
Residual		0.1849	0.430

Number of obs: 1042, groups: ID, 134

Fixed effects:

	Estimate	Std. Error
(Intercept)	3.2630	0.1499
Age_Decades	0.0380	0.0288
Ethnic_CodeHispanic/Latino	-0.0520	0.0889
Ethnic_CodeOther	0.0716	0.0925
Education_3catSome college	-0.0599	0.0740
Education_3catTech./College/Grad Degree	-0.0589	0.0737
FinancialWorry_catOften	0.0873	0.0836
FinancialWorry_catAlmost all the time	0.0583	0.0773
GenderFemale	0.0647	0.0764
Divorced_DichotomousDivorced	-0.0566	0.0632
TimePost	0.9376	0.0758
DomainPartner_Selection	-0.1322	0.0533
DomainPast_Rel_Behav	0.1810	0.0537
DomainRel_Behav_Attit	0.3313	0.0536
Prior_RshpEducation_collapsedSome/A lot	0.2007	0.0655
Number_AttendedTwo Sessions	-0.1101	0.0826
Number_AttendedThree Sessions	-0.2220	0.0757
TimePost:DomainPartner_Selection	0.2317	0.0752
TimePost:DomainPast_Rel_Behav	-0.0727	0.0755

TimePost:DomainRel_Behav_Attit	-0.1359	0.0755
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.1476	0.0552
TimePost:Number_AttendedTwo Sessions	0.1148	0.0702
TimePost:Number_AttendedThree Sessions	0.2724	0.0637
Ethnic_CodeHispanic/Latino:TimePost	0.1388	0.0743
Ethnic_CodeOther:TimePost	-0.2908	0.0792
	t value	
(Intercept)	21.76	
Age_Decades	1.32	
Ethnic_CodeHispanic/Latino	-0.58	
Ethnic_CodeOther	0.77	
Education_3catSome college	-0.81	
Education_3catTech./College/Grad Degree	-0.80	
FinancialWorry_catOften	1.04	
FinancialWorry_catAlmost all the time	0.75	
GenderFemale	0.85	
Divorced_DichotomousDivorced	-0.89	
TimePost	12.37	
DomainPartner_Selection	-2.48	
DomainPast_Rel_Behav	3.37	
DomainRel_Behav_Attit	6.18	
Prior_RshpEducation_collapsedSome/A lot	3.06	
Number_AttendedTwo Sessions	-1.33	
Number_AttendedThree Sessions	-2.93	
TimePost:DomainPartner_Selection	3.08	
TimePost:DomainPast_Rel_Behav	-0.96	
TimePost:DomainRel_Behav_Attit	-1.80	
TimePost:Prior_RshpEducation_collapsedSome/A lot	-2.67	
TimePost:Number_AttendedTwo Sessions	1.64	
TimePost:Number_AttendedThree Sessions	4.28	
Ethnic_CodeHispanic/Latino:TimePost	1.87	
Ethnic_CodeOther:TimePost	-3.67	

Correlation matrix not shown by default, as $p = 25 > 12$.
 Use `print(summary(Model.9.ML), correlation=TRUE)` or
`vcov(summary(Model.9.ML))` if you need it

1.8.1.1.1 Time X Race/Ethnicity

The effect of Time varied by Race/Ethnicity ($\chi^2 = 20.550$, $df = 2$, $p < .001$).

1.8.1.1.2 Time X Dosage

The effect of Time varied by Dosage ($\chi^2 = 18.372$, $df = 2$, $p < .001$).

1.8.1.1.3 Time X Prior Exposure

The effect of Time varied by Prior Exposure ($\chi^2 = 7.118$, $df = 1$, $p = .008$).

1.8.1.1.4 Time X Domain

The effect of Time varied by Domain ($\chi^2 = 26.808$, $df = 3$, $p < .001$).

1.8.1.1.5 Divorce

The effect of Divorce History was not significant ($\chi^2 = 0.798$, $df = 1$, $p = .372$).

1.8.1.1.6 Gender

The effect of Gender was not significant ($\chi^2 = 0.715$, $df = 1$, $p = .398$).

1.8.1.1.7 Financial Worry

The effect of Financial Worry was not significant ($\chi^2 = 1.094$, $df = 2$, $p = .579$).

1.8.1.1.8 Education

The effect of Education was not significant ($\chi^2 = 0.939$, $df = 2$, $p = .625$).

1.8.1.1.9 Age

The effect of Financial Worry was not significant ($\chi^2 = 1.733$, $df = 1$, $p = .188$).

1.8.1.2 Determining Significant Differences at Retro-Pre- and Post-Program Assessments

- Easier way to do this than by switching out reference groups? Possibly.

1.8.1.3 Determining Significance of Simple Slopes

- Easier way to do this than by switching out reference groups? Possibly.

1.8.1.4 Refitting Final Model with REML

Linear mixed model fit by REML ['lmerMod']

Formula:

Score ~ Age_Decades + Ethnic_Code + Education_3cat + FinancialWorry_cat +
 Gender + Divorced_Dichotomous + Time + Domain + Time:Domain +
 Prior_RshpEducation_collapsed + Number_Attended + Time:Prior_RshpEducation_collapsed +
 Time:Number_Attended + Time:Ethnic_Code + (1 | ID)
 Data: PICK_clean_longlong2

REML criterion at convergence: 1491.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.1420	-0.6861	0.0152	0.6496	2.9748

Random effects:

Groups	Name	Variance	Std.Dev.
ID	(Intercept)	0.0897	0.299
Residual		0.1874	0.433

Number of obs: 1042, groups: ID, 134

Fixed effects:

	Estimate	Std. Error
(Intercept)	3.2643	0.1572
Age_Decades	0.0377	0.0303
Ethnic_CodeHispanic/Latino	-0.0526	0.0929
Ethnic_CodeOther	0.0718	0.0966
Education_3catSome college	-0.0599	0.0779
Education_3catTech./College/Grad Degree	-0.0584	0.0776
FinancialWorry_catOften	0.0877	0.0880
FinancialWorry_catAlmost all the time	0.0584	0.0814
GenderFemale	0.0644	0.0805
Divorced_DichotomousDivorced	-0.0566	0.0666
TimePost	0.9376	0.0763
DomainPartner_Selection	-0.1322	0.0536
DomainPast_Rel_Behav	0.1809	0.0541
DomainRel_Behav_Attit	0.3312	0.0540
Prior_RshpEducation_collapsedSome/A lot	0.1999	0.0685
Number_AttendedTwo Sessions	-0.1109	0.0863
Number_AttendedThree Sessions	-0.2219	0.0791
TimePost:DomainPartner_Selection	0.2317	0.0757
TimePost:DomainPast_Rel_Behav	-0.0725	0.0760
TimePost:DomainRel_Behav_Attit	-0.1358	0.0760
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.1470	0.0556
TimePost:Number_AttendedTwo Sessions	0.1152	0.0706
TimePost:Number_AttendedThree Sessions	0.2720	0.0641
Ethnic_CodeHispanic/Latino:TimePost	0.1392	0.0749

Ethnic_CodeOther:TimePost	-0.2910	0.0797
	t value	
(Intercept)	20.76	
Age_Decades	1.25	
Ethnic_CodeHispanic/Latino	-0.57	
Ethnic_CodeOther	0.74	
Education_3catSome college	-0.77	
Education_3catTech./College/Grad Degree	-0.75	
FinancialWorry_catOften	1.00	
FinancialWorry_catAlmost all the time	0.72	
GenderFemale	0.80	
Divorced_DichotomousDivorced	-0.85	
TimePost	12.29	
DomainPartner_Selection	-2.47	
DomainPast_Rel_Behav	3.34	
DomainRel_Behav_Attit	6.14	
Prior_RshpEducation_collapsedSome/A lot	2.92	
Number_AttendedTwo Sessions	-1.29	
Number_AttendedThree Sessions	-2.81	
TimePost:DomainPartner_Selection	3.06	
TimePost:DomainPast_Rel_Behav	-0.95	
TimePost:DomainRel_Behav_Attit	-1.79	
TimePost:Prior_RshpEducation_collapsedSome/A lot	-2.64	
TimePost:Number_AttendedTwo Sessions	1.63	
TimePost:Number_AttendedThree Sessions	4.25	
Ethnic_CodeHispanic/Latino:TimePost	1.86	
Ethnic_CodeOther:TimePost	-3.65	

Correlation matrix not shown by default, as $p = 25 > 12$.

Use `print(summary(Model.9.RE), correlation=TRUE)` or
`vcov(summary(Model.9.RE))` if you need it

	Model 1	Model 2	Model 3
(Intercept)	3.35 *** (0.13)	3.26 *** (0.14)	3.29 *** (0.15)
Age_Decades	0.03 (0.03)	0.04 (0.03)	0.04 (0.03)
Ethnic_CodeHispanic/Latino	0.01 (0.08)	0.01 (0.08)	0.02 (0.08)
Ethnic_CodeOther	-0.08 (0.08)	-0.09 (0.08)	-0.07 (0.08)
Education_3catSome college	-0.06 (0.08)	-0.06 (0.08)	-0.06 (0.07)
Education_3catTech./College/Grad Degree	-0.03 (0.07)	-0.03 (0.07)	-0.06 (0.07)
FinancialWorry_catOften	0.08 (0.09)	0.09 (0.09)	0.08 (0.08)
FinancialWorry_catAlmost all the time	0.06 (0.08)	0.06 (0.08)	0.05 (0.08)
GenderFemale	0.08 (0.08)	0.08 (0.08)	0.07 (0.08)
Divorced_DichotomousDivorced	-0.06 (0.07)	-0.07 (0.06)	-0.06 (0.06)
TimePost	0.99 *** (0.03)	0.98 *** (0.05)	0.88 *** (0.07)
DomainPartner_Selection		-0.13 * (0.05)	-0.13 * (0.05)
DomainPast_Rel_Behav		0.18 ** (0.06)	0.18 *** (0.05)
DomainRel_Behav_Attit		0.33 *** (0.06)	0.33 *** (0.05)
TimePost:DomainPartner_Selection		0.23 ** (0.08)	0.23 ** (0.08)
TimePost:DomainPast_Rel_Behav		-0.08 (0.08)	-0.08 (0.08)
TimePost:DomainRel_Behav_Attit		-0.14 (0.08)	-0.14 (0.08)
Prior_RshpEducation_collapsedSome/A lot			0.19 ** (0.07)
Number_AttendedTwo Sessions			-0.13 (0.08)
Number_AttendedThree Sessions			-0.24 ** (0.08)
TimePost:Prior_RshpEducation_collapsedSome/A lot			-0.13 * (0.05)
TimePost:Number_AttendedTwo Sessions			0.15 * (0.07)

TimePost: Number_AttendedThree Sessions			0.31 *** (0.06)
---	--	--	--------------------

AIC	1565.95	1488.03	1464.03
BIC	1630.29	1582.06	1587.76
Log Likelihood	-769.98	-725.01	-707.02
Num. obs.	1042	1042	1042
Num. groups: ID	134	134	134
Var: ID (Intercept)	0.08	0.08	0.08
Var: Residual	0.22	0.20	0.19

*** p < 0.001, ** p < 0.01, * p < 0.05

	Model 1	Model 2
(Intercept)	3.26 *** (0.15)	3.26 *** (0.16)
Age_Decades	0.04 (0.03)	0.04 (0.03)
Ethnic_CodeHispanic/Latino	-0.05 (0.09)	-0.05 (0.09)
Ethnic_CodeOther	0.07 (0.09)	0.07 (0.10)
Education_3catSome college	-0.06 (0.07)	-0.06 (0.08)
Education_3catTech./College/Grad Degree	-0.06 (0.07)	-0.06 (0.08)
FinancialWorry_catOften	0.09 (0.08)	0.09 (0.09)
FinancialWorry_catAlmost all the time	0.06 (0.08)	0.06 (0.08)
GenderFemale	0.06 (0.08)	0.06 (0.08)
Divorced_DichotomousDivorced	-0.06 (0.06)	-0.06 (0.07)
TimePost	0.94 *** (0.08)	0.94 *** (0.08)
DomainPartner_Selection	-0.13 * (0.05)	-0.13 * (0.05)
DomainPast_Rel_Behav	0.18 *** (0.05)	0.18 *** (0.05)
DomainRel_Behav_Attit	0.33 *** (0.05)	0.33 *** (0.05)
Prior_RshpEducation_collapsedSome/A lot	0.20 ** (0.07)	0.20 ** (0.07)
Number_AttendedTwo Sessions	-0.11 (0.08)	-0.11 (0.09)
Number_AttendedThree Sessions	-0.22 ** (0.08)	-0.22 ** (0.08)
TimePost:DomainPartner_Selection	0.23 ** (0.08)	0.23 ** (0.08)
TimePost:DomainPast_Rel_Behav	-0.07 (0.08)	-0.07 (0.08)
TimePost:DomainRel_Behav_Attit	-0.14 (0.08)	-0.14 (0.08)
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.15 ** (0.06)	-0.15 ** (0.06)
TimePost:Number_AttendedTwo Sessions	0.11 (0.07)	0.12 (0.07)

TimePost:Number_AttendedThree Sessions	0.27 *** (0.06)	0.27 *** (0.06)
Ethnic_CodeHispanic/Latino:TimePost	0.14 (0.07)	0.14 (0.07)
Ethnic_CodeOther:TimePost	-0.29 *** (0.08)	-0.29 *** (0.08)

AIC	1447.48	1545.54
BIC	1581.10	1679.16
Log Likelihood	-696.74	-745.77
Num. obs.	1042	1042
Num. groups: ID	134	134
Var: ID (Intercept)	0.08	0.09
Var: Residual	0.18	0.19
=====		
*** p < 0.001, ** p < 0.01, * p < 0.05		

1.8.2 Testing Significance of Regression Coefficients

1.8.2.1 Kenward-Roger method via lmerTest

Type III Analysis of Variance Table with Kenward-Roger's method

	Sum Sq	Mean Sq	NumDF	DenDF	F value
Age_Decades	0.291	0.291	1	121.94	1.5520
Ethnic_Code	0.160	0.080	2	121.20	0.4263
Education_3cat	0.158	0.079	2	121.49	0.4210
FinancialWorry_cat	0.187	0.094	2	121.40	0.4993
Gender	0.120	0.120	1	120.19	0.6407
Divorced_Dichotomous	0.135	0.135	1	119.98	0.7229
Time	142.293	142.293	1	903.67	759.4967
Domain	13.547	4.516	3	896.72	24.1029
Prior_RshpEducation_collapsed	0.771	0.771	1	121.06	4.1147
Number_Attended	0.267	0.134	2	120.85	0.7139
Time:Domain	5.024	1.675	3	897.79	8.9381
Time:Prior_RshpEducation_collapsed	1.309	1.309	1	902.34	6.9891
Time:Number_Attended	3.419	1.710	2	903.99	9.1249
Ethnic_Code:Time	3.854	1.927	2	903.21	10.2855

Pr(>F)

Age_Decades	0.2152237
Ethnic_Code	0.6538961
Education_3cat	0.6573682
FinancialWorry_cat	0.6082199
Gender	0.4250311
Divorced_Dichotomous	0.3969027
Time	< 2.2e-16 ***
Domain	5.252e-15 ***
Prior_RshpEducation_collapsed	0.0447068 *
Number_Attended	0.4917892
Time:Domain	7.728e-06 ***
Time:Prior_RshpEducation_collapsed	0.0083430 **
Time:Number_Attended	0.0001193 ***
Ethnic_Code:Time	3.830e-05 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Linear mixed model fit by REML. t-tests use Kenward-Roger's method [
lmerModLmerTest]

Formula:

Score ~ Age_Decades + Ethnic_Code + Education_3cat + FinancialWorry_cat +
Gender + Divorced_Dichotomous + Time + Domain + Time:Domain +
Prior_RshpEducation_collapsed + Number_Attended + Time:Prior_RshpEducation_collapsed +
Time:Number_Attended + Time:Ethnic_Code + (1 | ID)
Data: PICK_clean_longlong2

REML criterion at convergence: 1491.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.14196	-0.68610	0.01518	0.64965	2.97484

Random effects:

Groups	Name	Variance	Std.Dev.
ID	(Intercept)	0.08965	0.2994
	Residual	0.18735	0.4328

Number of obs: 1042, groups: ID, 134

Fixed effects:

	Estimate	Std. Error
(Intercept)	3.26434	0.15724
Age_Decades	0.03772	0.03028
Ethnic_CodeHispanic/Latino	-0.05260	0.09286
Ethnic_CodeOther	0.07184	0.09660
Education_3catSome college	-0.05991	0.07791
Education_3catTech./College/Grad Degree	-0.05837	0.07760
FinancialWorry_catOften	0.08768	0.08798
FinancialWorry_catAlmost all the time	0.05843	0.08137
GenderFemale	0.06440	0.08045
Divorced_DichotomousDivorced	-0.05663	0.06661
TimePost	0.93759	0.07629
DomainPartner_Selection	-0.13217	0.05361
DomainPast_Rel_Behav	0.18090	0.05409
DomainRel_Behav_Attit	0.33117	0.05396
Prior_RshpEducation_collapsedSome/A lot	0.19986	0.06847
Number_AttendedTwo Sessions	-0.11087	0.08628
Number_AttendedThree Sessions	-0.22187	0.07906
TimePost:DomainPartner_Selection	0.23171	0.07566
TimePost:DomainPast_Rel_Behav	-0.07254	0.07603
TimePost:DomainRel_Behav_Attit	-0.13577	0.07596
TimePost:Prior_RshpEducation_collapsedSome/A lot	-0.14703	0.05562
TimePost:Number_AttendedTwo Sessions	0.11522	0.07064
TimePost:Number_AttendedThree Sessions	0.27205	0.06409
Ethnic_CodeHispanic/Latino:TimePost	0.13918	0.07487
Ethnic_CodeOther:TimePost	-0.29104	0.07970

	df	t	value
(Intercept)	143.80300	20.760	
Age_Decades	121.93524	1.246	
Ethnic_CodeHispanic/Latino	174.75418	-0.566	
Ethnic_CodeOther	172.92604	0.744	
Education_3catSome college	120.90120	-0.769	
Education_3catTech./College/Grad Degree	121.58902	-0.752	
FinancialWorry_catOften	121.34142	0.997	
FinancialWorry_catAlmost all the time	122.17905	0.718	
GenderFemale	120.19104	0.800	
Divorced_DichotomousDivorced	119.97662	-0.850	
TimePost	898.04743	12.289	
DomainPartner_Selection	896.81511	-2.465	
DomainPast_Rel_Behav	898.09244	3.344	
DomainRel_Behav_Attit	897.42247	6.137	
Prior_RshpEducation_collapsedSome/A lot	175.03350	2.919	
Number_AttendedTwo Sessions	178.68210	-1.285	
Number_AttendedThree Sessions	172.38634	-2.807	
TimePost:DomainPartner_Selection	896.58901	3.062	
TimePost:DomainPast_Rel_Behav	899.03357	-0.954	
TimePost:DomainRel_Behav_Attit	897.71451	-1.787	
TimePost:Prior_RshpEducation_collapsedSome/A lot	902.34271	-2.644	
TimePost:Number_AttendedTwo Sessions	907.90522	1.631	
TimePost:Number_AttendedThree Sessions	899.44057	4.245	
Ethnic_CodeHispanic/Latino:TimePost	908.36097	1.859	
Ethnic_CodeOther:TimePost	897.86333	-3.652	
	Pr(> t)		
(Intercept)	< 2e-16	***	
Age_Decades	0.215224		
Ethnic_CodeHispanic/Latino	0.571849		
Ethnic_CodeOther	0.458046		
Education_3catSome college	0.443376		
Education_3catTech./College/Grad Degree	0.453395		
FinancialWorry_catOften	0.320942		
FinancialWorry_catAlmost all the time	0.474039		
GenderFemale	0.425031		
Divorced_DichotomousDivorced	0.396903		
TimePost	< 2e-16	***	
DomainPartner_Selection	0.013870	*	
DomainPast_Rel_Behav	0.000859	***	
DomainRel_Behav_Attit	1.26e-09	***	
Prior_RshpEducation_collapsedSome/A lot	0.003971	**	
Number_AttendedTwo Sessions	0.200424		
Number_AttendedThree Sessions	0.005584	**	
TimePost:DomainPartner_Selection	0.002261	**	
TimePost:DomainPast_Rel_Behav	0.340244		
TimePost:DomainRel_Behav_Attit	0.074217	.	
TimePost:Prior_RshpEducation_collapsedSome/A lot	0.008343	**	

TimePost:Number_AttendedTwo Sessions	0.103241
TimePost:Number_AttendedThree Sessions	2.41e-05 ***
Ethnic_CodeHispanic/Latino:TimePost	0.063352 .
Ethnic_CodeOther:TimePost	0.000276 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation matrix not shown by default, as $p = 25 > 12$.

Use `print(x, correlation=TRUE)` or
`vcov(x)` if you need it

2 Textual Summary

2.1 Methods

To evaluate the program quantitatively, we examined the impact of the program (i.e., post vs. retrospective pre-program assessments) on the four outcomes (Skills, Partner Selection, Relationship Patterns, Behavior and Attitudes) described above. We used a linear mixed effects model instead of a repeated measures MANOVA in order to assess interactions between multiple covariates, both continuous and categorical. Furthermore, mixed effects models do not assume homogeneity of variance. Specifically, we used a random intercept multilevel regression model (RI MLM) in which scores on the four outcomes at two assessments (retrospective-pre and post-program) were nested within participant.

First, we tested whether the program (i.e., post vs. retrospective pre-program assessment) had a significant effect on the four outcomes (all main effects were tested simultaneously) even after controlling for demographic covariates. In other words, did participants experience the hypothesized gains on the four outcomes? Second, we tested whether the effect of the program differed for each outcome by including interactions with outcome level. Did participants gain more on some outcomes than for others? Third, we tested whether the effect of the program varied by dosage and prior exposure to relationship education by including interactions with dosage and prior exposure. Did participants gain more if they attended more courses or had not previously received relationship education? Finally, we examined whether the effect of the program varied by age, race/ethnicity, education level, financial worry, gender, and divorce history by adding additional interactions one-at-a-time. Significant interactions were retained in the final model. To reduce the risk of Type I error in detecting the effects of demographic variables, a Bonferroni correction was used. Significance of predictors was tested using the likelihood ratio test following recommendations of Hox, Moerbeek, & van de Schoot (2018). Analyses were conducted using the lme4 package (Bates, Machler, Boker, & Walker, 2015) in R version 3.5.0 (R Core Team, 2018) and RStudio version 1.1.453 (RStudio Team, 2018). Full details and results of quantitative analyses are available upon request.

2.1.1 Notes on Methods Section

- Add short descriptors to the factor descriptions used above to the measurement section.

2.2 Results

A series of nested multilevel regression models (RI MLM) were compared and indicated that, on average, participants gained in knowledge and skills ($\beta = 0.99$, $\chi^2 = 750.954$, $df = 1$, $p < .001$). The effect of the program varied by outcome ($\chi^2 = 25.701$, $df = 3$, $p < .001$), prior exposure to relationship education ($\chi^2 = 5.269$, $df = 1$, $p = .022$), dosage ($\chi^2 = 23.570$, $df = 2$, $p < .001$), and race/ethnicity ($\chi^2 = 20.550$, $df = 2$, $p < .001$).

The average gains in knowledge and skills for each outcome were as follows. Significance of regression coefficients was tested using the lmerTest package (Kuznetsova, Brockhoff, & Christensen, 2017) using Kenward-Roger's method. Each covariate was held at its reference group – i.e., briefly, in terms of significant covariates: a Caucasian participant who attended only one session and had not previously received relationship education: Skills, $\beta = 0.938$, $t = 12.289$, $df = 898.047$, $p <$

.001; Partner Selection, $\beta = 1.169$, $t = 15.291$, $df = 897.670$, $p < .001$; Relationship Patterns, $\beta = 0.865$, $t = 11.276$, $df = 898.351$, $p < .001$; and Behavior and Attitudes, $\beta = 0.802$, $t = 10.451$, $df = 898.725$, $p < .001$. The program had a significant effect on all outcomes even after controlling for age, ethnicity, prior relationship education, the number of classes attended (dosage), education level, financial worry, gender, and divorce history.

Our analyses also tested whether the effect of the program varied by prior experience with relationship education, dosage, and (using a Bonferroni correction) demographic covariates. All interactions are shown in Figure 1. Participants who had previously received relationship education through courses, counseling, workshops, etc. gained less than those who had not ($\beta = -0.147$, $t = -2.644$, $df = 901.268$, $p = .008$). Gains were greater for participants who attended three sessions compared to only one ($\beta = 0.272$, $t = 4.245$, $df = 898.342$, $p < .001$). Gains did not differ for participants who attended two sessions compared to only one ($\beta = 0.115$, $t = 1.631$, $df = 906.876$, $p = .103$).

The only demographic covariate that significantly moderated the effect of the program was race/ethnicity. There was no difference in the effect of the program for participants who identified as Hispanic/Latino than for participants who identified as Caucasian ($\beta = 0.139$, $t = 1.859$, $df = 907.336$, $p = .063$). However, the program had a diminished effect for participants who identified as another race/ethnicity than for participants who identified as Caucasian ($\beta = -0.291$, $t = -3.652$, $df = 896.752$, $p < .001$).

2.3 Limitations

- “What he/she learned from his/her family when growing up” appears to load with the item, “How he/she fights when angry”, “How he/she reacts when my feelings are hurt”, and “What he/she believes about right and wrong” instead of the factors it is currently associated with.
- If not already included, the extremely high level of skewness (“ceiling effect”) at the item level for most items at post should be acknowledged. The residuals of the model look fine, indicating that the skewness at the construct level is not an issue. However, this doesn’t negate the skewness at the item level and that it limits how much information the measure gives us and how much growth individuals could experience.
- Might consider reporting congeneric reliability, which is more appropriate for skewed data, in addition to Cronbach’s alpha.

2.4 References

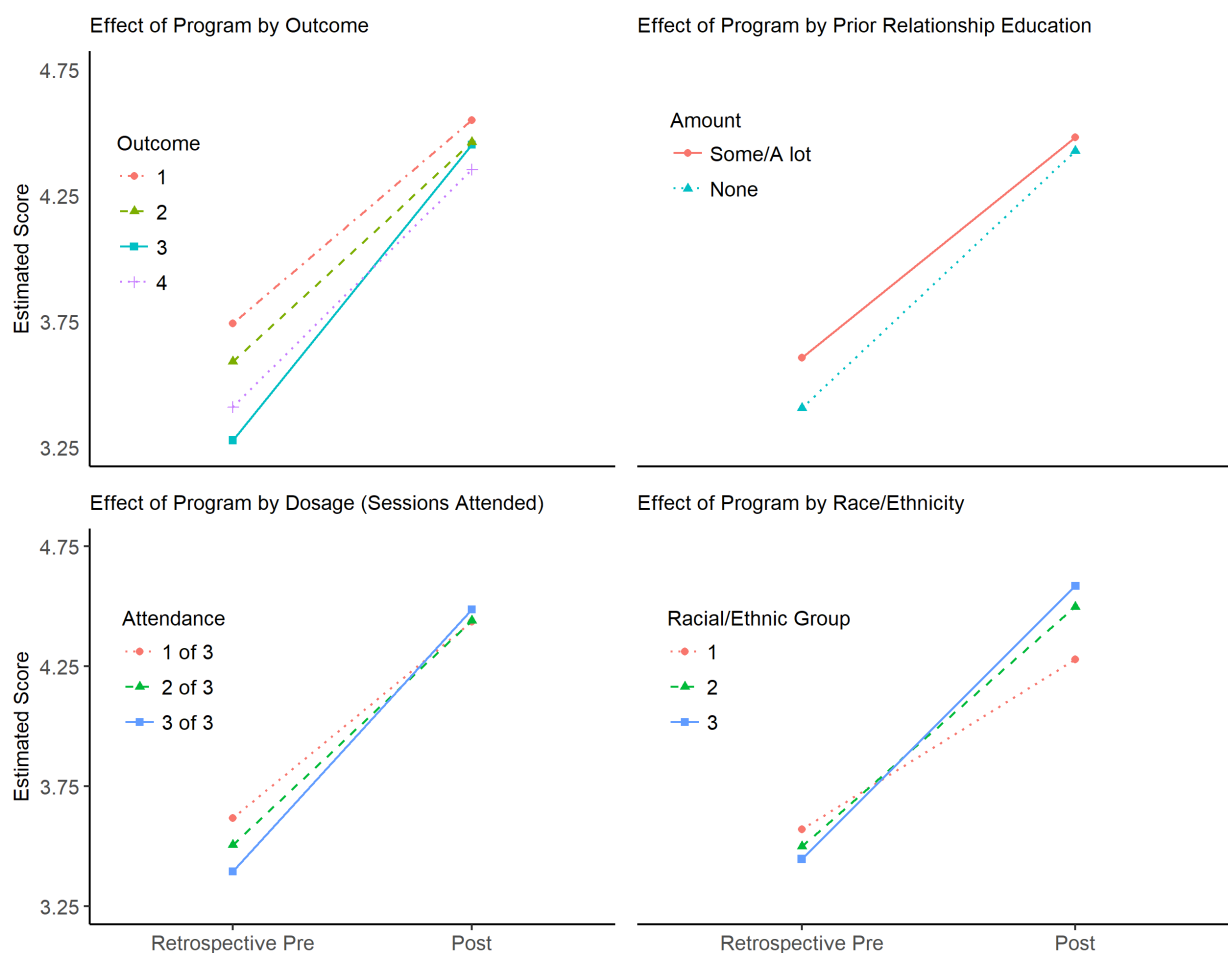
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- Hox, J. J., Moerbeek, M., & van de Schoot, R. (2018). *Multilevel analysis: Techniques and applications*. New York: Routledge.
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2.4.1 Notes on Results Section

- Make sure methods section says “Another race” rather than “Other”

2.4.2 Figure 1. Effect of Program by Outcome, Prior Relationship Education, Dosage, and Race/Ethnicity



Note. Outcome 1: Relationship Behavior and Attitudes, Outcome 2: Past Relationship Behavior, Outcome 3: Partner Selection, Outcome 4: Healthy Relationship Skills, Racial/Ethnic Group 1: Another Race/Ethnicity, Racial/Ethnic Group 2: Caucasian, and Racial/Ethnic Group 3: Hispanic/Latino.