

Electronic Supplemental Material 1

Table 1. *Correlations of Study Variables*

Variable	1	2	3	4	5	6	7	8	9	10
1. Gender	-									
2. SES ^a	0.02	-								
3. Pubertal Status ^b	-0.06*	-0.03*	-							
4. Self-control ^b	-0.03*	0.35*	-0.05*	-						
5. Parent Tobacco Use ^b	-0.02	-0.09*	0.02	-0.06*	-					
6. Parent Monitoring ^b	-0.12*	0.24*	-0.06*	0.19*	-0.04*	-				
7. Peer Smoking ^b	0.04*	-0.13*	0.11*	-0.11*	0.06*	-0.18*	-			
8. Cigarette Availability ^b	0.03	-0.11*	0.12*	-0.10*	0.05*	-0.13*	0.32*	-		
9. Smoking Intentions ^b	0.01	-0.07*	0.05*	-0.07*	0.05*	-0.13*	0.18*	0.19*	-	
10. Smoking Willingness ^b	-0.02	-0.05*	0.05*	-0.06*	0.02	-0.09*	0.15*	0.12*	0.34*	-
11. Smoking Initiation ^c	0.04*	-0.07*	0.11*	-0.10*	0.11*	-0.13*	0.17*	0.17*	0.16*	0.09*

Note. ^aSES= the highest level of education in household. ^bVariable measured at Grade 7. ^cVariable measured at Grade 10.

Measurement Invariance Testing

Approach

To examine racial/ethnic and gender differences, measurement invariance tests for the measurement models of *self-control* and *parental monitoring* were conducted across the three racial/ethnic groups (Black, Hispanic, and White) and gender (female and male; see Appendix Table 1 for specific items). Invariances tests were conducted using multiple steps (Millsap & Olivera-Aguilar, 2012) as follows: (1) configural or baseline invariance model, where factor loadings were allowed to be freely estimated across each group; (2) metric invariance model, where factor loadings are held equal across groups, also referred to as weak factorial invariance; (3) scalar invariance model, where intercepts or thresholds are constrained to be equal across group, referred to as strong factorial invariance; (4) residual variances are constrained to be equal across groups, referred to as strict factorial invariance; (5) invariant factor variances, where factor variances are constrained to be equal across groups; and (6) equal factor means, where the factor means were constrained to be equal (Van de Schoot, Lugtig, & Hox, 2012).

At each step in the process, model fit is tested using the chi-square difference test and ΔCFI as recommended by Cheung and Rensvold (2002) comparing the current step model to the previous step model. For the ΔCFI , values that are smaller than or equal to -0.01 indicate invariance of the current model (Cheung & Rensvold, 2002). For the chi-square difference test, if invariance is rejected (i.e., if the chi-square test is significant), then an attempt is made to locate the violation of invariance (loadings, intercepts or thresholds, residual invariances, or factor variance) using Lagrangian multipliers (modification indexes) to search for sources of model misfit (Apsarouhov & Muthén, 2009). If located, this parameter can be “freed” across the groups and the model retested for potential achievement of partial invariance (Millsap &

Olivera-Aguilar, 2012). This process will ultimately uncover whether the model is invariant across groups (race/ethnicity and gender). Rejection of invariance (or lack of equivalence), however, may indicate that responses on measured and latent variables may (in part) be a reflection of membership in a particular group.

Results for Gender

All invariance testing results for gender are reported in Appendix Tables 2 and 3, indicating first that fit for the configural model (Step 1) was acceptable for both the factors *self-control* and *parental monitoring*. For the latent factor *self-control* full metric invariance, where all factor loadings are constrained to be equal across females and males, the χ^2 difference test indicated that invariance was rejected ($p < .05$), but the ΔCFI test indicated that invariance would not be rejected ($\Delta CFI = 0.01$). Following the χ^2 difference test results, MIs for the model pointed to strong non-invariance for item 1 (*does your child respond appropriately when hit*) and item 6 (*does your child control temper in conflict situations*), indicating that content for these items varied for females and males. To achieve partial metric invariance and proceed with the invariance testing, loadings for these items were allowed freely to be estimated across the groups ($p > .05$). Both the χ^2 difference test and ΔCFI indicated that full scalar invariance, where the goal is to constrain all thresholds to be equal across groups, was achieved. This indicates that the endorsement of all seven items were similar for males and females in the sample. For comparison of factor means, there appeared to not be a significant difference when comparing mean factor scores for females and males. Finally, for the overall factor variance, the χ^2 difference test and the ΔCFI test indicated that invariance of factor variance should be rejected, indicating that males had significantly less variance in the latent factor of self control compared to females.

For the latent factor *parental monitoring*, full metric invariance, where all factor loadings are constrained to be equal across females and males, the χ^2 difference test and the ΔCFI test indicated that invariance was achieved ($p > .05$; $\Delta\text{CFI} < .01$). However, scalar invariance, both full and partial, was not achieved. All thresholds had to be freely estimated for model convergence. This can be taken to mean that the endorsement of all five items were not similar for females and males in the sample. Factor means were compared, and results indicated that compared to males, females appeared to have significantly higher mean factor score ($\Delta M = -0.23$, $p < .05$).

Results for Race/Ethnicity

All invariance testing results for race/ethnicity are reported in Appendix Tables 4 and 5, indicating first that fit for the configural model (Step 1) was acceptable for both the factors *self-control* and *parental monitoring*. For the latent factor *self-control* full metric invariance was rejected ($p < .05$; $\Delta\text{CFI} = .02$). MIs for the model pointed to strong non-invariance for item 1 (*does your child respond appropriately when hit*) indicating that content varied across Black, Latino, and White adolescents. When the loading for this item was allowed to freely be estimated across the groups, partial metric invariance was achieved ($p > .05$; $\Delta\text{CFI} = .01$). Both the χ^2 difference test and ΔCFI indicated that full scalar invariance was not achieved ($p < .05$; $\Delta\text{CFI} = .08$), however, partial invariance was achieved when almost all except three item thresholds (for items 5 and 6) were allowed to be freely estimated across groups ($p > .05$; $\Delta\text{CFI} < .01$). For comparison of factor means, results indicated that compared to Whites, Blacks and Latinos appeared to have significantly lower mean factor scores ($\Delta M = -0.38$, $p < .05$; $\Delta M = -0.53$, $p < .05$, respectively).

For the latent factor *parental monitoring*, full metric invariance was achieved ($p > .05$;

$\Delta\text{CFI} < .01$). However, scalar invariance, both full and partial, was not achieved, and all thresholds had to be freely estimated for model convergence. Finally, for comparison of factor means, results indicated that compared to Whites, Blacks and Latinos appeared to have significantly lower mean factor scores ($\Delta M = -0.65, p < .05$; $\Delta M = -1.11, p < .05$, respectively).

Conclusions

Measurement invariance testing indicated that the constructs of *self-control* and *parental monitoring* were not comparable across gender or race/ethnicity, suggesting that observed mean differences may not reflect true differences in self-control or perceived level of monitoring by parents. Measures that are equivalent across gender and racial/ethnic groups should be developed to ensure more precise measurement and assess true group differences.

References

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Table 2. *Items on the Social Skills Rating System - Self-Control Subscale and Parental Monitoring Scale*

Item	Description
SSRS – Self-Control Subscale	
S1	“How often does your child respond appropriately when hit or pushed by other children?”
S2	“How often does your child politely refuse unreasonable requests from others?”
S3	“How often does your child avoid situations that are likely to result in trouble?”
S4	“How often does your child control his or her temper when arguing with other children?”
S5	“How often does your child end disagreements calmly?”
S6	“How often does your child control temper in conflict situations with you?”
S7	“How often does your child respond appropriately to teasing from friends or relatives of his or her own age?”
Parental Monitoring Scale	
P1	“How much do your parents know about who your friends really are?”
P2	“How much do your parents know about where you are most afternoons after school?”
P3	“How much do your parents really know about how you spend your money?”
P4	“How much do your parents really know about where you go at night?”
P5	“How much do your parents really know about how you spend your free time?”

Table 3. Goodness of Fit Indexes for Measurement Invariance Testing of Social Skills Rating System - Self-control score Across Gender (Female and Male)

Models	Difference in Fit for Current vs. Previous Models				Fit Indices for Current Model			
	χ^2_{diff}	fp	df	p	RMSEA (90% CI)	TLI	CFI	$ \Delta CFI $
1. Configural model – all parameters freed	-	42	-	-	.07 (.06, .08)	.93	.96	-
2. Metric – all loadings constrained Model 2a vs. Model 1	19.83	35	7	.01	.05 (.04, .06)	.97	.97	.01
3. Partial Metric – some loadings constrained Model 2b vs. Model 1	8.17	37	5	.15	.05 (.05, .06)	.96	.97	.01
4. All thresholds constrained & loadings free Model 3 vs. Model 1	19.28	28	14	.15	.04 (.03, .05)	.98	.98	.02
5. Scalar - thresholds constrained & some loadings constrained Model 4 vs. Model 2b	28.02	23	19	.08	.04 (.03, .05)	.98	.98	.01
6. Full uniqueness – residual variances constrained Model 5 vs. Model 1	10.12	35	7	.18	.05 (.04, .06)	.97	.97	.01
7. Factor mean Model 6 vs. Model 1	18.96	30	12	.09	.05 (.05, .06)	.96	.96	0
8. Factor variance Model 7 vs. Model 1	35.96	24	18	.01	.05 (.04, .05)	.97	.97	.01

Note. Resid. = Residual; Var. = Variance; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Squared Error of Approximation; CI = Confidence Interval; χ^2_{diff} = Chi-square difference test; df = degrees of freedom; fp = free parameters; ΔCFI = Change in Comparative Fit Index.

Table 4. Goodness of Fit Indexes for Measurement Invariance Testing of Parental Monitoring Across Gender (Female and Male)

Models	Difference in Fit for Current vs. Previous Models				Fit Indices for Current Model			
	χ^2_{diff}	<i>fp</i>	df	<i>p</i>	RMSEA (90% CI)	TLI	CFI	$ \Delta CFI $
1. Configural model – all parameters freed	-	40	-	-	.05 (.04, .07)	.96	.98	-
2. Metric – all loadings constrained Model 2a vs. Model 1	10.23	35	5	.07	.04 (.03, .05)	.98	.98	0
3. All thresholds constrained & loadings free Model 3 vs. Model 1	81.05	25	15	< .01	.05 (.04, .06)	.97	.97	.01
4. Scalar – all thresholds constrained & some loadings constrained Model 4a vs. Model 2b	73.56	20	15	< .01	.04 (.03, .05)	.98	.97	.01
5. Partial Scalar – some thresholds & some loadings constrained Model 4b vs. 2b					ERROR			
6. Full uniqueness – residual variances constrained Model 5 vs. 2b					ERROR			
7. Factor mean Model 6 vs. Model 1	26.34	27	13	.02	.04 (.03, .05)	.98	.98	0
8. Factor variance Model 7 vs. Model 1					ERROR			

Note. Resid. = Residual; Var. = Variance; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Squared Error of Approximation; CI = Confidence Interval; χ^2_{diff} = Chi-square difference test; df = degrees of freedom; fp = free parameters; ΔCFI = Change in Comparative Fit Index.

Table 5. Goodness of Fit Indexes for Measurement Invariance Testing of Social Skills Rating System - Self-control score Across Race/ethnicity (Black, Latino, and White)

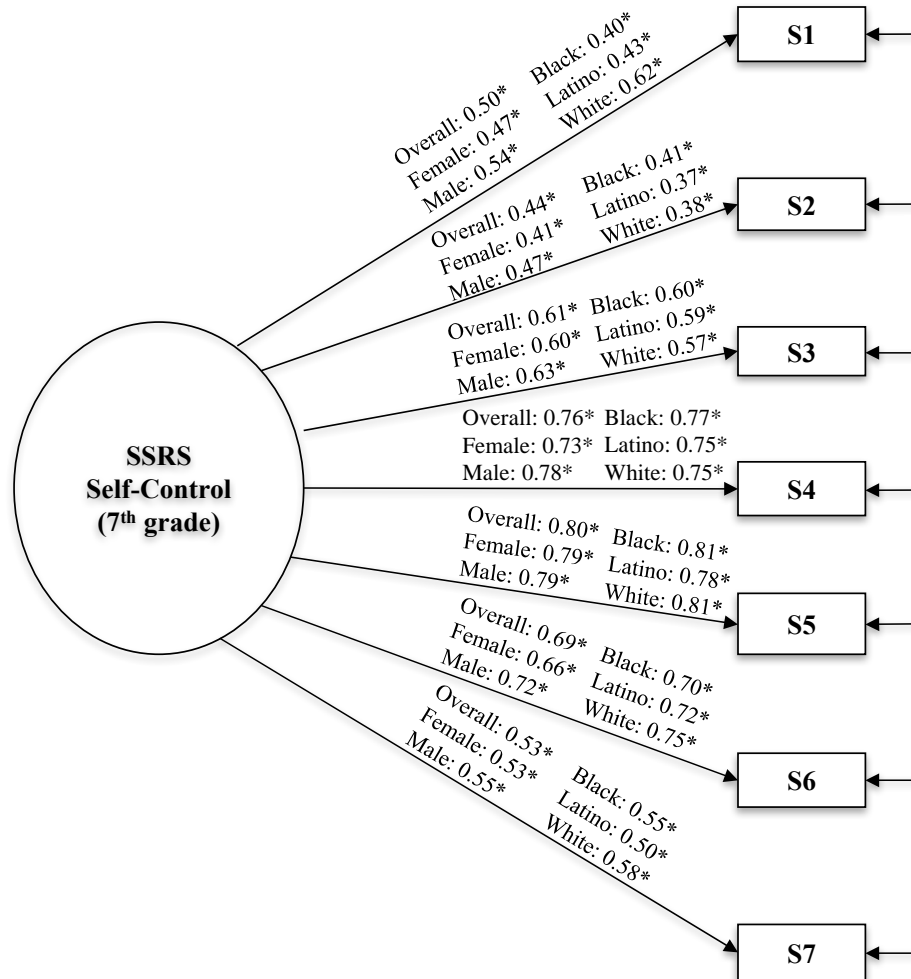
Models	Difference in Fit for Current vs. Previous Models				Fit Indices for Current Model			
	χ^2_{diff}	fp	df	p	RMSEA (90% CI)	TLI	CFI	$ \Delta CFI $
1. Configural model – all parameters freed	-	63	-	-	.06 (.06, .08)	.94	.96	-
2. Metric – all loadings constrained Model 2a vs. Model 1	162.39	48	15	< .01	.07 (.06, .08)	.93	.94	.02
3. Partial Metric – some loadings constrained Model 2b vs. Model 1	11.59	51	12	.48	.05 (.04, .05)	.97	.97	.01
4. All thresholds constrained & loadings free Model 3 vs. Model 1	478.62	21	42	< .01	.08 (.07, .08)	.92	.89	.07
5. Scalar – all thresholds constrained & some loadings constrained Model 4a vs. Model 2b	488.17	23	40	< .01	.08 (.07, .08)	.92	.89	.08
6. Partial Scalar – some thresholds & some loadings constrained Model 4b vs. 2b	22.90	48	15	.09	.05 (.04, .05)	.97	.97	0
7. Full uniqueness – residual variances constrained Model 5 vs. 2b					ERROR			
8. Factor mean Model 6 vs. Model 1	323.47	39	24	< .01	.08 (.07, .08)	.92	.91	.05
9. Factor variance Model 7 vs. Model 1	22.67	49	14	.07	.05 (.04, .05)	.97	.97	.01

Note. Resid. = Residual; Var. = Variance; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Squared Error of Approximation; CI = Confidence Interval; χ^2_{diff} = Chi-square difference test; df = degrees of freedom; fp = free parameters; ΔCFI = Change in Comparative Fit Index.

Table 6. Goodness of Fit Indexes for Measurement Invariance Testing of Parental Monitoring Across Race/ethnicity (Black, Latino, and White)

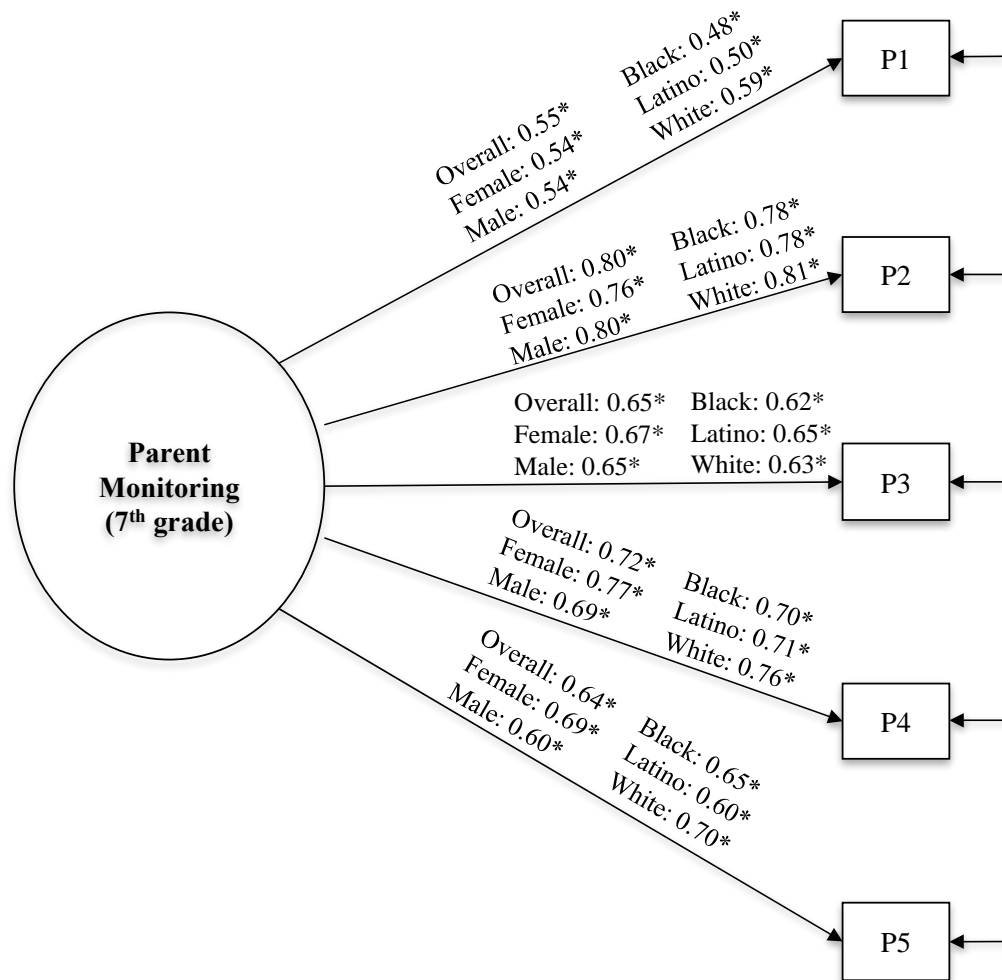
Models	Difference in Fit for Current vs. Previous Models				Fit Indices for Current Model			
	χ^2_{diff}	fp	df	p	RMSEA (90% CI)	TLI	CFI	$ \Delta CFI $
1. Configural model – all parameters freed	-	60	-	-	.05 (.04, .07)	.96	.98	-
2. Metric – all loadings constrained Model 2a vs. Model 1	15.65	50	10	.11	.04 (.03, .05)	.98	.98	0
3. All thresholds constrained & loadings free Model 3 vs. Model 1	636.00	30	30	< .01	.11 (.10, .11)	.85	.78	.20
4. Scalar – all thresholds constrained & some loadings constrained Model 4a vs. Model 2b	477.67	20	40	< .01	.08 (.08, .09)	.91	.83	.15
5. Partial Scalar – some thresholds & some loadings constrained Model 4b vs. 2b	ERROR							
6. Full uniqueness – only residual variances constrained Model 5 vs. 2b	2.44	55	5	.79	.04 (.02, .05)	.98	.98	0
7. Factor mean Model 6 vs. Model 1	103.05	34	26	< .01	.05 (.04, .06)	.97	.96	.02
8. Factor variance Model 7 vs. Model 1	ERROR							

Note. Resid. = Residual; Var. = Variance; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Squared Error of Approximation; CI = Confidence Interval; χ^2_{diff} = Chi-square difference test; df = degrees of freedom; fp = free parameters; ΔCFI = Change in Comparative Fit Index.



Supplemental Figure 1. Confirmatory Factor Analysis for Social Skills Rating System Self-Control (SSRS) Self-Control by Gender and Race/Ethnicity.

* $p < .05$.



Supplemental Figure 2. Confirmatory Factor Analysis for Parental Monitoring by Gender and Race/Ethnicity
 * $p < .05$.