

## **Abstract Title Page**

**Title:** Childhood Resiliency Effects from Schoolwide Treatment: A Cluster Randomized Trial

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## Abstract Body

### **Background / Context:**

Belize is a country with a developing economy based primarily on agriculture and tourism. However, according to a 2007 ICF/ICS study, crime and violence are emerging as a threat to the country's governance and business climate. The number of homicides in Belize have increased by more than 30% from 2003-2006 and a majority of the homicides (40%) are committed in Belize City. This notion of violence, in particular gang violence, is extremely concerning because the population of Belize is very young. Almost half of the population of Belize is under the age of 18 (ICF/ICS, 2007). The youth of Belize are becoming engaged in criminal and delinquent behaviors at an early age that have both individual and societal consequences. According to ICF/ICS (2007) nearly 40% of those convicted to serve sentences in the adult prison are between the ages of 16 and 25. Not only is the issue of violence among youth and adolescents and problem in Belize but so too are the potential physical and mental health problems associated with exposure to frequent episodes of violence. According to a UNICEF commissioned study, 25% of boys and 30% of girls ages 17 and under reported being exposed to some form of crime and violence (ICF/ICS, 2007).

### **Purpose / Objective / Research Question / Focus of Study:**

The purpose of the Childhood Resiliency Effects from Schoolwide Treatment (CREST) Pilot was to implement a comprehensive school wide social and character development program aimed at decreasing violence among students and assist students exposed to violence in Belize City. This one-year pilot program implemented portions of the Positive Action curriculum with a randomized controlled design with 13 intervention and 12 control primary schools in Belize City. The Positive Action curriculum was developed and revised by Carol Allred from 1977 to the present using continuous process monitoring and evaluation. The current intervention, although not used with the current population, has been found to be effective in significantly improving school performance and behavior in multi-ethnic and diverse samples from various regions in the United States.

### **Setting:**

Within the nation of Belize, the Ministry of Education, Youth & Sports coordinates management of schools under six districts (Belize, Cayo, Corozal, Orange Walk, Stann Creek, and Toledo). The focus of the present study was on schools in the Belize District. In 2011, the Belize District contained 68 primary schools, ranging in enrollment from  $N = 12$  to 1056 students per school ( $Mdn = 207$ ) inclusive of eight grades that in Belize are referred to as Infant 1 and 2 (generally aged 5 and 6 years, respectively), and 1<sup>st</sup> through 6<sup>th</sup> Standard (comprising ages 7 – 12 years, respectively). Within the Belize district, approximately 60% of the primary schools are categorized as urban schools, as most of these are within Belize City. In the Belize District in 2011 there were  $N = 51$  Government Aided Schools,  $N = 6$  Government Schools, and  $N = 11$  Private Schools.

### **Population / Participants / Subjects:**

A sample of  $N = 24$  schools were randomly drawn from the Belize District with 12 schools randomly assigned to implement the CREST program, and 12 schools assigned to a control group. Students ( $N = 7564$ ) from the 24 schools enrolled in standards Infant I to Standard 6 are described in Table 1.

**Intervention / Program / Practice:**

The aim of the CREST treatment program was to provide a proven model curriculum that could be integrated with the existing Health and Family Life Education curriculum in Belize, thus providing grounding in a theoretical framework (Cognitive Behavioral Therapy) and consistent organizational structure for delivery that would permit children and adolescents to self-reinforce positive behaviors. The program includes curriculum, school infrastructure elements, as well as parent and community involvement activities that help to transform all areas of life in which children are exposed, including home and family. Throughout all Standards, Positive Action is organized into six units which allows school personnel to align an entire school behind the lessons and concepts: (1) Self-concept; (2) Positive actions for your body and mind; (3) Managing yourself responsibly; (4) Treating others the way you like to be treated; (5) Telling yourself the truth; and (6) Improving yourself continually.

Stories, games, activities and vignettes from HFLE were identified through a curriculum crosswalk that was provided to all teachers so that additional resources were available to emphasize the six Positive Action units. Additionally, the CREST program is implemented in a tiered fashion. Teacher instruction forms Tier 1 of the CREST program and focuses on the needs of all students. Tier 2 involves additional teacher and school administrator training to focus on the needs of students that do not respond to Tier 1 with group CBT for addressing bullies, or children that exhibit symptoms related to posttraumatic stress resulting from abuse or exposure to other traumatic events. For the very small number of students that do not respond to Tier 2, trained counselors and social workers are available, since often, childhood behavior problems in a school environment can affect peer behavior.

**Research Design:**

The design was a pretest posttest control group design with random assignment to treatment and control groups, otherwise known as a cluster-randomized trial. Schools ( $N = 24$ ) were randomly drawn from the Belize District. Each school was asked to commit to participation in the study despite the 50% probability that their school may or may not be selected to implement the CREST intervention. Upon commitment from all schools in the sample, every student from the 24 schools was assessed on a brief measure of general cognitive ability. Average school scores on this measure, combined with Urban/Rural status, and school size were used to form three strata or blocks containing 8 schools per stratum. Random assignment of schools to treatment (CREST) or control (business as usual) groups was performed within strata, with 4 schools assigned to the CREST treatment from each stratum. Consequently, there were 12 schools eventually assigned to the CREST treatment group, and 12 schools assigned to a control group, resulting in balance on three pretest covariates (general cognitive ability, urban/rural status, and school size). In order to retain participation of schools and teachers assigned to the control group, the control group teachers received a separate teacher training intervention program related to behavior management. The alternative intervention provided for the control group was focused on character development and positive discipline. None of the teachers in control group schools received intervention training in CREST instruction or any form of math intervention, thus math instruction in the control group was business-as-usual.

**Data Collection and Analysis:**

To assess the streams of influence from CREST, students completed an assessment battery

specifically designed for the present study. This battery of assessments was created using select items from multiple existing measures on different aspects of resiliency and positive youth development that reflect cultural, social and intrapersonal influences on behavior. The combined measures resulted in student assessments of different lengths depending on Standard. A 21-item battery was used for Infant 1 and Infant 2, a 48-item battery was used for Standards 1-3, and a 78-item battery was given to Standards 4-6. The items were adapted from several existing measures as described below. (1) Social-Emotional and Character Development Scale (Positive Action, 2007; Matson, 1995, Ji, DuBois, & Flay, 2014); (2) Peer affiliation items were included based on a previous study by Elliott, Wilson, Huizinga, Sampson, Elliott, & Rankin (1996) (3) To assess substance use and serious violence tendencies, a measure was adapted from the Centers for Disease Control (CDC, 2004). (4) Negative and positive belief in moral center was measured with items from the “Item-Construct Dictionary for the Student Survey of Risk and Protective Factors (Arthur, Hawkins, Catalano & Pollard, 2000). (5) In addition to the pro-social behavior component of the SECD measure, a separate measure targeted student perceptions of rewards for pro-social behavior (Arthur et al., 2000). (6) A measure of school self-esteem was included, and based on an assessment strategy from DuBois, Felner, Brand, Phillips, and Lease (1996). (7) Anxiety was measured using items from the “Behavior Assessment for Children” (BASC) scale (Reynold & Kamphaus, 2002). (8) Student perception of their neighborhood context was assessed since the CREST program included a community component. Items from the “Neighborhood Youth Inventory” (Chipuer, Pretty, Delorey, Miller, Power, Rumstein, Barnes, Cordasic, & Laurent, 1999)

#### *Analyses*

Considering students were given age-adapted positive youth development surveys with different PYD traits being assessed, analyses were conducted according to the survey version: Infant 1 and 2, Standards 1 to 3, and Standards 4 to 6. The design effects for the all considered models were higher than two which indicates a two-level model is most suitable for the current data sets; therefore, hierarchical linear modeling was used to examine the research hypotheses. The basic model structure remained the same for all examined constructs. Although treatment was assigned to the 24 schools at the school level, school level effects were aggregated to the teacher level in an attempt to increase the cluster number and maximize the power to detect treatment effects.

#### **Findings / Results:**

***Infant 1 and 2:*** For Infant 1 and 2, an Intention to Treat Model (ITT) was examined where the treatment variable was entered as a Level 2 predictor and the composite pretest score was entered at Level 1. Separate HLM analyses were conducted on three different outcome variables: the total CREST score, an Attachment (Attach) score and an Engagement (Engage) score. No statistically significant main treatment effects or cross-level interaction effects were noted and adding the treatment indicator to the Level 2 models explained less than 1% additional variance in slope and intercept over the model with only the pretest as a predictor.

***Standards 1 to 3:*** For Standards 1 to 3 intent to treat (ITT) models, the treatment variable was entered as a Level 2 predictor and the composite pretest score was entered at Level 1. Separate HLM analyses were conducted on three different outcome variables: the total CREST score, the Engage score and a Feelings (Feel) score. In summary, the results indicate that after controlling for pre-treatment group differences, the students in classrooms who received the CREST

intervention program had higher post-treatment total CREST scores than those in the control group. However the main treatment effect was not statistically significantly different.

In order to better understand the origination of the additional variance explained in the omnibus model, albeit statistically insignificant, and in consideration of the EFA results which indicate the Engage composite and Feel composite are separate constructs, additional HLM analysis were conducted on the Engage and Feel composites separately. As noted in Table 5, the final Engage model indicated a statistically significant main treatment effect. Adding the treatment indicator as a Level 2 predictor in the Engage ITT model explained an additional 19.93% of the variance in the intercept and 18.41% of the variance in the slope over the model with no Level 2 predictor.

**Standards 4 to 6:** As indicated above under *Outcome Measures*, the CREST assessment for Standards 4 to 6 included several independently established instruments; therefore a multivariate HLM model was most appropriate for this analysis. In the Standard 4 to 6 multivariate multi-level model the following composite outcome scores were entered simultaneously: Table 8 shows the correlation between the included outcome measures. The resulting unrestricted multivariate HLM model's main treatment effect was statistically significant ( $\gamma_{001} = 0.569$ ,  $SE = 0.280$ ,  $t = 2.035$ ,  $d.f. = 92$ ,  $p < 0.041$ ) indicating students assigned to a treatment classroom experienced a higher latent multivariate CREST post-test score. As indicated in Table 6, adding the treatment indicator to the classroom level model explained an additional 8.52% of the classroom level intercept and an additional 12.50% of the slope.

### **Conclusions:**

Infant 1 and 2, Standards 1 to 3, and Standards 4 to 6 all experienced positive main treatment effects for at least one composite outcome as a result of participation in the CREST treatment program. Although Infant 1 and 2 did not result in statistically significant main or cross-level treatment effects, this is likely due to low reliability of measurement since it is difficult to accurately assess latent constructs of the type assessed with our paper and pencil measures on participants aged 4-5 years, still, however, the positive coefficients indicate positive effects for Infant 1 and 2 students assigned to the CREST treatment group.

The statistically significant main treatment effect for the Standard 1 to 3 on the "Engage" outcome indicates students' assigned to the CREST treatment group reported an increase in measured behaviors associated with positive youth development. While the absence of a statistically significant main treatment effect on the mirrored "Feel" items seems to suggest both treatment and control groups report similar levels of concern about negative behavior and appreciation for approval when engaging in positive behavior. In other words, students from the treatment and control groups may both report experiencing negative feelings when engaging in behaviors seen as indicative of negative youth development traits; however, CREST treatment students report engaging in fewer negative youth behaviors. Since thinking about feelings prior to acting is a core CREST curricular tenant under CBT framework, the discrepancy between treatment effects for Feel and Engage between treatment and control could suggest students assigned to the CREST group are adapting their decision making process to reflect upon how engaging in a particular behavior will make them feel and are subsequently avoiding behaviors associated with negative feelings and increasing behaviors associated with positive behaviors. This is precisely the intent of the CREST program. Whereas students in the control group without specific positive youth development decision making coaching exhibit a decreased

tendency to deliberately connect the feelings associated with a particular behavior prior to their actions.

The Standard 4 to 6 statistically significant multivariate main effect indicates students assigned to the CREST treatment group experienced a higher joint effect of the intervention program when simultaneously considering all composite outcomes. In other words, students assigned to the treatment group self-reported as exhibiting greater positive youth development with respect to the overall profile as measured by the selected assessments. The post hoc univariate HLM analysis on the separate constructs revealed no statistically significant treatment effects. This seemingly lack of congruency between the multivariate and series of univariate effects may be due in part to the greater power and reduced standard errors of the multivariate HLM model in addition to the multivariate capacity to capitalize on the correlation between multiple outcomes (Snijders & Bosker, 2012). In addition, it would appear that effects from CREST are only beginning to occur in these older student groups, which is consistent with resistance to change as children age. Consequently, early introduction of cognitive-behavioral training is essential if children in Belize are to be able to adapt their behavior in response to what they understand as negative outcomes when they do not.

## Appendices

### Appendix A. Extended References

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## Appendix B. Tables and Figures

Table 1. Participant demographics and missing data percentages.

Item	Original Data		Final Data**		
	Count	Percent	Count	Percent	
Total participants	7678	100%	7564	100%	
MATH treatment group	3651	48%	3017	47%	
CREST treatment (control) group	4027	52%	4547	53%	
No teacher ID*	270	4%	0	0%	
Standard	Infant 1	895	12%	842	13%
	Infant 2	827	11%	818	12%
	Standard 1	1074	14%	862	13%
	Standard 2	1012	13%	810	12%
	Standard 3	1443	19%	1004	15%
	Standard 4	901	12%	824	13%
	Standard 5	773	10%	721	11%
	Standard 6	753	10%	682	10%
Demographics	No demographic information	1869	24%	863	11%
	Male	2959	39%	2886	44%
	Female	2850	37%	2814	43%
	Creole	3275	43%	3214	49%
	Garifuna	447	6%	437	7%
	Maya	160	2%	158	2%
	Metizo	1632	21%	1602	24%
	Other	268	3%	262	4%
Missing Data	Missing all pre and post scores*	954	12%	0	0%
	Missing pre and post math*	1072	14%	0	0%
	Missing pre and post resiliency	1529	20%	551	8%
	Missing pre math	1749	23%	667	9%
	Missing post math	1821	24%	706	9%
	Missing pre resiliency	2554	33%	1548	20%
	Missing post resiliency	2411	31%	1330	17%
	Have pre and post math	5180	67%	5180	79%
	Have pre and post resiliency	4242	55%	4236	65%

\*Deleted from final models. \*\* Final data after deleting cases based on missing essential data.

Table 3

*Treatment (CREST) and Control composite summed score means, standard deviations and reliability coefficient\*.*

Standards	Composite	#Items	Pre Treatment					Post Treatment				
			Treatment		Control		$\alpha$	Treatment		Control		$\alpha$
			Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Infant 1 and 2	Attachment	5	12.835	2.573	13.194	2.247	0.588	12.776	2.398	13.053	2.100	0.493
	Engaging in Behavior	16	41.215	7.386	41.456	7.017	0.787	41.659	6.522	42.274	5.470	0.771
Standard 1 to 3	Attachment	5	13.037	1.948	12.981	2.016	0.487	13.115	1.749	12.977	1.865	0.477
	Engaging in Behavior	21	51.331	6.797	51.205	7.245	0.718	52.093	5.907	51.604	6.365	0.734
	Feelings about Behavior	21	70.838	9.695	71.437	10.107	0.769	73.280	7.618	72.998	9.543	0.757
Standard 4 to 6	Reward for Pro-social Behavior	6	14.276	4.154	13.846	3.934	0.714	13.414	3.992	13.259	3.937	0.755
	Anxiety	6	12.729	2.546	12.685	2.551	0.536	12.558	2.645	12.535	2.701	0.636
	Neighborhood Participation	9	22.492	5.177	22.894	5.410	0.657	22.078	5.480	22.511	5.567	0.718
	Peer Affiliation	7	19.215	4.513	20.207	4.184	0.742	18.726	4.536	19.915	4.095	0.775
	Substance Abuse & Violence	11	13.054	3.557	12.243	2.360	0.819	13.617	4.098	13.036	3.431	0.822
	Moral Center	11	41.107	7.397	41.873	7.331	0.710	40.927	7.459	41.763	7.305	0.741
	Socio-Emotional Character Devl	29	86.323	15.134	89.307	14.579	0.910	85.164	16.095	87.640	14.707	0.925
	Self-control	4	10.598	2.973	10.971	2.874	0.634	10.444	2.936	10.747	2.705	0.653
	Pro-social	7	20.330	4.355	21.334	4.129	0.765	20.063	4.508	21.113	4.213	0.784
	Respect for Teachers	5	15.468	3.459	16.082	3.272	0.757	15.187	3.669	15.560	3.454	0.818
	Respect for Parents	4	12.954	2.727	13.162	2.554	0.662	12.768	2.811	12.946	2.636	0.735
	Honesty	5	13.911	3.205	14.332	3.047	0.662	13.685	3.285	14.051	3.008	0.724
	Self-development	4	13.245	2.565	13.563	2.392	0.681	13.099	2.636	13.264	2.460	0.719

\*Original summed CREST composite totals prior to imputation for both treatment and control groups. Alpha reliabilities are for both groups combined.

**Table 4. Infant 1 and 2 Intent to Treat Models**

Standard	Composite	Adding Pretest as Level 1 Predictor					Adding Treatment Indicator as Level 2 Predictor						Lvl 2 Variance Explained		
		$\gamma_{00}$	$\gamma_{10}$	$\sigma^2$	$\tau \pi$	$\tau 1$	$\gamma_{00}$	$\gamma_{01}$	$\gamma_{10}$	$\gamma_{11}$	$\sigma^2$	$\tau \pi$	$\tau 1$	Intercept	Slope
I1 & I2	Omnibus PYD Score	39.177*	0.303*	24.812	129.600	0.039	38.217*	2.044	0.321*	-0.039	24.810	129.789	0.039	-	-
	Attachment	10.410*	0.211*	2.634	3.017	0.015	10.217*	0.401	0.224*	-0.027	2.634	3.009	0.015	<b>0.265%</b>	-
	Engaging in behavior	30.936*	0.281*	16.619	73.829	0.036	29.979*	1.999	0.305*	-0.051	16.615	73.772	0.036	<b>0.077%</b>	-

Coefficients associated elements:  $\gamma_{00}$  = Intercept;  $\gamma_{01}$  = Treatment Indicator - Main Treatment Effect;  $\gamma_{10}$  = Pretest PYD;  $\gamma_{11}$  = Treatment Indicator x Pretest PYD – Cross-Level Interaction Effect;  $\sigma^2$  = Level 1 Residual Variance;  $\tau \pi$  = Level 2 Intercept Residual Variance;  $\tau 1$  = Level 2 Slope Residual Variance

\*p < 0.01

**Bold** indicates additional variance explained by adding Treatment Indicator over the model with only the Pre-test predictor.

- Indicates poor fitting model with no additional variance explained after adding treatment indicator as a predictor.

**Table 5. Standards 1 to 3 Intent to Treat Models**

Standard	Composite	Adding Pretest as Level 1 Predictor					Adding Treatment Indicator as Level 2 Predictor						Lvl 2 Variance Explained		
		$\gamma_{00}$	$\gamma_{10}$	$\sigma^2$	$\tau \pi$	$\tau 1$	$\gamma_{00}$	$\gamma_{01}$	$\gamma_{10}$	$\gamma_{11}$	$\sigma^2$	$\tau \pi$	$\tau 1$	Intercept	Slope
1 to 3	Omnibus PYD Score	79.147*	0.448*	94.192	575.869	0.026	74.588*	10.353	0.476*	-0.065	94.155	561.303	0.025	<b>2.52%</b>	<b>3.85%</b>
	Engaging in behavior	29.755**	0.431*	19.193	56.498	0.019	26.899*	6.557*	0.480*	-0.113*	19.192	45.240	0.016	<b>19.93%</b>	<b>18.41%</b>
	Feelings about engaging in behavior	47.457*	0.365*	36.486	154.05	0.026	47.194*	0.559	0.366*	-0.003	36.480	157.13	0.026	-	-

Coefficients associated elements:  $\gamma_{00}$  = Intercept;  $\gamma_{01}$  = Treatment Indicator;  $\gamma_{10}$  = Pretest PYD;  $\gamma_{11}$  = Treatment Indicator x Pretest PYD;  $\sigma^2$  = Level 1 Residual Variance;  $\tau \pi$  = Level 2 Intercept Residual Variance;  $\tau 1$  = Level 2 Slope Residual Variance

\*p < 0.01 \*\*p < 0.001

**Bold** indicates additional variance explained by adding Treatment Indicator over the model with only the Pre-test predictor.

- Indicates poor fitting model with no additional variance explained after adding treatment indicator as a predictor.

**Table 6. Standards 4 to 6 Unrestricted Multivariate Treatment Model**

Standard	Pretest as Level 1 Predictor				Adding Treatment Indicator as Level 2 Predictor						Lvl 2 Variance Explained	
	$\gamma_{000}$	$\gamma_{100}$	$\tau_{\beta 00}$	$\tau_{\beta 01}$	$\gamma_{000}$	$\gamma_{001}$	$\gamma_{100}$	$\gamma_{101}$	$\tau_{\beta 00}$	$\tau_{\beta 01}$	Intercept	Slope
Coefficient	5.273**	0.597**	1.261	0.008	4.967**	0.569*	0.619**	-0.042	1.162	0.007	<b>8.52%</b>	<b>12.50%</b>
SE	0.143	0.011	0.278	0.002	0.203	0.28	0.015	0.021	0.263	0.002		
t-value	36.778	54.769			24.493	2.035	40.046	-1.954				
df	93	93			92	92	92	92				

Coefficients associated elements:  $\gamma_{000}$  = Intercept;  $\gamma_{001}$  = Treatment Indicator;  $\gamma_{100}$  = Pretest;  $\gamma_{101}$  = Treatment Indicator x Pretest;  $\tau_{\beta 00}$  = Level 3 Intercept Residual Variance;  $\tau_{\beta 01}$  = Level 3 Slope Residual Variance

\*p <.01 \*\*p <.001

**Bold** indicates additional variance explained by adding Treatment Indicator over the model with only the Pre-test predictor.

**Table 7. Standards 4 to 6 Post Hoc Composite Intent to Treat Models**

Composite	Adding Pretest as Level 1 Predictor					Adding Treatment Indicator as Level 2 Predictor							Lvl 2 Variance Explained	
	$\gamma_{00}$	$\gamma_{10}$	$\sigma^2$	$\tau_{\pi}$	$\tau_1$	$\gamma_{00}$	$\gamma_{01}$	$\gamma_{10}$	$\gamma_{11}$	$\sigma^2$	$\tau_{\pi}$	$\tau_1$	Intercept	Slope
Reward for Pro-social Behavior														
Anxiety	6.080*	0.508*	5.178	1.485	0.006	5.921*	0.331	0.521*	-0.028	5.179	1.538	0.006	-	-
Neighborhood Participation	9.989*	0.545*	17.872	13.772	0.020	9.559*	0.935	0.567*	-0.049	17.877	13.692	0.020	<b>0.58%</b>	-
Peer Affiliation	12.687*	0.339*	13.209	13.355	0.033	12.888*	-0.297	0.343*	-0.011	13.221	13.645	0.034	-	-
Substance Abuse & Violence**	3.887*	0.748*	8.792	30.086	0.242	3.214*	1.227	0.803*	-0.099	8.794	29.957	0.242	<b>0.43%</b>	-
Moral Center	21.976*	0.471*	35.937	16.933	0.010	20.939*	2.022	0.500*	-0.055	35.948	16.353	0.009	<b>3.43%</b>	<b>10.00%</b>
Socio-Emotional Character Devl	34.616*	0.592*	133.611	35.207	0.004	36.928*	-4.298	0.568*	0.044	133.596	31.550	0.004	<b>10.18%</b>	-
Self-control	5.943*	0.436*	5.593	2.014	0.013	5.837*	0.204	0.451*	-0.03	5.594	2.064	0.013	-	-
Pro-social	10.876*	0.471*	12.449	7.041	0.011	10.865*	0.119	0.482*	-0.027	12.448	7.464	0.012	-	-
Respect for Teachers	6.886	0.541	7.516	4.159	0.015	7.405*	-0.969	0.509*	0.06	7.512	4.198	0.015	-	-
Respect for Parents	7.022*	0.452*	5.094	0.757	0.002	6.578*	0.851	0.487*	-0.067	5.093	0.704	0.001	<b>7.00%</b>	<b>50.00%</b>
Honesty	7.671	0.441	6.932	0.402	0.003	7.871*	-0.366	0.431*	0.017	6.930	0.540	0.004	-	-
Self-development	6.855*	0.472*	4.557	5.571	0.030	6.839*	0.031	0.473*	-0.002	4.557	5.753	0.031	-	-

Coefficients associated elements:  $\gamma_{00}$  = Intercept;  $\gamma_{01}$  = Treatment Indicator;  $\gamma_{10}$  = Pretest PYD;  $\gamma_{11}$  = Treatment Indicator x Pretest PYD;  $\sigma^2$  = Level 1 Residual Variance;  $\tau_{\pi}$  = Level 2 Intercept Residual Variance;  $\tau_1$  = Level 2 Slope Residual Variance

\*p <.01 \*\*Composite does not meet normality assumptions.

**Bold** indicates additional variance explained by adding Treatment Indicator over the model with only the Pre-test predictor.

- Indicates poor fitting model with no additional variance explained after adding treatment indicator as a predictor.

Table 8. Standard 4 to 6: Correlations among multivariate outcomes.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Anxiety												
2. Neighborhood Participation	-.078											
3. Peer Affiliation	-.139	.261										
4. Substance Abuse & Violence	.050	-.156	-.260									
5. Moral Center	<b>.026</b>	.151	.262	-.289								
6. Socio-Emotional Character	<b>.010</b>	.215	.335	-.289	.494							
a. Self-control	<b>-.032</b>	.190	.273	-.290	.422	.776						
b. Pro-social	.065	.234	.318	-.219	.400	.870	.609					
c. Respect for Teachers	<b>-.017</b>	.122	.283	-.301	.444	.813	.609	.599				
d. Respect for Parents	-.049	.161	.204	-.195	.323	.705	.441	.492	.534			
e. Honesty	<b>.012</b>	.191	.301	-.199	.409	.831	.592	.704	.576	.517		
f. Self-development	.045	.096	.173	-.156	.330	.714	.427	.587	.488	.439	.510	
7. PYD Total	.086	.468	.487	-.185	.667	.882	.684	.788	.704	.607	.750	.608

NON-significant correlations are in bold. All other correlations are statistically significant at  $p < 0.05$ .

Table 9. Standard 4 to 6: Summary of Multivariate Model Fit

Model	# Parameters	Deviance
1. Unrestricted	73	105656.91
2. Homogeneous $\sigma^2$	9	113811.396
3. Heterogeneous $\sigma^2$	19	108065.394

Model Comparison	$\chi^2$	<i>d.f.</i>	<i>p</i> -value
Model 1 vs Model 2	8154.4863	64	<0.001
Model 1 vs Model 3	2408.4839	54	<0.001
Model 2 vs Model 3	5746.0024	10	<0.001