



**Measurement of Social-Emotional and Character  
Development (SECD) in young children, and the  
mediating effects of SECD on outcomes of the  
*Positive Action* program**

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**Measurement of Social-Emotional and Character Development (SECD) in young children,  
and the mediating effects of SECD on outcomes of the *Positive Action* program**

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**Abstract**

To evaluate the effects of a Social-Emotional and Character Development (SECD) program, *Positive Action*, we developed a multi-faceted measure of SECD for grades 3-8 students. Factor analyses, reliability statistics and correlations with other behaviors demonstrated the measure’s factor invariance across ages, gender and ethnicity, internal consistency, and validity. We have also demonstrated the sensitivity of the measure to the effects of the *Positive Action* program in three randomized trials (in a rural Southeastern school district, in Hawai’i elementary schools, and in Chicago K-8 schools). In addition, the program has reduced disruptive behaviors at both grades 5 and 8, as assessed in the Chicago trial. The *Positive Action* program is hypothesized to also improve more distal manifestations of SECD, namely positive and negative behaviors, emotional/mental health, and academics – and Dr. Allred presented these findings from Hawai’i and Chicago trials confirming these hypotheses. Furthermore, changes in SECD are hypothesized to mediate these improvements. I will present analyses conducted to date that support this hypothesis – specifically, changes in SECD mediated improvements in substance use, emotional/mental health, and health-related behaviors.

## **Measurement of Social-Emotional and Character Development (SECD) in young children, and the mediating effects of SECD on outcomes of the *Positive Action* program**

In recent years, schools and youth-serving organizations increasingly have adopted programs based on theories of social-emotional learning (SEL) (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011) and social-emotional and character development (SECD) (Elias, 2009). The aims of these programs are to improve students' SEL/SECD<sup>1</sup> competencies in areas such as such as prosocial behavior, honesty, self-development and self-control that, in turn, prevent negative student outcomes such as violence and substance use, and promote positive student outcomes such as social competence and academic achievement (Durlak et al., 2011; Institute of Education Sciences, 2006). Research that informs the design and evaluation of both types of programs thus shares a need for reliable and valid measures that assess SECD-related skills and behaviors. In this paper, I summarize data on a new measure, the Social-Emotional and Character Development Scale (SECDs), designed to assess skills and behaviors with likely relevance to SECD programs. I present findings from our study (Ji, DuBois, & Flay, in press) of the measure's psychometric properties using data gathered from elementary school students who participated in an evaluation of *Positive Action (PA)*, a school-based SECD program.

Dr. Allred (Allred, 2014) summarized findings regarding the effects of the *PA* program on more distal manifestations of SECD, namely positive and negative behaviors, emotional/mental health, and school performance. Changes in SECD are hypothesized to mediate these improvements. I will present analyses conducted to date that support this hypothesis – specifically, changes in SECD-mediated improvements in negative behaviors (substance use), emotional/mental health, and positive health behaviors (hygiene and healthy food and exercise).

### **Background: Why develop a measure of SECD?**

Conceptualizations of SECD emphasize those social and emotional skills that promote youth's positive adaptation and well-being, namely the skills, including self-management, self-awareness, social-awareness, relationship skills, and responsible decision-making, that youth need to handle themselves, their relationships and their work effectively and ethically (Zins, Weissberg, Wang, & Walberg, 2004). These types of skills are expected to prepare youth for success in adulthood by teaching them to be good communicators, cooperative members of a team, effective leaders, and caring, concerned members of their communities (Denham, 2006; Greenberg et al., 2003). The development of one's own personal qualities, capacities, talents, and skills are also viewed as demonstrations of exemplary character; a person with good character consciously acts in accordance with principles that are valued by society, so that the person makes decisions that reflect, not only the quality of the person, but that are also good for others and society (Baumrind, 1998; Elias, 2009; King et al., 2005; R. M. Lerner et al., 2005; Park &

Peterson, 2006).

Discussions of SECD also emphasize the extent to which youth demonstrate respect for rules and expectations for appropriate behavior and, by implication, adult authority figures (e.g., teachers and parents), with studies indicating that such behavior may differ considerably across home and school settings (Brand & Felner, 1996; Dishion, Patterson, Stoolmiller, & Skinner, 1991; Morris, Silk, & Steinberg, 2007; Pettit, Bates, & Dodge, 1997). Conceptualizations of SECD also include references to broader, meta- or second-order manifestations of these constructs – that may reflect a youth’s overarching motivation and ability to act in several interrelated ways that are consistent with social-emotional learning and good character (Baumrind, 1998; Denham, 2006; Park & Peterson, 2006; Payton et al., 2000; Zins et al., 2004).

Despite the broad base of interest in programs that focus on SECD within schools and other settings, comprehensive approaches to assessing the behaviors and skills underlying these constructs are in an early stage of development (for reviews see Humphrey et al., 2011; Wigelsworth, Humphrey, Kalambouka, & Lendrum, 2010; Wilson-Ahlstrom, Yohalem, DuBois, & Ji, 2011). Although scales assessing skills and behaviors in areas similar to those highlighted above have demonstrated encouraging psychometric properties, several concerns merited our attention.

First, there was a lack of measures for younger child populations, especially those that use self-report paper-pencil measures (Merrell & Gueldner, 2010; Person, Moiduddin, Hague-Angus, & Malone, 2009). It may be difficult to assess constructs relevant to SECD in a valid manner without directly assessing the personal knowledge that children have of their own behaviors, associated attitudes and motivations.

Second, the skills and behaviors associated with SECD may manifest themselves differently as children mature, and contexts such as home, school, and peer groups exert varying degrees of influence on their development (Denham, Wyatt, Bassett, Echeverria, & Knox, 2009). Few studies have examined the psychometric properties of instruments intended to measure constructs relevant to SECD as children mature and develop during the important early developmental years.

Third, only a few studies have used factor analysis to investigate the structural validity of instruments that measure the intended distinct SECD skills and behaviors (Humphrey et al., 2011). With notable exceptions (e.g., Bowers et al., 2010), possible higher-order hierarchical or second-order factor structures that might reflect broader SECD constructs have not been considered.

Finally, reports of SECD instruments offer little evidence for their validity (Durlak et al., 2011;

Humphrey et al., 2011; Wigelsworth et al., 2010). Key issues in this regard include demonstrating that SECD instruments are associated in expected ways with indices of constructs that theory and prior research suggest should contribute to, and/or be outcomes supported by, SECD-related skills (Person et al., 2009; Wilson-Ahlstrom et al., 2011). Moreover, reports of validity evidence by student gender and race are lacking and would be informative for examining SECD program impacts for different student demographics (Wilson-Ahlstrom et al., 2011).

## Research Context

The instrument that my team developed, the Social-Emotional and Character Development Scale (SECDS), was developed in the context of an ongoing program of research on the *Positive Action (PA)* program (Allred, 2014). As Dr. Allred has described, the *PA* program includes classroom, school-wide climate, and family components and is based on theories of self-concept/esteem, learning, behavior, and school ecology. The program is designed to improve the abilities of children and adolescents to have positive prosocial interactions with peers, to be honest with self and others, to engage in self-improvement, to exhibit self-control, and to demonstrate respect for rules and expectations for appropriate behavior in school and home contexts. These skills and behaviors, in turn, are intended collectively to strengthen overall SECD and contribute to both the prevention of problem behaviors, such as violence and substance abuse, and the promotion of positive outcomes such emotional/mental health, physical health behavior and school performance.

The SECDS is intended to assess each of the overlapping facets of social-emotional learning and character (i.e., prosocial behavior, honesty, self-development, self-control, and respect for rules and expectations for appropriate behavior both at school and in the home). We conceptualize these different facets of skill and behavior as being subsumed under a more global construct of overall SECD. The SECDS uses a self-report format and was designed for use with children as young as third grade. Our broader goal in developing the measure was to contribute an instrument to the literature that would be of value both in the evaluation of SEL/SECD/PYD programs and in research on the development and etiology of social-emotional skills and character among elementary school-age children.

Data for this study came from an evaluation of the *PA* program in 14 K-6 and K-8 schools in the Chicago Public Schools system that were randomly assigned to condition from 7 matched pairs (Ji et al., 2006; Lewis et al., under review)<sup>2,3</sup>. We followed a cohort of students that was surveyed initially in the fall of grade three (pre-intervention baseline or Wave 1, W1) and subsequently in the spring of grade 3 (W2), fall and spring of grade 4 (W3 & W4), the spring of grade 5 (W5), the fall and spring of grade 7<sup>4</sup>, and the spring of grade 8 (from 2004 to 2010)<sup>5</sup>. The total N was 1170, of whom approximately 54% were African American, 31% Hispanic, 8% Caucasian, 4%

Asian-American and 3% Other or unknown (Lewis, Schure, et al., 2013). At the end of grade 5, 32 students in one control school repeated the surveys to provide test-retest data. A total of 459 students provided two or more waves of data for the measurement development study. Of the 593 students at W1, 54% were Black/African American, 30% Hispanic/Latino, 11% Caucasian, 5% Asian/Asian-American; and 90% received reduced price or free lunches.

One of the major challenges of conducting trials in poor, inner-city schools in large cities is the high turnover or mobility of students. Given that we deliberately selected high-risk (low-performing) schools, this was a major issue for the Chicago trial of *PA*. Due to a) the high student mobility in this low-income, urban setting, b) decreasing student population in Chicago schools during the time of this study and c) lower rates of parental consent as students advance, only 363 students participated at the end of grade 8 (W8), and only 131 of these were from the original 624 grade 3 students (Lewis et al., under review). Because the trial was cluster-focused, we assessed students who entered schools after the beginning of the trial (joiners), but did not follow individual students who stopped attending the study schools (leavers)<sup>6</sup>.

### **Scale Development (Grades 3-5)**

#### *Measures*

We piloted 46 items with 300 grades 3-5 students in two schools, and used factor analysis to reduced the pool to the 28 items reported on here (see Table 1, next page). The 46 items were derived/adapted from a larger set of items used in previous studies (e.g., Ji et al., 2005). The number of items retained for each of the targeted facets of SECD were as follows: Prosocial Behavior – 6 items, Honesty – 6 items, Self-Control – 5 items, Self-Development – 4 items, Respect at School – 5 items, and Respect at Home – 4 items. Items were rated on a 4-point scale with simplified response anchors (None of the time = 1, Some of the time = 2, Most of the time = 3, All of the time = 4) that were suitable for younger elementary school students. Each item was scored 1 to 4 in the direction of reports of more positive social-emotional skills and character.

Data for the initial validity analyses up to grade 5 included established measures of engagement with school (Furrer & Skinner, 2003), negative school orientation (Furrer & Skinner, 2003), peer group affiliation behaviors (Elliott et al., 1996), positive and negative values (Arthur, Hawkins, Catalano, & Pollard, 2000), social problem solving skills (Aber, Brown, Jones, & Samples, 1995), altruistic behavior (Solomon, Battistich, Watson, Schaps, & Lewis, 2000), positive and negative affect (Laurent et al., 1999), self-esteem (DuBois, Felner, Brand, Phillips, & Lease, 1996), life satisfaction (Huebner, 1991a, 1991b), positive health behaviors (Bavarian et al., under review), grades, depression and anxiety (Reynolds & Kamphaus, 2002), and risk behavior (CDC, 2004)<sup>7</sup>. All measures were scored by averaging responses across items, with items scored such that higher scores indicated greater levels of the construct.

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**Table 1:** Social-Emotional and Character Development Scale

Question stem: How much of the time do you do the following things?

Response scale: None of the time, Some of the time, Most of the time, All of the time

Note: The items were presented in random order.

SCED Scale	Item
1. Prosocial Behavior	I play nicely with others.
2.	I do things that are good for the group.
3.	I treat my friends the way I like to be treated.
4.	I am nice to kids who are different from me.
5.	I try to cheer up other kids if they are feeling sad.
6.	I am a good friend to others.
7. Honesty	I apologize when I have done something wrong.
8.	I tell the truth when I have done something wrong.
9.	I tell others the truth.
10.	I keep promises I make to others.
11.	I admit my mistakes.
12. Self-Development	I make myself a better person.
13.	I keep trying at something until I succeed.
14.	I set goals for myself (make plans for the future).
15.	I try to be my best.
16. Self-Control	I wait my turn in line patiently.
17.	I keep my temper when I have an argument with other kids.
18.	I follow the rules even when nobody is watching.
19.	I ignore other children when they tease me or call me bad names.
20. Respect at School	I speak politely to my teacher and other adults at school.
21.	I obey my teacher and other adults at schools.
22.	I follow the directions of my teacher and other adults at school.
23.	I listen (without interrupting) to my teacher and other adults at school.
24.	I follow school rules.
25. Respect at Home	I speak politely to my parents.
26.	I obey my parents.
27.	I listen (without interrupting) to my parents.
28.	I follow the rules at home.

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### *Analyses and Results*

We used confirmatory factor analysis to address our first aim – to investigate support for the SECDS’s hypothesized multi-dimensional and second-order factor structure. A second aim was to examine the internal reliability of the measure including, as recommended by Wilson-Ahlstrom et al. (2011), separate estimates of reliability across subgroups of children varying in age, gender, and race/ethnicity. We also examined the test-retest reliability of the measure. A third aim was to test for potential changes in both the absolute and relative levels of scores on the

measure as students progressed from grade three to grade five. A final aim was to assess the validity of the instrument according to the framework and recommendations of several prior studies (Humphrey et al., 2011; Person et al., 2009; Wigelsworth et al., 2010; Wilson-Ahlstrom et al., 2011). After establishing the factor structure of the SECDS, validity analyses examined the degree to which scores on the measures exhibited expected associations with measures of relevant constructs (i.e., those that would be expected to contribute to and/or be influenced by the development of SECD-related skills and behaviors). Finally, we have used this scale to assess the effects of the PA program on SECD and also to investigate the extent to which changes in SECD mediate the effects of the program on more distal manifestations of character, namely, positive and negative behaviors and school performance.

Confirmatory factor analysis confirmed that responses on the SECDS were consistent with the multidimensional, hierarchical conceptualization of social-emotional skills and character that guided the development of the instrument. We used the weighted least squares with diagonal weight matrix within Mplus 5.2 (Muthén & Muthén, 1998-2010) to fit the ordinal scores to a second-order factor model to the data, in which the 28 SECDS items were assigned to their respective factors that represented each of the six specific facets of SECD-related skills and behaviors; these factors were, in turn, nested within a second-order factor. The hypothesized second-order factor model demonstrated adequate fit at all five waves, with CFI and TLI values above .90 and RMSEA values below .08<sup>8</sup>. Scale means demonstrated negative skewness (mean of -1.13 across all scales and waves) indicating that they clustered at the high end of the scale, and positive kurtosis (mean of 1.20) indicating a distribution of scores that were moderately peaked above the mean. Internal consistency correlations (alpha) for the complete SECD score were 0.88, 0.90, 0.90, 0.91, 0.90, 0.90, 0.90, and 0.92 for Waves 1 through 8, respectively. With a few exceptions, estimates of internal consistency reliability for the subscales at each time (i.e., grades three through five) were generally acceptable (i.e., .70 or greater), and generally improved across waves. The improvement in internal reliability estimates across waves was also evident for the estimates by gender and by racial/ethnic group (i.e., Caucasian, Black/African-American, Hispanic/Latino).

Test-retest correlations for SECDS individual scales at W5 (two-week interval) were as follows: Prosocial Behavior = .76, Honesty = .62, Self-Development = .75, Self-Control = .63, Respect at School = .78, Respect at Home = .72, General = .79. Average intercorrelations among the SECDS individual scale scores at each wave ranged from .43 to .79. At each wave, the strongest correlation was between the Honesty and Prosocial Behavior scales (.66 to .79) and the weakest correlation was between the Respect at Home and the Self-Control scales (.43 to .48).

We observed a developmental level-related pattern of decreasing scores across waves for all scales. This finding was consistent with prior research in which measures of behaviors associated with social-emotional and character development have exhibited declines during childhood



(Carlo, Crockett, Randall, & Roesch, 2007; Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006; Washburn et al., 2011). As indicated by significant Wave x Scale interactions, however, this pattern of scores across scales also varied somewhat across scales. Illustratively, whereas the mean scores for Self-Control and Honesty were only moderately lower than those for other scales at W1 (i.e., typically less than one-third of a standard deviation), by W5 these differences had grown to a larger margin (i.e., typically more than one-half of a standard deviation). Support for this finding was found in the post-hoc pairwise comparisons of the means among the scales indicating that at W1, three SECDS individual scales (Prosocial Behavior, Honesty, Self-Development) were significantly different from the remaining three SECDS individual scales (Self-Control, Respect at School, Respect at Home), whereas at W5, all six SECDS individual scales were significantly different from each other. Consistent with this, the *extent* of decline across waves varied across scales, being most marked for Honesty (Cohen's  $d$  for correlated data for comparison of W1 and W5 means = .55) and Self-Control (Cohen's  $d$  = .53), followed by Prosocial Behavior (Cohen's  $d$  = .48), Respect at School (Cohen's  $d$  = .41), Respect at Home (Cohen's  $d$  = .37), and Self-Development (Cohen's  $d$  = .18).

In validity analyses, the SECDS individual scales were associated significantly and in expected directions with concurrent measures of anticipated correlates of social-emotional and character development at both W1 and W5, with the exception of the measure of negative affect. In the longitudinal analyses, the SECDS general scale at W1 also had significant associations in expected directions with outcomes at W5. SECDS individual scales also had notable longitudinal associations with the same measures. The Self-Development scale had a significant positive association with student self-reported grades, and each of the six individual scales had significant negative associations with the measure of anxiety and/or at least one of the two measures of risk behaviors. Concurrent associations of SECDS scores with the measures used in validity analyses at W5 followed similar patterns for gender and racial groups.

### *Program effects on SECD*

As noted above, the normal trend among these students was for SECDS scores to decline as students advance through the grades. Washburn and colleagues (2011) used various combinations of these and related items to demonstrate that *Positive Action* attenuated the downward trend in student reports of SECD in three different trials. In other publications, we have confirmed that declines on the measure developed here were similarly attenuated. For example, Lewis and colleagues (2012) reported that the mean SECD score was 3.09 for PA students and 2.91 for control school students at the end of grade 8 (W8), compared with a W1 score of 3.53. These results demonstrate that the SECDS is sensitive to change due to exposure to a school-based intervention focused on promotion of SECD, an important consideration in establishing the utility of any measure within this domain.

### SECD as mediator of program effects

Character and values should have distal manifestations in behavior and school performance. In the various trials of PA, particularly the Chicago trial, we measured many of these as possible effects of the program, and Dr. Allred has summarized those results (Allred, 2014). Using data from the Chicago trial, we have started investigating the question of whether changes in SECD brought about by the program mediate the effects of the program on these other behavioral and academic outcomes.

Li et al. (2011) and Lewis and colleagues (Lewis, Bavarian, Acock, et al., 2012; Lewis, Schure, et al., 2013) reported the effects of PA on negative behavior – several indicators of both substance use (SU) and violence – at grades 5 and 8, respectively. Using the grade 8 data, we have also demonstrated that changes in the slope of SECD mediated the effects of PA on substance use at grade 8 (Lewis, Bavarian, Acock, et al., 2012). After inclusion of the change in SECD in the model, the effect of the SECD intercept on SU demonstrated that students with higher SECD at W1 had lower SU at W8 ( $\beta = -.359, p < .001$ ), the direct effect of SECD slope on SU indicated that students with a smaller decline in SECD reported less SU at W8 ( $\beta = .442, p < .001$ ). We also conducted separate mediation analyses for each substance in the SU composite. The effect of the SECD slope on the individual substances indicated that students with less SECD change (and therefore greater SECD at grade 8) reported less tobacco use ( $\beta = -.413, p < .001$ ), less alcohol use ( $\beta = -.294, p < .01$ ), less alcohol intoxication ( $\beta = -.274, p < .01$ ), and less marijuana use ( $\beta = -.457, p < .001$ ).

Additionally, results from the analyses comparing SU and SECD scores between stayers, leavers, and joiners found no differences in SU scores, indicating that those who were stayers (i.e., present at all eight waves and therefore received 6 years of PA) did not have significantly lower SU than joiners (average exposure = 1.31 years). Leavers (average exposure = 2.62 years), however, did have significantly lower SECD than did stayers or joiners ( $\beta = -.327, p < .01$ ).

In another recent paper, we reported the effects of PA on several emotional/mental health outcomes – positive affect, life satisfaction, depression and anxiety – and demonstrated that those effects were mediated by changes in the slope of SECD (Lewis, DuBois, et al., 2013)<sup>9</sup>. The indirect effect of the program on change in positive affect via SECD was significant ( $b = .03, p < .01$ ) as were the indirect effects on end-point depression ( $b = -.19, p < .01$ ) and anxiety ( $b = -.17, p < .01$ ). For life satisfaction, the indirect effects of the program on linear and quadratic change in the outcome were significant and marginally significant ( $b = .03, p < .05$ , and  $b = -.01, p < .10$ , respectively), with a noteworthy indirect effect on life satisfaction at study end point ( $ES = -.58$ ). The residual direct effects of the program on positive affect, life satisfaction, and depression were nonsignificant, arguing for indirect mediation (Zhao, Lynch, & Chen, 2010), and significant for anxiety, arguing for complementary mediation (Zhao et al., 2010).

In a paper under review, we reported the effects of PA on several health-related behaviors –

healthy food and physical activity habits, unhealthy food, personal hygiene – and demonstrated that those effects were partially mediated by changes in the slope of SECD (Bavarian et al., under review). Namely, the *a* path (i.e. the path from PA to the slope of SECD at W6<sup>10</sup>) was significant at the .01 level, the *b* path (i.e. the path from the slope of SECD at W6 to the slope of the outcome) was significant for healthy habits ( $p < 0.01$ ), unhealthy food intake ( $p < 0.05$ ), and personal hygiene ( $p < 0.01$ ). The calculated indirect effects (Zhao et al., 2010) were significant at the .01 level for healthy habits and personal hygiene, and at the .05 level for unhealthy food intake.

Bavarian et al. (in preparation) tested a mediation model that included two mediators, one each from the intrapersonal domain (one component of SECD - self-control) and the interpersonal (affiliation with deviant peers) domains of ecological models (Bronfenbrenner, 1979; McLeroy, Bibeau, & Glanz, 1988) or the Theory of Triadic Influence (Flay, 1999; Flay, Snyder, & Petraitis, 2009). Results from a model including the two mediators (self-control and deviant peer affiliation) and three substance use outcomes showed that the total indirect effect was significant for marijuana ( $p = 0.020$ ), marginal for alcohol ( $p = 0.077$ ), and not significant for cigarette use. Changes in self-control were responsible for the observed mediation; and the mediating influence of deviant peer affiliation was reduced to nonsignificance when self-control was included in the model. Findings from these analyses suggest that programs fostering SECD delay the initiation of adolescent alcohol and marijuana use, primarily by improving student self-control skills.

## Conclusions

Results provide encouraging initial support for the SECDS as an instrument that measures elementary school children's social-emotional skills and character. The support found for the instrument's multi-dimensional and hierarchical factor structure was broadly consistent with prior conceptualizations of SEL and SECD (Denham, 2006; Park & Peterson, 2008; Payton et al., 2000) and, notably, was consistent across waves of assessment that began at a relatively young age (grade three) and spanned over three years of development. SECDS general and individual scales aligned with this factor structure and demonstrated evidence of both reliability and validity, both for the sample as a whole and for gender and racial/ethnic groups. The SECDS measure is also sensitive to change, specifically demonstrating the effectiveness of the *Positive Action* program in changing the aspects of social-emotional skills and character it assesses. Finally, we demonstrated that, consistent with theory, changes in SECDS, which we consider the proximal manifestations of character, mediated the effects of the *Positive Action* program on more distal manifestations of character, namely negative behaviors (substance use), emotional/mental health, and positive health-related behaviors (hygiene and healthy food and exercise).

Thus, my research group<sup>11</sup> has demonstrated that (a) it is possible to measure a latent construct that is related to character, virtues and social-emotional skills, (b) scores on the resulting scale

are related to other constructs in expected ways, (c) SECDs scores are sensitive to change due to exposure to the *Positive Action* program, and (d) changes in SECD are related to changes in more distal manifestations of SECD in ways predicted by theory<sup>12</sup>.

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## Footnotes

<sup>1</sup> From here on, I will use SECD to refer to the broad set of both SEL, SECD, Positive Youth Development (PYD) (J. V. Lerner, Phelps, Forman, & Bowers, 2009), the Search Institute's Developmental Assets (Benson, 2002; Benson, Leffert, Scales, & Blyth, 2012), and what we have previously called Skills for Successful Learning and Living (SSLL) (Flay & Allred, 2010)

<sup>2</sup> The trial was funded by the Institute of Educational Sciences (IES) of the U.S. Department of Education grants R305L030072, R305L030004 and R305A080253 to Brian R. Flay the University of Illinois at Chicago (2003-05) and Oregon State University (2005-12). Institutional Review Boards at the University of Illinois at Chicago and Oregon State University, the Research Review Board at Chicago Public Schools, and the Public/Private Ventures Institutional Review Board for Mathematica Policy Research (MPR; a subcontractor who collects some of the data from Chicago schools as well as schools involved in evaluations of 6 other programs at 6 other sites) approved all research procedures.

<sup>3</sup> The Chicago trial was a component of the Social And Character Development (SACD) Research Program, which was a collaboration among IES, the Centers for Disease Control and Prevention's (CDC) Division of Violence Prevention, Mathematica Policy Research Inc. (MPR), and of SACD cooperative agreements (Children's Institute, New York University, Oregon State University, University at Buffalo-SUNY, University of Maryland, University of North Carolina-Chapel Hill, and Vanderbilt University). The SACD research program included multi-program evaluation data collected by MPR and complementary research study data collected by each grantee. The findings reported here are based only on the Chicago portion of the multi-program and complementary data collected by the University of Illinois at Chicago and Oregon State University (Brian Flay, Principle Investigator) under the SACD program.

<sup>4</sup> No data were collected in grade 6 due to a gap in funding.

<sup>5</sup> The scale development data reported here are from waves 1-5 (grades 3-5) only. Analyses of the data from grades 7 & 8 were not yet complete at the time of writing.

<sup>6</sup> We used several methods to deal with student mobility. First, at each time of assessment, we attempted to collect data from all students in the grade cohort being followed, including those who had transferred into schools



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since the inception of the research – but we did not follow those students in the study cohort who had left the study schools (Brown et al., 2008; Vuchinich, Flay, Aber, & Bickman, 2012). Across time, then, the student cohort (total N = 1170) could be considered “dynamic” (i.e., changing) because of student mobility. Second, we considered patterns of mobility – in Lewis et al. (2012) we considered stayers, leavers and joiners, while in later papers, we utilized results from a Latent Class Analysis to define 5 classes of student mobility – stayers, joiners, temporary participants, early leavers, late leavers (Lewis, Bavarian, Duncan, et al., 2012). Third, for our outcome analyses we utilized cluster-focused intent-to-treat (ITT) analysis (Vuchinich et al., 2012). It acknowledges the focus on schools and follows all schools randomized to condition to trial endpoint, regardless of whether the school continues the *PA* intervention or how well it is implemented. It also involves collecting data from all students who are in the appropriate grade cohort in the schools when the assessments occur.

<sup>7</sup> The last three administered at grade 5 and higher only.

<sup>8</sup> This second-order factor model fit the data significantly better than either a single-factor model or a correlated-factors model (Ji et al., in press).

<sup>9</sup> Because preliminary analyses on SECD revealed a quadratic trend in change over time, scores on the measure were centered at the sample mean at each wave in order to effectively eliminate the need to model a quadratic trend and thus facilitate model interpretation.

<sup>10</sup> In this paper, to handle a quadratic nature of SECD, the effect of the linear slope on the change in each outcome is interpretable at the intercept; thus, we adjusted time scales to run from -4.00 years to 1.58 years (as opposed to the real time of 0.00 to 5.58 years), with the intercept being set at W6, the first data collection time after the important transition to middle-school grades.

<sup>11</sup> Full disclosure: I am married to Dr. Carol G. Allred, the developer of the *Positive Action* program and owner of Positive Action, Inc., which markets the program. The potential conflict of interest was disclosed to the funding agencies and managed by UIC and OSU. The avoidance of possible biases was managed primarily by the involvement of other rigorous investigators. I thank my Co-investigators, Professors Alan Acock (OSU), Michael Berbaum (UIC), Richard Campbell (UIC), David DuBois (UIC), Joseph Durlak (Loyola University, Chicago), Naida Silverthorn (UIC), Sam Vuchinich (OSU); our ex-students Drs Niloo Bavarian (Postdoctoral Fellow, UC Berkeley), Michael Beets (Associate Professor, University of South Carolina), Dan Cantillon, Research Associate, ICF International, VA), Joseph Day (Assistant Professor, Governors State University, Chicago), Michael Fagan (Clinical Assistant Professor, UIC), Peter Ji (Assistant Professor, Adler School of Professional Psychology, Chicago), Kin-Kit Li (Associate Professor, City University of Hong Kong), Marc Schure (Postdoctoral Fellow, Puget Sound Healthcare System-Health Services Research & Development, Seattle), Frank Snyder (Assistant Professor, Purdue University), Isaac Washburn (Research Scientist, Oregon Social Learning Center); staff Vanessa Brechling and Kate Burns (UIC), Howard Humphries and Jonathan Wong (Hawai'i); and the Hawai'i School Board, the Chicago Public Schools system, and the participating schools and their Principals, staff, students and parents.

<sup>12</sup> As with all research, there are some limitations to these trials, all of which have been acknowledged in the publications cited. I note some of them here. Both studies were small for cluster-randomized trials; nevertheless, careful matching and analysis of multiple waves of data appears to have provided sufficient statistical power to detect many effects. Potential conflicts of interest and the lack of independence of the principle investigator from the program developer were addressed in footnote # 4. Reliance on student self-reports for many outcomes is a potential concern that is, however, mitigated by finding effects using archival data collected by schools for other purposes. Strictly speaking, the effects obtained cannot be generalized beyond schools like those that agreed to participate in these trials; however, replication of results across three very different school districts provides some confidence of greater generalizability. The control schools were not pure controls (there is no such thing these days), but they did not use any one kind of SECD program or strategy; and the lack of purity leads to the size of the effects we observed probably being underestimated. Implementation of the program was not complete in most study schools, which also leads to underestimation of possible effects. These latter two concerns do however, mean that the estimated effects obtained in these trials are probably representative of what would happen in many other schools – that is, these were closer to being effectiveness trials rather than efficacy trials. The use of random assignment was the greatest strength of these trials, giving us considerable confidence that the observed effects were due to the *PA* program rather than to other events.