EXPLORING NORMATIVE TRENDS OF POSITIVE YOUTH DEVELOPMENT: AN EXAMINATION OF ADOLESCENT SOCIAL AND EMOTIONAL SKILLS

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ABSTRACT

This dissertation presents three empirical studies that explore social and emotional development in adolescence through the framework put forth by the Collaborative for Academic, Social, and Emotional Learning (CASEL). The first study confirmed the five-factor structure of the CASEL model and showed the model's predictive validity for important outcomes for youth such as grades, school engagement, depressive symptoms, delinquency, and risky behaviors. This study suggested that the CASEL model is appropriate and useful for studying adolescent social and emotional development. Study 2 explored the normative growth trajectories for social and emotional development and the component skills (self awareness, self management, responsible decision making, creating relationship skills, and relationship quality) in a longitudinal sample of adolescents from ages 10 to 18. The results indicated that SEL growth is complex, and often non-linear, and significantly varies by gender. Additionally, the component skills each followed a unique growth trajectory, indicating that there is value added in viewing each as distinct, while interrelated, components of SEL. Study 3 employed a person-centered approach to examine profiles of social and emotional functioning and their relation to important youth outcomes. The results suggested that social and emotional functioning is not homogenous and that different profiles of functioning are associated with different outcomes for youth. In culmination, the work in this dissertation suggests that (1) there is utility in the CASEL model for studying adolescent social and emotional development, (2) social and emotional growth is complex and quite varied between gender and component skills and (3) adolescents tend to present a profile of social and emotional function that can be linked to important youth outcomes. Collectively, these studies begin to shed light on potential avenues for studying and ultimately promoting positive social and emotional growth in adolescence.

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APPROVAL OF THE DISSERTATION

This dissertation, "Exploring Normative Trends of Positive Youth Development: An Examination of Adolescent Social and Emotional Skills" has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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DEDICATION

To Tim: between the lines of this dissertation lies four years of memories with you.

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"During the teen years, our minds change in the way we remember, think, reason, focus attention, make decisions, and relate to others. From around age twelve to age twenty-four, there is a burst of growth and maturation taking place as never before in our lives. Understanding the nature of these changes can help us create a more positive and productive life journey." – Daniel Seigel (2013, p. 6)

The state of the nation's youth, portrayed in the media and woven into the fabric of the cultural narrative, is quite grim. The historically dominant perception is that teens are a ticking time bomb, burdened with "raging hormones", "peer pressure", and "egocentrism". This perception continues to permeate the modern-day description of the adolescent experience. Trends of U.S. youth, compared to the rest of the developed world, reiterate the notion that they are, in fact, struggling. United States' youth are trailing academically, and leading in terms of violence and delinquency, suicide rates, drug and alcohol abuse, unwanted pregnancy, and obesity (CDC, 2013). Despite the cultural narrative, contemporary positive development approaches and advances in research indicate that adolescence is a time of significant *opportunity* (Steinberg, 2014). This approach operates under the presumption that all youth have strengths, are agents in their own development, and that the culmination of individual strengths and positive supports will lead to thriving, or an individual that is a healthy, happy, contributing member of society (e.g. PYD; Lerner, Dowling, & Anderson, 2003; Larson, 2000; Benson, Leffert, Scales, & Blyth, 1998).

Marked by new contexts and experiences, in addition to neurological malleability, adolescence is an opportunity for substantial learning/positive development and laying the foundation for adult functioning and success (Sawyer et al., 2012). Furthermore, the adolescent

stage of life has expanded in recent history due to earlier pubertal onset and the delay in events, such as economic independence, that mark adulthood (Dahl, 2004; Steinberg, 2014). This has led to youth (ages 10-24) accounting for a quarter of the world's population (Sawyer et al., 2012). The understanding that adolescence is expanding and also a time of opportunity coupled with the current dismal state of youth in the nation calls for more understanding of developmental pathways to success and happiness. One avenue to greater understanding are models of positive development such as Social and Emotional Learning (SEL).

SEL emerged as a conceptual umbrella bridging research on developmental experience, social and emotional functioning, and healthy youth functioning in school and in life (Elias et al., 1997; Zins et al., 2007). SEL is defined as the process through which youth develop competency to "understand, manage, and express the social and emotional aspects of one's life" (Elias et al., 1997, pg. 2). The Collaborative for Academic, Social, and Emotional Learning (CASEL) is a national organization that systematizes the literature and support for programming and policy changes in education and other youth-serving agencies to promote SEL. CASEL organizes SEL as the promotion of five key competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision making. The skills are defined as: (1) Self-awareness; the ability to accurately appraise thoughts, emotions, and behaviors, and to have self-confidence. (2) Self-management; the ability to manage emotions, thoughts, and behaviors, and to set and achieve personal goals. (3) Social awareness; the ability to empathize and take perspective, understand diversity, and recognize potential resources/supports. (4) Relationship skills; the ability to communicate, cooperate, and resolve conflict in addition to resist peer pressure and offer or seek help. (5) Responsible decision-making; the ability to appraise potential

consequences of actions, to understand social norms and overall safety, and to make choices that are healthy and responsible (Durlak, Domitrovich, Weissberg, & Gullotta, 2015).

These skills, and programs designed to promote these skills, have been linked to indicators of thriving such as increased school performance and decreased likelihood of developing mood or behavioral disorders (Durlak et al., 2011). However, relatively few studies have focused on the expectable developmental patterns of these skills or how they may conjointly contribute to functioning during adolescence (Jones, 2015; Jagers, Harris, & Skoog, 2015). Moreover, most of the empirical research supporting the importance of SEL is from studies on early childhood and elementary-aged children (Haggerty, Elgin, & Woolley, 2011; Durlak et al., 2011). Thus, while these skills are theorized to apply into middle and high school programming, and studies that incorporate adolescents suggest this is valid, there are relatively few studies of the role of SEL patterns of development and variations in level and growth during adolescence.

There is substantial evidence in existing literature that the five CASEL skills are important to adolescent functioning. Increased self-awareness has been shown to increase learning skills (Weil et al., 2013; Metcalfe & Finn, 2008; Efklides, 2009). Self-management skills are evidenced as crucial through studies on poor self-management skills, which have been linked to academic difficulties (Duckworth, Quinn, & Tsukayama, 2012) and substance use (Gibbons et al., 20012; Wills, Knight, Williams, Pagano, & Sargent, 2014). Social awareness abilities have been shown to be important for prosocial behaviors and developing moral reasoning (Eisenberg et al., 2001; Laible et al., 2004). Relationship skills in adolescence are predictive of positive adjustment (Laible, Carlo, & Raffaelli, 2000) and poor relationship skills are linked to social exclusion, which has long lasting and detrimental effects (Baumeister,

DeWall, Ciarocco, & Twenge, 2005). Decision-making during adolescence is studied extensively, as adolescents are given more autonomy on making their own decisions and are known for making risky decisions (Wray-Lake, Crouter, & McHale, 2011; Xiao et al., 2012). These lines of empirical work suggest that these five skills continue to be important in adolescence, but may not have previously been conceptualized to completely align with the CASEL theoretical model and have not been studied simultaneously, as components of a theoretical model. Specifically, there are three fundamental questions that seem important to address to gain a developmentally useful and informed understanding of the CASEL model for application to adolescence: (1) Does the five-skill multidimensional model as theorized by CASEL hold for adolescents? (2) What are the expected growth patterns of these skills during adolescent development and how might these differ by gender? (3) What profiles of SEL component skills exist in a normative adolescent sample and do factors such as gender or pubertal status affect profile membership? This dissertation aims to help improve understanding of the patterns of SEL in adolescence, through delving into these questions.

Paper 1, *Social and Emotional Learning in Adolescence: Testing the CASEL Model in a Normative Sample*, tests that the leading SEL model works as a multidimensional model for an adolescent sample. Using a longitudinal sample of 1,717 U.S. youth from the 4-H Study of Positive Youth Development, I tested and validated the CASEL five-factor theoretical model using confirmatory factor analysis (CFA) on the fifth grade (wave 1) subsample. The model that fit well was a slight variant on the theorized model; creating relationships and relationship quality were distinct scales, albeit related enough to form a higher order factor (e.g. relationship skills). The invariance of this model was tested with two subsequent waves of data (following the sample into grade 6 and 7). The results confirm that the model was robust and appropriate for

measuring adolescent social and emotional functioning. Predictive validity was tested for several outcomes including school engagement, grades, delinquency, depressive symptoms, and risky behaviors with a pattern of most SEL scales predicting each outcome. This was the first study to empirically test and validate the CASEL model in an adolescent sample. This validation supports using the model for further study. In addition, as it was tested with a sample used to validate the 5Cs model of PYD (Lerner et al., 2005), it offers a complimentary approach to this PYD measurement method. The two dimensions of relationship skills found in our data suggest the need for a closer look at this skill with attention to its potential specificity during adolescence, but also potentially having importance in earlier development as well. Finally, social and emotional functioning, as measured by this model, positively predicted school engagement and grades, and negatively predicted delinquency, depressive symptoms, and risky behaviors. This finding was consistent with the validation study of the PYD model, further confirming their different but complimentary utility for studying adolescent development (Bowers et al., 2010; Phelps et al., 2009). Interestingly, the significant patterns of prediction varied across SEL scale (self-awareness, self-management, social awareness, relationship skills, and responsible decision making) and time (grade 5, 6, and 7). The findings point to variation in skill importance in explaining functioning over adolescence and calls for future investigation of potentially different developmental patterns for each SEL scale over adolescence.

Paper 2, *An Exploration of the Normative Growth Trajectory of Social and Emotional Skills for Adolescence: A Gender Comparison* presents the findings from the initial exploration of the developmental patterns of each SEL component skill identified in the initial study (self-awareness, self-management, creating relationship skills, relationship quality, and responsible decision-making). In this study, the full longitudinal sample of adolescence from the 4-H Study

of Positive Youth Development was used, beginning when participants were age 10 and following them to age 18. A series of model comparisons were conducted to determine the typical growth trajectories of each SEL component skill over this period of development using multilevel growth curve analysis. This study yielded three primary findings. First, we found that most SEL component skills followed a non-linear growth trajectory, meaning adding non-linear terms improved fit over a simple linear model. Second, the SEL scales followed different patterns of growth; each showed somewhat different characteristics over adolescence. Third, we found that there was a significant difference in levels and/or in growth pattern by gender for each skill, except creating relationships. This is the first study to examine the longitudinal growth of the CASEL component skills in an adolescent sample. The findings support viewing the SEL component skills as distinct and evidencing differing patterns of development across adolescence. This also suggests value in further consideration of the level of functioning in these skills in relation to each other and in relation to markers of well-being and functioning.

This leads to paper 3, *Profiles of Social and Emotional Functioning in Adolescence,* where I took a person-centered approach to examine profiles of social and emotional functioning in a cohort of adolescents. Additionally, I examined the role of puberty and gender in predicting profile membership and if profile membership was associated with important outcomes for youth such as school engagement, depressive symptoms, or delinquency. This study focused on the wave one (5^{th} grade) cohort (n=1717) of the 4-H Study of Positive Youth Development, which was chosen to represent the average age of pubertal onset for boys and girls (Chumlea et al., 2003; Tinggaard et al., 2012). Latent profile analysis was used to identify six different profiles of social and emotional functioning in this sample of adolescents, using the six dimensions of SEL as indicators (self-awareness, self-managmenet, social awareness, creating realtionship skills,

relationship quality, and responsible decision-making). Additionally, multinomial logistic regression analysis revealed that gender, ethnicity, and income, but not puberty was a significant predictor of profile membership. Finally, MANCOVA analyses determined that profile membership was predictive of differential youth functioning, one year later. This is the first study to take a person-centered approach to profiling SEL development, as defined by the CASEL model, in an adolescent sample. A similar approach has been used with preschool children (Denham et al., 2012). The results suggest that (1) social and emotional functioning is not homogenous in adolescent populations, (2) gender, income, and ethnicity are important factors for predicting social and emotional profile, and (3) SEL profiles differentially predict later adolescent functioning. These findings point to the potential utility of interventions that differentially target skills based on social and emotional profile and potential pathways to risky outcomes. Universal strategies that target promotion of all skills may be less efficient for adolescent populations. This study further highlights the importance of examining SEL component skills (their interrelation and distinction) in determining pathways to positive functioning and success. This paper provides a more in-depth understanding of SEL around the time of puberty and begins to disentangle profiles of social and emotional functioning and their relation to overall functioning in adolescence.

Conclusion

Adolescence may be a particularly sensitive time for positive development, which can establish a foundation for lifelong thriving and success (Burnett, Thompson, Bird, & Blakemore, 2011; Sawyer at el., 2012; Monahan & Steinberg, 2011). Prior to this dissertation, the CASEL theoretical model had not been subjected to CFA and had little empirical investigations of normative developmental patterns of the component skills during adolescence. This work offers

a complimentary approach to the Positive Youth Development (PYD) model. The collective set of studies suggests the utility of the CASEL model for adolescence and begins to uncover the developmental patterns that might typify this age period. Ultimately, this critical examination of the CASEL model and ensuing social and emotional developmental patterns in adolescence, can connect childhood and adolescent SEL development and suggest the role of these skills for adult functioning. This baseline understanding is critical for future studies of adolescent social and emotional development and for future development of interventions aimed at improving these skills.

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Social and Emotional Learning in Adolescence: Testing the CASEL Model in a Normative Sample

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Keywords: social and emotional learning, adolescence, academic achievement, positive youth development

Abstract

As Social and Emotional Learning (SEL) expands to focus on adolescent populations, the broadly accepted theoretical framework put forth by the Collaborative for Academic, Social, and Emotional Learning (CASEL) should be empirically tested for measurement utility. Using longitudinal data from the 4-H Study of Positive Youth Development, we first tested and validated the five factor (self-awareness, self-management, social awareness, relationship skills, responsible decision making) model using confirmatory factor analysis (CFA) in a normative sample of 1,717 grade 5 United States youth. The model was then subjected to longitudinal measurement invariance testing using CFA models that included the 6th and 7th grade samples to confirm SEL as a robust model across these grades. Evidence was also found for predictive validity of the model for important youth outcomes (e.g. academic achievement). Relations were significant and in the expected direction, but varied in some cases across grade and SEL scales. Implications for application of the model in comparison to the PYD model to adolescent development are discussed.

Social and Emotional Learning in Adolescence: Testing the CASEL Model in a Normative Sample

The study of adolescent development has shifted from viewing adolescence as a time of "storm and stress" (Hall, 1904) to a time of significant opportunity (Steinberg, 2014). Instead of thinking of adolescence as a stage in life to simply *get through*, researchers across disciplines are deeming adolescence as a time that affects crucial patterns of development that allow key abilities to emerge and prosper into adulthood (Siegel, 2013). Central to this shift has been the recognition that adolescence is both a time of continuing and securing patterns of social and emotional functioning formed over childhood but also a time of potential important change in these. In light of this evolution, several theoretical frameworks have been developed to provide an organizational or conceptual approach to understand and track the positive benchmarks of adolescent development. Two particularly influential approaches have been the Positive Youth Development (PYD; Lerner et al., 2005; Pittman, Irby, & Ferber, 2001; Roth & Brooks-Gunn, 2003; Eccles & Gootman, 2002) and the Social and Emotional Learning (SEL; Elias, Zins, Weissberg, Frey, Greenberg, Haynes, et al., 1997) frameworks. While PYD conceptually arose from observations of strengths exhibited as part of adolescent development, SEL arose from theories of emotional intelligence (Goleman, 1995) and the collective literature attending to multiple social and emotional skills as affecting school and life successful. While conceptually linked as multiple skills, the SEL literature has not linked the utility of this model to measure and understand adolescent development. The present study focuses on testing and validating the SEL model in an adolescent sample as a complimentary or alternative approach to PYD.

While the PYD framework has been subjected to an empirical formulation of measurement and dimensional relations among key constructs (Lerner et al., 2005; Bowers et al.,

2010; Phelps et al., 2009), the SEL framework has not had such a study, to date. Reviews of SEL have identified a set of constructs theorized to represent the major dimensions of social and emotional skills, but there has not been a test of this formulation as a measurement model. Moreover, the primary focus of SEL formulations and reviews has been elementary-aged children. SEL programming in schools is growing, learning standards are beginning to be developed, and the SEL approach is increasingly of interest to those studying adolescent development. This paper seeks to address this gap by examining the factor validity of the five construct SEL model in a normative adolescent sample and its relation to indicators of functioning. This study utilizes the dataset applied to test the PYD measurement model which facilitates comparison of correspondence and distinction between the frameworks' constructs and features.

The Positive Youth Development (PYD) Framework

The PYD framework focuses on how aligning adolescent strengths with external resources and opportunities can potentially promote optimal development or "thriving". Thus, this framework approaches adolescent development by examining how assets that lead to success, happiness, engagement, care for others, and preparing for adult roles may depend on this alignment. PYD emphasizes the dynamic nature of development, adolescents as agents of their own development, and the effects of these in eventuating thriving functioning (Lerner, Dowling, & Anderson, 2003). The PYD framework has been formulated as a model comprised of "Five Cs" that are essential components to thriving. These Cs are: (1) Competence, which refers to positive view and performance in the social, academic, cognitive, health, and vocational domains, (2) Confidence, or an overall sense of positive self-worth, (3) Connection, which refers to positive and reciprocal relationships with peers, family, school, and community members (4)

Character, or acting within the moral, societal, and cultural expectations and (5) Caring, which refers to showing compassion towards others (Bowers et al., 2010; Zarrett & Lerner, 2008). The Five Cs PYD model has been validated with a confirmatory factor analysis and as a predictor of youth social and emotional functioning. For example, the five constructs positively correlate with measures of educational and civic engagement and negatively correlate with mental illness symptoms and delinquency (Bowers et al., 2010; Phelps et al., 2009).

The Social and Emotional Learning (SEL) Framework

The SEL framework is also focused on positive development. SEL emerged as findings from the emotional intelligence literature (e.g. Goleman, 1995) suggested that these "non-cognitive" skills are just as, if not more important, than "cognitive" skills for life success (Zins , Bloodworth, Weissberg, & Walberg, 2007). Thus, the framework emerged as a framework for connecting many different social and emotional skills shown to affect development and collectively thought to comprise important skills for successful development. The field was also propelled by concern that schools were not addressing the mental health and social development needs of students. Since the conception of SEL, a large number of studies have supported the importance of social and emotional functioning for behavioral and academic success (e.g. Durlak et al., 2011).The Collaborative for Academic, Social, and Emotional Learning (CASEL) organization proposed a five factor SEL model, based on surveys of studies of development and interventions meant to affect various social and personal skills (Zins et al., 2007). Notably, the majority of these studies focused on elementary school age samples.

The CASEL Model has become prominent in social and emotional competency studies. The five competencies of this model are (1) self-management, or the ability to regulate thoughts, emotions, and behaviors, (2) self-awareness, or the ability to recognize one's emotions and

accurately assess one's strengths and weaknesses, (3) social awareness or awareness of the culture, beliefs, and feelings of the people and world around them, (4) relationship skills or the ability to effectively communicate, work well with peers, and build meaningful relationships, and (5) responsible decision-making or the ability to make plans for the future, follow moral/ethical standards, and contribute to the well-being of others (CASEL.org, 2014; Payton et al., 2000). The CASEL model includes assertion that these five competences impact four major outcomes; positive social behavior, conduct problems, emotional distress, and academic success (Durlak et al., 2011; Zins et al., 2007; Greenberg et al., 2003). Definitions of these constructs are included in Table 1 and the conceptual model is depicted in Figure 1.

The components of the SEL model have been primarily tested with preschool and early elementary populations, but are now being presumed to apply into middle and high school programming as well. Additionally, there has been no test of the five competencies as a multidimensional measurement model (similar to the process followed for PYD identified above and typically applied to conceptual frameworks). This leaves unclear whether (1) these competencies act as distinct but related components of a model of social and emotional development and (2) the relation of each competency and the overall framework to important indicators of academic, emotional, and social functioning. There have been other attempts to measure social and emotional competencies as informed by the CASEL model, and some have been developed for adolescent populations (e.g., DESSA; LeBuffe & Naglieri, 2008; EQ-i: YV; Bar-On & Parker, 2000). However, neither of these have been specifically intended to follow the CASEL five competencies model and neither tested this specific model as part of the measurement development.

Recent reviews and meta-analyses substantiate the effectiveness of programs captured under the CASEL model, with evidence in school and after school settings. In a meta-analysis of over 207,000 students in K-12th grade, Durlak and colleagues (2011) saw an average increase of 11 percentile points on standardized test scores for students participating in universal school-based SEL programs. In addition to academic achievement improvements (mean effect size of d = 0.27), the findings pointed to improvements in social and emotional skills (mean effect size d = 0.57), attitudes (mean effect size d = 0.23), and behaviors (mean effect size d = 0.24). These results were consistent with previous meta-analyses that explored similar outcomes (Losel & Beelman, 2003; Haney & Durlak, 1998; Wilson & Lipsey, 2007; DuBois, Holloway, Valentine, & Cooper, 2002; Wilson, Gottfredson, & Najaka, 2001; Durlak & Wells, 1997; Horowitz & Garber, 2006). These results also seem to hold for SEL interventions administered in after school settings. In a review of 48 afterschool programs that targeted personal and social skills, Durlak, Weissberg, and Pachan (2010) saw significant positive associations with feelings and attitudes (mean effect size ranging from d = .14 to d = .34), behavioral adjustment (mean effect size of d = .19), and school performance (mean effect size ranging from d = .12 to d = .17).

The interest in conceptualizing SEL as a framework for promoting positive development and ongoing understanding of intervention effects suggests a need to determine if the framework functions as a multi-dimensional model. Two primary questions are (1) whether all five competencies are distinct, critical, and/or complimentary components of effects on positive functioning and (2) whether this SEL formulation, as drawn predominately from studies of children, also applies to adolescents.

Applicability of the SEL model to Adolescence

A recent commission review by the Raikes Foundation on the state of knowledge about SEL assessment for middle school youth noted the limited work in this area and called for more and improved assessment methods that were comprehensive and developmentally informed (Haggerty, Elgin, & Woolley, 2011). Moreover, the importance of establishing a developmental understanding of SEL in adolescence was noted. While many SEL reviews and recommendations encompass kindergarten through 12th grade, a review of the included studies shows the predominance of studies focused on elementary school age populations. For instance, in the Durlak et al. (2011) review, the majority of the samples were from elementary school only. Thirty-one percent included middle school, but only 13% included high school students in the sample. This is also reflected in the SEL measurement development and literature. In a recent review of measures that support SEL implementation, the authors only included measures developed for preschool through 5th graders (Denham, Ji, & Hamre, 2010; CASEL, 2010).

These trends are also present in the policy arena, where all 50 states have free-standing SEL standards at the pre-kindergarten level but only 3 states have free-standing and comprehensive SEL standards that extend into high school (Dusenbury, Weissberg, Goren, & Domitrovich, 2014). Reviews have noted the need for focus on developmental subgroups in future studies (Durlak et al., 2011). While it is possible that the SEL model is robust across adolescence and is similar in form as that thought to apply to children, this has not been tested to date.

The current study used data previously collected on a diverse, nationwide, and normative adolescent sample to validate the PYD Five C's measurement model (Lerner et al., 2005). Utilizing this data set, intended to help establish the validity of measurement of a multi-dimensional framework for positive development, can facilitate understanding of the fit of the

CASEL model for adolescents. The items included provide a rich basis to construct scales to test the fit of the proposed five factor SEL model. In these previous investigations, the proposed model of PYD was found to be a good representation of the interrelation of the five C constructs and robust in multiple waves of data from this longitudinal sample (Lerner et al., 2005, Bowers et al., 2010; Phelps et al., 2009). By utilizing the same candidate items and the same sample, the fit of SEL as an alternative positive youth development schema can be tested and some comparison of the overlap and difference from the PYD measurement model can be completed.

Specifically, this study investigates the following research questions:

1. Does the CASEL theoretical model hold in a normative early adolescent sample? Is there evidence that five constructs (Self-Management, Self-Awareness, Social Awareness, Relationship Skills, and Responsible Decision-Making) form a robust model for adolescent positive functioning?
2. Is this model robust for longitudinal measurement (specifically following adolescence into 6^{th} and 7^{th} grade)?
3. Does this model have predictive validity, such that it is positively related to desirable outcomes such as academic achievement, as measured by school engagement and grades, and negatively related to undesirable outcomes, such as risky behaviors, delinquency, and depressive symptoms?

Method

Participants and Procedures

This study used data collected by the National 4-H Study of Positive Youth Development. Researchers strategically contacted schools to gather a youth sample that was diverse in terms of regional, racial or ethnic, and rural-urban composition. Within each

participating school, all fifth grade students were contacted for participation in the first year (all sixth grade students were contacted the second year, and so on). Data were collected in the United States from 40 cities or towns in 13 different states. Surveys were administered to youth and their parent or guardian (Lerner et al., 2005). More details on the recruitment and methods of this study can be found in previously published work (e.g. Lerner et al., 2005; Phelps et al., 2007). The participants were a diverse group of U.S. adolescents beginning in 5th grade and following them through high school.

The present study used the data from the first wave of data collection (5th grade) for the building and testing of the measurement model and for the questions of predictive validity. The second and third waves (6th and 7th grade) of data were used for the purposes of determining the model's appropriateness for different developmental time periods, and for further exploration of predictive validity. For wave one, a diverse sample of 1,700 fifth grade (10 and 11 year old) students was engaged. For waves two and three, youth from wave one were retested and an additional group was added to maintain power in light of attrition (749 added in sixth grade and 783 added in seventh grade). Attrition in this sample, like most, was not completely random and happened at both the individual and site level. In some instances, participants from an entire school/site were lost when principals withdrew consent. For example, this resulted in the loss of over 500 participants from wave one to wave two and over 300 participants from wave two to wave three (Phelps et al., 2007). At the individual level, only 10-20% of participants attrited between waves one, two, and three. For the purposes of this study, the differences in sample composition from one wave to the next can be seen as a strength, as our primary interest is in robustness of the model over age and sample variations. Details about the participant characteristics, demographic information, and overall sample attrition/addition for each wave are

reported in Table 2. Participants completed the surveys in groups engaged through youth serving agencies. All responses were kept confidential.

This is a secondary data analysis study and intended to test a different theoretical organization of the positive development items than previously tested and reported in other publications. Thus, there has been utilization of the items and similar scale development test reported in prior publications but for substantially different purposes (e.g. Lerner et al., 2005). Previous studies that utilized the 4-H dataset did use items and scales that are used in this study. Specifically, the same outcome measures used for predictive validity of the Five Cs PYD model were also used in the predictive validity section of this study. This was purposeful on part of the authors, to examine SEL as an alternative or complimentary model to PYD and to determine if this model also predicts the outcomes that we tend to be interested in for adolescent samples (delinquency, risky behaviors, and depression). Items used in the SEL scale development do overlap with items in the PYD measure to some extent, however the overlap is minimal and the configuration of the items is unique to this paper. Table 3 summarizes the items utilized to measure the five competencies here and the relation to loadings on the Five Cs PYD model.

Measures

The measures used in this study were drawn from the 4-H dataset. The same outcome measures used are those also used in the original validation study of the PYD model (Phelps, 2009; Bowers, 2010). A short description of each is provided below. The items used in the development of the SEL model do not overlap with items on any of the measures used as outcomes in the predictive validity analysis.

Social and Emotional Learning. The items used to create this measure were derived from the Selection, Optimization, and Compensation scale (SOC; Freund & Baltes, 2002),

Target-Based Expectations Scale (TBES; Buchanan & Hughes, 2004), Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998), Peer Support Scale (PSS; Armsden & Greenberg, 1987), and the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983). Items were selected if they related to positive development or SEL conceptually.

School engagement. The school engagement measure consisted of four items from the Search Institute's Profiles of Student Life – Attitudes and Behaviors (PSL-AB; Benson et al., 1998) questionnaire. An example item is, "*How often do you come to classes without your homework finished?*" The items were on a three-point Likert scale where *1= usually*, 2 = *sometimes*, and 3 = *never*. Scales were calculated by summing the four items. The Cronbach alpha's ranged from 0.63 to 0.65.

Grades. Grades were measured using a self-report item from the PSL-AB (Benson et al., 1998) questionnaire. The item asked participants to report the grades they earned in school from *mostly A's* to *mostly D's*. The items were then coded to reflect a number on the GPA scale of 0 to 4.0, which were used in these analyses.

Risk behaviors. Risk behaviors were measured using a combination of items from the PSL-AB scale (Benson et al., 1998) and the Monitoring the Future (2000) questionnaire. There were five items assessing the frequency of risk taking activity (e.g. smoke cigarettes) with responses ranging from 1 (*never*) to 4 (*regularly*). All items contained the prefix, "*During the last 12 months, have you ever done any of the following?*" An example item is, "*Have you ever smoked cigarettes?*" The score used in this analysis was the summation of the five items on this scale. The Cronbach's alpha for this scale ranged from .70 to .87.

Delinquency. Delinquency was measured using four items from the PSL-AB scale (Benson et al., 1998). The items assessed the frequency of delinquent behaviors (e.g. damaged property) with responses ranging from 1 (*never*) to 5 (*five or more times*). An example item is, "*During the last 12 months, how many times have you stolen something from a store?"* The score used in this analysis was the summation of the four items on this scale. The Cronbach's alpha for this scale ranged from .70 to .87.

Depressive Symptoms. Depressive symptoms were measured using the Center for Epidemiological Studies Depression (CES-D) scale (Radloff, 1977). It consisted of 20 items on a likert scale where participants indicated from 0 (*rarely or none of the time (less than 1 day)*) to 3 (*most of the time (5-7 days)*) how often they experienced symptoms during the past week. An example item is, "*During the past week I felt sad*". The score used in this analysis was the summation of the 20 items on this scale. The Cronbach's alpha for this scale ranged from .81 to .89.

Results

Scale Development and Replication

In order to address the first two research questions of whether the CASEL theoretical model was appropriate in a normative early adolescent sample and would replicate over three waves, similar procedures utilized by Lerner et al. (2005), Bowers et al. (2010), and Phelps et al. (2009) to form the scales and the measurement model for the Five Cs PYD model with these data were applied, as follows.

The 4-H survey contained over 100 items that aimed to capture information on physical and mental health, engagement in school and community, goals for the future, and behaviors, just to name a few. First, we selected items within the survey that seemed to distinctly capture one of

the five constructs in the SEL model; adhering to the CASEL definitions outlined in the introduction (refer to Table 1). The original list was gathered with a broad lens and resulted in a substantial number of items. This item list was then reduced in two ways; first by an independent rater item-sort task and second by conducting an Exploratory Factor Analyses (EFA) for each scale.

Four independent raters (lab members familiar with PYD and SEL) were given the full item list with the definitions (Table 1) of each of the five constructs. They were asked to sort the items into the five constructs, strictly adhering to the definitions. If an item did not fit into any of the five constructs, they were able to note that, as well. Items that had more than two raters disagree were removed from the item list. Items that had complete agreement or only one rater disagreement were retained and subjected to EFA.

The data was randomly split in half to conduct the EFA (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Items with loadings below .30 were excluded from further consideration. If the number of items per scale was still large (greater than 10 items), additional items were dropped if they seemed redundant or had a low loading relative to the other items on the scale. This procedure was intended to ensure equal representation of each scale and to not artificially increase reliability due to redundancy within a scale.

A model of these retained items with assigned membership on the five construct scales was then subjected to a confirmatory factor analysis (CFA) using MPlus version 7.1. This model is illustrated in Figure 2 and the item list is included in Table 3. The resulting structure was then tested for fit with waves two (6^{th} grade) and three (7^{th} grade) data. A reliability analysis was also run on all five scales in each wave using SPSS version 21.0.

Scale Factor Structure and Model Fit

The first model (Figure 2) was tested for wave one (5th grade) using CFA and resulted in a fit that was not within the acceptable range for all indices ($\chi 2$= 1764, *df* = 512, $p < .01$; root mean square error of approximation (RMSEA) = .038 [.036, .040]; comparative fit index (CFI) = .906; Tucker Lewis Index (TLI) = .897). Modification indices and the loadings of items were evaluated and directed toward improvements. In particular, the Relationship Skills scale seemed to be comprised of items that split into two distinct themes. The first theme was related to creating relationships and an example item was, "*Which kind of kid is more like you?: Some kids find it hard to make friends OR for other kids it's pretty easy*". The second theme was related to relationship quality and an example item was, "*My friends are there when I need them*". Thus, it seemed that the model should contain two subscales for relationship skills: a creating relationships subscale and a relationship quality subscale. This modified model, when subjected to CFA, resulted in all hypothesized pathways being significant, however the model fit was still below the level fully acceptable for some indices, $\chi 2$= 1275, *df* = 398, $p < .01$; RMSEA = 0.036; CFI = 0.928; TLI = 0.921. Review of the modification indices suggested fit could be improved by allowing residual correlations among some items within scales (e.g.; RD14 – "*Accepting responsibility for my actions when I make a mistake or get in trouble*." with RD13 – "*Telling the truth, even when it's not easy*.") as well as one correlation between a scale and a subscale (Self Awareness with Creating Relationships). These were inspected within the context of the theoretical framework. These modifications improved the fit that was retained as the final model, $\chi 2$= 624, *df* = 443, $p < .001$; RMSEA = 0.015 [0.013, 0.018]; CFI = 0.986; TLI = 0.984. The model can be seen in Figure 3. As shown there, standardized factor loadings for the items in this final model ranged from .31 to .89.

Longitudinal Model Fit

This established model was then tested for longitudinal fit through measurement invariance testing. First, the final model was tested for wave two and wave three. Results from each CFA indicated good stability of the model over these three waves through good fit indices, factor loadings, and standardized estimates; as detailed in Table 4. Reliability analyses further supported the model robustness, with Cronbach's Alpha mostly stable across waves (Table 5).

We tested for configural invariance across waves, which requires that the factor structure (number of factors and loading pattern) is stable over time, by including all three waves in the CFA model (Geiser, 2013). This resulted in good fit (χ^2 = 6974, *df*= 4398, p<.001; RMSEA = 0.014; CFI= .953, TLI=.951). We tested for metric invariance of the SEL model by testing whether the first and second order loadings of like items were stable across time (Bowers et al., 2010). First, the first order factor loadings of like items were constrained to be equal. This resulted in good fit (χ^2 = 6896, *df*= 4374, p<.001; RMSEA = 0.013; CFI= .954, TLI=.952). Second, the second order factor loadings were constrained to be equal, which also resulted in good fit (χ^2 = 7385, *df*= 4313, p<.001; RMSEA = 0.015; CFI= .944, TLI=.941). These results support that both the first and second order factor loadings were invariant across time (Bowers et al., 2010; Geiser, 2013).

Scale Predictive Validity

In order to address the predictive validity of the model in explaining indicators of functioning, we ran a regression in an SEM framework with wave one, wave two, and wave three data, separately. The five SEL scales (Self-awareness, Self-management, Social Awareness, Relationship Skills, and Responsible Decision Making) were used at predictors (independent variables) and the five outcomes of interest (school engagement, grades, risk

behaviors, delinquency, and depression) were used as dependent variables. The analysis was run in MPlus version 7.11 (Muthen & Muthen, 2015).

To test the value of the SEL measurement model in relation to important outcomes for youth, regression analyses were conducted in an SEM framework for each wave. First, by using the latent factor SEL as a predictor of all five outcomes and then, by using the SEL scales as the independent variables (predictor) and academic achievement (school engagement and grades) and negative outcomes (risky behaviors, delinquency, and depression) as the dependent variables. The latent SEL factor significantly predicted all but one outcome in the expected direction. Prediction using all five SEL scale factors predicting the outcomes of interest in depicted for each wave in Figure 4. Only significant coefficients are included. There is consistent significant positive relations with positive outcomes and negative relations with negative outcomes across SEL dimensions.

Discussion

To date, the CASEL model has been primarily relied on as a conceptual model that captures a set of primary social and emotional skills thought to constitute essential contributors to healthy development. Nor has there been much consideration about how this model may or may not have utility for understanding adolescents. Yet, it is increasingly offered and referred to as a comprehensive multi-dimensional framework of the skills essential for successful social and emotional development (Domitrovich, 2015; Durlak, Domitrovich, Weissberg, & Gullotta, 2015; Phelps et al., 2009). Thus, while many developmental and intervention studies can fall under the umbrella of these five skills, the model itself has not been subjected to a test of its coherence or completeness.

When tested in a normative adolescent sample confirmatory factor analysis support the CASEL five factor model with the dimensional components as theorized, with one important variant. The relationship skills scale separated into two subscales; creating relationships and relationship quality. This finding points to several possibilities worthy of further exploration. First, it may be that relationship creating and quality are distinct enough components of SEL to warrant being separate components in a revised model. Further, this found difference may be developmentally dependent; it could be that this differentiation emerges in adolescence when peer relationships rise to primacy in personal concern and in developmental influence (Seigel, 2013; Steinberg, 2005). A factor analytic study of younger age samples could inform the developmental specificity of this finding. Second, as any item pool cannot capture all possible applicable items, it could be that the items accessible in this data set pulled for differentiation of these skills or did not adequately tap across the domain to cause a single dimension to emerge. However, the clarity of the loadings and the fit of the model, as well as the subsequent confirmation suggest this is not simply a measurement artifact or unreliable finding. While further consideration of the specificity and completeness of the items is certainly needed, these results seem to suggest some consideration of how these might be different domains of relationship skills is warranted.

Despite this variation from the framework model offered by CASEL and utilized widely, the overall results suggest the validity of the model as a multidimensional measurement approach. The CFA modifications from the theorized model other than this were minor and related to error correlation of some items. Thus, the factor analysis suggest the model as theorized has validity and can be seen as capturing the critical components of SEL and acting as a positive adolescent development approach.

The resulting scale structure was confirmed with the additional waves of data, corresponding to 6th and 7th grade. The configural and metric invariance findings suggest that the resulting model is appropriate for early adolescence (5th through 7th grade) in that both first and second order factors are stable across measurement occasions (Geiser, 2013; Bowers et al., 2010). The sample utilized, while not representative of the United States and of limited ethnic diversity, is normative in the sense of being engaged as a cross-section of youth engaged in a widespread youth organizations and schools.

Further, the predictive validity analysis in this study supports the model's relation to important outcomes for adolescence, such that SEL is positively related to school engagement and grades and negatively related to risk behaviors, delinquency, and depressions. These results support the notion that social and emotional competencies are importantly linked to outcomes of success and thriving in adolescence, consistent with findings of explanatory value earlier in development of a multidimensional SEL formulation (Payton et al., 2000). Further, the differential prediction patterns across waves support the notion that the five scales uniquely contribute to important outcomes and therefore, should not be reduced to a single, SEL factor. For instance, self-awareness consistently predicts outcomes across all three waves, particularly depressive symptoms, delinquency, and grades. On the other hand, relationship skills is predictive of more outcomes in wave one (risky behaviors, depressive symptoms, and delinquency), than in wave two (depressive symptoms) and wave three (delinquency). Self-management consistently predicts school engagement across all three waves and additional outcomes in waves two and three. This model has great utility for understanding adolescent development. One implication is to suggest evaluation about how the SEL scales each contribute

to adolescent development and the interdependency of these in shaping pathways through this age period.

When juxtaposed to the Five Cs model, it is apparent that there is considerable overlap in what each model emphasizes, but some distinction in conceptual organization. The Five Cs model emphasizes some characteristics the CASEL model does not, including positive identity (in the confidence scale), physical competence (in the competence scale), personal values (in the character scale), values diversity (in the character scale), community connection (in the connection scale), family connection (in the connection scale), and school connection (in the connection scale) (Phelps et al., 2009). This comparison using the same data suggest there are important conceptual and construct component similarities. There is substantial overlap in the items retained in the SEL model and the items on the Five Cs PYD scale, but also substantial difference. For instance, the self-awareness (SEL) scale has three items in common with the confidence (PYD) scale and two items in common with the character (PYD) scale. Self-awareness may be capturing some confidence and character traits of PYD. Additionally, creating friendships (SEL) overlaps with competence (PYD). Creating friendships might be a sub-theme of the competence construct that is not overtly reflected in the current definition (positive view and performance in the social, academic, cognitive, health, and vocational domains), but perhaps inherent. The relationship quality (SEL) scalealso shares items with the connection (PYD) scale, which makes sense intuitively, as does the overlap between responsible decision making (SEL) and character (PYD). Conceptually, the SEL model suggests that the component skills should be promoted in all youth, while the Five Cs PYD model focuses more on alignment of resources to strengths in a more individualized manner (Lerner, Dowling, & Anderson, 2003). Divergently, SEL is traditionally applied to educational settings while PYD has spanned many settings that

include educational and community, among others (Elias et al., 1997; Greenberg et al., 2003; Lerner, Dowling, & Anderson, 2003). This may point to a broad conceptual overlap between the models but distinction in constructs composing the models and how competencies or skills are formulated.

Limitations

The authors must point out several limitations to this work. First, the 4-H dataset was not collected with the intention to create an SEL measurement model. For this reason, the items on the scales may not have captured appropriately, broadly, or in depth important representations of all the five constructs. In addition, the self-awareness scale had the lowest loading, relative to the other scales. The authors purport that the key interest in this study was the validation of the overall theorized model and, with the strong findings for the overall model fit and the loadings of the items on the factors (including the items on the self-awareness scale), retaining the self-awareness scale is justified. One other limitation is the sample. While having many strengths, the sample has relatively limited ethnic and economic diversity and size for sensitively detecting variations related to these demographic differences. This study also did not have the space to adequately address specific racial or ethnic groups in the analysis. Similarly, this sample is only of youth in the United States. Future work and sampling that permits more confidence about fit to subgroups and other populations are needed.

Conclusion

Overall, the results support viewing a slightly modified version of the CASEL model as a valid, and perhaps alternative or complimentary, framework for adolescent research and practice. While both the Five Cs and SEL models have now been empirically supported as appropriate models for adolescent development, it is important to note that these models have similarities

and distinctions. The models similarly approach development from a positive lens as opposed to a deficit lens. It does seem apparent that each model has distinct features and both models are appropriate (have strong factor reliability and predictive validity of youth outcomes) when considering early adolescent development. Further examination of their interrelation and utility in varying contexts of adolescent development is necessary.

This first test of the CASEL conceptual model as a measurement model provides robust support for its utility in studying adolescent social and emotional development. While limited by reliance on single sources and self-report, the results hold across age groups and changing membership of cohort samples. Further studies with larger, more diverse, and child- through adult-hood samples are needed to determine the extent of robustness across age groups and different populations. However, these results suggest a reliable basis for measurement in those studies and for further developmental studies that examine the trajectories of the five SEL constructs and the meaning of differences in these trajectories for overall functioning and intervention design.

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Tables

Table 1.
Definitions of the 5 Core SEL Competencies.

SEL Competency	Definition
Self-management	The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.
Self-awareness	The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.
Social awareness	The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.
Relationship skills	The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
Responsible decision making	The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.

Note: Derived from CASEL.org (2014).

Table 2.
Sample Characteristics.

	Wave 1	**Wave 2**	**Wave 3**
Number of Youth	1717	1953	2069
Number Lost	-	749	783
Number Added	-	985	899
Age (mean, SD)	10.97 (0.53)	12.09 (0.69)	13.13 (0.87)
Male (%)	48.0	42.6	39.4
Geographic Location (%)			
Urban	27.8	26.3	28.8
Suburban	44.4	33.2	28.3
Rural	27.9	40.8	43.0
Race/Ethnicity (%)			
African American	7.5	7.4	8.3
Asian American	3.9	2.6	2.7
American Indian	3.0	2.9	2.3
European American	53.3	60.2	67.1
Latino/a American	17.7	15.6	11.3
Multiracial	4.7	4.6	4.1
SES indicators			
Annual per capita income (mean, SD)	$13,657 (8348)	$13,636 (8621)	$16,553 (10631)
Mothers' Ed in years (mean, SD)	13.66 (2.40)	13.94 (2.51)	14.16 (2.31)

Table 3.
Retained Item List with Original Source and Overlap with PYD Model.

Scale	Item name	Item description	Original Scale Source	If used in PYD measure
Self-management	SM15	When I decide upon a goal, I stick to it OR I can change a goal again at any time.	Selection scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
	SM17	When I do not succeed right away at what I want to do, I don't try other possibilities for very long OR I keep trying as many different possibilities as are necessary to succeed at my goal.	Optimization scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
	SM19	I don't think long about how to realize my plans, I just try it OR I think about exacttly how I can best realize my plans.	Optimization scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
	SM20	I make every effort to achieve a given goal OR I prefer to wait for a while and see if things will work out by themselves.	Optimization scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
	SM21	When I have started something that is important to me, but has little chance at success, I make a particular effort OR When I start somethng that is important to me but has little chance at success, I usually stop trying.	Optimization scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
	SM24	Even if something is important to me, it can happen that I don't invest the necessary time or effort OR For important things, I pay attention to whether I need to devote more time or effort.	Compensation scale from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002)	
Self-awareness	SA13	Some kids often get mad at themselves BUT Other kids are pretty pleased with themselves.	Self-Worth scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Confidence
	SA17	Some kids aren't very happy with the way they do a lot of things BUT Other kids thinks the way they do things is fine.	Self-Worth scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Confidence
	SA38	Some kids don't like the way they are leading their life But Other kids do	Self-Worth scale from the Self-Perception	Confidence

		like the way they are leading their life	Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	
	SA39	Some kids usually get in trouble because of the things they do But Other kids usually don't do things that get them in trouble.	Conduct Behavior scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Character
	SA40	Some kids do things they know they shouldn't do But Other kids hardly ever do things they know they shouldn't do.	Conduct Behavior scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Character
Social Awareness	SO4	caring	Pro-Social scale from Target-Based Expectations scale (Buchanan & Hughes, 2004)	
	SO5	honest	Pro-Social scale from Target-Based Expectations scale (Buchanan & Hughes, 2004)	
	SO7	considerate of others	Pro-Social scale from Target-Based Expectations scale (Buchanan & Hughes, 2004)	
	SO9	respectful	Pro-Social scale from Target-Based Expectations scale (Buchanan & Hughes, 2004)	
	SO11	helpful	Pro-Social scale from Target-Based Expectations scale (Buchanan & Hughes, 2004)	
Relationship Skills (Creating)	RS13	Some kids find it hard to make friends BUT for other kids it's pretty easy.	Social Competence scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Competence
	RS15	Some kids are kind of hard to like BUT others are really easy to like.	Social Competence scale from the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	Competence
	RS17	Some kids wish that more kids liked them BUT Others feel that most kids	Social Competence scale from the Self-Perception	Competence

Relationship Skills (Quality)		do like them.	Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983)	
	RS19	I trust my friends.	Peer Support scale (PSS; Armsden & Greenberg, 1987)	Connection
	RS20	I feel my friends are good friends.	Peer Support scale (PSS; Armsden & Greenberg, 1987)	Connection
	RS21	My friends care about me.	Peer Support scale (PSS; Armsden & Greenberg, 1987)	Connection
	RS22	My friends are there when I need them.	Peer Support scale (PSS; Armsden & Greenberg, 1987)	Connection
Responsible Decision Making	RD5	Helping other people	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD6	Helping to make the world a better place to live in.	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD7	Giving time and money to make life better for other people.	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD8	Helping to reduce hunger and poverty in the world.	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD9	Helping to make sure all people are treated fairly	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD10	Speaking up for equality (everyone should have the same rights and opportunities)/	Social Conscience scale on the Search Institute's Profiles of Student Life: Attitudes and Behaviors	Character

			scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	
	RD11	Doing what I believe is right even if my friends make fun of me.	Personal Values scale from the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD13	Telling the truth, even when it's not easy.	Personal Values scale from the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character
	RD14	Accepting responsbility for my actions when I make a mistake or get in trouble.	Personal Values scale from the Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998)	Character

Table 4.
Measurement Models for Grades 5, 6, and 7 SEL Standardized Estimates, (Residual Errors).

	Grade 5 (Wave 1)	Grade 6 (Wave 2)	Grade 7 (Wave 3)
Self-Management			
SM15	0.378 (0.031)	0.376 (0.032)	0.362 (0.031)
SM17	0.498 (0.031)	0.521 (0.031)	0.562 (0.027)
SM19	0.318 (0.031)	0.373 (0.029)	0.350 (0.028)
SM20	0.313 (0.032)	0.397 (0.034)	0.456 (0.032)
SM21	0.474 (0.031)	0.398 (0.034)	0.443 (0.033)
SM24	0.413 (0.031)	0.467 (0.033)	0.416 (0.030)
Self-awareness			
SA13	0.585 (0.023)	0.611 (0.022)	0.638 (0.023)
SA17	0.600 (0.027)	0.702 (0.021)	0.613 (0.025)
SA38	0.586 (0.026)	0.637 (0.023)	0.713 (0.023)
SA39	0.529 (0.027)	0.540 (0.025)	0.534 (0.026)
SA40	0.492 (0.028)	0.568 (0.025)	0.507 (0.027)
Social Awareness			
SO4	0.730 (0.021)	0.828 (0.017)	0.835 (0.014)
SO5	0.697 (0.023)	0.788 (0.016)	0.756 (0.018)
SO7	0.716 (0.022)	0.833 (0.015)	0.841 (0.015)
SO9	0.690 (0.024)	0.746 (0.021)	0.704 (0.022)
SO11	0.662 (0.025)	0.720 (0.022)	0.741 (0.021)
Creating Relationships			
RS19	0.735 (0.022)	0.722 (0.020)	0.790 (0.018)
RS20	0.803 (0.019)	0.772 (0.019)	0.849 (0.014)
RS21	0.888 (0.012)	0.897 (0.012)	0.929 (0.010)
RS22	0.827 (0.016)	0.822 (0.015)	0.906 (0.009)
Relationship Quality			
RS13	0.553 (0.027)	0.610 (0.024)	0.637 (0.027)
RS15	0.645 (0.023)	0.692 (0.022)	0.674 (0.027)
RS17	0.573 (0.026)	0.648 (0.024)	0.615 (0.029)
Responsible Decision Making			
RD5	0.823 (0.018)	0.827 (0.014)	0.774 (0.017)
RD6	0.815 (0.017)	0.843 (0.012)	0.797 (0.014)
RD7	0.802 (0.018)	0.807 (0.014)	0.796 (0.014)
RD8	0.831 (0.015)	0.790 (0.016)	0.747 (0.016)
RD9	0.829 (0.016)	0.847 (0.012)	0.718 (0.018)
RD10	0.802 (0.019)	0.802 (0.015)	0.622 (0.023)

RD11	0.687 (0.026)	0.736 (0.020)	0.572 (0.023)
RD13	0.690 (0.025)	0.735 (0.018)	0.565 (0.023)
RD14	0.716 (0.024)	0.751 (0.018)	0.582 (0.023)
Relationship Skills			
Creating Relationships	0.476 (0.050)	0.512 (0.041)	0.746 (0.040)
Relationship Quality	0.517 (0.050)	0.540 (0.043)	0.536 (0.040)
SEL			
Self-management	0.836 (0.040)	0.629 (0.036)	0.732 (0.033)
Self-awareness	0.490 (0.038)	0.561 (0.032)	0.579 (0.031)
Social awareness	0.721 (0.035)	0.827 (0.025)	0.827 (0.023)
Relationship Skills	0.703 (0.057)	0.747 (0.047)	0.729 (0.038)
Responsible Decision Making	0.610 (0.039)	0.711 (0.026)	0.665 (0.026)

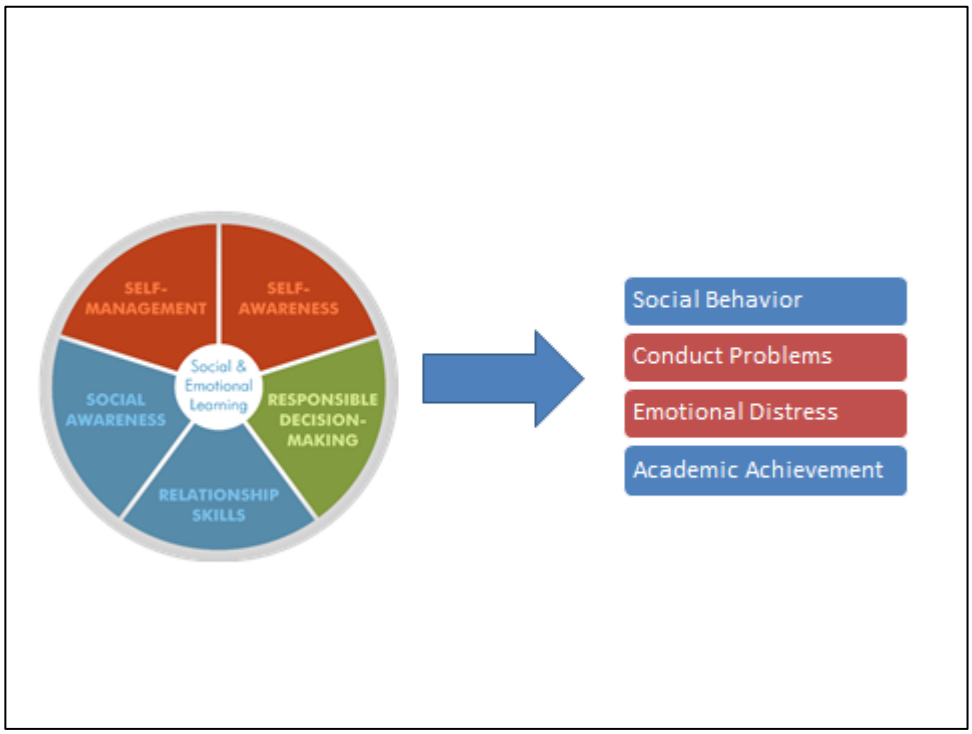
Note: Original item names were retained for clarity. For reference, please refer to Table 3.

Table 5.
Reliability Coefficients for SEL Scales.

	Cronbach's Alpha		
	Wave 1	Wave 2	Wave 3
Self-Awareness	.71	.76	.76
Social Awareness	.83	.89	.89
Self-Management	.48	.48	.49
Responsible Decision Making	.93	.94	.90
Relationship Skills	.76	.78	.83

Figures

Figure 1.
The CASEL Theoretical Model.



Note: Retrieved from CASEL.org (2014).

Figure 2.
Hypothesized SEL Measurement Model for Initial CFA.

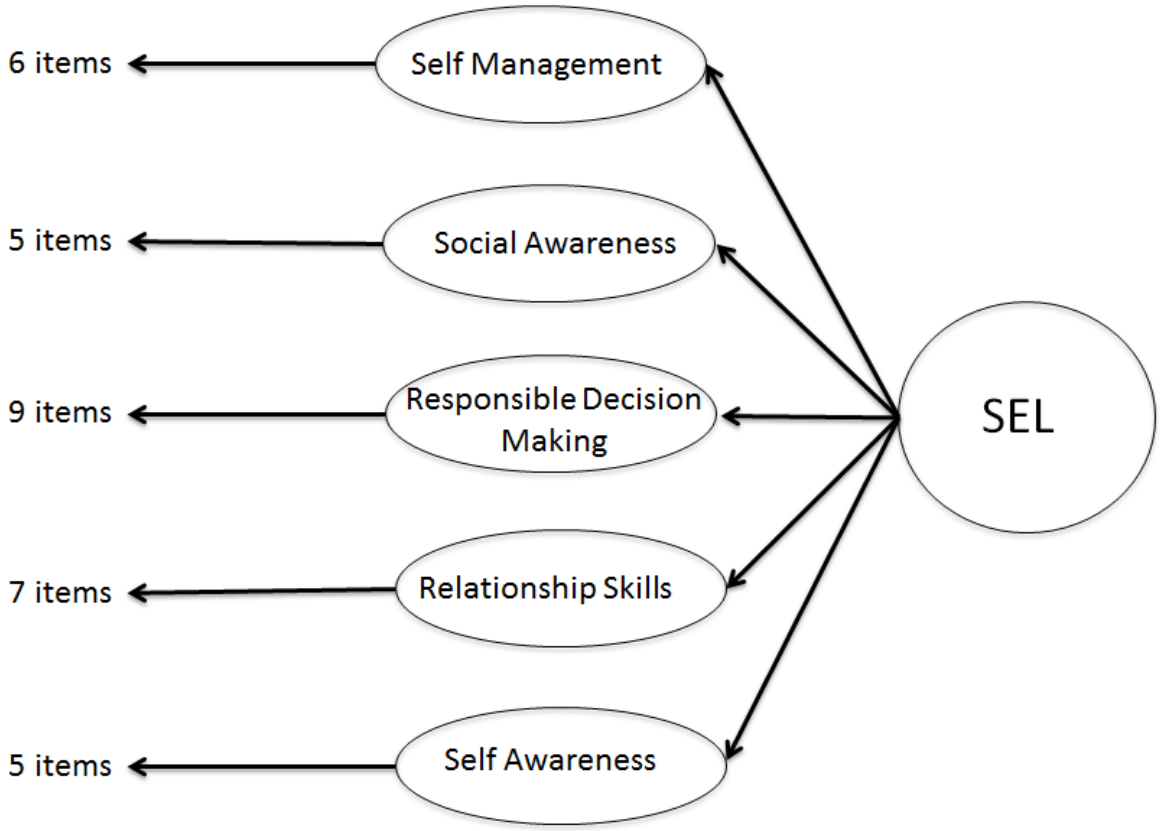
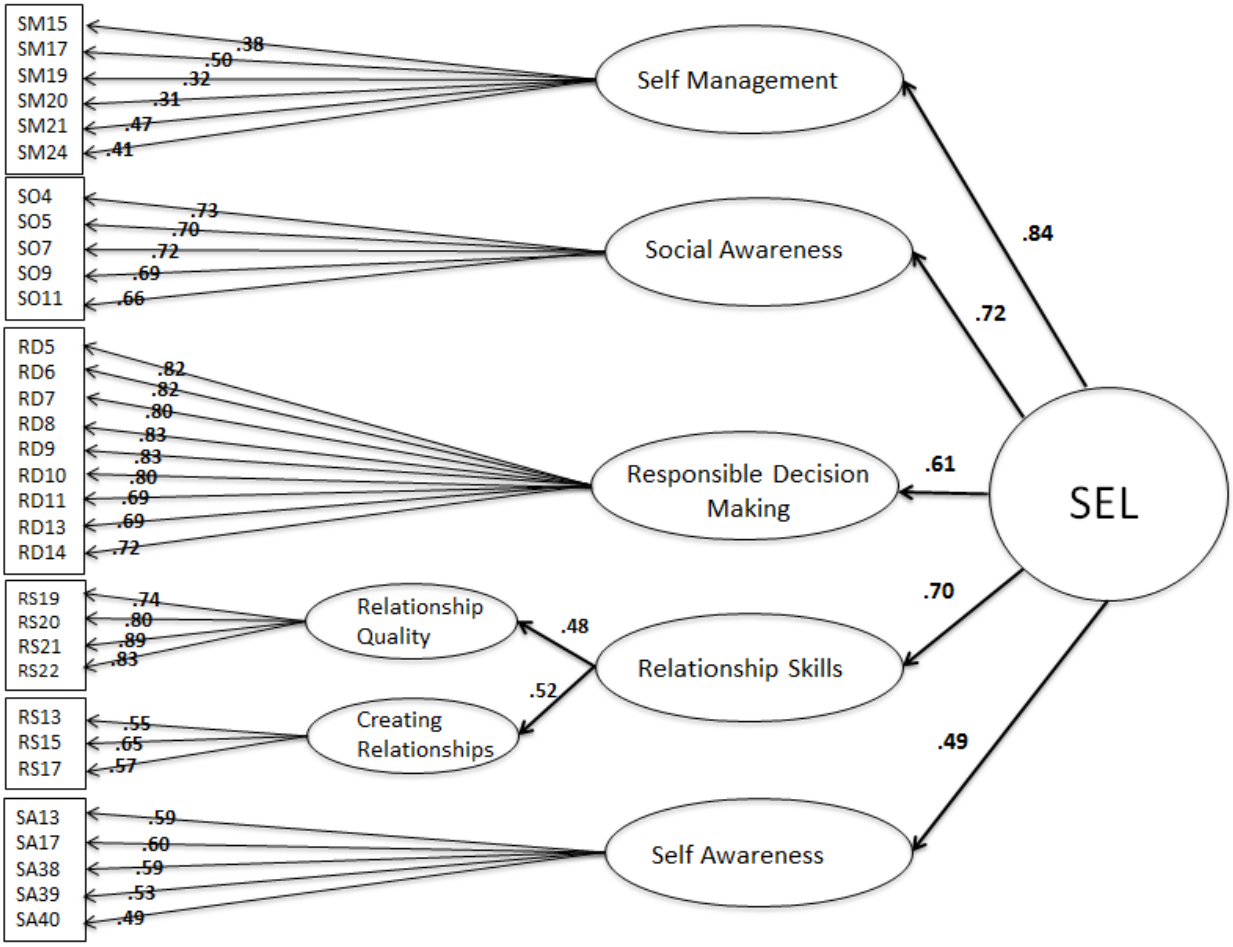
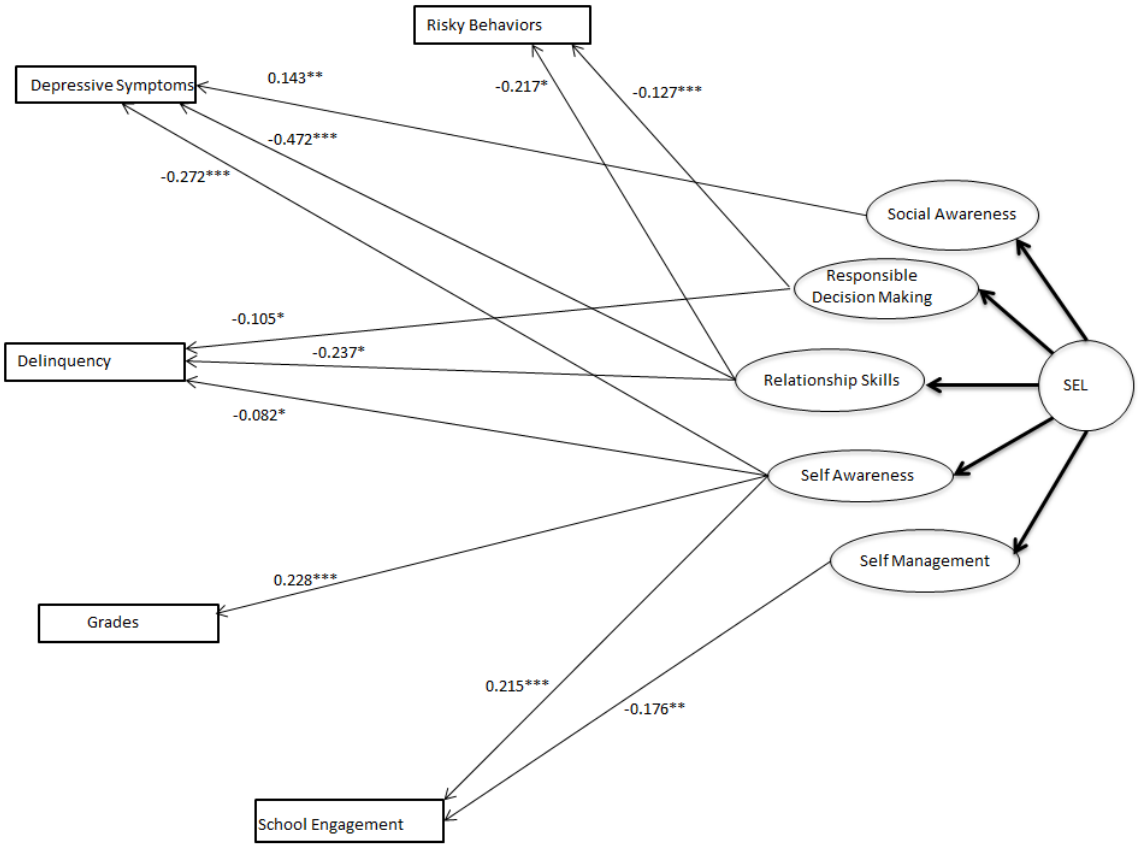


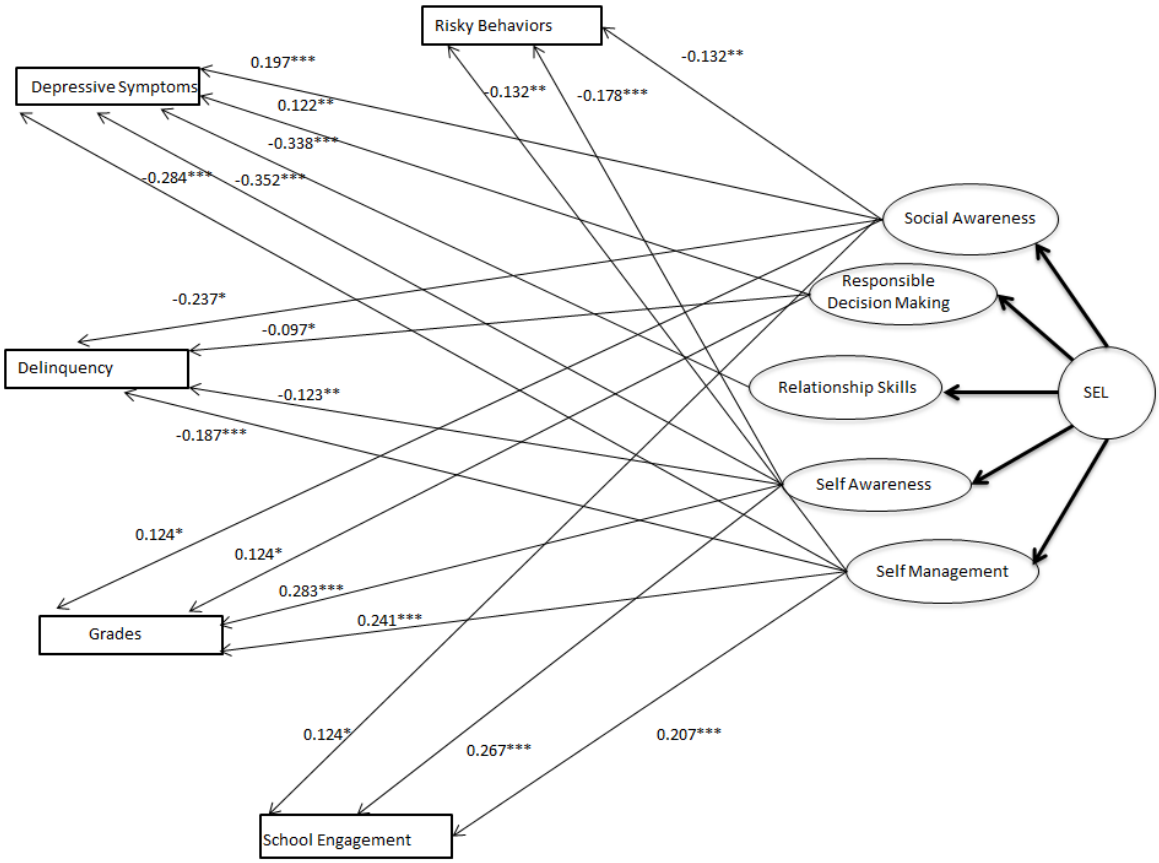
Figure 3.
Revised SEL Model for grade 5 (wave 1).

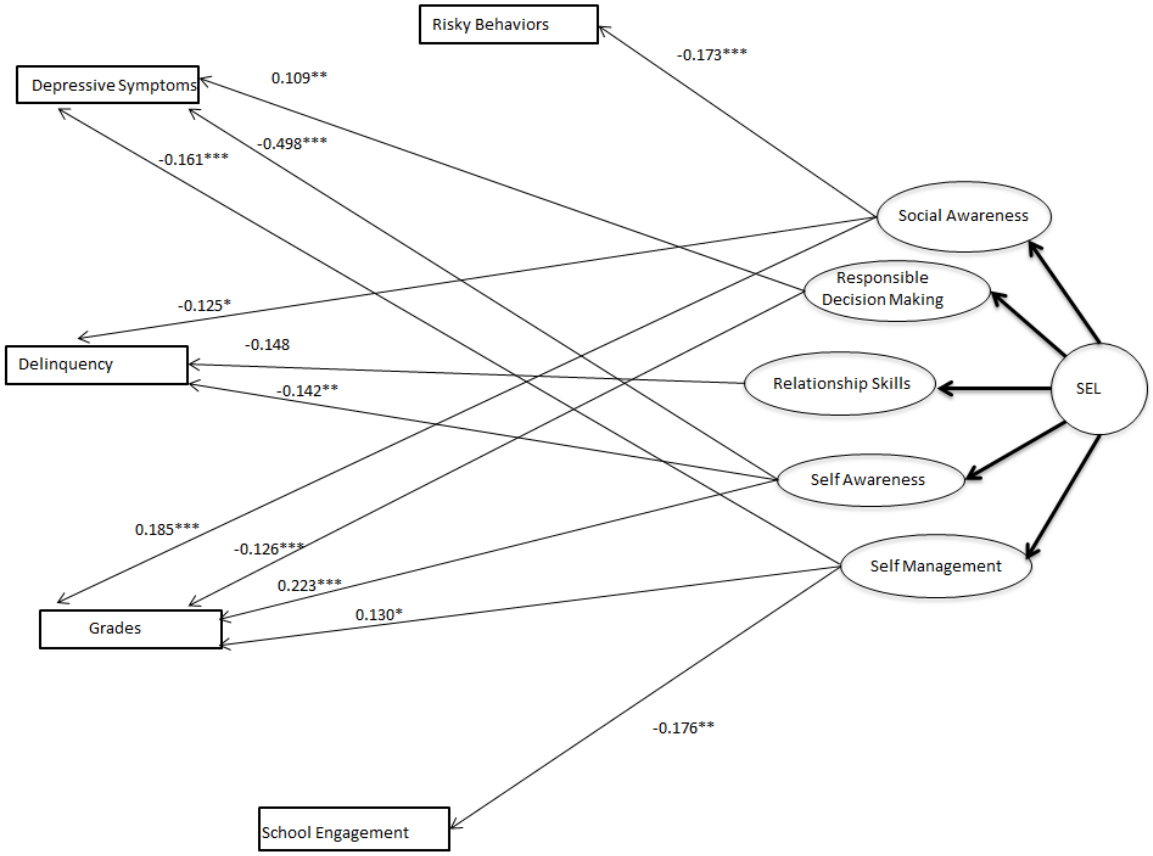


Note: Correlations among items are not shown here to maintain clarity of the figure. ($\chi 2$= 624, *df* = 443, $p < .001$; RMSEA = 0.015 [0.013, 0.018]; CFI = 0.986; TLI = 0.984)

Figure 4.
Predictive Validity of SEL Scales on Positive and Negative Outcomes (waves 1, 2, and 3 separately).




Risky Behaviors
Depressive Symptoms
Delinquency
Grades
School Engagement
Social Awareness
Responsible Decision Making
Relationship Skills
Self Awareness
Self Management
SEL
0.197***
0.122**
-0.338***
-0.284***
-0.352***
-0.132**
-0.178***
-0.132**
-0.237*
-0.097*
-0.123**
-0.187***
0.124*
0.124*
0.283***
0.241***
0.124*
0.267***
0.207***


Risky Behaviors
Depressive Symptoms
0.109**
-0.173***
-0.498***
-0.161***
Social Awareness
Responsible Decision Making
-0.125*
Delinquency
-0.148
Relationship Skills
SEL
-0.142**
Self Awareness
0.185***
-0.126***
Self Management
0.223***
0.130*
Grades
-0.176**
School Engagement

An Exploration of the Normative Growth Trajectory of Social and Emotional Skills for Adolescence: A Gender Comparison

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Keywords: social and emotional learning, adolescence, development, growth trajectories

Abstract

Empirical evidence supports the importance of Social and Emotional Learning (SEL) skills in school and life success. However, no study to date has documented the normative/typical growth trajectories of these critical skills over adolescence. This study examines longitudinal growth trajectories of self-awareness, self-management, responsible decision making, and relationship skills (creating relationships and relationship quality) using data from the 4-H Study of Positive Youth Development, a diverse (61% female; 7% African American, 3% Asian American, 2% American Indian, 72% White; 25% Urban, 38% Suburban, 37% Rural) sample of over 1,500 United States youth beginning at age 10 and following them to age 18. Findings suggest that (1) SEL skills each follow differing, non-linear trajectories and (2) the trajectories differ for males and females. Implications for adolescent SEL studies and practices are discussed.

An Exploration of the Normative Growth Trajectory of Social and Emotional Skills for Adolescence: A Gender Comparison

The recent publication of the Handbook of Social and Emotional Learning highlights the growing body of empirical and practical work in the field of Social and Emotional Learning (SEL) and the evidence of relation to academic and life success (Durlak, Domitrovich, Weissberrg, & Gullotta, 2015; Durlak et al., 2011). Steinberg (2014) argues that social and emotional skills are *more* crucial during adolescence than any other stage of life, because this stage lays the foundation for adult functioning and is the "greatest period of malleability" (p. 31). In addition, given the biological and neurological changes documented during adolescence, it is unclear whether social and emotional skills should be stable or changing, and if the development of these skills are likely to be closely or minimally related to each other (Blakemore & Mills, 2014; Blakemore, 2012).

This study draws on one common model used to study social and emotional development, put forth by the Collaborative for Academic Social and Emotional Learning (CASEL). This model highlights five key SEL competencies that are essential for school and life success; self-awareness, self-management, social awareness, responsible decision-making, and relationship skills. However, there has been limited effort to assess across all five skills or specify these as components within a multidimensional model. Most of these efforts have been focused on one or two skills included under the conceptual umbrella of social and emotional learning skills. Moreover, there has been limited articulation of what the developmental pattern of these skills should be during the adolescence period. Most prior conceptual and empirical efforts have focused on elementary-aged youth (Durlak et al., 2011; Durlak, Weissberg, & Pachan, 2010; Denham, Ji, & Hamre, 2010). Yet, much programming and discussion of child and youth

development refers to this organization and these components skills as part of a specific multi-dimensional framework, with presumed developmental trajectory(s).

While growth patterns during adolescence have been given attention in prior research, much of this is focused on problem behavior (e.g. Bongers, Koot, van der Ende, & Verhulst, 2003) or growth patterns in risk factors that predict problems in functioning (e.g. Cillessen & Borch, 2006). This study traces developmental trajectories of the SEL skills as identified and defined in the CASEL model and verified through confirmatory factor analysis (Ross & Tolan, 2016). Tracing the developmental patterns of these component skills that are thought to be related can inform how much change in each skill can be expected over adolescence, whether that change is linear or more complex, and how synchronized patterns and timing of changes in component SEL skills are over adolescence. This exploratory study takes advantage of a large longitudinal data set drawn from a diverse, normative sample between ages 10 and 18 to identify the growth patterns and variations by gender in a validated multi-dimensional measurement model of CASEL skills.

Social and Emotional Learning Skills

CASEL has identified five essential SEL skills for positive development and adjustment that can be promoted by schools and other agencies working with children and youth, based on conceptual and empirical reviews (Elias et al., 1997). These five skills are self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Since its conceptualization, the importance of these skills for affecting learning, behavior, and well-being has been validated through meta-analyses that indicate the predictive validity of skill level, the extent to which these skills can be learned, and the effectiveness of programs designed to promote these skills for impacting academic engagement and achievement and behaviors

important in personal success (Durlak et al., 2011; Durlak, Weissberg, & Pachan, 2010). For example, Durlak et al. (2011) found that promotion of SEL skills by teachers and mentors can, on average, increase kids scores on high stakes standardized testing by 11-percentile points.

In a prior analysis using this data, Ross and Tolan (2016) confirmed the CASEL model in a normative adolescent sample using confirmatory factor analysis with one important variation. The relationship skills scale consisted of two distinct subscales; creating relationship skills and relationship quality. For this reason, both of these components of relationship skills are included in this study. Further, longitudinal data for the social awareness scale was not available in the dataset used for this study. For this reason, social awareness is not included.

Previous work, while not comprehensive, can inform what might be expected patterns of social and emotional growth during adolescence. However, prior studies are limited in either focusing on only one or two skills, not tracing development over time, and/or not considering gender variations. In fact, to date, no developmental studies of SEL in adolescence, as defined by the CASEL theoretical framework, have been conducted. For this reason, this literature review references studies on constructs that are related to these CASEL constructs, but perhaps do not align exactly. Nevertheless, these investigations can theoretically inform what we may expect in this exploratory study.

Self-awareness. Self-awareness is the ability to accurately appraise one's thoughts, emotions, strengths, and limitations and their influences on behaviors (CASEL, 2015) Studies on adolescence tend to identify several components of self-awareness which include, but are not limited to: self-appraisal, self-reflection, self-concept, self-processing, and self-perception. Empirical evidence suggests that the underlying processes of self-awareness undergo a reorganization process in adolescence that cause this skill to be heightened consequent to

puberty. Neuroimaging research has indicated that during self-appraisal or self-reflection tasks, adolescents rely on different neural network organizations than is observed in adults, supporting the view that adolescence is a time of change in self-awareness (Burnett et al., 2009). Additionally, developmental psychology research has evidenced that awareness of self and others rises in early adolescence (Sebastian, Burnett, & Blakemore, 2008) and seems to peek immediately after puberty (Harter & Monsour, 1992). During this time, individuals are more keenly aware of others' perspectives and particularly others' observations of them; this leads to an integration of others' evaluations of them during self-appraisal and an overall increase in peer comparisons(Sebastian, Burnett, & Blakemore, 2008; Vartanian, 2000). This increase in self-concept can be accompanied by negative consequences such as increased critical self-evaluation, increased comparison to peers, and the incorporation of others' perspectives into self-concept (Burnett, Bird, Moll, Frith, & Blakemore, 2009; Heatherton & Baumester, 1991; Parker et al., 2006; Vartanian, 2000; Sebastian, Burnett, & Blakemore, 2008). Increased self-awareness during adolescence has also been linked to an increase in contradictions of identity, maladaptive eating behaviors, and negative affect (Harter & Monsour, 1992; Heatherton & Baumester, 1991; Mor & Winquist, 2002). This line of research suggests that self-awareness growth is complex and has a complex influence on overall well-being during adolescence.

Self-management. Self-management is the ability to regulate thoughts, emotions, and behaviors in various situations and the ability to manage stress, self-motivate, and set and achieve goals (CASEL, 2015). Components of self-management that are captured in current adolescent development literature include self-control, self-regulation, resisting negative influences, and impulse control. While self-management or regulation is important across childhood and adolescence, it has additional implications during adolescence. Steinberg (2014)

purports that self-management is the single best determinant of adolescent and subsequent adult success (Zimmerman, Phelps, & Lerner, 2003; Freund & Bates, 2002; Lerner et al., 2005). An adolescent must learn to regulate a rapidly changing body and mind while also navigating changes and increased demands in school and social settings (Gestsdottir & Lerner, 2007). Self-management involves the coordination of two brain regions that develop significantly during adolescence: the limbic system and the prefrontal cortex. Before these systems develop the ability to function in a coordinated fashion, adolescents tend to be less adept at conflict resolution and self-management (Ernst et al., 2009), while growth in the coordination of these regions is associated with adolescents' increased impulse control (Yurgelun-Todd, 2007). Thus, as adolescence proceeds, it seems likely that self-management should increase; with perhaps some initial dip at puberty entry. For adolescents, self-management is contextually dependent. While they can exert adult-like self-control in an unaroused condition, they have difficulty in emotionally aroused situations or in the presence of peers (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011; Steinberg, 2014). These findings suggest that self-management is undergoing significant developments during adolescence and that the skill may be highly context specific.

Responsible Decision-making. Responsible decision-making is the ability to consider ethics, safety, culture, and consequences to make healthy choices about behaviors and relationships (CASEL, 2015). Decision-making is a fairly consistent term in the adolescent development literature. Decision-making, like self-management, is also affected by the coordination of the limbic system and prefrontal cortex. Integration of these two brain regions supports more sophisticated and more accurate appraisal, leading to better decision-making (Seigel, 2013). But, during adolescence in general, *risky* decision making increases with age (Gardner & Steinberg, 2005). There is less evidence in the literature on adolescence development

of *positive* or healthy decision-making skills. Neuroimaging studies have suggested that adolescent decision-making is biased in favoring short-term gains over long-term gains (Galvan et al., 2006; Casey, Jones, & Hare, 2008) and are biased towards social interactions, exhibiting a stronger neurological reward response. This bias makes adolescence more likely to make risky decisions in the presence of peers, because more value is given to potential benefits than potential risks (Gardner & Steinberg, 2005). As brain maturity occurs, affect and cognition become more coordinated and adolescents are better able to self-regulate and resist peer influence and ultimately make better decisions (Albert, Chein, & Steinberg, 2013; Gardner & Steinberg, 2005). In summary, decision-making is strongly mediated by the social and emotional context (Steinberg, 2005) and may develop after self-management and in a similar pattern.

Relationship skills. Relationship skills are the abilities to develop and maintain mutually beneficial relationships through communication, cooperation, conflict resolution, and compassion (CASEL, 2015). Adolescent relationship skills are captured in the literature on friendships and peer and parent relationships.

Creating Relationship Skills. This aspect of relationship skills pertains to *developing* relationships. Adolescents shift their primary relationship investment from parents to peers (Nickerson & Nagle, 2005). Relationships skills are essential as adolescence shift from an isolated view of identity to the incorporation of others in their sense of self and appraisal of ability (Woolley, Chabris, Pentland, Hashmi, & Malone, 2010).

Relationship Quality. This aspect of relationship skills pertains to *maintaining* beneficial relationships. Supportive relationships in adolescence are one of the best predictors of adult well-being and life satisfaction (Seigel, 2013). There is evidence of significant individual differences in the ability to navigate the changes in relationships during adolescence, such as the shift in

interest from parents to peer friendships and the balance of friendships with romantic partners (Roth & Parker, 2001). Relationship quality during adolescence also acts as a foundation for future relationship contexts, suggesting that we might see similar relationship quality across development (Farley & Kim-Spoon, 2014).

Creating relationship skills and relationship quality are likely closely tied to other SEL skills such as self-management and social awareness. For instance, a recent review noted the value of examining relationship skills development in tandem with self-management development in adolescence due to their bidirectional influence (Farley & Kim-Spoon, 2014). Similarly, adolescents who experience social exclusion (lack of relationships) tend to have lower levels of self-management (Baumeister, DeWall, Ciarocco, & Twenge, 2005). Thus, it seems likely that relationship skills will develop along with self-management and it will be valuable to track the dependency between these two skills over adolescence.

Gender Differences in Adolescent SEL Development

Biological developments, such as puberty, and contextual developments, such as transitioning peer groups and social settings (including cultural and social norms) play roles in influencing differential developmental patterns for males and females during adolescence (Rose & Rudolph, 2011; Blakemore & Choudhury, 2006; Steinberg, 2008; Ostovich & Sabini, 2005). With varying patterns and timing of physical, biological, and contextual developments for males and females during adolescence, it seems likely that gender differences exist in social and emotional development too. However, few studies have tested or suggested specific gender differences in development for the component SEL skills. Likely differences can be inferred from existing studies, though.

Studies have suggested differences in self-awareness, decision-making, and aspects of relationship skills by gender. For instance, increases in self-awareness during adolescence has been found to be associated with negative outcomes such as identity contradictions, maladaptive eating behaviors, and negative affect for females, but not for males (Mor & Winquist, 2002). Evidence suggests that reasoning used to make decisions is different for males and females during adolescent development. Males tend to weigh the benefits of a risky decision more highly than female counterparts (Gardner & Steinberg, 2005), rely more on hedonic reasoning (pleasure seeking), and orient toward self-gain during adolescence (Eisenberg, Miller, Shell, McNalley, & Shea, 1991). Females tend to rely more on perspective taking and value reasoning and orient toward moral reasoning when making decisions (Eisenberg et al., 1991). Males also seem to be more heavily influenced by peers to make risky decisions, particularly in early adolescence (Gardner & Steinberg, 2005).

Several studies have pointed to gender differences in relationship skills during adolescence. Females consistently score higher than males on scales of empathy, sympathy, prosocial behavior, helping behavior, perspective taking, and social desirability (Allemand, Steiger, & Fend, 2014; Bandura et al., 2003; Eisenberg et al., 1991). Additionally, friend support during adolescence tends to mediate the relationship between social skills and problematic outcomes such as depressive symptoms for girls but not for boys (Nilsen, Karevold, Roysamb, Gustavson, & Mathiesen, 2013). In summary, research suggests complex growth patterns of SEL skill development in adolescence, by domain and by gender, but these patterns have not been explicitly explored for multiple skills with attention to patterns over time.

Present Study & Hypotheses

The first aim of the present study is to identify the typical pattern of growth over adolescence in each skill (e.g. linear or more complex, change or stable; direction). The second aim is to examine variations in such growth patterns as a function of gender. Due to the lack of previous research of this type, this study is exploratory in nature, particularly in identifying the qualities of growth trajectories for each skill. Given that this is exploratory, we will explore increasingly complex growth models (e.g. non-linear) to identify the best fitting growth trajectory for each skill.

Method

Participants and Procedure

This study draws from a dataset collected for the National 4-H Study of Positive Youth Development. This sample was utilized because it is longitudinal across much of the adolescent years, is large enough to permit valid trajectory calculations and gender comparisons, and has been utilized in prior work to confirm the SEL measurement model utilized here (Ross & Tolan, 2016). Participants were recruited from schools and community organizations across the United States in the 5th grade and followed through the 12th grade, totaling eight waves of data collection. Data were collected once per year, and at each wave of collection additional participants were recruited (in addition to collecting data from previous participants). This strategy helped mitigate the attrition that occurs in multi-year longitudinal data collection. The participants were diverse in terms of geographic location (23% West, 28% Southeast, 22% North Central, and 26% Northeast; 25%), urbanicity (Urban, 38% Suburban, and 37% Rural), gender (61% Female), and maternal education level (20 % High Degree or less, 37% some training or school beyond High School, 28% college degree and 14% advanced degree). Ethnicity distribution included most of the prevalent ethnic heritages in the US, but with proportionally

more Whites than is representative of the population at the time of data collection (7% African American, 3% Asian American, 2% American Indian, 72% White, 9% Latino/a American, and 4% Multiracial). Refer to Table 1 for a description of the sample demographics by age group. Additional information about the original study, participant recruitment, and data collection methods can be found in various publications (e.g. Lerner et al., 2005; Phelps et al. 2007, 2009).

For the purposes of this study, all eight waves of data were used to capture longitudinal changes in SEL skills over an eight year period during adolescence, from ages 10-18. The number of participants ranged from 565 to 1809 for each age. The specific age and gender breakdown is available in Table 1.

Measures

Social and emotional skills were measured using a model previously validated by the authors (Ross & Tolan, 2016) using confirmatory factor analysis. Items within the 4-H Study of Positive Youth Development were used to create scales for each of the five social and emotional learning constructs in the CASEL model. Items were drawn from the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002), Target-Based Expectations Scale (TBES; Buchanan & Hughes, 2004), Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998), Peer Support Scale (PSS; Armsden & Greenberg, 1987), and the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983). Confirmatory Factor Analysis (CFA) indicated good model fit, with one modification. The relationship skills scale contained two subscales; creating relationships and relationship quality. Therefore, this analysis includes these two subscales for relationship skills. Additionally, because the dataset did not contain the items that form the social awareness scale beyond wave 3, that scale was not modeled.

Self-awareness. The self-awareness scale consists of five items from the SPPA/C (Harter, 1988; Harter, 1983). Participants indicated which choice was more like them. For example, one item reads "*Some kids aren't very happy with the way they do a lot of things BUT other kids think the way they do things is fine*." The scale had acceptable reliability (α = .65).

Self-management. The self-management scale consists of six items from the SOC scale (Freund & Baltes, 2002). Participants indicated which choice was most like them. An example item is "*Even if something is important to me, it can happen that I don't invest the necessary time or effort.* ***OR*** *For important things, I pay attention to whether I need to devote more time or effort.*" The scale had acceptable reliability (α = .54).

Responsible decision-making. The decision-making scale drew seven items from the PSL-AB survey (Benson, Leffert, Scales, & Blyth, 1998). Participants indicated how important each of the items were in their life. For example, an item read, "*Doing what I believe is right even if my friends make fun of me.*" The scale had good reliability (α = .89).

Creating Relationship skills. The creating relationships scale consists of three items from the SPAA/C (Harter, 1988; Harter, 1983) where youth indicated which choice is more like them. An example item is, "*Some kids find it hard to make friends BUT For other kids it's pretty easy.*" The reliability of this scale was acceptable (α = .58).

Relationship quality. The relationship quality scale consists of four items from the PSS (Armsden & Greenberg, 1987) where youth indicated how true a statement was for them. An example item is "*My friends are there when I need them*." This subscale had very good reliability (α = .92).

Analysis

Missing data

Information on sample size for each age group is available in Table 1. As with most setting based longitudinal data that span multiple years, attrition, absenteeism on data collection days, and participants entering and leaving the sample at different time points during the ongoing longitudinal study can lead to missing data. Therefore, we opted to conduct multilevel models to examine changes in SEL skills over time that permitted estimation of missing data and could consider different sample membership at different points (Singer & Willett, 2003). This makes it possible even if there are not scores for all variables for all participants at all time points; participants vary with regard to the number of data points; or the spacing between data points differs across participants (Cillessen & Borch, 2006; Singer & Willett, 2003).

Analytic Approach

The data were structured by age (instead of wave), since this study is of age-based developmental trends. The sample was trimmed to only include ages 10 to 18 because there was sparse representation of ages outside that range and the primary interest in this study was in these adolescent years. Growth trajectories for a composite SEL variable, as well as each SEL scale were examined using multilevel growth curve analysis (Heck & Thomas, 2015), using R base version 3.1.0—"Spring Dance" (R Development Core Team, 2014), with the ggplot2 (Wickham, 2009) and lme4 (Bates, Mächler, Bolker, & Walker, 2014) packages (graphing and model building packages). We examined the initial status and age-related changes in these skills, as well as gender differences in these parameter estimates.

Multilevel growth curve analysis. Multilevel growth curve modeling is a preferred method for examining changes in constructs over time using longitudinal data (e.g., Raudenbush & Bryk, 1992; Singer & Willett, 2003). Multilevel analyses address the nested nature of the data, where repeated observations of SEL skills (Level 1) are nested within individual participants

(Level 2). In the present study, we were interested in describing the normative or group characterizing course of SEL development using multilevel growth curve analysis (Raudenbush & Bryk, 1992). Because our primary interest is in the study of growth in SEL skills across ages, the age variable was centered at the first time point (i.e., age 10), in order to provide meaningful and readily interpretable intercept estimates (Cillessen & Borch, 2006). Therefore, the intercept represents the initial level of the SEL skills at age 10, and the linear slope represents the average rate of change in SEL skills across ages 10-18 for each participant (Raudenbush & Bryk, 1992).

First, unconditional growth models were conducted on raw scores to obtain the estimated overall growth curves (i.e., average of all individual growth curves) for the total sample for the composite SEL score and each SEL competency, separately. We first modeled only the linear effect of time (i.e., age in years) for each of the SEL competencies (baseline model). Next, we tested nonlinear effects of time by including higher order effects (quadratic, then cubic, then quartic, and then quantic) and compared this to the baseline model (linear) using a chi-square difference test. Similar to previous studies (i.e., Bongers et al., 2003), we tested the significance of nested models rather than the parameters, themselves; thus, it is possible that the parameters in the final model are not significant. However, the final model was chosen based on the model fit. Once the best fitting model was determined, we examined the estimated parameters that describe the overall growth curve, as in the mean growth trajectory for the total sample, as well as the variation around this mean.

Trajectories by gender. Gender comparisons were determined by first testing if there was a significant difference by gender for the best-fitting model for each skill. In other words, gender was included as a Level 2 time-invariant predictor for the best-fitting model for each SEL skill. If a difference was found, then the best-fitting model comparisons described above were

conducted on the gender specific data. Gender was coded as a dummy variable, where 0=Male and 1=Female. Therefore, intercept and slope statistics indicate the raw score for girls (at age 10). A significant gender effect on intercept suggests that there is a significant difference in the SEL skill in the initial level of the SEL skill at age 10, and slope differences suggest differences in growth pattern conditioned on intercept.

Results

Growth curve modeling is useful only when there is some variance in the construct over time (Cillessen & Borch, 2006). As preliminary analyses, we examined descriptive statistics for all variables of interest, including means, standard deviations, and ranges by age group from age 10 to 18 overall and by gender (Table 1). These features of the data suggest substantial variation over time in all SEL competencies across all time points. In addition, we examined the intercorrelations of the main study variables, which indicated that the correlations were, in general, different from zero suggesting some co-variation by skill. Stability correlations also followed a predictable pattern, such that correlations were stronger across shorter time intervals, as well as later on in the developmental trajectory but were not at such a level that growth would likely be nonsignificant.

Next, we tested multilevel growth models for the composite SEL construct, as well as for each SEL skill across an eight-year period. We constructed models that added in succession, to a simple linear model, quadratic, cubic, quartic, and quantic terms, testing if the more complex model significantly improved fit to that scale's growth pattern data. Table 3 summarizes the chi-square difference statistic for the best fitting model, as compared to the previous, less complex model for each scale; for the overall sample and gender specific samples. We interpreted the least complex model that adding additional terms did not improve fit significantly. Table 4

summarizes the retained models for reference. For those models, most typical developmental trajectories showed changes across age (non-zero slopes), and for most skills, adding non-linear parameter(s) improved fit over a simple linear model. Figure 1 illustrates the normative developmental trajectories each of the SEL skills and for a composite scale (average across scales) for the overall sample (without gender considered) and also for each gender. While the additional terms were added to ensure best fit to the data, our comparison across scales focuses on linear growth patterns controlling for those variations; whether growth was different from zero and direction overall (and how those varied by gender).

Self-Awareness

The final growth model for self-awareness, $\chi^2(\text{df} = 7, N = 8{,}872) = 16{,}074$, was quadratic, which was significantly better than the linear model, $\chi^2(\text{df} = 6, N = 8{,}872) = 16{,}086,)$, as is shown by the chi-square different test, $\Delta\chi^2(\text{df} = 1, N = 8{,}872) = 11.94$, $p < .001$. The overall sample had a linear intercept of 3.02 ($p < .001$) and a slope of -0.05 ($p < .01$). There was a significant gender difference in intercept (B = 2.87, $p < .001$) and slope (B = 0.26, $p < .001$). The best fitting model for females was also quadratic, but for males it was quartic. For girls, the linear intercept was 3.19 ($p < .001$) with a slop of -0.11 ($p < .001$) and for the boys, the linear intercept was 3.07 ($p < .001$) with a slope of -0.40 ($p < .001$). Boys and girls both experienced a dip in self-awareness scores, but the dip appears to have occurred earlier in development for boys (around about age 11) than for girls (around about age 16).

Self-Management

The final growth model for self-management, $\chi^2(\text{df} = 9, N = 9{,}898) = -393$, was quartic, which was significantly better than the cubic model, $\chi^2(\text{df} = 8, N = 9{,}898) = -391$, as is shown by the chi-square different test, $\Delta\chi^2(\text{df} = 1, N = 9{,}898) = 4.16$, $p < .05$. The overall sample had a

linear intercept of 0.75 ($p < .001$) and a slope of 0.03 (non-significant). There was a significant gender difference in intercept (B = 0.78, p< .001) and slope (B = 0.02, $p < .05$). The best fitting model for girls was quartic, but for boys it was linear. The girls had a linear intercept of 0.76 ($p < .001$) and a slope of 0.05 (non-significant) and the boys had a linear intercept of 0.76 ($p < .001$) and a linear slope of -0.02 ($p < .001$). While overall there was a steady decline in self-management for both boys and girls, with a consistent starting value and growth pattern, there was more variability in growth pattern in self-management for girls, as evidenced by the more complex model.

Responsible Decision-Making

The final growth model for decision-making, $\chi^2(df = 8, N = 9,399) = 20,521$, was cubic, which was significantly better than the quadratic model, $\chi^2(df = 7, N = 9,399) = 20,527$, as is shown by the chi-square different test, $\Delta\chi^2(df = 1, N = 9,399) = 8.03$, $p < .01$. The full sample linear model had an intercept of 4.12 ($p < .001$) and a slope of -0.12 ($p < .01$). There was a significant difference by gender in intercept (B = 3.80, p< .001) and slope (B = 0.35, $p < .001$). The best fitting model for girls was quadratic, but for boys it was cubic. The girls had a linear intercept of 4.17 ($p < .001$) and a slope of -0.02 (non-significant) and the boys had a linear intercept of 3.99 ($p < .001$) and a slope of -0.19 ($p < .001$). Boys and girls followed different trajectories for decision-making. Even though the slopes initially are close to zero, decision-making skills increased for both boys and girls throughout adolescent development. Girls began higher than boys and remained higher across all ages.

Creating Relationship Skills

The final unconditional growth model for creating relationships, $\chi^2(df = 9, N = 9,227) = 19,227$, was quartic, which was significantly better than the cubic model, $\chi^2(df = 8, N = 9,227) =$

19,277, as is shown by the chi-square different test, $\Delta\chi^2$(df = 1, N = 9,227) = 51.25, p < .001. The full sample had a linear intercept of 3.13 (p < .001) and a slope of -0.42 (p < .001). There was a significant gender difference in intercept (B = 2.73, p < .001) and slope (B = 0.19, p < .001). For creating relationship skills, the quartic growth trajectory model was best fitting for girls and the linear growth trajectory model was the best fitting for boys. The girls had a linear intercept of 3.16 (p < .001) and a slope of -0.38 (p < .001) and the boys had a linear intercept of 2.79 (p < .001) and a slope of 0.05 (p < .001). Overall, girls tended to score higher on this skill but with less difference by gender as adolescence proceeds.

Relationship Quality Skills

The final growth model for relationship quality, χ^2(N = 9,373) = 23,160, was linear, as is shown by the chi-square different test with the quadratic model, $\Delta\chi^2$(df = 7, N = 9,373) = 3.30, p = .07. The full sample had a linear intercept of 4.25 (p < .001) and a slope of -0.02 (p < .01). There was a significant gender difference in intercept (B = 4.08, p < .001) and slope (B = 0.31, p < .001). For relationship quality, the best fitting model was quadratic for both girls and boys. The girls had a linear intercept of 4.33 (p < .001) and a slope of 0.02 (non-significant) and the boys had a linear intercept of 4.28 (p < .001) and a slope of -0.16 (p < .05). The standard error was larger for boys compared to that for girls (see Figure 1). At around age 10, girls and boys have similar intercepts for relationship quality. However, the high standard error and more complex growth shape for boys imply more variability in relationship quality. Girls, on the other hand, appear to maintain more stable and consistent quality relationship skill patterns.

Composite SEL Skill

The final growth model for overall SEL skill, χ^2(df = 9, N = 7,467) = 30,564, was quartic, which was significantly better than the cubic model, χ^2(df = 8, N = 7,467) = 30,568, as is shown

by the chi-square different test, $\Delta\chi^2(\text{df} = 9, N = 7{,}467) = 5.79, p < .05$. Gender was significant in affecting the overall SEL final model intercept (B = 14.22, $p < .001$), as well as the linear slope (B = 1.26, $p < .001$), which indicates that, the initial value (SEL value at age 10) and the normative trajectory (slope) differs for boys and girls. Examination by gender shows the best fitting model for girls was linear and for boys was quartic. The girls had a linear intercept of 15.44 ($p < .001$) and a slope of -0.02 (non-significant) and the males had a linear intercept of 15.44 ($p < .001$) with a slope of -1.52 ($p < .001$).

Discussion

Adolescent development involves a reorganization of systems that presents both opportunity and risk (Steinberg, 2005). Adolescent developmental patterns have been shown as both an amplification of foundational abilities (Monahan & Steinberg, 2011; Jaffari-Bimmel, Juffer, Ijzendoorn, Bakermans-Kranenburg, & Mooijaart, 2006) and as a sensitive period or opportunity to develop lifelong healthy behavioral trajectories (Steinberg, 2014; Seigel, 2013). For this reason, it is valuable to study and understand developmental trajectories of social and emotional skills and to examine variations over time, in complexity, and by gender throughout adolescence. The present study provides a first careful exploration and tracking of these skills, which are key elements of healthy and successful development.

Trajectories for the Total Sample

The results of this study support previous research that social and emotional skills follow complex (often non-linear) growth patterns during adolescent development and vary in whether that growth is positive, negative, or essentially without change over adolescence. This study provides the first tracing of such growth and comparison across these skills identified as important to functioning. In some cases, the overall growth pattern (linear growth) was also

augmented by non-linear growth and more complex variations in change patterns (e.g. cubic, quartic, and even quintic patterns). In fact, each skill had a different growth pattern with the exception of self-management and creating relationship skills trajectories, both with quartic features. Also, the gender comparisons revealed that within the overall complexity, in some cases linear patterns were sufficient to account for growth; e.g, the male self-management trajectory, the male responsible decision-making trajectory, and the female SEL composite trajectory.

The results also support the added value of looking at the SEL components skills individually than solely looking at a composite score of SEL skills. For example, looking solely at the SEL composite trajectory, one might conclude that girls do not demonstrate significant and unchanging levels of social and emotional development throughout adolescence. However, when girls' SEL skills are examined individually, none of the SEL component skills follow this pattern and each was characterized by non-linear features. Examination of individual patterns also reveals differential timing in slope changes by skill. Four of the five component skills have a downward growth trajectory. Creating Relationship skills, which is the largest in magnitude, shows a non-linear shift starting around age 16, and this seems to characterize males and females. Others show inflections at other ages and some show nonlinear change with no net growth while others have net linear slopes different from zero. Further study of how these age variations in net linear growth, inflection points in growth, and consistency (or lack of), by gender, seem warranted to delve into what might produce these variations. For what skills is it important to support maintaining versus growth important for positive development? How might off-timing inflection relate to risk or resilience in functioning? While a host of questions could

emanate from these initial findings, at least they suggest need to assume variation across skills in growth over adolescence.

Differences in Trajectories for Boys and Girls

In examining the results of the growth trajectories for the gender specific sub-samples, the main finding is that males and females show distinct growth patterns for most skills and they differed in complexity of models needed to fit the data best for all but one skill (Relationship Quality). Overall, comparing the two gender models, it seems that SEL levels are quite similar at age 10 by gender, but the growth patterns are quite different. Also, while female scored higher at the outset and overall across adolescence for most skills, this was not true across all skills.

The variation in model complexity may not have much importance in understanding overall patterns of growth but could have nuanced implications for risk prediction and intervention planning. When different complexities of data modeling are needed to explain growth best, it may mean different temporary responses or patterns or response in overall change will occur by gender. Also, it may be that females may have overall higher scores coming into adolescence, but still may need intervention to aid healthy development as much as boys.

The differences found for self-awareness provide a good example. It is the only skill where boys scored higher than girls during a period of development. The growth trajectories indicate that boys actually begin adolescence with lower rates of self-awareness, and that trajectory begins a positive incline a little after around 11 years old and eventually surpasses the girls at around 13 years old. This trend for boys appears to coincide with average onset of male puberty, which is a factor that deserves more consideration and further exploration in future studies. It could be that self-awareness is an area of particular vulnerability to females or may be a skill that is particularly affected by adolescence for girls, whereas for boys there is a positive

experience. It may also be that the patterns do not simply reflect more difficulty for females and less for males on this. It may be that lower self-awareness for females serves to protect some from sensitivity to and lowered self-confidence (Sebastian, Burnett, & Blakemore, 2008; Vartanian, 2000).

There were also gender differences in patterns for self-management and responsible decision-making. First, the overall growth trends seem to be the same for both genders in that self-management declines and responsible decision-making increases across development (the increase for responsible decision-making among boys is minimal). This is counter to our original hypothesis and previous literature that suggests that we should see increases in both of these skills over time. During mid adolescence (13-15 years old), self-management rates are the same for both genders. Over time, boys in this sample showed a greater drop in self-management and towards the end of adolescence, the gap between the genders widens. Responsible decision making results show a consistent gap between boys and girls over time, with girls consistently demonstrating higher levels. The standard error for girls was small, indicating an almost universal trajectory in decision-making skills for the female population in this sample. On the other hand, the standard error for boys was higher and the trajectory more complex (cubic versus quadratic), which indicates more variability in trajectory within the male population, and both increases and decreases in this ability throughout adolescent development. Overall, the findings for decision-making are consistent with previous literature that suggests adolescents get better at this skill as they grow older (Gardner & Steinberg, 2005).

Consistent with previous literature, girls show consistently higher levels of relationship skills in both domains across adolescence (Allemand, Steiger, & Fend, 2014; Bandura et al., 2003; Eisenberg et al., 1991), with particularly higher levels of relationship qualitythan boys.

Boys show steep decreasing patterns of relationship quality throughout adolescence, although the growth trajectory suggests that they begin to increase in this skill towards the end of adolescence. Creating relationship skills improve for boys over adolescent development. These results suggest that the two aspects of relationship skills are distinct and follow different developmental trajectories in adolescence. Future work can explore the implications for thriving from these distinct aspects of relationship skills. This points out that in general, more studies of impact on functioning in change in skills are needed to determine what an increase, decrease, or stability of skills mean for each gender.

Limitations

There are several limitations to this study. First, this study was designed to be exploratory in nature; and therefore, the authors caution in the overgeneralization of these results. These developmental patterns should be viewed as a starting point for future empirical work and as a basis for arguing the need to examine component SEL skills over a composite score. Another limitation of the study is that due to data restrictions it did not include one of the five CASEL constructs, social awareness. In order to build a complete picture of SEL development, future work should consider developmental trajectories of this specific SEL construct. Additionally, the sample used in this study had limited ethnic and racial diversity. These limitations should further caution readers from making broad generalizations about SEL development from this exploratory work.

The authors note that a limitation to this study is that the scales were created using items within an existing dataset, and therefore may not capture all elements of each construct. This seems particularly true for the self-awareness scale, which consists of five items from the Self-Perception Profile for Adolescents and Children (Harter, 1988) (three items from the self-worth

scale and two items from the conduct behavior scale). Close inspection of these items indict that the scale may be capturing only the positive aspects of self-appraisal, first that the adolescent is generally happy with themselves and the way they lead their life and second, that they are aware of their positive behaviors (e.g. not getting into trouble or doing things they shouldn't). Generally, the construct of self-awareness is difficult to measure, particularly in terms of measuring neutral or negative (perhaps) accurate appraisals of oneself. It is important to reiterate that this study is exploratory in nature and intended to begin to describe these developmental trajectories of social and emotional skills and provoke future work.

Conclusion and Future Research

Previous empirical work has highlighted the significant and complex changes that occur in adolescent social and emotional development. To the authors' knowledge, this is the first study that comprehensively examined the CASEL social and emotional component skills in a longitudinal adolescent sample. These developmental trajectories help to begin to explore this unchartered territory and act as a basis for further scientific inquiry. The findings can begin to inform promotion and prevention efforts for youth serving agencies such as schools and community programs. Specifically, the findings may point to interventions that are developmentally targeted, perhaps differentially by gender, to optimize social and emotional growth trajectories for youth.

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Tables

Table 1.
Demographic Data by Age Group.

		Age								
		10	11	12	13	14	15	16	17	18
	N	897	1544	1791	1764	1654	1752	1475	982	563
Sex	Female	55.74%	56.15%	58.18%	59.47%	63.00%	63.24%	63.66%	66.29%	67.50%
	Male	44.26%	43.85%	41.82%	40.53%	37.00%	58.12%	36.34%	33.71%	32.50%
Race	American Indian/Native American	3.23%	3.70%	2.42%	2.15%	2.02%	1.92%	1.10%	1.85%	0.91%
	Asian or Pacific Islander	5.22%	3.06%	2.84%	2.27%	2.33%	1.92%	2.48%	2.68%	2.91%
	Black or African American	6.97%	8.97%	8.34%	8.31%	7.89%	5.57%	5.23%	4.84%	4.19%
	Hispanic or Latino/a	14.30%	17.73%	12.93%	11.24%	0.20%	8.71%	6.27%	5.87%	5.10%
	White	58.71%	56.05%	65.68%	69.32%	75.58%	77.35%	79.89%	81.67%	82.88%
	Multiethnic or Multiracial	4.73%	5.13%	4.29%	4.25%	2.65%	2.96%	3.03%	2.27%	2.73%
Mother's Education in Years	Less than HS	7.34%	9.05%	7.96%	5.30%	3.08%	1.99%	0.97%	2.48%	2.56%
	HS	22.03%	22.85%	21.49%	21.82%	15.13%	10.30%	10.19%	12.40%	15.38%
	2 year degree, trade school, or some college	36.89%	37.44%	40.00%	36.36%	41.03%	36.88%	40.29%	36.36%	30.77%
	College Degree	22.90%	20.70%	20.00%	23.79%	27.44%	34.22%	35.44%	34.71%	30.77%
	Advanced Degree	10.84%	9.95%	10.55%	12.73%	13.33%	16.61%	13.11%	14.05%	20.51%

Table 2.
Means and Standard Deviations of SEL Components score by Age and Gender.

SEL Component	Full Sample - Raw Scores								
Age Group	10	11	12	13	14	15	16	17	18
N	904	1554	1809	1778	1668	1766	1485	992	565
Self-Awareness									
M	3.03	2.95	2.95	2.90	2.95	2.90	2.90	2.88	2.99
SD	0.69	0.69	0.68	0.64	0.59	0.57	0.55	0.57	0.56
N	700	1125	1324	1254	1112	1104	1119	771	379
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Self-Management									
M	0.80	0.80	0.78	0.74	0.73	0.71	0.69	0.67	0.69
SD	0.25	0.25	0.26	0.27	0.27	0.27	0.28	0.28	0.29
N	809	1313	1534	1447	1298	1332	1153	759	379
Range	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1
Decision Making									
M	4.07	3.96	3.98	4.02	4.08	4.13	4.18	4.24	4.34
SD	0.91	0.90	0.82	0.77	0.74	0.69	0.72	0.67	0.64
N	514	1030	1402	1464	1311	1341	1182	784	385
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5
Creating Relationships									
M	3.01	2.91	2.97	3.11	3.29	3.20	3.19	3.17	3.26
SD	0.78	0.79	0.75	0.72	0.68	0.70	0.67	0.67	0.61
N	753	1217	1417	1288	1146	1123	1135	780	384
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Maintaining Relationships									
M	4.25	4.24	4.21	4.13	4.15	4.17	4.21	4.15	4.12
SD	0.93	0.90	0.85	0.88	0.91	0.82	0.82	0.85	0.79
N	778	1294	1425	1304	1214	1174	1088	744	368
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5

SEL Component	Boys								
Age Group	10	11	12	13	14	15	16	17	18
N	397	679	760	729	612	671	535	337	186
Self-Awareness									
M	2.93	2.84	2.83	2.87	3.05	2.99	2.97	2.92	3.02
SD	0.70	0.68	0.70	0.63	0.59	0.78	0.55	0.59	0.57
N	326	480	528	494	393	371	397	265	130
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Self-Management									
M	0.79	0.77	0.77	0.73	0.72	0.70	0.67	0.63	0.67
SD	0.25	0.26	0.26	0.26	0.26	0.26	0.27	0.29	0.28
N	360	570	631	582	478	493	424	262	129
Range	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1
Decision Making									
M	3.90	3.79	3.75	3.81	3.89	3.90	3.97	4.03	4.15
SD	0.94	0.94	0.88	0.84	0.80	0.76	0.80	0.77	0.77
N	225	450	575	588	483	489	435	268	129
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5
Creating Relationships									
M	2.92	2.85	2.86	3.01	3.21	3.06	3.06	3.13	3.21
SD	0.81	0.81	0.77	0.72	0.71	0.73	0.71	0.67	0.61
N	345	529	579	513	404	378	405	268	131
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Maintaining Relationships									
M	4.16	4.14	3.96	3.90	3.86	4.01	4.00	3.99	4.05
SD	0.96	0.91	0.91	0.91	0.10	0.86	0.91	0.90	0.72
N	341	565	581	506	439	414	391	249	125
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5

SEL Component	Girls								
Age Group	10	11	12	13	14	15	16	17	18
N	507	875	1049	1049	1056	1095	950	457	379
Self-Awareness									
M	3.12	3.03	3.03	2.93	2.89	2.86	2.86	2.85	2.96
SD	0.67	0.69	0.66	0.64	0.58	0.56	0.54	0.56	0.55
N	372	643	793	757	719	732	721	503	248
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Self-Management									
M	0.81	0.81	0.78	0.74	0.73	0.72	0.69	0.70	0.70
SD	0.26	0.24	0.25	0.27	0.28	0.28	0.28	0.28	0.29
N	447	741	900	862	820	838	728	494	249
Range	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1
Decision Making									
M	4.20	4.10	4.14	4.16	4.20	4.26	4.30	4.35	4.43
SD	0.87	0.83	0.73	0.69	0.67	0.61	0.64	0.58	0.54
N	288	579	824	873	828	851	746	513	255
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5
Creating Relationships									
M	3.08	2.96	3.05	3.19	3.33	3.27	3.26	3.19	3.28
SD	0.75	0.77	0.73	0.71	0.66	0.68	0.64	0.67	0.60
N	406	686	835	772	742	744	729	509	252
Range	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4	1 to 4
Maintaining Relationships									
M	4.32	4.32	4.38	4.27	4.31	4.26	4.33	4.24	4.15
SD	0.89	0.88	0.78	0.83	0.81	0.79	0.74	0.81	0.82
N	434	727	841	795	775	759	696	492	243
Range	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5

Table 3.
Model Comparison Results.

		Chi-sqare Difference		
		Overall	Boys	Girls
SEL	Linear	-	-	-
	Quadratic	1.58*	4.94*	0.40
	Cubic	9.84**	13.78***	1.30
	Quartic	5.79*	8.29**	1.37
	Quintic	0.74	0.23	2.26
Self-awareness	Linear	-	-	-
	Quadratic	11.94***		32.24***
	Cubic	0.06		2.09
	Quartic	4.34*	12.15***	0.05
	Quintic	1.74		0.77
Self-management	Linear	-	-	-
	Quadratic	15.07***	1.10	17.44***
	Cubic	7.73**	2.45	6.80**
	Quartic	4.16*	2.52	6.16*
	Quintic	2.30	3.39	1.91
Decision-making	Linear	-	-	-
	Quadratic	19.73***	10.24**	11.26***
	Cubic	8.03**	5.70*	3.04
	Quartic	3.79	3.76	0.32
	Quintic	0.02	0.04	0.00
Creating Relationship Skills	Linear	-	-	-
	Quadratic	33.51***	0.66	42.15***
	Cubic	12.09***	2.06	9.58**
	Quartic	51.25***	20.74***	27.76***
	Quintic	0.22	0.40	0.17
Maintaining Relationship Skills	Linear	-	-	-
	Quadratic	3.30	30.87***	4.58*
	Cubic	1.90	2.45	0.00
	Quartic	13.12***	11.14***	5.31*
	Quintic	3.85**	4.39*	0.30

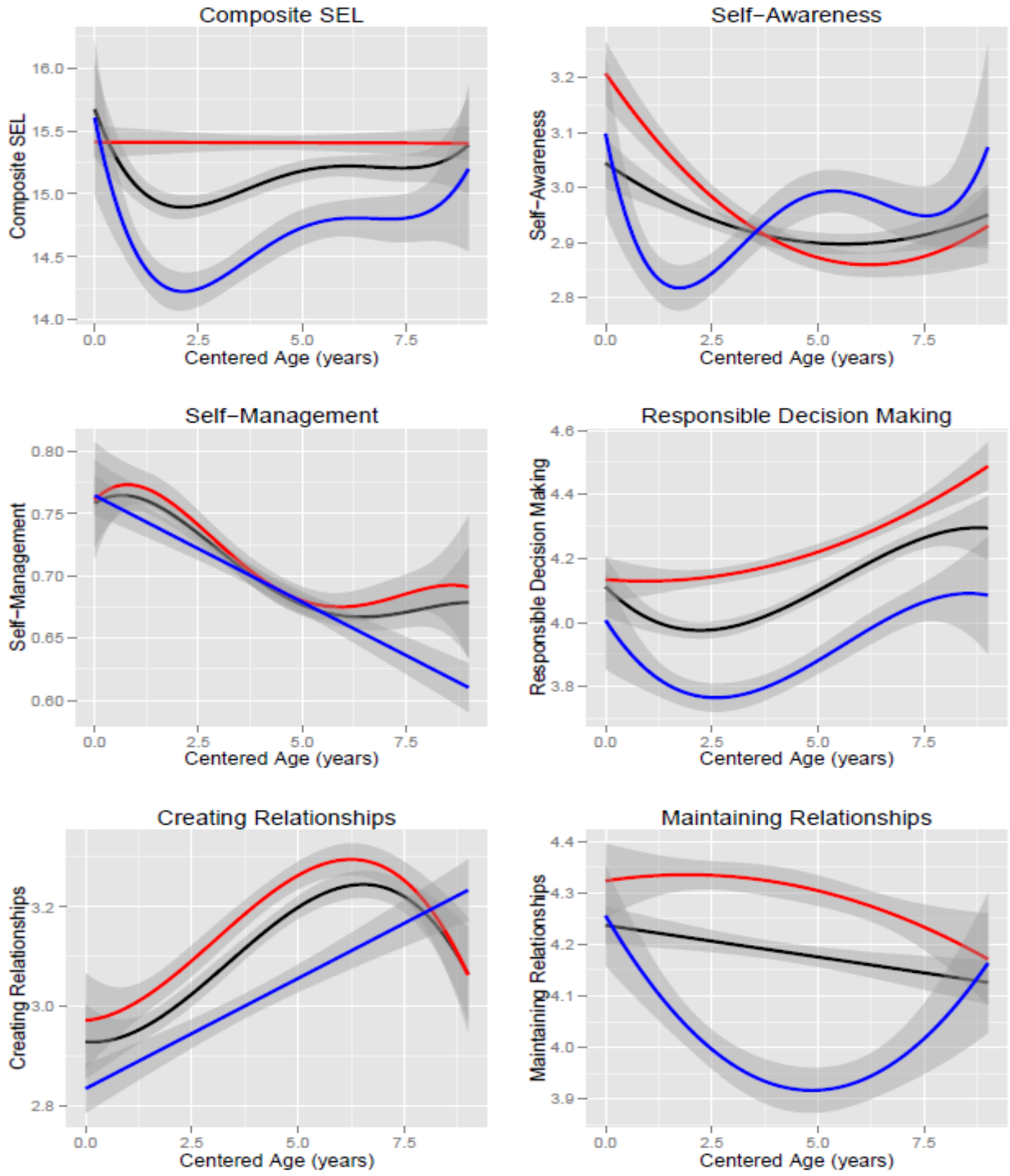
$p < .05$*, $p < .01$**, $p < .001$***

Table 4.
Model Results Summary for Overall and Component SEL Skills.

	SEL			Self Awareness			Self Management			Responsible Decision Making			Creating Relationships			Maintaining Relationships		
	Overall	Male	Female	Overall	Male	Female	Overall	Male	Female	Overall	Male	Female	Overall	Male	Female	Overall	Male	Female
Linear			x					x						x		x		
Quadratic				x		x						x					x	x
Cubic										x	x							
Quartic	x	x			x		x		x				x		x			
Quintic																		
Sextic																		

Figures

Figure 1.
Growth Trajectories for Overall and the Component SEL Skills.



Note: The black line is for the overall sample, the red line is for the girls-only sample, and the blue line is for the boys-only sample. The data were centered at age 10, so zero on the x-axis corresponds to age 10.

Profiles of Adolescent Social and Emotional Development

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Abstract

Social and emotional learning (SEL) skills are important for youth functioning and success. The present study explores the heterogeneity of SEL skills in adolescence to provide insight on the nature of social and emotional functioning in relation to youth outcomes. Latent profile analysis was employed on a national sample of 1,717 diverse 5th grade youth from the 4-H Study of Positive Youth Development. Six SEL indicators were used to create the profiles (self-awareness, self-management, social awareness, creating relationship skills, relationship quality, and responsible decision-making). Six profiles of social and emotional functioning were identified. Additionally, logistic regression was utilized to determine that gender, ethnicity, and income predicted profile membership and MANCOVA was utilized to determine differential prediction of outcomes, one year later, based on profile membership. Results indicate that social and emotional functioning is not homogenous, but rather, individuals present different profiles of social and emotional functioning that are related to key outcomes such as school engagement, depressive symptoms, and delinquency.

Profiles of Adolescent Social and Emotional Development

A long line of research has established the importance of social and emotional skills in human functioning and success. Since the conception of "emotional intelligence" (Goleman, 1995), several positive development frameworks have emerged to study and to ultimately support the notion that social and emotional "intelligence" is as, if not more, predictive of thriving in school and career settings than the traditional definitions of "intelligence"(Zins, Bloodworth, Weissberg, & Walberg, 2007). Social and emotional competency during adolescence is linked to adult social and emotional functioning and other adult outcomes (Monahan & Steinberg, 2011; Steinberg; 2014). Cognitive neuroscience research has pointed to adolescence as being a time of crucial and often profound social and emotional development (Burnett, Thompson, Bird, & Blakemore, 2011; Goddings, Heyes, Bird, Viner, & Blakemore, 2012). Understanding how interrelated social and emotional skills affect development during adolescence will help illuminate pathways to healthy development and mitigating problem development. While recognized as important, in fact, there has been little empirical examination of multiple social and emotional skills in adolescent samples.

One of the major frameworks for social and emotional competencies, put forth by the Collaborative for Academic, Social, and Emotional Learning (CASEL), purports that there are five essential social and emotional learning (SEL) skills; self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). This study utilizes that conceptual framework and builds from an empirically verified multidimensional model from it to track the patterns and interrelation of these key competencies over adolescence and examines how these skills relate to indicators of positive and problematic functioning (Ross & Tolan, 2016; Ross, Kim, Tolan, & Jennings,

2016). The approach taken here is not just to examine variation in each skill and its correlation to functioning, but to examine how profiles across the skills in combination explain functioning. While each skill is seen as an important and distinct contributor to functioning, they are thought to be interrelated and so examining different profiles may be particularly informative about how they related to patterns of functioning. Moreover, it seems likely that individuals will vary across skills in level and that it is the combination of skills that will help explain useful effects on functioning. Thus, social and emotional competency is crucial to adolescent well-being, but the explanation to be gained from viewing variations in combinations of SEL skills in explaining functioning at different stages in development warrants more attention. This person-centered approach is taken here to compliment and expand on variable-centered findings from other studies. A similar study on SEL has been conducted in preschool populations (Denham et al., 2012) to show that profile variations predict school readiness and academic performance.

One important consideration for understanding how social and emotional skills affect functioning is the role of puberty in affecting such skills. Pubertal development has been linked to social and emotional functioning in multiple studies. One important question is how pubertal development affects or interacts with skills thought to be important in personal and social functioning (Goddings et al., 2012; Chumlea et al., 2003). And, given that pubertal status and timing have differential effects by gender and there is evidence that social and emotional skills may vary in level and impact by gender (Ross, Kim, Tolan, & Jennings, 2016), it is important to consider gender along with puberty in understanding profile differences (Anderson, Dallal, & Must, 2003; Kaplowitz et al., 2001). Thus, this study examines profiles of configurations of social and emotional skills with attention to pubertal status and gender in explaining capability and problematic functioning indicators.

In prior analyses with these data, Ross and Tolan (2016) found that while the CASEL SEL model was validated in an adolescent sample via factor analysis, one notable variation emerged. The relationship skills scale was comprised of two distinct subscales: creating relationships and relationship quality. In a second set of analyses, Ross, Kim, Tolan, and Jennings (2016) explored the growth patterns across adolescence of the six skill scales and showed that non-linear growth was common and while there was substantial similarity for males and females in patterns, females tended to have higher scores than males except for self-awareness. Thus, these two studies established the empirical basis for use of the CASEL model with adolescence and due attention to gender in understanding impact on functioning during this age period. This study builds from that work to 1) determine if different profiles of SEL functioning formulate at early adolescence; 2) how those profiles relate to pubertal status and gender; and 3) how those profiles differentially predict functioning (school engagement, depressive symptoms, or delinquency) one year later.

Relation of Puberty and Gender to SEL Skills

Puberty contributes to heterogeneous patterns of development in adolescence, specifically by gender. For instance, girls tend to enter puberty at a younger age than boys and early onset relates to negative social consequences for girls but not boys (Mendle, Turkeheimer, & Emery, 2007; Kaplowitz et al., 2001). What is not clear is how gender differences in pubertal timing and effects might relate to differences in SEL skills and in turn, indicators of adolescent functioning. The onset of puberty, in both sexes, activates hormones that directly influence the development of the social and emotional processing centers of the brain: the prefrontal cortex and the limbic system (Ernst et al., 2009; Nelson, Leibenluft, McClure, & Pine, 2005). Studies have shown that puberty can have amplifying effects on skills and dispositions from childhood. For instance,

there has been evidence of accentuation of childhood temperament (Jaffari-Bimmel, Juffer, IJzendoorn, Bakermans-Kranenburg, & Mooijaart, 2006) and accentuation of social and academic competencies; where individuals who had high competence before puberty make significant gains and individuals who had low competence before puberty show even greater disparities (Monahan & Steinberg, 2011). Yet, it might be that puberty leads to growth and change in social and emotional skills with limited connection to pre-pubertal functioning. The present study focuses on how differential pubertal status among early adolescents, a time of much pubertal change, related to profiles of SEL skills, and then relates those profiles to later functioning.

The Heterogeneity of SEL Skills; Relation to Puberty and Functioning During Adolescence

Self-Awareness. Self-awareness is the ability to recognize thoughts, emotions, and behaviors in addition to strengths and weaknesses (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). In the literature, self-awareness (the ability to appraise thoughts, emotions, and behaviors) is represented by many terms such as metacognition, self-concept, and self-consciousness. Metacognition, or the ability to reflect on thoughts and behaviors, has been shown to steadily increase throughout adolescence and is linked to improved learning (Weil et al., 2013; Metcalfe & Finn, 2008; Efklides, 2009). Overall, females outperform males on metacognition tasks (Weil et al., 2013). Self-consciousness, or the awareness of self through the perception of others (particularly peers), is influenced by puberty. Specifically, self-consciousness tends to peak during and immediately after puberty (Parker et al., 2006; Vartanian, 2000). Emotion processing is greatly impacted by hormones activated with the onset of puberty (Ernst et al., 2009). Overall, the literature shows that while self-awareness is developing during adolescence, the pattern is

likely tied to puberty. Therefore we would expect to find those further into puberty would show greater self-awareness, irrespective of gender.

Self-Management. Self-management is also a concept that has been the subject of adolescent studies emphasizing self-control, cognitive control, response inhibition, self-regulation, and self-motivation. For the purposes of this study, we define self-management as the ability to manage emotions, thoughts, and behaviors, to set and achieve personal goals (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Adolescents are expected to self-manage much more than children, as they are given more autonomy, take on more adult-like responsibilities, and are involved in more complex social interactions. Studies indicate that adolescents feel a greater sense of control over themselves and their environment than children report (Gestsdottir & Lerner, 2008; Bandura, 2001). Neurological studies have indicated that adolescents experience a vulnerability in the cognitive control that is required for self-management that is closely tied to puberty (Chambers et al., 2003; Spear, 2000; Luna, Padmanabhan, & O'Hearn, 2010; Steinberg, 2010). For example, executive functioning skills needed for goal setting and planning ahead coincide with the maturation of the prefrontal cortex, which is impacted by puberty (Ernst, Romeo, & Anderson, 2009). At the same time, there are multiple studies documenting that poor self-management skills among adolescents are linked to negative outcomes such as drug use (Gibbons et al., 2012; Spear, 2000), tobacco use (Wills, Knight, Williams, Pagano, & Sargent, 2014), association with delinquent peers (Meldrum, Miller, & Flexon, 2013), and academic difficulties (Duckworth, Quinn, & Tsukayama, 2012).

Creating Relationship Skills and Relationship Quality. Relationship skills encompass communication, cooperation, and conflict resolution skills in addition to resisting peer pressure and offering or seeking help (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). The literature

has not specifically differentiated between the two aspects of relationship skills (creating relationships and relationship quality; Ross & Tolan, 2016). There has been a substantial focus on issues of peer pressure and conflict resolution, but less on positive aspects of relationship skills such as communication and helping behaviors, although a few studies that show such relations can be found (Laible, Carlo, & Raffaelli, 2000). Relationships become increasingly complex as adolescents shift to rely more on peer support than parental support (Helsen, Volleberg, & Meeus, 2000; Nickerson & Nagle, 2005). With this shift comes both the opportunity to develop positive relationship skills and the vulnerability of potential negative peer influence. Susceptibility to negative peer influence (such as engaging in delinquent behaviors) tends to be greater for boys than girls and for adolescents who enter puberty earlier than others (Widman, Choukas-Bradley, Helms, & Prinstein, 2015; Sumter, Bokhort, Steinberg, & Westenberg, 2009; Monahan & Steinberg, 2007; Schelleman-Offermans, Knibbe, & Kuntsche, 2013). The literature documents that relationship skills are tied to gender, pubertal development, and indicators of adolescent functioning. Furthermore, poor relationship skills can lead to social exclusion and susceptibility to peer pressure to engage in risky behaviors (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Widman, Choukas-Bradley, Helms, & Prinstein, 2016).

Responsible Decision-Making. Decision-making includes the ability to appraise potential consequences of actions, understand social norms and overall safety, and make choices that are healthy and responsible (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Adolescents gain more autonomy as they transition out of childhood and are therefore given more opportunities to practice decision-making skills, both in making short and long-term choices (Wray-Lake, Crouter, & McHale, 2011). An fMRI study found that adolescence take longer to recognize “bad” decisions than adults do, in that they are not as efficient in identifying

potential negative outcomes. One explanation is that adolescents' experience a more intense reward reaction to a risky or "bad" decision than adult or child counterparts and this is especially true when they are in the presence of peers (Albert, Chein, & Steinberg, 2013; Steinberg, 2010). Furthermore, the neurological mechanisms and behavioral manifestations of decision-making are closely linked to self-management skills (Pokhrel et al., 2013; Steinberg, 2010). The reward system is also impacted by the hormones associated with puberty, indicating a link between decision-making abilities and puberty. Variation between individual development of decision-making skills and between the genders has been demonstrated (Xiao et al., 2012; Eisenberg, 1991). This study can help determine if self-management skills are likely to be linked or needed for profiles of high decision-making skills around the time of puberty.

Social Awareness. Social awareness includes perspective taking, empathy, and the recognition of cultural diversity and community support (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). It is suggested that adolescence is a sensitive period for social processing; in other words, adolescence may be particularly sensitive to their social and cultural environments (Blakemore & Mills, 2014). Research has suggested that, on average, adolescent girls tend to empathize more than their male counterparts (Auyeung, Allison, Wheelwright, & Baron-Cohen, 2012). Pubertal development has been shown to coincide with development of perspective taking abilities and empathy (Masten, Eisenberger, Pfiefer, Colich, & Dapretto, 2013). Further, puberty has been linked to increases in empathy for girls, but not boys (Bun Lam, Solmeyer, & McHale, 2012), and in fact for some boys, puberty has been linked to decreases in empathy (Van der Graaff et al., 2014). The ability to take the perspective of another is dependent on the ability to have self-awareness (Blakemore & Choudhury, 2006), suggesting that it is unlikely that individuals' with low self-awareness will have moderate to high levels of social awareness skills.

This Study

Study Aims

This study uses a person-centered approach to test how SEL skill configurations relate to gender and pubertal status and in conjunction with those two potential factors, predict functioning later in adolescence. This approach permits attention to the collective impact of six identified important skills while still considering potential differences in importance of impact of the component skills on school engagement, depressive symptoms, and delinquency.

Method

Participants & Procedure

This study utilizes data from the National 4-H Study of Positive Youth Development (Lerner et al., 2005). Participants in this study were United States youth drawn from school and community agencies. Data collection occurred once per year and began when the youth were in 5th grade and followed them through the 12th grade. Like most longitudinal investigations, participants were both added and dropped with each wave of data collection. The participants were diverse on many factors including race (7% African American, 3% Asian American, 2% American Indian, 72% White, 9% Latino/a American, and 4% Multiracial), gender (61% Female), geographic locale (23% West, 28% Southeast, 22% North Central, and 26% Northeast; 25%Urban, 38% Suburban, and 37% Rural) and mother's education (20 % High Degree or less, 37% some training or school beyond High School, 28% college degree and 14% advanced degree). Youth parents also completed a survey to supplement demographic information. Previous studies include more detail on the original study, including recruitment and data collection procedures (e.g. Lerner et al., 2005; Phelps et al., 2007).

For the purposes of this study, the data from the first two waves of data collection were utilized. The age selection (wave 1 is mostly 5th grade and wave 2 is mostly 6th grade) was purposefully meant to center around the age of pubertal onset (Chumlea et al., 2003; Tinggaard et al., 2012). The number of participants ranged from 1,717 in wave 1 to 1,953 in wave 2. Demographic details for the sample in this study are provided in Table 1.

Measures

Social and emotional skills. Social and emotional skills were measured using a scale previously validated by the authors (Ross & Tolan, under review) created using items within the 4-H Study of Positive Youth Development thought to reflect the five social and emotional learning scales as defined in the CASEL model (Durlak, Domitrovich, Weissberg, & Gullotta, 2015). Items were drawn from scales assembled by Lerner and colleagues to potentially tap dimensions of their Positive Youth Development model; the 5 Cs (Lerner et al., 2005). These include the Selection, Optimization, & Compensation scale (SOC; Freund & Baltes, 2002), Target-Based Expectations Scale (TBES; Buchanan & Hughes, 2004), Search Institute's Profiles of Student Life: Attitudes and Behaviors scale (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998), Peer Support Scale (PSS; Armsden & Greenberg, 1987), and the Self-Perception Profile for Adolescents and Children (SPAA; Harter, 1988; SPPC; Harter 1983). Confirmatory Factor Analysis (CFA) indicated good model fit, with one caveat. The relationships skills scale contained two subscales; creating relationships and relationship quality. This model was confirmed through measurement invariance testing with multiple age group samples (Ross & Tolan, 2016). Therefore, this analysis incorporates those results to focus on six scales.

Self-awareness. The self-awareness scale consists of five items from the SPPA/C (Harter, 1988; Harter, 1983). Participants indicated which choice was more like them. An

example item is "*Some kids aren't very happy with the way they do a lot of things BUT other kids think the way they do things is fine*." The scale had acceptable reliability (α = .65).

Self-management. The self-management scale is measured with six items from the SOC scale (Freund & Baltes, 2002). Participants indicated which choice was most like them. An example item is "*Even if something is important to me, it can happen that I don't invest the necessary time or effort.* ***OR*** *For important things, I pay attention to whether I need to devote more time or effort.*" The scale had acceptable reliability (α = .54).

Responsible decision-making. The decision-making scale drew seven items from the PSL-AB survey (Benson, Leffert, Scales, & Blyth, 1998). Participants indicated how important each of the items were in their life. For example, an item read, "*Doing what I believe is right even if my friends make fun of me.*" The scale had good reliability (α = .89).

Creating relationship skills. Creating relationships is measured with three items from the SPAA/C (Harter, 1988; Harter, 1983) where youth indicated which choice is more like them. An example item is, "*Some kids find it hard to make friends BUT For other kids it's pretty easy.*" The reliability of this scale was acceptable (α = .58)

Relationship Quality. Relationship quality is measured with four items from the PSS (Armsden & Greenberg, 1987) where youth indicated how true a statement was for them. An example item is "*My friends are there when I need them*." This subscale had very good reliability (α = .92).

Social awareness. Social awareness is measured with five items from the Target-Based Expectations scale (Buchanan & Hughes, 2004). Youth indicated how well each of the words described them and their behavior on a scale of 0 (not at all well) to 9 (very well). An example item is "*helpful*". This scale had good reliability (α = .83).

Predictor & Control Variables.

Pubertal Status. Pubertal status is measured using the Puberty Development Scale (PDS; Petersen, Crockett, Richards & Boxer, 1988). This eight-item (gender specific) self-report measure of pubertal development is widely used. An example item is "*Have you noticed any skin changes, especially pimples?*" The response options are 1= "*has not yet begun*", 2 = "*has barely started*", 3 = "*is definitely underway*", and 4 = "*seems completed*". A pubertal score status is established on a scale of 1 to 5 (1=prepubertal, 5=postpubertal), separately for boys and girls, using a previously developed coding scheme (Petersen et al., 1988). The scale has been validated through correlations with the Sexual Maturation Scale (Tanner, 1962) and physician ratings (Brooks-Gunn, Warren, Rosso, & Gargiulo, 1987).

Income. Income is measured through parent reports of annual salary per household. Responses were recoded into eight income brackets ranging from $10,000 per year to over $100,000 per year.

Ethnicity. Ethnicity is measured through youth self-reports. The item asked, "*How would you describe yourself? Please mark the one that applies to you.*" The responses were, "*American Indian*", "*Asian or Pacific Islander*", "*Black or African American*", "*Hispanic or Latino/Latina*", "*White*", "*Multiethnic or multiracial (more than one race or ethnicity)*" or "*Other* _____". Due to small representation of American Indian, Asian, Multiracial, and Other, these categories were collapsed into one category that we called "Other". Therefore, the four ethnic categories included in this analysis were Black, Hispanic, White, and Other.

Mother's Education. Mother's education is measured through parent reports of the number of years of schooling that the mother obtained at the time of administration. Responses ranged from eight years to 20 or more years.

Outcomes.

School engagement. School engagement is measured with a 4-item scale from PSL-AB (Benson, et al., 1998). An example item is, "*How often do you come to classes without your homework finished?*" The response options are 1= *"usually"*, 2= *"sometimes"*, and 3 = *"never"*. The items are reverse coded and summed, so a higher score indicates higher levels of engagement. The scale has good reliability (α = .74).

Depressive Symptoms. Depressive symptoms is measured using the Center for Epidemiological Studies Depression (CES-D) scale. This 20-item self-report measure is widely used (Radloff, 1977). An example item is, "During the past week I felt sad." The response options range from; 0 = "*rarely or none of the time (less than 1 day)*" to 3 = "*most of all of the time (5-7 days)*". Items are summed to create a total score, with 60 being the highest score possible. Higher scores are reflective of higher rates of depressive symptoms. The reliability and validity of the scale has been demonstrated extensively in previous studies (e.g. Radloff, 1977; Windle et al., 1986) and the reliability for the sample is this study is also good (α = .85).

Delinquency. Delinquency is measured using a 4-item scale from the PSL-AB (Benson et al., 1998). An example item is *"During the last 12 months, how many times have you stolen something from a store?"* The response options range from 1 = *"never"* to 5 = "five or more times". The scale is scored by adding scores across four items. It also has good reliability (α = .79).

Analyses

Analyses were conducted in multiple steps. First, a latent profile analysis (LPA) was conducted in Mplus (Muthen & Muthen, 2008). LPA clusters individuals into groups with like profiles across multiple dimensions/scales and creates distinct groups (Marsh et al., 2009; Lanza,

Flaherty, & Collins, 2003). This approach allowed flexible model specification and provides fit indices for model comparisons and a more systematic approach to selecting the number of underlying classes (Masyn, 2013; Pastor et al., 2007; Vermunt & Magidson, 2002). The final number and defining characteristics of groups are determined by examining the fit of solutions with varying numbers of groups and the coherent interpretability of the groups (Marsh, Ludtke, Trautwein, & Morin, 2009; Flaherty & Kiff, 2012). This analysis also identified the groups by differentiated profiles which are utilized in the ensuing analyses.

We hypothesized that, like in many LPA analyses, one or groups would emerge that showed relatively high scores across scales (optimally functioning), one or more groups would show relatively low scores across scales (risk level functioning), and one or more groups would have a mixture of higher and lower scores across scales. We also expected that optimally functioning adolescents would show more on-time pubertal status, and show better subsequent functioning than low level social and emotional functioning adolescents; it is expected that significant differences will emerge for specific profiles.

After the profiles were established, logistic regression using SPSS version 21.0 was used to examine predictors of profile membership (e.g. gender and puberty). Finally, a MANCOVA was used to determine if profiles predicted important outcomes for youth. Pairwise comparisons were examined to make direct comparisons between each of the groups, in both describing their characteristics and their association with outcomes.

Results

Latent Profile Analysis

LPA was conducted to determine the optimal number of SEL profiles. The six SEL scales were included as the dimensional characteristics of SEL; self-awareness, self-management,

social awareness, creating relationship skills, relationship quality, and responsible decision making. To determine the optimal solution, one- to eight- profile solutions were estimated. Fit indices for the solutions are summarized in Table 2. Based on fit indices, distribution of participants across classes, and conceptual interpretability of the profiles, it was evident that six profile groupings fit the data best. The relative loading of scales for each configuration in this model are reported in Table 3 and Figure 1 presents these loadings in a histogram. The profiles are listed in order of overall score, across scales. For example, the first class had an overall mean SEL score of 2.86 and the sixth class had an overall mean SEL score of -5.74. Demographic characteristics of each profile are reported in Table 4. Profiles were labeled by the authors based on the configurations of scores, first with a general qualifier and next with distinct characteristics of that profile. The general qualifiers were *Socially Competent* (given to the two profiles with the relative highest overall mean), *Socially Average* (given to the two profiles with the relative midrange mean), or *Socially Struggling* (given to the two profiles with the relative lowest overall mean).

Profile 1 (*Socially Competent all around*) was characterized by high levels (above average scores) on all six dimensions of SEL. This profile had the largest sample size at 53% (n=459). This indicates that over half of the adolescence in the sample had above average levels on all domains of social and emotional functioning. Profile 1 (*Socially Competent all around*) had the highest mother's education level and highest annual household income. Further, this group was slightly more female (60%). This group also had higher representation of white youth than any other group at 64%.

Profile 2 (*Socially Competent except with Relationship Quality*) was comprised of 6% (n=51) of the sample and was distinguished by very low levels of relationship quality despite

high levels of all other social and emotional domains. This low level of relationships quality drove a much lower overall mean SEL score (-0.57) compared to Profile 1 (2.86). In fact, all other skills were comparable in level to Profile 1. Profile 2 was also characterized by low household income (only above Profile 6) and high representation of black youth (33%) and similar representation of females (59%) to Profile 1.

Profile 3 (*Socially Average; High Relationship Quality with Self Awareness and Creating Relationship Challenges*) was comprised of 12% (n=100) of the sample and was distinguished by low levels of self-awareness and creating relationship skills, despite high levels of all other social and emotional domains. Profile 3 was also characterized by the highest representation of Hispanic youth (27%) and more males (57%) than females. On all other demographic characteristics, Profile 3 was fairly average.

Profile 4 (*Socially Average all around*) was comprised of 13% (n=117) of the sample and was distinguished by higher than average levels of self-management, but mostly average or slightly below average levels on all domains of social and emotional functioning. There wasn't a particular skill that seemed to stick out or contrast the others in this profile. Profile 4 was also characterized by the earliest developers on the puberty scale (average score at 2.96) of all groups and the most representation of the "Other" ethnic category (27%). This category included youth that self-identified as American Indian, Asian, multiracial, or other.

Profile 5 (*Socially Struggling, particularly with Self-Management*) was comprised of 11% (n=92) of the sample and was distinguished by poor self-management skills (and poor social awareness skills). Overall, this group scored below average on all domains of social and emotional functioning. Profile 5 did not have any distinguishing characteristics in terms of

demographics. In fact, in terms of pubertal status, mother's educational attainment, household income, and race, Profile 5 was the closest to the overall sample means.

Profile 6 (*Socially Struggling, particularly with Relationship Quality*) was comprised of 6% (n=51) of the sample and was distinguished by poor relationship quality. Overall, this group scored below average on all domains of social and emotional functioning and had the lowest mean SEL score of all the groups. Profile 6 was characterized by the highest sample representation of males (70%) and the lowest household income level ($32,222). Additionally, Profile 6 had the second highest representation of Black youth (31%).

Predictors of Profile Membership

A multinominal logistic regression was conducted using profile membership as the dependent variable and gender, puberty, the interaction of gender and puberty as predictor variables. Logistic regression was used due to profile membership being a categorical variables. Profile 1 (*Socially Competent all around*) was chosen as the reference group. Results indicated that only gender significantly predicted group membership ($p<.01$). Puberty and the interaction of puberty and gender did not predict group membership. Income, ethnicity, and mother's education were added at a second stage to the logistic regression to determine if variables that weren't originally identified in the analyses might predict group membership. The white racial/ethnic category was chosen as the reference group. Income and ethnicity predicted profile membership, but mother's education did not (see Table 5a and 5b).

Profile Membership Predicting Outcomes

A MANCOVA analysis was conducted to determine if profiles predicted important outcomes for youth. The covariates that were used in this analysis were gender and ethnic group. In this sample, income was confounded with ethnic group (mean income was $27,783 for

Blacks, $46,351 for Hispanics, $57,176 for Other, and $69,721 for Whites), and therefore we chose to include ethnic group but not income as a covariate in this analysis. Controlling for gender and ethnic group, group membership significantly predicted all outcomes; school engagement ($p<.01$), depressive symptoms ($p<.001$), and delinquency ($p<.01$). Pairwise comparisons were examined to further differentiate the profiles according to outcomes of interest. The pairwise comparisons are presented in Table 6. The majority of significant pairwise comparisons are between the extreme profiles (Profile 1 and Profile 6) with other groups. However, there are other significant differences to note by outcome. In terms of school engagement, Profile 6 (*Socially Struggling, particularly with Relationship Quality*), was significantly worse than all other profiles, except Profile 3 (*Socially Average; High Relationship Quality with Self Awareness and Creating Relationship Challenges*). Additionally, Profile 1 (*Socially Competent all around*) was significantly better in terms of school engagement than Profile 2 (*Socially Competent except with Relationship Quality*). Differences in depressive symptoms revealed some interesting patterns. For instance, the highest mean (indicating the most depressive symptoms) were in Profile 2 and Profile 2 was significantly different than the two closest groups (Profile 1 and Profile 3). In terms of delinquency, Profile 1 (*Socially Competent all around*) had significantly lower rates of delinquency than Profile 3 (*Socially Average; High Relationship Quality with Self Awareness and Creating Relationship Challenges*), Profile 5 (*Socially Struggling, particularly with Self-Management*), and Profile 6 (*Socially Struggling, particularly with Relationship Quality*).

Discussion

This study is the first to take a person-centered approach to address the multi-dimensionality of social and emotional functioning in adolescence by examining profiles of SEL

skills in a normative adolescent sample, to trace potential variation by gender, ethnicity, parental education, and puberty, and to subsequently investigate the relation of these profiles to important outcomes for youth. (A similar study has been conducted with preschool children (Denham, 2012).) In doing so, we found that six differential configurations fit the data best and these configurations showed some variation by gender, ethnicity, and income, but not by pubertal status or mother's education. Moreover, these profiles related to differential functioning one year later.

Profiles of SEL

The results of this study suggest that there are distinct profiles of social and emotional functioning during early adolescence, consistent with our hypothesis. Specifically, six distinct profiles were found. For orientation to the results, the profiles were ordered from highest overall SEL mean score (Profile 1) to lowest overall SEL mean score (Profile 6). The characteristics of each profile were quite distinct, and added a richer understanding of social and emotional functioning than simply looking at a composite score. Over half (53%) of the sample fell into Profile 1, which was the *Socially Competent all around* group, indicating that the majority of adolescents in this sample are functioning well, socially and emotionally.

Prediction of Profile Membership

In support of the original hypotheses, gender did significantly predict profile membership. However, counter to the original hypotheses, pubertal status and the interaction of gender and pubertal status did not predict profile membership. Additionally, we found that both income and race predicted profile membership. One possible explanation for puberty not predicting SEL profile is that although the sample was primarily 5th graders, they were further along in puberty that what has been suggested by previous literature (e.g. Cabrera, Bright, Frane,

Blethen, & Lee, 2014; Herman-Giddens et al., 2012). Another possible explanation for this finding is that there was not enough variation of pubertal status in the sample. For example, the majority of the sample (47%) was in the 4th stage on the Peterson scale or "advanced pubertal development". Less than 8% of the sample was in the earliest (first) stage, or "prepubertal stage". Perhaps a prediction would be detected if the same analysis were run on a sample that were younger and/or in earlier stages of puberty.

Profiles Predicting Youth Outcomes

The results supported the hypotheses that SEL profiles predicted important outcomes for youth. Notably, the most differential predictions were of the extreme groups (Profile 1 and Profile 6). The positive outcome investigated was school engagement. In most instances, Profile 1 (*Socially Competent all around*) had significantly better positive outcomes than all other groups and Profile 6 had significantly poorer positive outcomes than all other groups. In terms of negative outcomes, the opposite (and expected) pattern was true. Surprisingly, Profile 2 (*Socially Competent except with Relationship Quality*) had the highest rates of depressive symptoms of all the groups and was significantly higher than Profile 3 (*Socially Average; High Relationship Quality with Self Awareness and Creating Relationship Challenges*) on depressive symptoms. Profile 2 had higher overall SEL scores (-0.57) than Profile 3 (-1.60), which would traditionally predict more optimal outcomes, but this does not seem to be the case. This finding also points out the value added of doing a person-centered analysis, because this nuance may have been overlooked in a traditional analysis. The distinguishing characteristic of Profile 2 (*Socially Competent except with Relationship Quality*) was the extremely low levels of relationship quality. The other group with extremely low levels of relationship quality was Profile 6 (*Socially*

Struggling, particularly with Relationship Quality). Interestingly, Profile 6 had the second highest level of depressive symptoms.

The profiles also seemed to give more information on positive outcomes than simply looking at overall SEL. For example, the mean level of school engagement did not incrementally decrease from Profile 1 to Profile 6. In fact, Profile 4 (*Socially Average all around*) had the second highest level of school engagement and Profile 3 (*Socially Average; High Relationship Quality with Self Awareness and Creating Relationship Challenges*) had the second lowest level of school engagement. This may suggest that the combination of low self-awareness and low creating relationship skills (like Profile 3) is detrimental to school performance. This group would most likely not traditionally be flagged as needing additional academic supports, but the profile predictions indicate that they may need it. Profile 3 is also the second highest in terms of delinquency, indicating that this group may also be having trouble in the community.

It is also important to note that of the two lowest SEL groups (Profile 5 and Profile 6), Profile 6 is significantly more associated with negative outcomes. This may indicate that youth with a profile of poor relationship quality and self-awareness are more at risk than youth with a profile of low self-management and social-awareness skills.

Trends of SEL skills in Profiles

Another interesting, post hoc, observation of the profiles is how the social and emotional component skills tend to configure with one-another. For instance, self-awareness and creating relationships (the blue and purple bars in Figure 1) tend to be at the same level in all six profiles. Correlations between the scales indicate that, in fact, self-awareness and creating relationships are the two highest correlated scales with one another (at .57). The other scales are also significantly correlated, but in the .13 to .42 range. This may point to self-awareness and creating

relationship skills being developmentally tied around early adolescence. Future work may look to unpack whether promoting one of these skills will inadvertently promote the other. This type of finding may leverage interventions or at least make them more efficient if one skill is more easily targeted than another.

The other two skills that are closely tied in all profiles are responsible decision-making and social awareness. These skills are the second highest correlated at .42. Similarly, these two skills may be closely tied during adolescence and this should be considered as a possible leverage to intervention. It may also be possible that self-management is a foundational skill for responsible decision-making and social awareness. Looking closely at the profiles, it doesn't seem that individuals need to have high responsible decision-making and social awareness to have high levels of self-management (Profile 4), but the inverse is not true (in all other profiles, responsible decision-making and social awareness follow the same pattern of self-management and in no profiles do individuals have high responsible decision-making skills and social awareness skills in the absence of high self-management skills). The literature does seem to suggest that the neurological processes involved in self-management are also necessary for making decisions and navigating social situations (Pokhrel et al., 2013; Steinberg, 2010). Future work can investigate whether specifically, developing self-management skills is advantageous as a precursor to developing decision making or social awareness skills. One way to unpack this is to see specifically if Profile 4 individuals gain decision making and social awareness skills in subsequent years.

SEL Skills and Ecological Factors

The authors deem it important to note that social and emotional skills do not exist in isolation. The ecological model of development (Bronfenbrenner, 1994) illuminates that

individual skill level and development occurs within the context of family and peer interactions (microsystem), neighborhood and school interactions (mesosytem), and cultural and political climates (exosystem). While this analysis limits our ability to explore potential interactions between income, race/ethnicity, and social and emotional functioning, findings did allude to potential racial and SES differences between the profiles; where there was a higher representation of low income youth and Black youth in Profiles 2 and 6. These two profiles were also the two that had particularly low relationship quality. Youth from low income households tend to have more mobility, less opportunity to participate in extracurricular activities, and more responsibility in their household (Fowler, Henry, Schoeny, Taylor, & Chavira, 2014; Snellman, Silva, Frederick, & Putman, 2015) which all may be barriers to developing quality relationships with peers. These and other ecological factors may be interacting with social and emotional functioning in a way that is not captured in the present study.

Limitations

One major limitation of this work is the underrepresentation of American Indian, Asian, and other racial/ethnic categories that made it necessary to collapse these into one variable. Additionally, ethnicity was highly correlated with income in this sample, reflecting an overrepresentation of low-income, black youth. Future work should strive to collect a diverse and more representative sample of current youth to further investigate the unique aspects of race/ethnicity and income in predicting social and emotional profiles.

Another limitation to this study is the measures of social and emotional skills. The scales were created within a pre-existing dataset and consequently do not encompass all aspects of each construct. Ideally, youth would complete a measure that was specifically developed to capture all

elements of social and emotional functioning and then be followed over time to best determine which profiles of social and emotional functioning are associated with certain outcomes.

Conclusions and Future Research

Previous work has evidenced the importance of social and emotional skills for youth functioning and success (Zins, Bloodworth, Weissberg, & Walberg, 2007; Durlak et al., 2011). This is the first study to look at all elements of social and emotional skills, as defined by CASEL, simultaneously while also considering that youth are not homogenous in their profiles of social and emotional functioning. Identifying and examining profiles of social and emotional functioning in youth can advance theory and understanding of the development of programs aimed at promoting these skills specifically during the adolescent years. These findings point to the potential need for differential interventions that target differential skills and accompanying risks in particular profiles of youth. For instance, youth who are high functioning in all domains except relationship quality may be at a heightened risk for depressive symptoms and in need of intervention. Previous methods of studying social and emotional functioning/development may not have identified this group as "at risk". Additionally, different profiles of low social and emotional functioning may be more alarming than others. According to these results, Profile 6 (*Socially Struggling, particularly with Relationship Quality*) youth have poorer outcomes that Profile 5 (*Socially Struggling, particularly with Self-Management*), which may suggest that the combination of low self-awareness and low relationship skills is a greater cause for concern than the combination of low self-management and social awareness skills during early adolescence. Future work can begin to look at these profiles longitudinally, to see how stable or transient they are over time and to identify optimal points of intervention.

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Table 1.
Demographic Characteristics of the Sample.

	Wave 1	**Wave 2**
Number of Youth	1717	1953
Age (mean, SD)	10.97 (0.53)	12.09 (0.69)
Male (%)	48.0	42.6
Geographic Location (%)		
Urban	27.8	26.3
Suburban	44.4	33.2
Rural	27.9	40.8
Race/Ethnicity (%)		
African American	7.5	7.4
Asian American	3.9	2.6
American Indian	3.0	2.9
European American	53.3	60.2
Latino/a American	17.7	15.6
Multiracial	4.7	4.6
SES indicators		
Annual per capita income (mean, SD)	$13,657 (8348)	$13,636 (8621)
Mothers' ed in years (mean, SD)	13.66 (2.40)	13.94 (2.51)

Table 2.
Fit indices for latent profile analyses on SEL

	1 Profile	2 Profiles	3 Profiles	4 Profiles	5 Profiles	6 Profiles	7 Profiles	8 Profiles
AIC	14383	14237	13903	13673	13569	13474	13416	13351
BIC	14895	14328	14027	13830	13759	13697	13673	13642
Sample size adjusted BIC	14857	14267	13944	13725	13632	13548	13502	13448
Entropy	---	0.74	0.82	0.85	0.84	0.84	0.86	0.87
Profile sample sizes	1 = 869	1 = 305	1 = 128	1 = 119	1 = 94	1 = 92	1 = 40	1 = 31
		2 = 564	2 = 177	2 = 530	2 = 90	2 = 117	2 = 110	2 = 30
			3 = 564	3 = 131	3 = 491	3 = 50	3 = 47	3 = 111
				4 = 89	4 = 92	4 = 100	4 = 77	4 = 45
					5 = 102	5 = 51	5 = 52	5 = 65
						6 = 459	6 = 95	6 = 94
							7 = 448	7 = 448
								8 = 45

Table 3.
SEL Profile Characteristics (mean scores by scale)

Overall Description	*Socially Competent*	*Socially Competent*	*Socially Average*	*Socially Average*	*Socially Struggling*	*Socially Struggling*
Unique Characteristics	*All around*	*except with Relationship Quality*	*High Relationship Quality with Self Awareness and Creating Relationships Challenges*	*All around*	*particularly with Self management*	*particularly with Relationship Quality*
	Profile 1 (53%)	**Profile 2 (6%)**	**Profile 3 (12%)**	**Profile 4 (13%)**	**Profile 5 (11%)**	**Profile 6 (6%)**
Self-Awareness	0.61	0.41	-1.48	-0.28	-0.40	-1.22
Self-Management	0.41	0.36	0.12	0.18	-1.88	-0.34
Responsible Decision-making	0.44	0.19	0.35	-0.81	-0.94	-0.42
Creating Relationships	0.51	0.17	-1.34	-0.19	-0.34	-1.09
Relationship Quality	0.44	-2.02	0.49	0.00	-0.32	-2.31
Social Awareness	0.45	0.32	0.27	-0.85	-1.18	-0.36

Table 4.
SEL Profile descriptions by demographic variables

		Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
	N	**459**	**51**	**100**	**117**	**92**	**50**
Gender	Male	40.5%	41.2%	57.0%	58.1%	51.6%	70.0%
	Female	59.5%	58.8%	43.0%	41.9%	48.4%	30.0%
Pubertal Status	Mean	3.20	3.28	3.12	2.96	3.10	3.11
	Pre	8.2%	9.3%	5.9%	7.3%	11.1%	4.3%
	Beg	19.7%	16.3%	23.5%	29.2%	18.1%	14.9%
	Mid	17.0%	16.3%	25.9%	26.0%	22.2%	46.8%
	Adv	54.0%	53.5%	42.4%	35.4%	47.2%	34.0%
	Post	1.1%	4.7%	2.4%	2.1%	1.4%	0.0%
Mother's Ed (years)	Mean	14.22	13.61	13.45	13.57	13.57	12.57
	8	1.9%	0.0%	3.4%	1.5%	3.8%	2.9%
	10	2.8%	3.0%	10.3%	8.8%	3.8%	20.0%
	12	17.7%	42.4%	32.8%	23.5%	17.0%	37.1%
	13	23.7%	15.2%	13.8%	25.0%	39.6%	11.4%
	14	15.8%	15.2%	13.8%	14.7%	15.1%	14.3%
	16	25.9%	15.2%	13.8%	17.6%	11.3%	11.4%
	18	9.8%	6.1%	6.9%	7.4%	5.7%	0.0%
	20	2.2%	3.0%	5.2%	1.5%	3.8%	2.9%
Household income	Mean	68,615	41,286	54,703	54,552	55,185	32,222
	10,000	5.1%	14.3%	6.8%	17.9%	9.3%	30.6%
	20,000	6.8%	22.9%	15.3%	11.9%	9.3%	16.7%
	30,000	8.4%	5.7%	10.2%	4.5%	5.6%	13.9%
	40,000	6.1%	20.0%	13.6%	7.5%	9.3%	8.3%
	50,000	9.8%	11.4%	15.3%	7.5%	16.7%	13.9%
	60,000	8.1%	2.9%	6.8%	14.9%	13.0%	5.6%
	72,500	13.5%	17.1%	5.1%	9.0%	22.2%	11.1%
	100,000	42.2%	5.7%	27.1%	26.9%	14.8%	0.0%
Ethnicity	Black	6.5%	32.7%	8.5%	10.9%	12.5%	31.3%
	Hispanic	14.0%	18.4%	26.6%	16.4%	20.5%	20.8%
	White	63.7%	32.7%	47.9%	45.5%	52.3%	29.2%
	Other	15.8%	16.3%	17.0%	27.3%	14.8%	18.8%

Table 5a.
Logistic regression results – likelihood ratio tests

	Chi-Square	df	Sig.
Puberty	1.23	0	0.94
Gender	19.56	5	0.00
Puberty x Gender	6.45	5	0.27
Mother's Ed	4.38	5	0.50
Income	20.50	5	0.00
Ethnicity	31.65	15	0.01

Table 5b.
Logistic regression results

Group	Puberty	Mother's Ed	Income	Puberty X Gender	Gender		Ethnicity			
					Male	Female	Other	Hispanic	Black	White
1 (Reference Group)	-	-	-	-	-	-	-	-	-	-
2	-0.12, (0.88)	0.14, (1.15)	0.00, (1.00) ***	0.39, (1.47)	0.24, (1.27)	-	0.64 (1.90)	0.77, (2.15)	1.72, (5.61)	-
3	-0.02 (0.98)	-0.04 (0.96)	0.00, (1.00)	-0.40 (0.67)	1.17, (3.21) ***	-	0.57, (1.78)	1.19 (3.29) **	0.60, (1.83)	-
4	-0.02, (0.99)	-0.07, (0.93)	0.00, (1.00)	0.07, (1.08)	0.55, (1.74)	-	1.19, (3.27) ***	0.60, (1.83)	1.15, (3.16) *	-
5	-0.06, (0.94)	-0.06, (0.94)	0.00, (1.00)	-0.33, (0.72)	0.57, (1.77)	-	-0.25, (0.78)	0.18, (1.20)	-0.29, (0.68)	-
6	0.09, (1.10)	-0.08, (0.92)	0.00, (1.00) **	-0.11, (.0.90)	1.25, (3.49) **	-	1.25, (3.48) *	1.08 (2.93)	1.53, (4.60) *	-

(β, (Exp(β) or odds ratio), $p<.01$**, $p<.001$***)

Table 6.
MANCOVA results, pairwise comparisons by profile

		Outcome								
		School Engagement			**Depressive Symptoms**			**Delinquency**		
Group	Comparison Group	Mean Difference	S.E.	Sig.	Mean Difference	S.E.	Sig.	Mean Difference	S.E.	Sig.
1	2	0.32	0.39	0.41	-6.55***	1.95	0.00	-0.34	0.49	0.49
	3	0.57*	0.26	0.03	-1.28	1.30	0.33	-0.74*	0.33	0.02
	4	0.28	0.24	0.26	-3.91***	1.21	0.00	-0.57	0.30	0.06
	5	0.33	0.27	0.24	-3.35**	1.35	0.01	-0.73*	0.34	0.03
	6	1.36***	0.38	0.00	-4.50*	1.87	0.02	-1.05*	0.47	0.03
2	3	0.25	0.45	0.58	5.27*	2.23	0.02	-0.40	0.56	0.48
	4	-0.05	0.44	0.91	2.64	2.17	0.23	-0.22	0.55	0.68
	5	0.00	0.46	1.00	3.20	2.26	0.16	-0.39	0.57	0.49
	6	1.04*	0.53	0.05	2.05	2.61	0.43	-0.71	0.65	0.28
3	4	-0.30	0.33	0.36	-2.63	1.61	0.10	0.18	0.40	0.66
	5	-0.25	0.35	0.48	-2.08	1.71	0.23	0.01	0.43	0.98
	6	0.79	0.43	0.07	-3.23	2.15	0.13	-0.31	0.54	0.57
4	5	0.05	0.33	0.88	0.56	1.65	0.74	-0.18	0.42	0.69
	6	1.09**	0.42	0.01	-0.60	2.10	0.78	-0.48	0.53	0.36
5	6	1.04*	0.44	0.02	-1.15	2.17	0.60	-0.32	0.55	0.56

Note: Significance adjusted for multiple comparisons

Figures

Figure 1.
SEL Profiles