

THE MODERATING ROLE OF BEHAVIORAL SELF-REGULATION
IN RELATIONS BETWEEN NEIGHORHOOD CONNECTION AND
ADOLESCENTS' POSITIVE ADJUSTMENT

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ADOLESCENTS' POSITIVE ADJUSTMENT

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The future is bright. Onward and upward!

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
LIST OF TABLES AND FIGURES.....	iv
ABSTRACT.....	v
CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: METHOD	11
CHAPTER 3: RESULTS.....	19
CHAPTER 4: DISCUSSION.....	22
REFERENCES	30
VITA.....	46

LIST OF TABLES AND FIGURES

Tables

- 1. Table 1. Items Included in Study Measures..... 37
- 2. Table 2. Descriptive Statistics for and Bivariate Correlations Between Study Variables..... 40

Figures

- 1. Figure 1. An Adapted Visual Representation of the R-DST Perspective..... 41
- 2. Figure 2. The Path Model..... 42
- 3. Figure 3. The Adjusted Effect of Neighborhood Connection on Prosocial Behavior..... 43
- 4. Figure 4. The Adjusted Effect of Neighborhood Connection on School Engagement..... 44
- 5. Figure 5. The Adjusted Effect of Neighborhood Connection on Self-esteem..... 45

ABSTRACT

The current study directly and longitudinally tested relational-developmental systems theories by analyzing whether neighborhood connection facilitates school engagement, self-esteem, and prosocial behavior depending on adolescents' behavioral self-regulation. Participants included 500 U.S. adolescents age 12 at Time 1 and age 16 at Time 2 (67.2% White; 77% from two-parent households; 119,000 USD average household income). Neighborhood connection at age 12 predicted self-esteem at age 16 for adolescents who reported low behavioral self-regulation at age 12. Behavioral self-regulation did not moderate relations between neighborhood connection and self-esteem for those who reported moderate to high behavioral self-regulation. Behavioral self-regulation did not moderate relations between neighborhood connection and prosocial behavior or school engagement. Aligned with relation-developmental systems theories, neighborhood connection facilitated positive personal adjustment among adolescents at-risk due to low behavioral self-regulation. I contextualize my findings within the extant literature, discuss the present study's limitations, and suggest directions for future research

CHAPTER 1: INTRODUCTION

Psychologists have long investigated multidimensional factors that predict adolescent adjustment and health in order (a) to understand what prepares adolescents to flourish as they transition to adulthood and (b) to create applied approaches to encourage adolescents to follow positive developmental trajectories. Based on decades of research, relational-developmental systems theorists assert that there is no single factor that determines adjustment. Instead, there are various ecological systems (e.g., environmental, personal) which coact to predict adolescent development (Lerner, Lerner, Bowers, & Geldhof, 2015; Lerner & Overton, 2008; Masten, 2018; Overton, 2013). During adolescence, one especially important aspect of the environmental system includes neighborhood characteristics, while an ever-influential aspect of the personal system includes self-regulation. Though research suggests that neighborhood factors are associated with youth adjustment (Leventhal, Dupéré, & Brooks-Gunn, 2009), additional research suggests this influence is dependent on more proximal factors such as individuals' capacities to self-regulate (Bush, Lengua, & Coler, 2010). Thus, adolescent adjustment may be sensitive to neighborhood experiences in concert with adolescents' capacities to self-regulate (Bush et al., 2010; Lengua, 2002). Four details of these relations remain unclear due to lack of research, but if investigated, could meaningfully inform theory and advance basic science. First, explicit tests of relational-developmental systems theories are needed to capture coactions between contextual and individual factors that affect adolescent development. Second, studies of positive adjustment outcomes are needed; research investigating coactions between neighborhoods and self-regulation on youth adjustment generally investigates neighborhood risks rather than

strengths, dysregulation rather than self-regulation, and maladjustment (for a review, see Leventhal et al., 2009). Third, studies of adolescents are needed; most research focuses on children, not adolescents (Bariola, Gullone, & Hughes, 2011), even though adolescents spend more autonomous time within their neighborhoods compared to children (Leventhal et al., 2009) and have an increasing need and ability to self-regulate (Lerner et al., 2011; Nelson et al., 2019). Finally, longitudinal studies are needed; most investigations in this area are cross-sectional (Bariola et al., 2011; Entwisle, 2007), leaving questions regarding the duration of effects of neighborhoods, self-regulation, and coactions on adolescent adjustment. The current investigation addresses each of these needs by taking a strengths-based approach to investigating whether neighborhood connection at 12 years of age differentially promotes positive adolescent adjustment (i.e., school engagement, self-esteem, and prosocial behavior) at 16 years of age based on adolescents' behavioral self-regulation.

Relational-Developmental Systems Theories

Relational-developmental systems theories (R-DST) is a meta-theory with its roots in Bronfenbrenner's (1994) ecological systems theory. Broadly, it posits that multidimensional systems within and outside of an individual (e.g., personal assets, situation, socioemotive, sociocognitive, biological, socialization, and culture-specific systems, among many others) coact to influence development (Lerner, 2006; Masten, 2001; Masten, 2018; Masten, & Cicchetti, 2010; 2016; Yates, Tyrell, & Masten, 2015). The R-DST perspective builds on ecological systems theory by providing more detailed and testable hypotheses for predicting developmental outcomes and takes an optimistic perspective to understand individuals' flourishing and resilience. According to the R-DST

perspective, coactions between within-person and contextual factors are referred to as person \longleftrightarrow context exchanges. This is because individuals' environmental systems and personal assets do not necessarily influence development independently; it is the *joint effect*, or the *contextualized effect*, of these systems that predict positive developmental outcomes (Masten & Cicchetti, 2010). See Figure 1 for a visual representation of the R-DST perspective.

The current study focused on investigating how an earlier person \longleftrightarrow context exchange involving neighborhood connection (a facet of the environmental system) and behavioral self-regulation (a personal asset) coact to predict later school engagement, self-esteem, and prosocial behavior across adolescence. The current approach focuses on relevant ecological systems during the adolescent period, and directly responds to recent calls for empirical work to explore the presence and influence of person \longleftrightarrow context exchanges present in the lives of adolescents (Lerner et al., 2015; Masten, 2018; Urban, Osgood, & Mabry, 2011).

Indicators of Positive Adolescent Adjustment

A myriad of positive adolescent adjustment indicators exist. Aligned with the scope of a single empirical study, I chose to focus on three key indicators of adolescent adjustment that are indicative of flourishing in the short- and long-term (Lerner et al., 2005): school engagement, self-esteem, and prosocial behavior.

I define school engagement as actively participating in academic and social activities, emotionally engaging with peers and teachers, and being interested in and committing to learning academic content and participating in the school environment (Fredericks, Blumenfield, & Paris, 2004). School engagement consistently leads to

increased academic success, positive emotions, and life satisfaction (for a review, see Upadaya & Salmela-Aro, 2013), marking it as a critical indicator of adolescent adjustment.

Self-esteem includes global self-perceptions of oneself as valuable and worthy compared to others (Rosenberg, 1965). Research over the past several decades has demonstrated that although there may be some risks of artificially inflated self-esteem (e.g., Bosson et al., 2008), higher self-esteem is usually positively associated with life and relationship satisfaction, as well as decreased substance dependence and mental health problems such as depression (Boden, Fergusson, & Horwood, 2008). Therefore, self-esteem is an important component of adolescent adjustment because of its overarching positive relations with desirable developmental outcomes.

Prosocial behavior is voluntary behavior intended to benefit others and promote harmonious relationships (i.e., multifaceted helping; Bergin, 2014; Eisenberg, Spinrad, & Knafo-Noam, 2015). Research indicates that prosocial behavior is a key indicator of social competence (Toseeb & Memmott-Elison, under review) because it can establish, strengthen, and repair relationships with family, friends, and others (Slavich, 2020). Since prosocial behavior is critical to maintaining relationships, and because relationships provide critical resources that support adolescents through noteworthy transitions, prosocial behavior is an essential component of positive adolescent adjustment.

The Role of Neighborhood Connection on Adolescent Adjustment

Neighborhoods can serve as salient socialization contexts for positive adolescent adjustment. This is because research shows that as adolescents experience the developmentally appropriate need for increased autonomy (Van Petegem, Beyers,

Vansteenkiste, & Soenens, 2012), they spend an increasing proportion of their free time outside of their family residence and within their neighborhoods (e.g., with peers who reside proximally in their neighborhoods; Leventhal et al., 2009). Most research on neighborhood context focuses on the role of neighborhood risks (e.g., crime, violence, distrust, Lichter, Shanahan, & Gardner, 2002; Chen & Paterson, 2006) on adolescent adjustment. However, it is also important to investigate the potentially positive role of neighborhood connection (i.e., neighborhoods characterized by care, involvement, support, contribution, and or available social resources) because connected neighborhoods may provide a context in which youth can flourish (Leventhal et al., 2009; Urban, Lewin-Bizan, Lerner, 2010). The available research suggests that neighborhood connection fosters youths' positive adjustment, including educational achievement, well-being (e.g., self-esteem), and social competence (Abdul Kadir et al., 2012; Canning, Denny, Bullen, Clark, & Rossen, 2017; Leventhal et al., 2009; Youngblade, et al., 2007). I sought to replicate these findings longitudinally and with an adolescent sample by exploring relations among neighborhood connection and school engagement, self-esteem, and prosocial behavior from early to mid-adolescence.

Behavioral Self-Regulation Predicts Adolescents' Adjustment

Self-regulation is broadly defined as the dynamic ability to control one's initial reactions and to select adaptive emotional expressions, thoughts, and or behaviors in their place (Nigg, 2017). Behavioral self-regulation is a bottom-up (i.e., automatic) component of self-regulation that includes meaningfully directing attention and inhibiting maladaptive behavioral impulses (Memmott-Elison, Moilanen, & Padilla-Walker, 2020; Nigg, 2017; Rabiner et al., 2016). Behavioral self-regulation is especially relevant for

adolescents, who must effectively recognize, internalize, and act in accordance with shifting social norms (i.e., behaviorally self-regulate) to engage in socially-acceptable behaviors and secure connections with others. Accordingly, it is not surprising that the capacity to behaviorally self-regulate is associated with a range of positive adolescent adjustment outcomes, most consistently increased school competence and academic achievement (Chen, Chen, Li, & Wang, 2009; Slobodskaya, 2007), self-esteem (Auerbach & Gardiner, 2012), and prosocial behavior (Chen, Chen, Li, & Wang, 2009). The capacity to behaviorally self-regulate may enable adolescents to focus when in school, inhibit negative thoughts about the self, and build lasting relationships. Thus, in addition to neighborhood connection, behavioral self-regulation likely predicts adolescents' academic, personal, and social adjustment.

The Moderating Role of Behavioral Self-Regulation

Aligned with the R-DST perspective, extant research indicates that adolescent development is differentially affected by neighborhood characteristics *depending on* adolescents' self-regulatory capacities (Bush, Lengua, & Colder, 2010; Lengua, 2002; Lengua et al., 2008; Miech, Essex, & Goldsmith, 2001; Mueller et al., 2011; Urban et al., 2010; Zalot, Jones, Forehand, & Brody, 2007). However, a consensus regarding the nature and effects of a person \longleftrightarrow context exchange including neighborhood factors and adolescent self-regulation, and its effects of on adolescent adjustment, remains unclear. There are two primary possibilities.

One sub-literature focuses on *facilitative* individual-neighborhood person \longleftrightarrow context exchanges. This sub-literature suggests that adolescents who reside in connected neighborhoods *and* have a strong personal capacity for behavioral self-regulation are

better equipped to acquire intangible resources (e.g., social support, feelings of security) that support positive adjustment (Bush et al., 2010; Mueller et al., 2011; Urban, Lewin-Bizan, & Lerner, 2010). Thus, adolescents with a greater ability to self-regulate likely glean more from their connected neighborhoods than their poorly-regulated counterparts, resulting in long-term positive adjustment. Conversely, adolescents who reside in less connected neighborhoods and who are less effective in their behavioral self-regulation are less likely to experience positive adjustment (and are likely to experience maladjustment) as a result of the cascading effect of less-than-optimal environmental factors and limited personal assets (Lengua, 2002; Lengua et al., 2008).

A second related yet distinctive sub-literature focuses on the *compensatory* effects of person \longleftrightarrow context exchanges on adolescent development. This sub-literature asserts that at-risk adolescents are particularly likely to benefit from available environmentally-derived protective factors (Masten, 2001; Masten & Cicchetti, 2010; Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). For example, adolescents at risk due to less effective or ineffective behavioral self-regulation are more likely to benefit from living in connected neighborhoods than their more regulated counterparts (Miech et al., 2001). This may be because connected neighborhoods provide low behaviorally-regulated adolescents with intangible resources (e.g., confidence, social support, feelings of security) that well-regulated youth access more readily through sources other than their neighborhoods (e.g., family, school).

Taken together, two parallel possibilities on the nature and effects of coactions between neighborhood factors and adolescent self-regulation on adolescent adjustment (i.e., facilitative, compensatory) exist but need further clarification. More research in this

area will enable basic scientists to iteratively fine-tune guiding theoretical perspectives and to identify the contributors to adolescent adjustment, which can ultimately inform applied approaches that improve the lives of adolescents. This is a priority because adolescence is a particularly plastic period with direct and salient implications for adulthood (Spear, 2013). The current study will, therefore, help meaningfully advance basic, and eventually, applied science.

Control Variables

While exploring relations between neighborhood connection, behavioral self-regulation, and school engagement, self-esteem, and prosocial behavior, I deemed it important to account for relevant demographic factors that may account for variability in adolescent adjustment. Therefore, in the current study analyses, I controlled for adolescent gender, ethnoracial status, maternal education, family structure, and the ratio of the number of people in a household to yearly family income.

Gender. Research indicates that girls generally exhibit greater school engagement (Simons-Morton & Crump, 2003) and prosocial behavior than boys (Xiao, Hashi, Korous, & Eisenberg, 2019). However, research is unclear regarding gender differences in adolescents' self-esteem (Bleidorn et al., 2016; Gentile, Grabe, Dolan-Pascoe, Twenge, Wells, & Maitino, 2009). Therefore, I expected that girls would report higher levels of school engagement and prosocial behavior than boys, and I explored the role of adolescent gender on self-esteem.

Ethnoracial status. Ethnoracial background may also relate to adolescent outcomes. For example, research suggests White adolescents are more academically engaged than ethnoracial minority adolescents (Warikoo & Carter, 2009). However, the

influence of ethnoracial status on self-esteem is unclear (Bleidorn et al., 2016). Furthermore, research suggests that there may not be significant ethnoracial differences in adolescents' prosocial behavior, given that prosocial behavior tends to be adaptive and developmentally beneficial across ethnoracial groups (Carlo & Padilla-Walker, in press; Padilla-Walker et al. 2013; Slavich, 2020). Thus, I expected that White adolescents would report higher levels of school engagement than ethnoracial minority adolescents, and I explored the possible relations of ethnoracial status on self-esteem and prosocial behavior.

Maternal education. Research suggests that maternal education predicts child and adolescent adjustment (Entwisle & Astone, 1994). Generally, youth whose mothers are more educated exhibit greater school engagement (Magnuson, 2007), self-esteem (Bulanda & Majumdar, 2008), and prosocial behavior than those whose mothers are less educated (Carlo, Crockett, Randall, & Roesch, 2007). Therefore, I expected that maternal education would be positively associated with each adolescent adjustment outcome in the current study.

Family structure. Family structure tends to contribute to adolescent adjustment. Specifically, youth from two-parent families compared to single-parent families tend to have greater access to tangible (e.g., fiscal) and intangible (e.g., time, emotional energy) assets, which promote school engagement (Astone & McLanahan, 1991), self-esteem (Quon & McGrath, 2014), and prosocial behavior (Padilla-Walker, Carlo, & Nielson, 2015; Padilla-Walker, Dyer, Yorgason, Fraser, & Coyne, 2013). Thus, family structure was included as a covariate.

The Current Study

The current longitudinal study explicitly tested the R-DST perspective by exploring whether neighborhood connection and adolescents' behavioral self-regulation at age 12 coact to predict school engagement, self-esteem, and prosocial behavior at age 16 while accounting for adolescent gender, ethnoracial status, family structure, maternal education, and the ratio of the number of people in a household to yearly family income. I expected that neighborhood connection would not be directly associated with positive adjustment outcomes since neighborhood influences are complex and likely to operate indirectly through youths' personal characteristics or other contextual factors (Leventhal et al., 2009). Additionally, I expected behavioral self-regulation would be directly and positively associated with youths' positive adjustment outcomes (Auerbach & Gardiner, 2012; Chen et al., 2009).

I expected behavioral self-regulation would moderate the associations between neighborhood connection and school-engagement, self-esteem, and prosocial behavior. I anticipated that one of two patterns of findings would emerge. First, it is possible that increased neighborhood connection and behavioral self-regulation will positively cascade to *facilitate* positive adolescent adjustment (Bush et al., 2010; Mueller et al., 2011; Urban et al., 2010). Alternatively, it is possible that neighborhood connection is more beneficial (i.e., *compensatory*) among adolescents who are at risk due to low behavioral self-regulation (Masten, 2001; Masten & Cicchetti, 2010; Miech et al., 2001; Southwick et al., 2014). I sought to test these competing hypotheses in the current study.

CHAPTER 2: METHOD

Participants

The data for this study came from Brigham Young University's Flourishing Families Project (FFP), which is a longitudinal study of adolescent development that involves 500 adolescents and their families. At baseline (i.e., Wave 1) of the FFP, adolescent participants were between the ages of 10 and 14; at the first follow-up, adolescent participants were between the ages of 11 and 15; and so on. Although data were originally collected by Wave on a yearly basis, data were reorganized by participants' age for use in the current study. For example, in the restructured age-based data, all participants at the first time point are 10 years old, all participants at the second time point are 11 years old, and all participants at the third time point are 12 years old. The sample for this study consists of all participants from the FFP ($n = 500$) at age 12 and again at age 16. At age 12, 11.54% of participants were African American, 2.56% were Asian American, 1.28% were Hispanic, 7.69% were Multiethnic, 76.28% were White, and .64% identified as "Other." In addition, 77% of participants were in two-parent families, and 23% were in single-parent families. On average, 11.6% of mothers and 6.4% of fathers reported earning a high school diploma or less; 35.5% of mothers and 24.8% of fathers attended some college or earned their associates degree; 36.4% of mothers and 40.4% of fathers reported earning their bachelor's degree; and 16.5% of mothers and 28.4% of fathers earned a master's and/or another advanced degree (e.g., JD, Ph.D, PsyD, etc.). Additionally, 8.3% of families reported an annual income of \$49,999 or less, 29.17% reported earning between \$50,000 and \$99,999, and 63% came from families that reported earning \$100,000+ per year. The average annual income of

participants in our sample was approximately \$119,000. Over the course of data collection, the study retained 90% of the original sample.

Procedures

Institutional Review Board (IRB) approval was obtained before the FFP was initiated. Initial data collection took place during Spring and Summer 2007, and the participating families were interviewed at yearly intervals ending in 2016. The participating families resided in a large city in the Northwestern United States and were recruited using Polk Directories/InfoUSA, a purchased national telephone survey database. At the time, this database contained 82 million households across the United States and had detailed information about each household, including the presence and age of children. All families with a child between the ages of 10 and 14 living within target census tracts were eligible to participate in the FFP. Census tracts that mirrored the socioeconomic status (SES) and racial stratification of local school district reports were targeted. Of the 692 eligible families contacted, 423 agreed to participate, resulting in a 61% response rate. Notably, the Polk Directory national database was created using telephone, magazine, and internet subscription reports, resulting in underrepresentation of lower SES families. In an attempt to mirror the demographics of the local area and broaden the socioeconomic and ethnoracial diversity of the sample, a limited number of families were recruited via other means (e.g., referrals, fliers; $n = 77$, 15%).

All families were contacted directly using a multi-stage recruitment protocol. First, a letter of introduction was mailed to eligible families, though this step was not the case for the 15% of families who responded to fliers or were recruited by referral. Second, interviewers made home visits and phone calls to confirm families' eligibility

and willingness to participate in the study. Once eligibility and consent were established, interviewers made an appointment to come to the family's home to conduct an in-person assessment interview that included videotaped interactions, as well as questionnaires that were completed in the home. Data collection occurred in participants' homes for the first five waves of data collection. Subsequent data collection took place over the Internet using online questionnaire links administered via *Qualtrics* software. Participants were compensated for their time with either an Amazon or Visa gift card after participation each year. The most frequent reasons cited by families for not wanting to participate in the study were lack of time and concerns about privacy.

Measures

Each measure was analyzed as a mean (manifest) scale. Higher coded values represented higher levels of each study variable. Items comprising each measure are provided in Table 1. Measures of school engagement (Carter, McGee, Taylor, & Williams, 2007) self-esteem (Hagborg, 1996), self-regulation (Memmott-Elison, Moilanen, & Padilla-Walker, 2020), and prosocial behavior (Padilla-Walker, Carlo, Christensen, & Yorgason, 2012) have been shown to be valid and reliable in past research that uses the same dataset as the current study. The neighborhood connection measure has been implemented on a national level by the Centers for Disease Control and Prevention (CDC). To ensure best practices, measurement invariance analyses were conducted prior to primary analyses to ensure that positive adjustment indicators were qualitatively similar at age 12 and age 16. I specifically tested each endogenous measure for weak invariance by assessing whether constraining the factor loadings to be equal across time

points significantly decreased model fit (Dyer, 2015). Results of each invariance analysis are reported below.

Parent-reported neighborhood connection. At age 12, a 7-item neighborhood connection questionnaire was used to assess the community processes/characteristics of adolescents' primary residences. Items were taken directly from the 2003 National Survey of Children's Health questionnaire (CDC, 2003), the only difference being that possible responses of "Don't know" and "Refused" were removed for use in the current study. Items such as "My child is safe in this community or neighborhood" and "If my child were outside playing and got hurt or scared, there are adults nearby who I trust to help my child" were responded to using a 4 pt. Likert-type scale that ranged from 1 (*definitely disagree*) to 4 (*definitely agree*). This measure was reliable at age 12 in the current study ($\alpha = .84$).

Adolescent-reported behavioral self-regulation. At age 12, a 4-item behavioral self-regulation subscale of the original 13-item measure (Novak & Clayton, 2001) was used. Participants responded to items such as, "I get distracted by little things" (reverse coded) on a 4 pt. Likert-type scale that ranged from 1 (*never true*) to 4 (*always true*). In the current sample, this measure was found to be reliable at age 12 ($\alpha = .81$).

Adolescent-reported school engagement. At age 12 and age 16, adolescents' school engagement was assessed using an 8-item modified version of a school engagement scale (Fredericks, Blumenfield, & Paris, 2004; 2005). Example items include "I pay attention in class" and "I am interested in the work at school," which were responded to on a 5 pt. Likert-type scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). This measure was reliable at age 12 ($\alpha = .80$) and age 16 ($\alpha = .85$) in the

current sample. Additional analyses revealed this measure was invariant from age 12 to 16 years, $Wald(10) = 17.10, p = .0721$.

Adolescent-reported self-esteem. At age 12 and age 16, adolescents' self-esteem was assessed using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Participants responded to 10 items such as "On the whole, I am satisfied with myself" on a 5-point Likert-type scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). This measure was reliable in the current sample at age 12 ($\alpha = .87$) and age 16 ($\alpha = .89$). Measurement invariance analyses revealed this measure was not fully invariant from age 12 to 16 years, $Wald(13) = 24.50, p = .0268$. Specifically, the factor loading of one item ("I feel I do not have much to be proud of" [*reverse coded*]) as well as the covariance between item 6 ("I wish I could have more respect for myself" [*reverse coded*]) and item 7 ("I have a positive attitude about myself") could not be constrained to be equal across time, respectively.

Adolescent-reported prosocial behavior. At age 12 and age 16, participants completed 27 items based on a modified version of the Inventory of Strengths (Peterson & Seligman, 2004). The measure assessed kindness and generosity (i.e. prosocial behavior) directed toward strangers/non-identified others (9 items), friends (9 items), and family members (9 items). In the current study, these three subscales were averaged together to represent general prosociality. Participants responded to items such as "I voluntarily help strangers/my friends/my family" on a 5-point Likert-type scale that ranged from 1 (*not like me at all*) to 5 (*very much like me*). This general prosocial behavior measure was reliable in the current sample at age 12 ($\alpha = .88$) and age 16 ($\alpha =$

.89). Additionally, tests for measurement invariance revealed that this measure was invariant across time points, $Wald(2) = 5.24, p = .0728$.

Control variables. At age 12, parents reported adolescents' biological sex as either female (coded as "0") or male (coded as "1"). At age 12, parents reported adolescents' ethnoracial background as African American, Asian-American, Biracial, White, Hispanic, or "Other." The ethnoracial background variable was dichotomized into ethnoracial minority (coded uniformly as "0") and White (coded as "1") subgroups to allow for meaningful interpretation of results. When adolescent participants were 12 years, parents reported the number of people residing in their home and their combined family income. To represent socioeconomic status, these variables were combined into a ratio variable (the number of people residing in the home to the combined family income) and were controlled for in analyses.

Missing Data Analyses

In order to assess the nature of missing data, a series of t-tests were conducted to assess whether missingness was significantly associated with observed scores of neighborhood connection, behavioral self-regulation, school engagement, self-esteem, and prosocial behavior (Rubin, 1976). A dichotomized variable representing missingness was created, and the values were coded as either "0" (no missing data on any primary study variables) or "1" (at least one missing value or more on primary study variables). Next, this "missing" variable was used as a predictor in a series of t-tests (i.e., one test for each primary study variable) to ascertain whether observed mean scores on each primary study variable were significantly related to overall missingness. Approximately 22.3% of cases had complete data across all primary study variables. Observed scores on

neighborhood connection, prosocial behavior at age 12, prosocial behavior at age 16, school engagement at age 12, school engagement at age 16, self-esteem at age 12, and self-esteem at age 16, were not significantly associated with missingness. Scores of behavioral self-regulation were associated with missingness, $t(410) = 2.18, p = .03$, indicating those with missing data ($M = 2.56, SD = .78$) reported significantly higher levels of behavioral self-regulation than those with at least one missing value on primary study variables ($M = 2.37, SD = .75$). A partial eta squares effect size was estimated for this relation using SPSS software. The dichotomous missingness variable accounted for only 1% of the variance in behavioral self-regulation, $n^2 = .011, p = .011$. Because this effect size was present although minute, I proceeded to run analyses using Full Information Maximum Likelihood estimation, which is ideal for handling data that are MAR (Muthén, Kaplan, & Hollis, 1987; Newsom, 2015).

Analysis Plan

First, I analyzed preliminary associations in the data by assessing variable distributions, estimating bivariate correlations between study variables, and estimating sample statistics.

Second, I estimated a longitudinal path model using Mplus v.8.1 software (Muthén & Muthén, 1998-2017) that examined neighborhood connection, behavioral self-regulation, and an interaction term (between neighborhood connection and behavioral self-regulation) at Time 1 as exogenous variables and positive adjustment indicators (i.e., school engagement, self-esteem, and prosocial behavior) at Time 2 as endogenous variables. Initial levels of distal outcomes, along with gender, ethnoracial background, family structure, maternal education, and a ratio of the number of people

residing in a home to the combined family income, were controlled for at age 12. Good model fit relying on absolute fit indices includes a non-significant chi-square statistic, CFI and TLI values greater than or equal to .95, and RMSEA and SRMR values equal to or smaller than .06 (Little, 2013; Newsom, 2015). A strength of path analysis compared to regression is that path analysis can assess multiple outcome measures contemporaneously.

Third, I probed the interaction terms by conducting regions of significance procedures (Hayes, 2017; Johnson & Neyman, 1936) in order to assess whether behavioral self-regulation moderates the association between neighborhood connection and positive youth development outcomes (independently). The regions of significance procedure included estimating a plot that (a) portrays the continuous range of behavioral self-regulation values on the x-axis; (b) portrays the continuous range of values for the adjusted effect of neighborhood connection on the adjustment outcome on the y-axis; (c) includes a line that illustrates the continuous range of the adjusted effect; and (d) includes confidence intervals above and below the adjusted effect line.

Fourth, I explicitly tested the simple slopes to ensure they were significantly different from zero, when the regions of significance procedures revealed promising results.

CHAPTER 3: RESULTS

Preliminary Analyses

Variable distributions were analyzed, descriptive statistics for each study variable were estimated, and bivariate correlations between continuous study variables were estimated. All variables were normally distributed (i.e., skewness was below three; Kline, 2015). Neighborhood connection was significantly positively correlated with school engagement at age 12. Behavioral self-regulation was significantly positively correlated with each adolescent adjustment outcome at age 12, and school engagement and self-esteem at age 16. Positive adjustment outcomes were generally significantly positively intercorrelated with one another cross-sectionally (at age 12 and age 16, respectively) and longitudinally (from age 12 to age 16). Girls and Whites reported higher levels of each adolescent adjustment outcome compared to boys and members of ethnoracial minority groups, respectively (see Table 2).

Path Model

The model fit the data well, $\chi^2(6) = 3.83, p = .6992, CFI = 1.00, TLI = 1.04, RMSEA = .00, 95\% CI [.00, .04], SRMR = .01$ (Little, 2013; Newsom, 2015). Results indicated the interaction term was significantly associated with self-esteem. School engagement, self-esteem, and prosocial behavior were moderately stable from age 12 to 16 (see Figure 1). Girls reported higher levels of prosocial behavior ($\beta = -.16, 95\% CI [-.24, -.08]$) and school engagement ($\beta = -.13, 95\% CI [-.22, -.04]$) than boys. White adolescents reported higher levels of prosocial behavior ($\beta = .14, 95\% CI [.05, .23]$) than ethnoracial minority adolescents. Adolescents whose mothers earned higher education reported more school engagement ($\beta = .32, 95\% CI [.17, .48]$) and self-esteem ($\beta = .27,$

95% CI [.10, .44]) than adolescents whose mothers earned less education. Adolescents from two-parent families reported higher self-esteem ($\beta = -.17$, 95% CI [-.33, .000]) than adolescents from single-parent families. The structural model accounted for a significant portion of the variance in prosocial behavior ($R^2 = .26$, $p < .001$), school engagement ($R^2 = .29$, $p < .001$), and self-esteem ($R^2 = .25$, $p < .001$).

Interaction Testing

I probed the interaction terms in order to determine whether the strength of the associations between neighborhood connection and each adjustment outcome depended on levels of the moderator, behavioral self-regulation. To do this, I conducted the regions of significance procedure three times, once for each adjustment outcome. The first regions of significance test revealed the relation between neighborhood connection and prosocial behavior did not depend on levels of behavioral self-regulation (see Figure 3). The second regions of significance test suggested that for those more than 0.5 standard deviations below the mean of behavioral self-regulation, neighborhood connection predicted higher levels of school engagement (see Figure 4). The positive association between neighborhood connection and school engagement did not persist for those who reported moderate to high levels of behavioral self-regulation (i.e., those within -0.5 and +1 standard deviations of the mean). The third regions of significance test suggested that for those more than 0.4 standard deviations below the mean of behavioral self-regulation, neighborhood connection predicted higher levels of self-esteem (see Figure 5). The positive association between neighborhood connection and self-esteem did not persist for those who reported moderate to high levels of behavioral self-regulation (i.e., those within -0.4 and +1 standard deviations of the mean).

I tested these simple slopes to ensure they were statistically significantly different than zero. The simple slope for those 0.5 standard deviations or more below the mean on behavioral self-regulation *was not* significantly different from zero for school engagement, $\beta = .12$, 95% CI [-.03, .28]. The simple slope for those more than 0.4 standard deviations below the mean on behavioral self-regulation *was* significantly different from zero for self-esteem, $\beta = .20$, 95% CI [.03, .36]. Therefore, the relation between neighborhood connection and self-esteem depends on behavioral self-regulation. More specifically, for adolescents roughly 0.4 standard deviations or more below the mean on behavioral self-regulation (which is a value of 2.20 out of a possible range of 1-4 for the non-standardized variable), neighborhood connection at age 12 facilitates self-esteem at age 16.

CHAPTER 4: DISCUSSION

The purpose of this study was to explicitly test the R-DST perspective by investigating whether behavioral self-regulation moderated relations between neighborhood connection and adolescents' positive adjustment outcomes from early to middle adolescence. Hypotheses regarding compensatory effects were partially supported. Hypotheses regarding facilitative effects were not supported. Results indicated that for adolescents with low behavioral self-regulation, neighborhood connection positively predicted self-esteem. That being said, neighborhood connection did not promote self-esteem for youth who reported moderate or high levels of behavioral self-regulation. Additionally, behavioral self-regulation did not moderate relations between neighborhood connection and school engagement or prosocial behavior, respectively. Below, I discuss the compensatory role of neighborhood connection for youth at risk due to behavioral self-regulation, explain how this study extended the R-DST perspective and basic science, and present study limitations and directions for future research.

The Compensatory Effects of Neighborhood Connection and Behavioral Self-regulation on Personal Adjustment

Strengthening a growing literature and the R-DST perspective (Lerner, 2006; Masten, 2001; Masten, 2018; Masten, & Cicchetti, 2010; 2016; Yates et al., 2015), the current study revealed that neighborhood connection longitudinally, positively predicted self-esteem among low behaviorally-regulated adolescents. Residing in a connected neighborhood that is equipped with valuable intangible resources such as positive social support from peers, responsible caregiving by non-parental adults, residential stability, and security (Sampson, Morenoff, & Earls, 1999), may provide low behaviorally-

regulated adolescents with a sense of community, worth, pride, ownership, and or strength (Bámaca, Umaña-Taylor, Shin, & Alfaro, 2005). In turn, these may bolster at-risk adolescents' self-esteem notwithstanding their likely challenges stemming from low behavioral self-regulation, such as distraction by maladaptive thoughts or impulses, social norm violations, and or hindered connectivity with others (Bagwell, Molina, Pelham Jr., & Hoza, 2001; Murphy, Shepard, Eisenberg, & Fabes, 2004). Other related reasons connected neighborhoods are protective for adolescents with low self-regulation could be that these neighborhoods present fewer risky temptations compared to less connected neighborhoods, and tend to have more organizational supports in place (Sampson et al., 1999). Thus, connected neighborhoods may provide an environment in which low behaviorally self-regulated adolescents can flourish on a *personal* level (Leventhal et al., 2009; Urban, Lewin-Bizan, Lerner, 2010). The current findings provide some support for the *compensatory* role of person \longleftrightarrow context exchanges in the lives of adolescents, which have been studied to a considerably lesser extent than the facilitative role (Masten, 2001; Masten & Cicchetti, 2010; Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). Based on these findings and their likelihood of sensitizing empirical investigations and eventual outreach and intervention work, I hope basic and applied scientists will continue to investigate the presence and effects of compensatory person \longleftrightarrow context exchanges during adolescence.

Neighborhood Connection, Behavioral Self-regulation, and Academic and Social Adjustment

On academic and social levels (i.e., regarding educational achievement and prosocial behavior, respectively), and in the context of adolescents' behavioral self-

regulation. Results also indicated that neighborhood connection may not be related to the same degree, or related in the same manner, to school engagement and prosocial behavior. Past research shows that school engagement may be more consistently predicted by school, classroom, or peer characteristics (Bergin, 2014) rather than neighborhood features. Thus, school engagement may have less to do with compounded neighborhood and personal influences, and more to do with variables unmeasured in the current study, such school or classroom factors (Ruiz, McMahon, & Jason, 2018; Wang, Degol, Amemiya, Parr, & Guo, 2020).

Other research indicates prosocial behavior is more consistently predicted by emotional, cognitive, and relational factors such as parenting and self-regulation (Padilla-Walker, Memmott-Elison, & Nielson, 2018) compared to neighborhood characteristics (Memmott-Elison, Carlo, Maiya, & Roos, 2021) or behavioral self-regulation independently. This may be because prosocial behavior has traditionally moralistic foundations (Carlo, 2014) and is inherently social (Wentzel, 2014). Taken together, and consistent with past research (see Entwisle, 2007; Leventhal et al., 2009; Memmott-Elison et al., 2021; Rankin & Quane, 2002), neighborhood connection likely has a more distal impact on academic and social adjustment. In fact, a growing literature suggests that neighborhood characteristics are related to child and adolescent adjustment *through* factors such as peer relationships, school climate, empathy, multifaceted self-regulation, or parenting (Ainsworth, 2002; Bergin, 2014; Padilla-Walker & Christensen, 2011; Wang, Choi, & Shin, 2020). Additionally, a forthcoming study suggests different facets of self-regulation are differently related to adolescents' prosocial behavior (Memmott-Elison et al., in preparation), so behavioral self-regulation may not be the facet of self-

regulation most relevant to adolescents' prosocial behavior. Taken together, researchers should seek to replicate current findings and empirically explore indirect relations between neighborhood features, behavioral self-regulation, and positive adolescent adjustment over time, as well as the influence of multiple self-regulatory facets on adolescent adjustment, to further strengthen the literature by detecting nuances in these associations.

In addition to the aforementioned conceptual and empirical explanations, non-findings in associations between neighborhood connection, behavioral self-regulation, and academic achievement and prosocial behavior, respectively, may be due to other causes. For instance, relations among neighborhood factors and self-regulation could be more relevant to personal, psychological adjustment (e.g., self-esteem) than to social-behavioral (e.g., prosocial behavior) or academic (e.g., school engagement) adjustment. More research is needed to strengthen these findings and to further explore coactions between neighborhood factors and self-regulation on adolescents' personal adjustment beyond self-esteem. Non-findings related to prosocial behavior and school engagement could also be related to the left-skewed nature of the data and or limited variability due to social desirability and or ceiling effects. Future researchers should address these limitations by using additional measures of prosocial behavior and school engagement, especially observational methods, peer nominations, or experimental designs when measuring prosocial behavior (El Mallah, 2020; Memmott-Elison, Holmgren, et al., 2020).

Extensions of Basic Research and the R-DST Perspective

The current investigation provided several novel and potentially impactful findings to the literature. First, the current longitudinal approach provided some needed evidence for the utility of the R-DST perspective, namely the presence of relevant person ↔ context exchanges in the lives of adolescents (Lerner et al., 2015; Masten, 2018; Urban, Osgood, & Mabry, 2011). Investigations of person ↔ context exchanges, such as the current study, demonstrate that adolescents' personal features contextualize the effect of environmental experiences (or vice versa) on individual adjustment (e.g., Bámaca et al., 2005). Broadening researchers' perspectives in this regard is critical to instigating more holistic investigations of developmental processes and their effects on youth adjustment outcomes. Such holistic approaches focused on adolescence are especially needed because of the significant transitions, increased risk for maladjustment, and serious implications for adulthood that the adolescent period encompasses (Arnett, 1999; Steinberg & Morris, 2001).

Second, given most research examines relational or personal correlates of adolescent adjustment (e.g., parental sensitivity and control, teacher-student relationship quality, adolescent self-regulation; Nelson, Padilla-Walker, Christensen, Evans, & Carroll, 2011; Padilla-Walker et al., 2018; Semeraro, Giofrè, Coppola, Lucangeli, & Cassibba, 2020), this study's emphasis on the role of environmental factors on adolescent adjustment bolstered the literature (Masten, 2001; Masten & Cicchetti, 2010; Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). It is especially noteworthy that the current study focused on a *positive* neighborhood characteristic because doing so helps expand the literature on neighborhood influences. It also demonstrates that neighborhood connection—an intangible asset which is available to many adolescents to varying

degrees—may be an asset with the potential to increase low behaviorally-regulated adolescents' longitudinal adjustment.

Accordingly, and third, this study took a strengths-based approach to adolescent adjustment, which is generally needed to counterbalance the multitude of research that explores risk factors (e.g., neighborhood risk) and maladjustment (delinquency, anxiety) during adolescence (Zimmerman, 2013). As noted by Southwick and colleagues (2014), Zimmerman (2013), and others, the absence of maladjustment does not equate to positive adjustment. Thus, additional studies that use a strengths-based approach to adolescent adjustment are needed to better describe possible environmental and personal assets that promote flourishing in adolescence and beyond.

Fourth, the current study extends past research by focusing on the role of behavioral self-regulation, which is a facet of self-regulation that is relatively understudied individually and in the context of other constructs during adolescence (Memmott-Elison et al., in preparation). Because adolescents are more autonomous and capable of self-regulating than ever before (Duineveld, Parker, Ryan, Ciarrochi, & Salmela-Aro, 2017; Niemiec, Ryan, & Deci, 2010), it makes sense that researchers have focused largely on intentional self-regulation and goal-setting during adolescence (see Gestsdottir & Lerner, 2007; 2008). However, the findings of the current study suggest that behavioral self-regulation is continually relevant to adolescence, probably because youth must demonstrate awareness, appropriately focus and direct their attention, and engage in socially appropriate behavior in order to adapt (Auerbach & Gardiner, 2012; Chen et al., 2009; Slobodskaya, 2007). Therefore, current findings might serve as enthusiastic encouragement for scholars to specifically and or additionally consider the

role of behavioral self-regulation among adolescents in order to better understand positive and longitudinal adjustment among this demographic.

Limitations and Future Directions

Despite the relatively large, longitudinal study design, the current study was not without limitations. First, our measure of self-esteem was not fully invariant at age 12 and 16 years, despite being reliable at both time points. Second, the sample was relatively advantaged in terms of relational support (majority two-parent families), income, and maternal education, suggesting participants largely reside in relatively advantaged neighborhoods. Future researchers should explore relations between neighborhood factors, behavioral self-regulation, and adolescent adjustment using disadvantaged samples to test the hypothesized model among socioeconomically diverse adolescents because the characteristics of disadvantaged neighborhoods may differentially affect adolescents' adjustment. Similarly, there was insufficient ethnoracial diversity in the sample to examine the generalizability of the findings to specific ethnoracial minority youth (e.g., African Americans, Latino/as). Third, many study variables were self-reported and therefore results may have, in part, been artifacts of shared method variance (Cooper et al., 2020; LaGrange & Cole, 2008) and or self-presentational demands. Future researchers should use multiple measurement methods and study designs to reduce these concerns and to replicate and extend the current findings. Future researchers should also conduct additional longitudinal tests of the R-DST perspective to compliment current compensatory findings and strengthen the literature by speaking to the directionality and causality of associations between neighborhood factors, behavioral self-regulation, and adolescents' positive adjustment. It would be especially interesting for future researchers

to explore the comparable predictive worth of facilitative and compensatory effect models in coactions among multifaceted factors and associations with adolescents' adjustment outcomes.

Conclusion

In conclusion, the current study suggested that residing in connected neighborhoods may longitudinally facilitate healthy self-esteem (but not prosocial behavior or school engagement) for low behaviorally-regulated adolescents, thereby supporting the compensatory hypothesis rather than the facilitative hypothesis.

Understanding this compensatory person \longleftrightarrow context exchange present in the lives of adolescents, especially adolescents at risk due to low behavioral self-regulation, provides some support for the R-DST perspective and may help applied scientists translate these and other basic research findings into applied strategies to encourage healthy adjustment across adolescence. Future longitudinal, strengths-based investigations are warranted to further evidence and critique the R-DST perspective.

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Table 1

Items included in study measures.

Measure	Items
Neighborhood connection	People in this neighborhood help each other out. We watch out for each other's children in this neighborhood. There are people I can count on in this neighborhood. There are people in this neighborhood that might be a bad influence on my child/children. (r) If my child were outside playing and got hurt or scared, there are adults nearby who I trust to help my child. My child is safe in this community or neighborhood. My child is safe at school.
Behavioral self-regulation	I get distracted by little things. (r) I get fidgety after a few minutes if I am supposed to sit still. (r) I have a hard time sitting still during important tasks. (r) I find that I bounce my legs or fiddle with objects. (r)
School engagement	I pay attention in class. I complete my homework on time. I follow the rules at school. I get in trouble at school. (r) I feel happy in school. I feel bored in school. (r) I feel excited by the work in school. I am interested in the work at school.
Self-esteem	I am able to do things as well as most people. I feel useless at times. (r) At times I think I am no good at all. (r) On the whole, I am satisfied with myself. I feel I do not have much to be proud of. (r) I wish I could have more respect for myself. (r) I have a positive attitude about myself.

Prosocial behavior

I feel that I have a number of good qualities.

All in all, I am inclined to feel that I am a failure. (r)

I feel that I am a good person, as good as any other person.

Strangers

I help people I don't know, even if it is not easy for me.

I really enjoy doing small favors for people I do not know.

I go out of my way to cheer up people who seem sad, even if I do not know them.

I voluntarily help my neighbors.

I help other kids at school (with things like homework, sports, or other activities).

I volunteer in programs to help others in need (like food or clothing drives, service groups or other volunteer projects).

I am involved in service at my school (such as student council or student government).

I enjoy being kind to others, even if I do not know them

I watch out for kids at school, even if I do not know them.

Friends

I help my friends, even if it is not easy for me.

I really enjoy doing small favors for my friends.

I go out of my way to cheer up my friends when they seem sad.

I voluntarily help my friends.

I always listen to my friends talk about their problems.

I enjoy being kind to my friends.

I love to make my friends happy.

I tell my friends how much they mean to me.

I watch out for my friends.

Family

I help my family, even if it is not easy for me.

I really enjoy doing small favors for my family.

I go out of my way to cheer up members of my family when they seem sad.

I voluntarily help my family (with things like chores or watching a sibling).

I always listen to my family members talk about their problems.

I enjoy being kind to members of my family.

I love to make my family happy.

I tell my family how much I love them.

I watch out for members of my family.

Note. (r) indicates items that were reverse coded when creating measures for analysis.

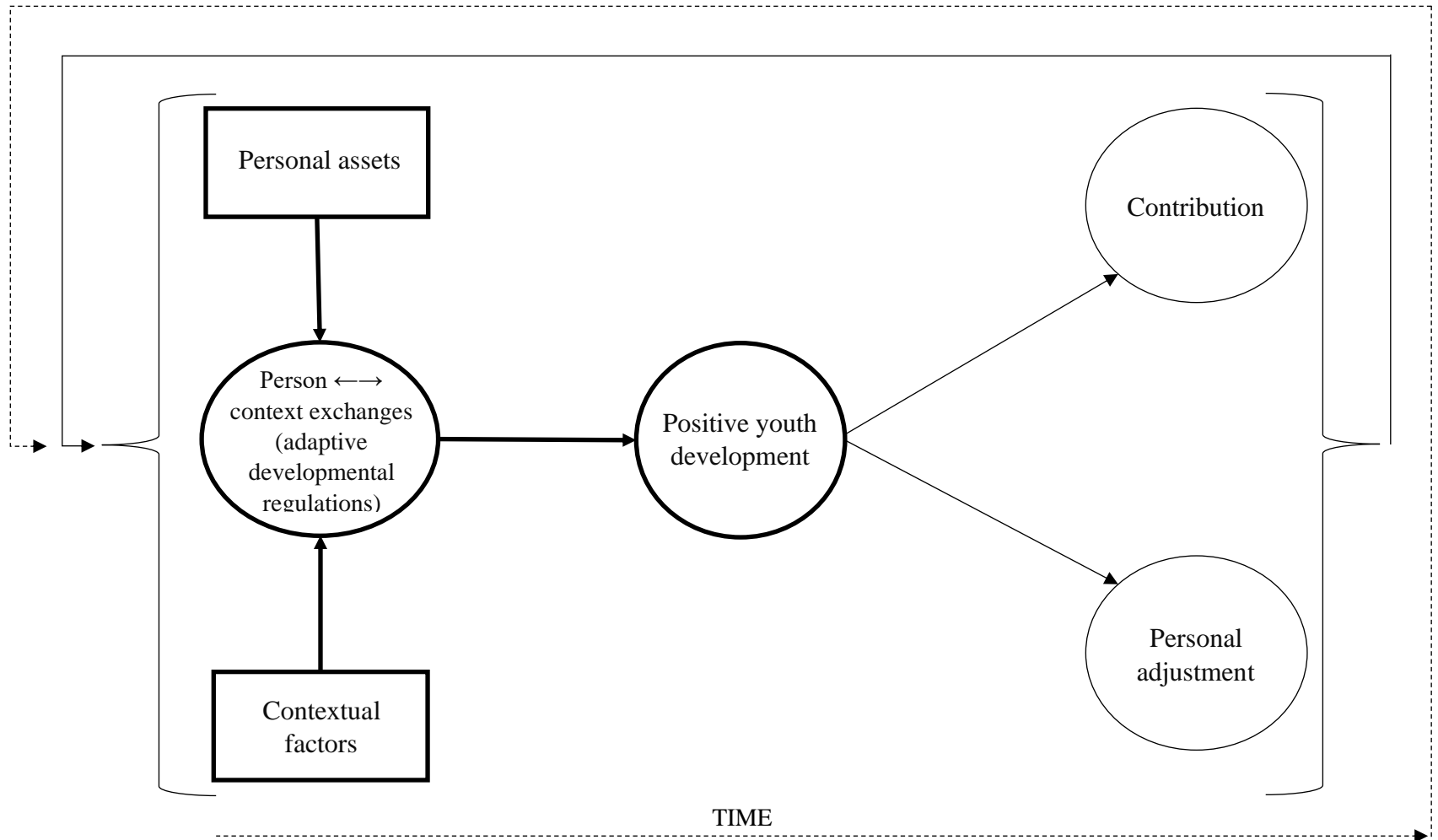
Table 2

Descriptive statistics for and bivariate correlations between study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Neighborhood connection age 12	--								
2. Behavioral self-regulation age 12	.07	--							
3. INT age 12	-.04	-.14	--						
4. School engagement age 12	.26**	.30***	-.05	--					
5. School engagement age 16	.01	.12*	.05	.42***	--				
6. Self-esteem age 12	.09	.26***	.03	.47***	.18***	--			
7. Self-esteem age 16	-.08	.16 [†]	.15	.15	.38***	.32***	--		
8. Prosocial behavior age 12	.07	.14**	-.04	.43***	.19***	.34***	-.03	--	
9. Prosocial behavior age 16	-.03	.05	.04	.27***	.38***	.17***	.34***	.45***	--
10. Sex	.005	-.06	.09	-.21***	-.19***	-.002	.06	-.25***	-.25***
11. Race	.14	.01	-.003	.08 [†]	.13**	.13*	.06	.11*	.15***
12. Family structure	-.36***	-.01	-.08	-.19**	-.07	.12*	.11	-.16**	-.004
13. Maternal education	.15**	.01	-.10	.19*	.34***	-.01	.14	.14	.05
14. Ratio	-	.08	-	.01	-.03	-.03	-	.07	.09
<i>M</i>	2.49	2.50	5.91	3.66	3.56	4.07	4.02	3.72	3.97
<i>(SD)</i>	.59	.78	2.46	.60	.67	.63	.70	.66	.60
<i>Range</i>	.71-3.29	1-4	1.25-11.5	1.75-5	1-4.88	1.6-5	2.1-5	1.67-5	1.8-5
<i>% missing</i>	75.8	17.6	75.8	17.6	1.6	17.4	64.2	17.4	1.6

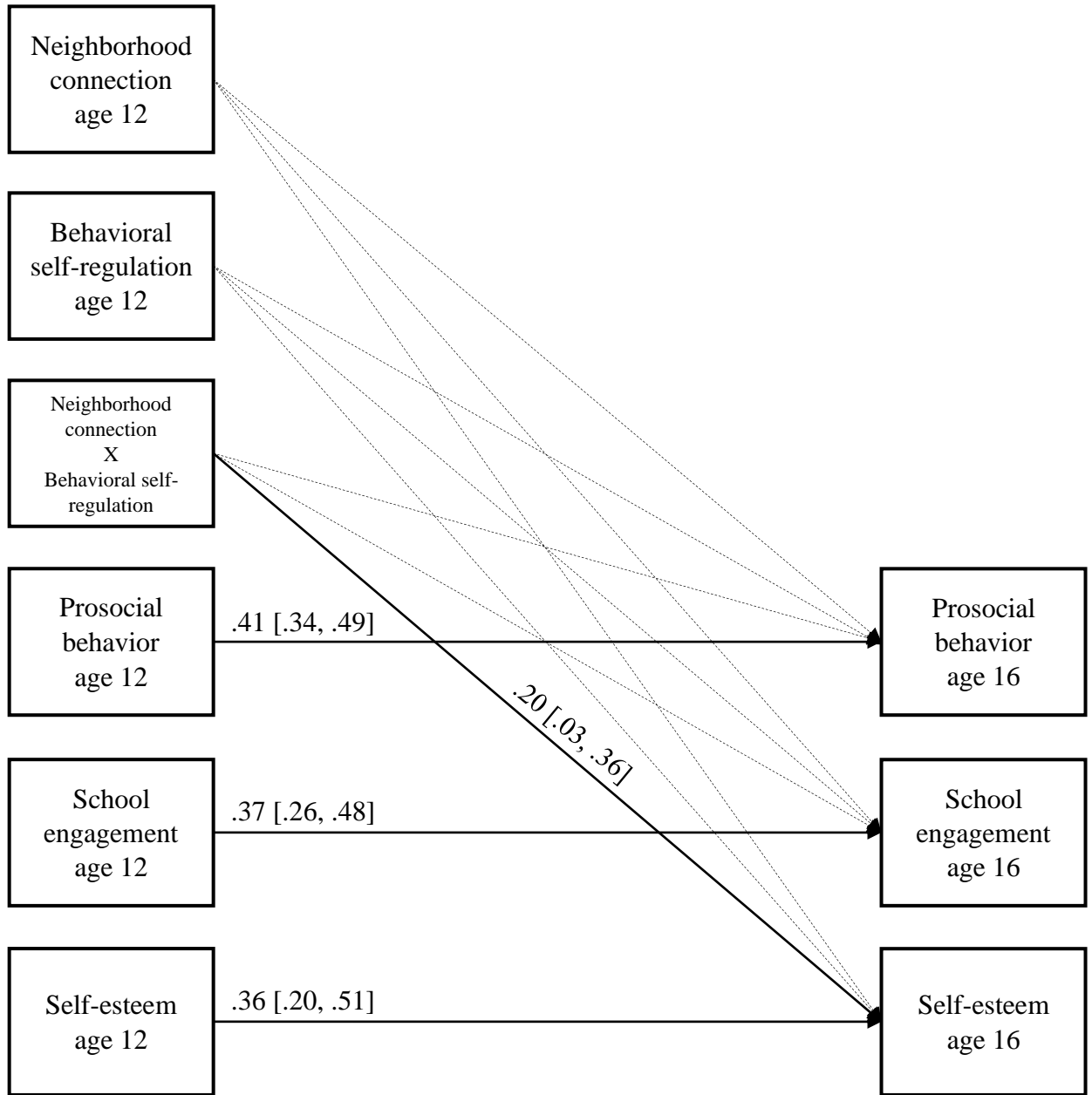
Note. INT = the interaction term between neighborhood connection and behavioral self-regulation. Neighborhood connection, behavioral self-regulation, and the interaction term were unstandardized in preliminary analyses (reported here) and standardized for primary analyses (reported later). - indicates a lack of covariance coverage. [†] $p < .09$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1. An adapted visual representation of the R-DST perspective based on Lerner et al., 2015 and Memmott-Elison, Padilla-Walker, Yorgason, & Coyne, 2020.



Note. The bolded portion of the figure is tested in the current study. The non-bolded features of the figure are not tested in the current study.

Figure 2. The path model and [95% confidence intervals] representing relations between neighborhood connection, behavioral self-regulation, the interaction term, and adjustment outcomes.



Note. Dashed lines represent non-significant relations. Exogenous and endogenous covariances, as well as endogenous error terms are not depicted in the figure for parsimony. Relations between control variables and endogenous variables are reported in text.

Figure 3. Results of the first regions of significance procedure, which depicts the adjusted effect of neighborhood connection on prosocial behavior.

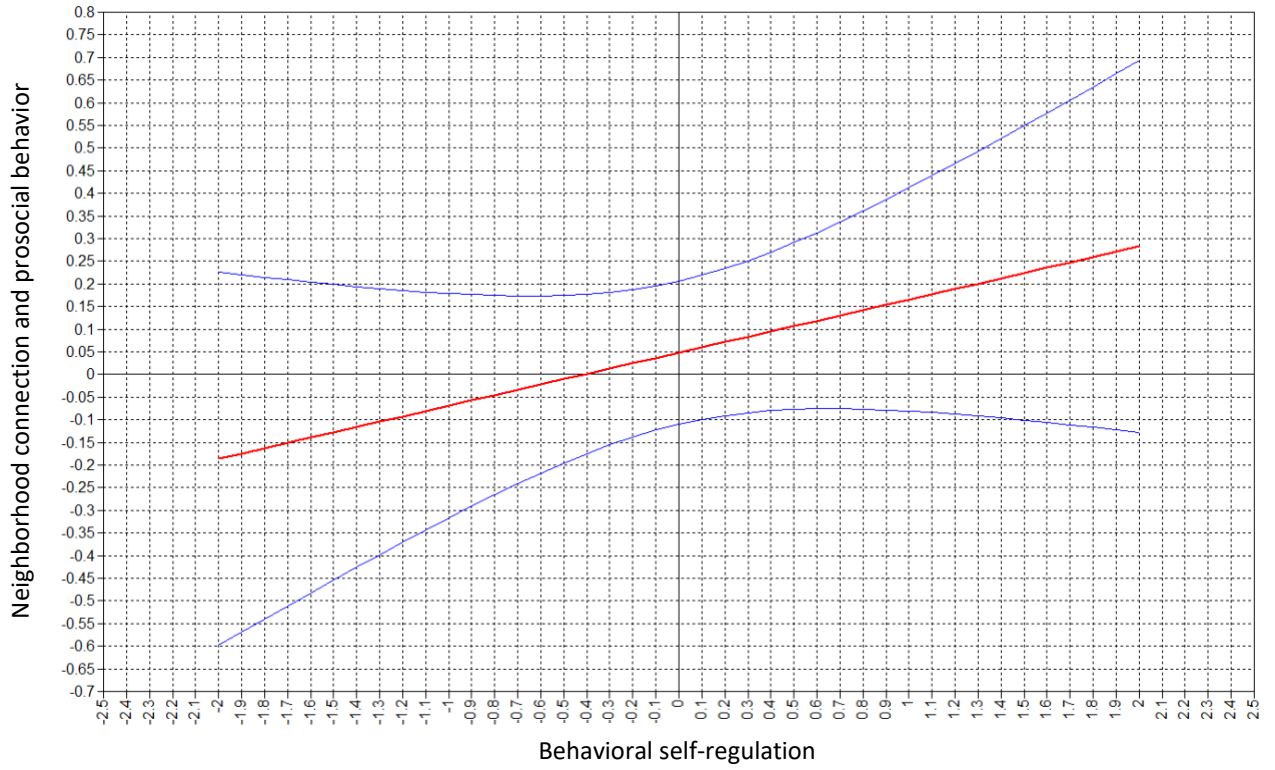


Figure 4. Results of the second regions of significance procedure, which depicts the adjusted effect of neighborhood connection on school engagement.

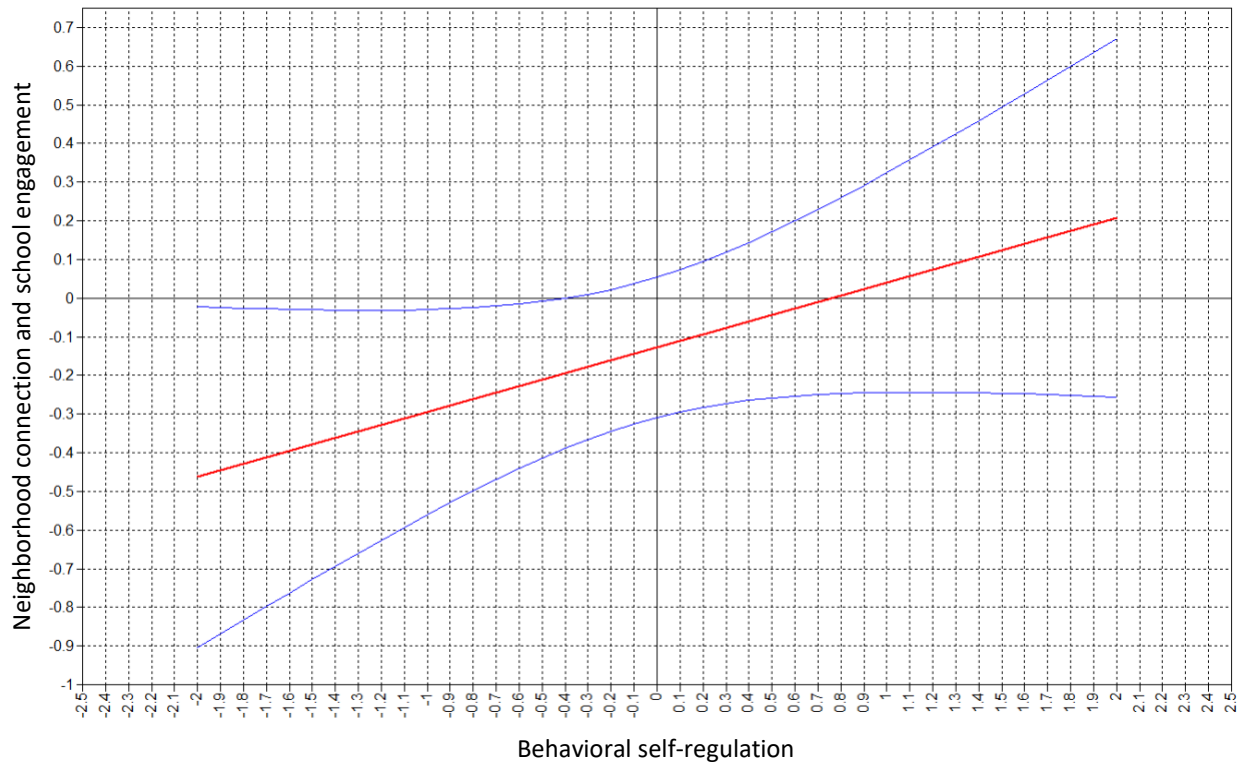
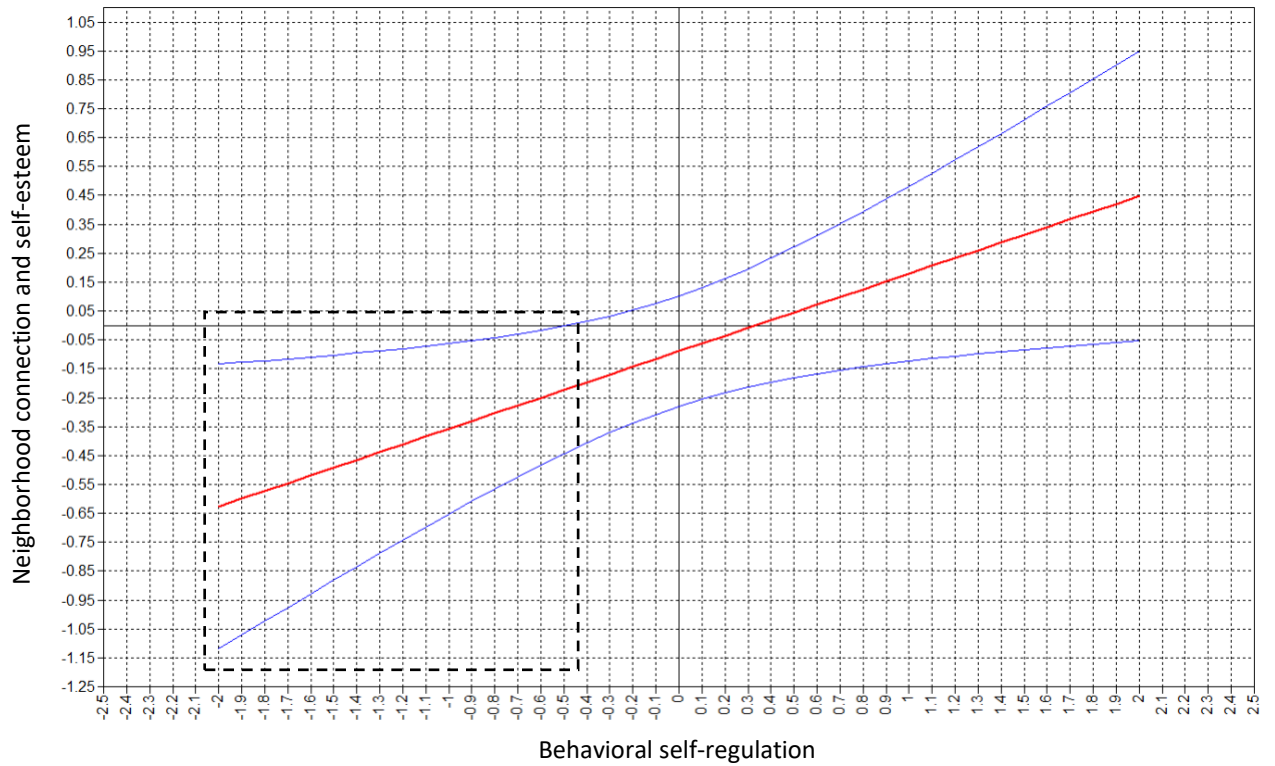


Figure 5. Results of the third regions of significance procedure, which depicts the adjusted effect of neighborhood connection on self-esteem.



Note. The dashed box indicates the region that is significantly different from zero.

VITA

Madison Memmott-Elison was born in Bakersfield, California, and was raised in the West with her four siblings.

Madison attended Brigham Young University, where she earned her Bachelor's degree in 2015 in Family Studies and her Master's degree in 2017 in Marriage, Family, and Human Development. Madison went on to earn her Doctorate degree in 2021 in Human Development and Family Science from the University of Missouri.

At the conclusion of her academic training, Madison was a named author on 16 journal articles (five first-author) and on four book chapters in edited volumes. Madison also gave seven talks and presented 15 posters at juried conferences and received numerous external and internal (university-, college-, and department-level) awards and honors related to her academic excellence and research productivity. In addition to her research, Madison worked as the Instructor of Record for nine undergraduate courses delivered in-person, synchronously online, and asynchronously online. Madison's students cite her enthusiasm and connectivity as her most effective teaching methods.

Madison has worked with collaborators on five external grant proposals and hopes to soon be awarded funds to provide her a Postdoctoral Researcher position.