Prosocial Peers and Depressive Symptoms in Adolescence:

A Time-Varying Effect Model

by

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ABSTRACT

The present study contributed an investigation of prosocial peers, a prospective promotive factor, and its association with depressive symptoms, an internalizing outcome. The study utilized six waves of panel data from 2,002 youth in the control condition of the Community Youth Development Study (mean age 13.12 at Grade 7; 52% male; 66.1% White; 26.6% Hispanic). A series of time-varying effect models (TVEM) illustrated the associations between prosocial peers and depressive symptoms over developmental time from Grades 7 through 12. It was hypothesized that prosocial peers and depressive symptoms would have a negative association for both males and females, and that the association would be moderated by gender at the time of transition to high school. It was expected that females would display a significantly stronger negative association than males between prosocial peers and depressive symptoms at this juncture, particularly due to gender-based differences in socialization that are compounded by transition. To strengthen conclusions about prosocial peers being a promotive factor, secondary analyses included covariates measuring previous levels of depressive symptoms; these models accounted either for baseline depressive symptoms or year-prior symptoms.

Results showed, overall, prosocial peers had a significant negative association with depressive symptoms over time, for both males and females. When controlling for baseline depressive symptoms, this was still the case. When controlling for year-prior depressive symptoms, prosocial peers was no longer significantly associated with depressive symptoms for males across Grades 10 through 12. Gender moderated the association between prosocial peers and depressive symptoms at the time of transition to

high school as well as other grades. When controlling for baseline depressive symptoms, it was again found that gender moderated the association between prosocial peers and depressive symptoms at the time of transition to high school (Grades 8 and 9) but also at Grade 12. When controlling for year-prior depressive symptoms, gender did not moderate the association at the time of transition to high school, but it did at Grades 10, 11, and 12. Overall, results support the possibility of prosocial peers as a prospective promotive factor for youth mental health.

DEDICATION

Dedicated to Anthony, for his unwavering support. And to my parents who have taught me to persist.

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CHAPTER 1

INTRODUCTION

Evaluating risk and promotive or protective factors is central to prevention science's efforts to promote positive behavioral health outcomes (Coie et al., 2000; Hawkins et al., 1992; Kellam & Langevin, 2003). These efforts have frequently focused on identifying and reducing risk factors, often for externalizing behaviors (e.g., substance use; Hawkins et al., 1992). Developmental experiences of risk and promotion or protection are not entirely separate processes and oftentimes both externalizing and internalizing outcomes cluster together (e.g., alcohol use and depressive symptoms; M. Mason et al., 2019; W. A. Mason et al., 2010). However, less is known about promotive or protective factors for youth mental health (Lippman et al., 2014; Zimmerman et al., 2013). The present study will focus on prosocial peers as a promotive factor, defined here as a factor that benefits all youth regardless of specific risk, versus a protective factor that buffers against a specific risk.

In the context of adolescent development, this study focused on depressive symptoms as an outcome and prosocial peers as a promotive factor. According to the National Comorbidity Survey-Adolescent Supplement (NCS-A), rates of depression tend to increase during adolescence (Avenevoli et al., 2015; Merikangas et al., 2010) which suggests that prevention efforts may be best situated either prior to or during early adolescence when depressive symptoms may begin to emerge, as for some youth those symptoms are prodromal prior to disorder. There are also gender and sex-based differences in terms of prevalence for depression, which tends to be higher for males

before puberty but shifts during adolescence such that females have much higher rates (Cyranowski et al., 2000; Hankin et al., 2007; Rose & Rudolph, 2006; Rudolph, 2002; Shih et al., 2006). Sub-clinical depressive symptoms have been shown to have multiple possible trajectories in adolescence (Garber et al., 2002; Ge et al., 2001), including in nationally representative samples such as the National Longitudinal Study of Adolescent Health (Add Health) (Adkins et al., 2009), and merit preventive intervention to avoid full disorder. Prevention is valuable not only in terms of quality of life but also in terms of negative health sequalae associated with depression (Keenan-Miller et al., 2007) and financial costs, both individual and societal, associated with depression over time (e.g., treatment, lost wages, long-term disability; Fletcher, 2013; Grazier, 2019; Kessler, 2012).

Promotion can occur at many levels (e.g., individual, peer, systems levels). The present study investigated peer domain, as this is a potentially salient point of intervention during adolescence when youth spend an increasing amount of time with peers and social environmental context has been shown to impact well-being outcomes (Lam et al., 2014). There is evidence that peers influence mental health, including over developmental time; for example, close friendship strength during middle adolescence has been shown to predict later lower levels of depressive symptoms by early adulthood (Narr et al., 2019).

In the present study, prosocial peers was studied as having a possible promotive influence on youth development, specifically as related to youth depressive symptoms. Here “prosocial peers” was defined as those with “positive behaviors” (Catalano et al., 2020) such as trying to do well in school, and not by a narrower “prosocial” definition

that points exclusively to altruistic behavior. Thus, the present study investigated the extent to which a person's peer group exhibits prosocial (positive) behavior might matter towards an individual's own mental health.

There is some evidence of a negative association between prosocial peers and depressive symptoms (Monahan et al., 2014), and the present study expanded upon that to look at the association over time and whether the it was moderated by gender. The trajectories of the two variables on their own are complex in regard to time and gender; depression has been observed to initially increase during adolescence and gender differences emerge in early adolescence (higher rates of depression for females; Adkins et al., 2009; Avenevoli et al., 2015). Participants' levels of prosocial peers in the present sample tends to decrease over adolescent development, but there are gender differences whereby males tend to increase in level of prosocial peers at the end of high school (Kim, Oesterle, et al., 2015).

The present study examined the concurrent associations between prosocial peers (a prospective promotive factor) with depressive symptoms (an outcome) during adolescent development. The findings can contribute towards novel strategies for the promotion of mental health and resilience. It also sought to elucidate, based on the following literature and theories, a more nuanced level of detail about how the association between the two variables change over developmental time, and how associations differ by gender over time. This provides implications for prevention, based on sensitive periods for intervention, as well as varying strategies or timing of prevention

based on gender. Integration of the following specific theories will inform the study at hand in terms of specific research questions, hypotheses, and methods.

CHAPTER 2

REVIEW OF LITERATURE

Several bodies of research informed the research questions and hypotheses of the current study regarding how the association between prosocial peers and depressive symptoms changes over time and by gender. These include theories about the emergence and developmental course of depressive symptoms, risk and promotive factors, and gender differences in development. Specifically, the present study conceptualized the emergence and course of depressive symptoms in terms of the *developmental psychopathology perspective*, which draws on risk and promotive influences in the context of the *social development model* and considers gender differences primarily in terms of *gender socialization*. All of these perspectives connect to one another and together, along with the context of *transition*, inform the research questions and hypotheses for the present study.

Developmental Psychopathology Perspective

Prevention science is deeply influenced by the developmental psychopathology perspective (Coie et al., 2000). This framework takes a life course development approach to characterizing the emergence of maladaptation and disorder. In adolescence, this includes recognizing the shifts in development that are considered normative and the ways in which healthy developmental processes may go awry (Cicchetti & Rogosch, 2002). This conceptualization of the emergence of psychopathology (e.g., depression) implies that risk, promotion, and protection, as well as continuity and discontinuity contribute towards adaptive or maladaptive trajectories.

Developmental psychopathology perspectives on depression focus primarily on cognitive vulnerabilities for depression which create substantial risk for maladaptation in the presence of stress (Abela & Hankin, 2009). Increased stressors (particularly interpersonal ones) are a normative part of adolescent development, but the differences in cognitive vulnerabilities contribute to healthy (lower cognitive vulnerability) or unhealthy (higher cognitive vulnerability) responses to that stress. The increase in interpersonal stressors during adolescence may contribute to the gender disparity (wherein females generally exhibit higher levels of depression), because interpersonal stressors are theorized to contribute more to depression in females than in males (Cyranowski et al., 2000; Hankin et al., 2007; Rudolph, 2002; Shih et al., 2006). Higher cognitive vulnerabilities in adolescent development may result in higher likelihood of psychopathology through multiple theoretical pathways; for example, Lakdawalla and colleagues (2007) found an increase between pre-adolescence and adolescence in the effect size of the cognitive vulnerability-stress interaction when considering it in three contexts: Beck's cognitive triad, hopelessness theory, and response styles theory.

Social Development Model

Development is complex; the "positive" and "negative" influences on development are not mutually exclusive of one another. The social development model elucidates two simultaneous processes in development: prosocial and antisocial (Catalano & Hawkins, 1996; Hawkins & Weis, 1985). It draws on social learning and social control theories (Bandura & Walters, 1977; Hirschi, 1969), and aligns well with conceptualizations of social-emotional learning (e.g., Jones et al., 2019). The social

development model considers that behaviors (both positive and negative) emerge and are maintained through social interaction and involvement within environmental contexts. The social-emotional developmental sequence that follows based on interactions in those spheres includes both a prosocial and an antisocial pathway. Relevant to the present study, youth develop with opportunities to interact with peers who may exhibit behaviors that are prosocial or antisocial. The model suggests the pathway towards prosocial, health-promoting behavior (as well as a parallel pathway to antisocial, health-compromising behavior) ultimately results in bonding (becoming emotionally attached and committed) to those with whom they are involved, and as a result, adopting the norms and beliefs of that group. The strength of the bond (to prosocial or antisocial others) then predicts behaviors consistent with the group's norms, and ultimately, positive or negative developmental outcomes (Catalano et al., 2020). Having a friend group comprised of peers with prosocial behavior, then, may be related to better mental health outcomes.

Thus close friendships with prosocial peers is the focus of the current study, as bonding within the context of school peers has been shown to be a worthy point of intervention for promoting healthy development (Catalano et al., 2004; Hawkins et al., 2001). Homel and colleagues (2020) found that, particularly during adolescence, youth with friends who were involved in positive activities experienced fewer depressive symptoms. Fredricks and Eccles (2005) found that the connection between participation in extracurricular and activities and positive adjustment is largely due, through a mediational pathway, to associating with a group of prosocial peers. Longitudinal

associations have been found with similar factors such as school bonding, which was associated with reduced risks for later comorbid depression and alcohol use disorders in young adulthood (W. A. Mason et al., 2010). Additionally, peer network health (defined as the relative balance of risk and promotive or protective factors in the peer group) has also been shown to moderate the association between depression and other negative outcomes, such that higher peer network health suppressed the effect of depression on substance use (M. Mason et al., 2019).

Gender Socialization and Differences

It has been suggested that the social development model may function differently based on identity factors such as gender (Catalano et al., 2020; Laundra et al., 2002). This is unsurprising given that gender socialization influences many domains including social interaction and social norms (Leaper & Friedman, 2007), and may also impact opportunities and rewards for involvement (Catalano et al., 2020). For example, it is reasonable to suspect that gender socialization may lead to greater opportunities and rewards for females (versus males) to engage in prosocial involvement and bonding, and indeed females tend to have higher mean levels of this promotive factor than males (Kim, Oesterle, et al., 2015).

Other gender differences may result in higher affiliative need for females, possibly due to a confluence of social and hormonal (i.e., pubertal) mechanisms (Cyranowski et al., 2000). Peer relationships may also function differently in terms of their associations with depression-related outcomes; for example, females may be more likely to develop social-cognitive styles that result in greater risk for depression due to

higher levels of concern regarding evaluation and approval within peer relationships (Rose & Rudolph, 2006). Based on this, the potential promotive influence of prosocial peers may be stronger in females, because females are both more likely to have opportunities for prosocial bonding than males and because negative interpersonal stressors have been more strongly linked with females' depression than they have for males.

Developmental Transitions

The aforementioned theories all point to developmental transition being a time where the association between prosocial peers and depressive symptoms may become particularly strong, especially for females. Specifically, the transition to high school presents significant changes in several domains such as social, academic, and physical; (Benner, 2011; Eccles & Roeser, 2011; Langenkamp, 2010; Uvaas & McKevitt, 2013; Wang & Eccles, 2012). Focusing on the social context, there is an increasing opportunity for creating new social connections (either prosocial or antisocial) for most students as they begin high school, because they tend to interact with an increasing number of classmates due to different academic paths (e.g., choice of electives, different levels in coursework, etc.). While there is also a similar transition in middle school, it is on a smaller scale and high school transitions tend to include additional independence and opportunities to select into specific peer groups. Additionally, the cognitive development around middle adolescence makes the interpersonal and cognitive vulnerability factors related to depression more salient than they are in the transition to middle school (Abela & Hankin, 2009; Cyranowski et al., 2000; Lakdawalla et al., 2007).

Transitioning to high school also represents a time of globally heightened risk (Benner, 2011; Catalano et al., 2012, 2020; Rudolph, 2002) and is known to be a time when depression rates tend to increase (Avenevoli et al., 2015). For example, a study by Newman and colleagues (2007) found a decline in social support was related to increased depressive symptoms between eighth and ninth grade. While parental/caregiver relationships with youth still play a crucial role, the salience of the peer group increases and close friendships may have an increasing opportunity to provide risk or promotion (Lee et al., 2017). For example, a longitudinal study by Narr and colleagues (2019) found that close friendship strength in middle adolescence predicted decreases in anxiety and depressive symptoms in early adulthood, and this finding was interpreted as being due to the opportunities to master social developmental tasks in the context of those friendships. During this period, peer groups become more salient and there is evidence they may serve as a possible promotive effect in development against internalizing symptoms.

CHAPTER 3

THE PRESENT STUDY

The primary objective of the present study was to increase understanding of the association between the presence of prosocial peers and youths' levels of depressive symptoms, including how this association changes over developmental time from Grade 7 to 12 and by gender. More specifically, this study addressed two primary research questions: (1) *To what extent is there a statistically significant and negative association between prosocial peers and depressive symptoms among males and females across adolescence (from Grade 7 to 12)?* (2) *To what extent does the association between prosocial peers and depressive symptoms differ by gender across developmental time (from Grade 7 to 12)?* It was hypothesized that the association would be significant and negative for both males and females across adolescence (Grade 7 to 12) and significantly stronger (i.e., more negative) for females than males at the time of transition to high school (Grades 8 and 9), suggesting that gender moderates the association at that time. This was hypothesized due to differences in gender socialization and unique vulnerabilities that the transition to high school may heighten by disrupting social systems and increasing interpersonal stressors which create greater risk for depressive symptoms in females than males.

Sociodemographic covariates were used to increase precision of the estimates and adjust for possible confounding due to sociodemographic variation in the sample that may explain the observed relationship between prosocial peers and depressive symptoms. To strengthen conclusions about prosocial peers as a promotive factor that is associated

with fewer depressive symptoms, secondary analyses included covariates measuring prior levels of depression. Adjusting for prior levels of depression (early in adolescence or the year prior) probed the impact of stability in depressive symptoms over time and the possibility of a bidirectional relationship between prosocial peers and depressive symptoms. For example, more depressive symptoms may not be due to fewer prosocial peers but having experienced depressive symptoms early on in adolescence or in the previous year (Holsen et al., 2000). Depressive symptoms may also be associated with greater difficulties establishing relationships with prosocial peers, but a lack of prosocial peers may, in turn, not contribute significantly to changes in depressive symptoms over time; a similar pattern to this was found in a cross-lagged analysis of 102 young adolescents' depressive symptoms and friendship stability (Chan & Poulin, 2009). If this is the case, adjusting for prior levels of depressive symptoms in analyses would weaken the concurrent association between prosocial peers and depressive symptoms. Revealing the dynamic associations between the prospective promotive factor (prosocial peers) and outcome (depressive symptoms) may inform prevention strategies in terms of both targets and timing.

CHAPTER 4

METHOD

Participants

This study utilized the control sample of 2,002 youth from the Community Youth Development Study (CYDS), a community-randomized trial of the Communities That Care (CTC) prevention system conducted within 24 paired communities across seven states (Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington). This study used the 12 control communities only, as the current study did not seek to address questions of possible intervention effects. Communities were all small-to-medium incorporated towns, ranging from approximately 1,500 to 50,000 residents with an average population of 14,646 residents.

Sample characteristics. All public school students from CTC communities who were in fifth grade in the 2003-2004 school year were eligible to participate in the study. Of those eligible, 2,002 participated, representing 76.6% of the eligible population (N = 2,610). The participants were 52% male, and 26.6% were Hispanic. On items about race which were not mutually exclusive (i.e., participants could select more than one category, and 5% identified as Multiracial), 66.1% identified as White, 5.8% as Native, 3.4% as Black, 2.2% as Asian, 0.8% as Pacific Islander, and 27.5% identified as "other." Of the "other" category, 82% identified their ethnicity as Hispanic. Mean age in years at data collection in Grade 7 was 13.12 years (*SD*=.40). The highest level of parental education (i.e., the highest of any parent/guardian as reported by the youth) was used in this study as a proxy for socioeconomic status and included the following: grade school or less

(4.1%), some high school (8.5%), completed high school (21.4%), some college (24.4%), completed college (29.1%), and graduate or professional degree (12.5%).

Procedure

The procedures for collecting these data were approved by the University of Washington Human Subjects Review Committee. The present study is a secondary data analysis, utilizing waves of data that were collected when youth were in Grades 6, 7, 8, 9, 10, and 12. There was no data collection during Grade 11. Data collection for the first wave utilized in the present study for a baseline measurement, Grade 6, occurred in Spring 2005. Recruitment took place in collaboration with public schools (or in one community where a school declined, community-based recruitment methods were used; E. C. Brown et al., 2009). Youth whose caregiver provided consent were eligible to complete an assent form and participate. The data were collected via self-report paper surveys completed by students in public schools during a classroom period. Youth who participated received a small incentive upon survey completion worth $5 to $8. Only identification numbers were used to ensure confidentiality and no other identifying information was included on the paper surveys. Data collection continued for all youth including those who left the original study community (i.e., change of residence) and the retention at Grade 12 for the control sample was 91.6% (Kim, Oesterle, et al., 2015). For additional information on sample, recruitment, and design, see Brown et al. (2009).

Measures

All measures come from the Communities That Care Youth Survey (CTC-YS) which has shown adequate psychometric properties across demographics such as gender

and race/ethnicity (Glaser et al., 2005). The primary purpose of the CTC-YS in broader use is for community prevention planning, to assist communities in recognizing elevated risk or low promotive factors to target; here, it was used to collect data on participants in both arms of the community-randomized control trial of the CTC prevention system.

Prosocial peers. Youth responded to items about prosocial peers at each of the grade levels used in this study. The instructions and question stem immediately prior to the prosocial peers items included the following: "For this next set of questions, think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have: _____" followed by a series of items, including the five questions about prosocial peers. The prosocial peers items included "Participated in clubs, organizations, or activities at school?" "Made a commitment to stay drug-free?" "Tried to do well in school?" "Liked school?" and "Regularly attended religious services?" Response options included the following: "None of my friends" = 0, "1 of my friends" = 1, "2 of my friends" = 2, "3 of my friends" = 3, and "4 of my friends" = 4. An average score across the items was calculated for each participant if at least four of the five total items had been answered. The possible range for a mean score on prosocial peers was from zero to four, with higher scores indicating higher exposure to prosocial behavior within the peer group (i.e., the highest scores would require a greater number of the respondent's friends were engaged in prosocial behavior, and in a variety of ways). On this measure, similar scores could come from different combinations. For example, a prosocial peers mean score of 3.00 could result from three of the friends each doing all five prosocial activities and the fourth friend doing none of the activities, or that same

3.00 could come from three friends each doing four of the activities and the fourth friend doing three of the activities. A lower mean score of 1.00 could result from having one friend who engages in all five prosocial activities while the remaining three friends engage in none, or it could be due to one friend engaging in two activities while the other three friends only engage in one activity each.

Depressive symptoms. Level of depressive symptoms was measured with the CTC Brief Depressive Symptoms scale (CTC-BDS) at each of the grade levels used in this study. The directions for the survey section on depressive symptoms items included the following: "The next questions are about your experience and feelings" and the most immediate directions prior to the depressive symptoms items included "Please answer BIG NO!, little no, little yes, or BIG YES! to the following:" with statements "Sometimes I think that life is not worth it" "At times I think I am no good at all" "All in all, I am inclined to think that I am a failure" and "In the past year (12 months), have you felt depressed or sad MOST days, even if you felt OK sometimes?" Response options were "NO!" = 1, "no" = 2, "yes" = 3, "YES!" = 4. An average score across the items was calculated for each participant if at least three of the four total items had been answered. The possible range for a mean score on the CTC-BDS was 1-4, with higher scores indicating higher levels of depressive symptoms.

Measurement work was previously conducted by Rhew and colleagues (2016) for the CYDS wave at age 19 because it was the first time point where participants completed both the CTC-BDS and a more standard diagnostic criterion measure, the Patient Health Questionnaire 9-Item (PHQ-9; Kroenke et al., 2001). The analyses

supported a single-factor model for the CTC-BDS with high standardized loadings (>.8) and strong model fit (RMSEA = .042; TLI = .999, CFI > .999) as well as a strong correlation with the PHQ-9 (Spearman's $\rho = .62$, $p < .001$) (Rhew et al., 2016). Based on these findings about the reliability and validity at age 19, the CTC-BDS was presumed to likely be similarly reliable and valid at earlier ages in the same sample. Measurement reliability analyses were conducted for both the prosocial peers and depressive symptoms measures.

Measurement reliability analyses. Preliminary checks of the focal measures included alpha reliability estimates and alpha with item removed. A full table of the alpha reliability estimates by gender and grade level is presented in Table 1. When separated by gender, the estimates were not consistently stronger or weaker based on gender. Overall alpha reliabilities for the prosocial peers measure across measurement points ranged from $\alpha = .649$ to .766; the average difference in alpha reliability between genders was 0.02. For depressive symptoms, alpha reliability estimates for scores on the CTC-BDS ranged from $\alpha = .821$ to .899; the average difference in alpha reliability estimates between genders was .015. Due to lower reliability (below .70; Nunnally, 1978) for prosocial peers, the scale was checked "if item deleted" for each item and no removal of any item improved the reliability of the scale scores. Overall, both measures offered good to excellent reliability across time and gender and were deemed reasonable to use in further analyses.

Table 1

Alpha Reliability Estimates for Prosocial Peers and CTC-BDS

	Alpha Reliability Estimate					
	Prosocial Peers			CTC-BDS		
	Overall	Male	Female	Overall	Male	Female
Grade 7	.649	.641	.619	.851	.836	.863
Grade 8	.693	.675	.672	.883	.871	.886
Grade 9	.709	.688	.716	.899	.899	.891
Grade 10	.713	.692	.726	.895	.899	.889
Grade 12	.766	.758	.773	.888	.895	.881

Note. CTC-BDS = Communities That Care Brief Depressive Symptoms scale.

Gender. Participants responded to an item which read as follows: "Are you?" with response options "Female" or "Male." This was considered the marker of the participants' gender, though it is possible that participants responded based on biological sex which may not have corresponded to their gender identity, and these response options also limited expression of non-binary or other gender identities.

Sociodemographic covariates. Sociodemographic covariates included the following: (1) parental level of education as a proxy for socioeconomic status, (2) race, and (3) ethnicity. These were used to adjust all models, increasing precision by controlling for sociodemographic characteristics that may confound the association between prosocial peers and depressive symptoms. All models were first estimated without these covariates; because the model results were similar, results are only presented with the adjusted models.

Parental level of education was computed based on the highest level of education reported by the youth for either parent/guardian by the time the participant was in Grade 12, coded from 1-6 corresponding to "grade school or less," "some high school," "completed high school," "some college," "completed college," or "graduate or professional degree." Race was coded based on whether the participant reported being White (coded as 1) or not White (coded as 0); this comparison was chosen due to the low prevalence of other race categories (e.g., Asian at 2.2%, Pacific Islander at 0.8%) and allows for adjustment of a possible confounding relation between race and depressive symptoms which could theoretically exist due to higher exposure to race-based discrimination, which was presumed to differ between the group coded as White and non-White. Similarly, ethnicity was coded as a binary of Hispanic (1) or not Hispanic (0).

Previous depressive symptoms covariates. Additional covariates were included in secondary analyses to adjust for previous levels of depressive symptoms. These covariates controlled either for baseline symptoms or for year-prior depressive symptoms. While each adjusted the models differently, both probed the impact of strong stability in depressive symptoms over time as well as possibility of bidirectionality in the relation between prosocial peers and depressive symptoms to bolster conclusions about prosocial peers as a prospective promotive factor.

Baseline depressive symptoms. Adjusting models for baseline depressive symptoms addressed the question of whether early levels of depressive symptoms impacted the association between prosocial peers and depressive symptoms over later developmental time. The mean score for depressive symptoms on the CTC-BDS at Grade

6 (one year before the first time point in the models) was used as the baseline depressive symptoms measure. For the baseline measure of depressive symptoms, the mean for males was 2.01 (*SD* = .81), mean for females was 2.09 (*SD* = .82); this difference was significant (t_{1945} = -.08, p = .032) with equal variances.

Year-prior depressive symptoms. Including the covariate of year-prior depressive symptoms was a highly stringent test. When models included the year-prior depressive symptoms throughout the model, what was estimated was ultimately an association between prosocial peers and the *difference* in depressive symptoms score year-to-year, rather than simply the association with that time-point's depressive symptoms. For this covariate, the prior year's depressive symptoms score was used (e.g., year-prior depressive symptoms for an individual in Grade 9 was their mean depressive symptoms score from Grade 8).

Data Analytic Plan

Descriptives. Prior to conducting analyses, mean levels of the focal variables (prosocial peers and depressive symptoms) were examined and described, over time and by gender. Independent samples t-tests were used to determine whether and when the mean levels differed by gender.

Time-varying Effect Model. To address the research questions about the dynamic association between prosocial peers and depressive symptoms over time, and by gender, time-varying effect modeling (TVEM) was used (Lanza et al., 2016; Vasilenko, 2017). TVEM allows for the associations between variables to change in nonparametric ways by adding time into the regression equation, making the coefficients functions of

near-continuous time. When looking over developmental time, this can highlight changes in the salience of particular risk or promotive factors for behavioral health outcomes (Vasilenko & Lanza, 2014). For example, the method has been used to model associations over developmental time between variables and behaviors such as nicotine quitting, marijuana use, and sexual behavior (Dierker et al., 2018; Lanza et al., 2014; Russell et al., 2016; Ungar et al., 2014; Vasilenko, 2017), though these examples typically focus on risks rather than promotive factors. TVEM is conducted with a SAS Macro (Li et al., 2017; Tan et al., 2012) and can incorporate both time-varying (e.g., year-prior depressive symptoms) and time-invariant predictors (e.g., gender) and estimate their effects as either time-varying or time-invariant.

Broadly, for the first research question (*To what extent is there a statistically significant and negative association between prosocial peers and depressive symptoms among males and females across adolescence (from Grade 7 to 12)?*), the association of prosocial peers and depressive symptoms was estimated across time, separately by gender, in a model adjusted for sociodemographic covariates. To test whether the association between prosocial peers and depressive symptoms was statistically different from zero for both males and females (Hypothesis 1), a *t* distribution with a .05 Type I error rate was used. Next, two subsequent multivariate analyses each included a covariate for previous depressive symptoms (first baseline, then year-prior).

For the second research question (*To what extent does the association between prosocial peers and depressive symptoms differ by gender across developmental time (from Grade 7 to 12)?*), data were pooled to formally test the extent to which there were

gender differences in the association by adding an interaction term between gender and prosocial peers. To determine whether the association was significantly stronger for females than males specifically at Grades 8 and Grade 9 (Hypothesis 2), the interaction term and its confidence interval was examined over time. A significant interaction term at Grades 8 and 9 would allow rejection of the null hypothesis that there was no difference in the association by gender at that time of transition, and if the coefficient estimates for the association were more negative for females than males at those grade levels, this would lend plausibility to the hypothesis that the association was stronger for females than males at that time. Again, two subsequent models each included a covariate for previous depressive symptoms (first baseline, then year-prior).

Models for Research Question One (Association)

Model one (basic association). As described more broadly in the previous section, three models were estimated separately by gender to address the first research question *(To what extent is there a statistically significant and negative association between prosocial peers and depressive symptoms among males and females across adolescence (from Grade 7 to 12)?)*. The first model estimated depressive symptoms as a function of an intercept, prosocial peers (the focal variable), and the covariates of parental education, race, and ethnicity. The model was specified as follows:

$$\text{Model 1: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \varepsilon_i$$

In this and subsequent models, the equations are similar to typical regression equations but with the addition of *(t)* which represents time, measured here as grade in school (coded with the corresponding numerical value for the grades as 7, 8, 9, 10, 12). For each model hereafter, the following specific definitions remain the same and only new terms in the equation will be defined. In Model 1, DS_i represents the depressive symptoms score for individual i; $\beta_0(t)$ represents the intercept function for estimated mean depressive symptoms across age when prosocial peers is zero, across grade; $\beta_1(t)$ represents the coefficient function for expected change on mean depressive symptoms associated with a one-unit increase in prosocial peers, across grade; PP_i represents the prosocial peers scores for individual i; $\beta_2(t)$ represents the coefficient function for the main effect of parents' highest educational status on depressive symptoms across grade; *PAREDU* is individual i's score for highest level of parental education of a parent or guardian; $\beta_3(t)$ is the coefficient function representing the main effect of being White on depressive symptoms across age; *WHITE* is individual i's being White (1) or non-White (0); $\beta_4(t)$ is the coefficient function representing the main effect of being Hispanic on depressive symptoms across age; *HISPANIC* is individual i's being Hispanic (1) or non-Hispanic (0) on depressive symptoms across grade; ε_i *is* individual i's residual error. Regarding how variables were specified, *PP* (prosocial peers) was included as a time-varying covariate with a time-varying effect, and *PAREDU*, *WHITE*, and *HISPANIC* were specified as time-invariant covariates with time-invariant effects.

Model two (association with baseline depressive symptoms). The second model added the baseline depressive symptoms measure and was specified as follows:

$$\text{Model 2: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \beta_5(t)BASEDEP_i + \varepsilon_i$$

For new terms introduced in this model, $\beta_5(t)$ represents the coefficient function for the main effect of baseline depressive symptoms across grade; *BASEDEP* represents the mean depressive symptoms score for individual i in Grade 6. *BASEDEP* was indicated as a time-invariant covariate with a time-varying effect.

Model three (association with year-prior depressive symptoms). As compared to Model 2 which used baseline depressive scores, the third model used year-prior depressive symptoms and was specified as follows:

$$\text{Model 3: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \beta_5(t)PREVDEP_i + \varepsilon_i$$

In this model, $\beta_5(t)$ represents the coefficient function for the main effect of the prior year's depressive symptoms in predicting depressive symptoms across grade; *PREVDEP* is individual i's mean depressive symptoms score for the year prior. *PREVDEP* was indicated as a time-varying covariate with a time-varying effect.

Models for Research Question Two (Moderation)

Model four (basic interaction). Three additional models were estimated using the pooled sample to address the second research question *(To what extent does the association between prosocial peers and depressive symptoms differ by gender across developmental time (from Grade 7 to 12)?)*. Here the hypothesis of moderation by gender

at Grades 8 and 9 was tested with the introduction of an interaction term. The first interaction model, Model 4, was specified as follows:

$$\text{Model 4: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \beta_5(t)MALE_i + \beta_6(t)MALEbyPP_i + \varepsilon_i$$

In the Model 4 equation above, $\beta_5(t)$ represents the coefficient function for the main effect of being male on depressive symptoms across grade; $MALE_i$ = is the self-reported gender for individual i (coded female = 0 and male = 1); $\beta_6(t)$ represents the coefficient function for the interaction of gender and prosocial peers score across grade; $MALEbyPP_i$ is individual i's product of gender and prosocial peers score across grade. In syntax, *MALE* was indicated as a time-invariant covariate with a time-varying effect and *MALEbyPP* was indicated as a time-varying covariate with a time-varying effects.

Model five (interaction with baseline depressive symptoms). Compared to Model 4 which did not include any covariate for previous depressive symptoms, Model 5 reintroduced the baseline depressive symptoms covariate (here, $\beta_7(t)BASEDEP_i$). The model was defined as follows:

$$\text{Model 5: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \beta_5(t)MALE_i + \beta_6(t)MALEbyPP_i + \beta_7(t)BASEDEP_i + \varepsilon_i$$

Model six (interaction with year-prior depressive symptoms). The next and final interaction model, Model 6, differs from Model 5 by using the year-prior depressive

symptoms covariate (here, $\beta_7(t)PREVDEP_i$), rather than baseline depressive symptoms. The full model was specified as follows:

$$\text{Model 6: } DS_i = \beta_0(t) + \beta_1(t)PP_i + \beta_2(t)PAREDU_i + \beta_3(t)WHITE_i + \beta_4(t)HISPANIC_i + \beta_5(t)MALE_i + \beta_6(t)MALEbyPP_i + \beta_7(t)PREVEDEP_i + \varepsilon_i$$

Analytic Sample

The final analytic sample is presented in Table 2 and reflects the number of participants for whom data was used at each time point in the TVEM. To be included in analysis, participants needed to have validly completed both the prosocial peers and depressive symptoms measures at that time point. As compared to the total consented sample (N = 2,002), the final analytic sample did not include, by wave: those who were not surveyed due to attrition, those who did not receive the prosocial peers or depressive symptoms measure in their survey due to the study's planned-missingness design, those who failed the validity screen, and those who either did not complete the two focal measures or did not complete sufficient items (i.e., at least all but one on each scale).

Attrition. Across the waves used in the TVEM (Grade 7 to Grade 12), attrition ranged from 61 to 170 participants (3.0% to 8.5%) out of the total consented sample of 2,002.

Planned missingness. The primary source of missing data was due to planned missingness. At each time point used in the TVEM, to reduce participant burden, approximately one-third of participants were randomly assigned to receive a short form of the survey. Planned missingness on the prosocial peers and depressive symptoms

measures excluded 475 to 637 of surveyed participants (25.1% to 32.8%) at each wave. In Grade 6, the timepoint for the baseline depressive symptoms measure, there was no planned missingness and 1,947 of surveyed participants (97.4%) responded to the measure.

Validity screen. Participants whose responses did not pass the CYDS validity screen procedure in a given wave of data collection were excluded from analysis in that year. The screen excludes those that said they were honest in their responses "some of the time" or less often, if they reported using a fictitious drug, or if they reported to having used two out of three illicit drugs on 40 or more occasions within the last month (Kim, Gloppen, et al., 2015). Of those surveyed, this resulted in excluding data from a range of 20 to 38 participants (1.0% to 2.0%) across Grades 7 to 12. The validity screen for Grade 6, at the point of the baseline depressive symptoms measurement, only excluded data from 12 (0.6%) of the surveyed participants.

Full scale and item missingness. Missingness on a full scale (i.e., zero answers on prosocial peers or depressive symptoms) could be due to overlapping causes, for example a participant whose responses were counted as removed due to the validity screen may also have been part of the planned missingness at that wave. Across all measurement points, item-level missingness for the prosocial peers scale occurred in a range of 21 to 95 participants' responses (an average of 3.7% of responses). Of those, most participants only missed one item, and therefore between only 3 and 16 participants' responses (an average of .8% of responses) were excluded due to partial completion. Across all measurement points, item-level missingness for the depressive symptoms

measure occurred in a range of 7 to 22 participants' responses (an average of 1.2% of responses). Of those, most participants only missed one item, and therefore only between 1 and 5 participants' responses (an average of .3% of responses) were excluded due to partial completion. For the baseline measure of depressive symptoms at Grade 6, 24 (1.2%) of the participants' responses were excluded due to partial completion.

Final Sample. All available data were used in the analysis. The final sample at each time point represented a large percentage (91.1% to 96.5%) of those who, at each wave, received a form that contained the items. The participants excluded by wave, a total of 575 to 735 participants (31.1% to 38.1% of those surveyed) were mostly excluded due to the random planned missingness, rather than attrition, failed validity screens, item-level missingness, or non-response. Because the planned missingness was random (i.e., not the same participants consistently received short surveys), a total of 1,976 unique participants' data were used in at least one point in the TVEM. Importantly, most participants had full data for most points in the TVEM. Specifically, of the 1,976 total participants whose data was used in the TVEM, 1,685 (85.3%) were only missing data from one or two time points in the TVEM.

Table 2

Analytic Sample Size by Grade

	Total Participants Received Long Version Survey[a]	Total Participants' Long Version Surveys Excluded[b]	Final Analysis Sample Size (Percent out of Total Long Surveys Completed)
	N	*N*	*N (%)*
Grade 7	1307	72	1235 (94.5%)
Grade 8	1303	64	1239 (95.1%)
Grade 9	1311	117	1194 (91.1%)
Grade 10	1418	114	1304 (92.0%)
Grade 12	1303	46	1257 (96.5%)

[a]This represents how many individuals participated in the wave and received the version of the survey containing both the prosocial peers and depressive symptoms measures.
[b]This represents how many individuals' long version surveys were excluded for any reason other than planned missingness (i.e., due to failed validity screen, scale nonresponse, item-level missingness).

CHAPTER 5

RESULTS

Descriptives on Focal Variables

Estimated mean levels for the key variables across time are shown in Figures 1 and 2. For males, the highest levels on prosocial peers (scale of 0-4) were at Grades 7 and 12; during the years in-between, the levels were slightly lower, but overall the estimate remained relatively stable over time. For females, the level of prosocial peers was greatest at Grade 7 and decreased in the following years; however, the value was generally steady from Grade 10 to Grade 12. To contextualize how the estimated mean values varied over time (for males between 2.01 and 2.22 and females between 2.22 and 2.67), the differences were equivalent to less than a quarter of the typical standard deviation on the observed means for males, and less than half of the typical standard deviation on the observed means for females. Overall, the mean estimate was slightly more stable over time for males than females.

For depressive symptoms, the estimated mean (scale of 1-4) for males was highest at Grade 7 and decreased slightly over time before leveling in Grades 11 to 12. For females, depressive symptoms estimates were highest around Grade 8 and lowest between Grade 11 and 12. To contextualize how the estimated mean values varied over time (for males between 1.73 and 1.87 and females between 1.85 to 2.20), the differences were equivalent to less than a fifth of the typical standard deviation on the observed means for males, and less than half of the typical standard deviation on the observed

means for females. Again, the estimate was slightly more stable over time for males than females.

Figure 1

Estimated Mean Levels of Prosocial Peers

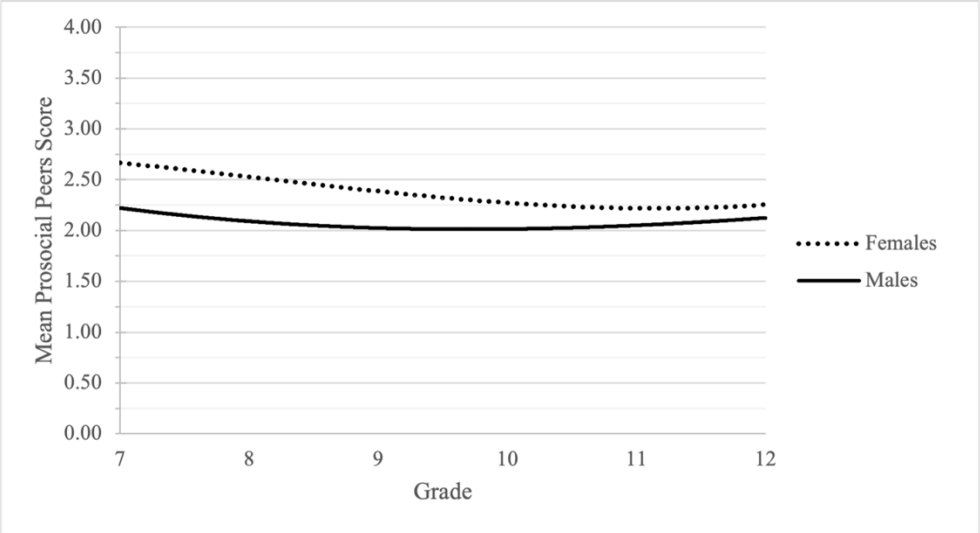
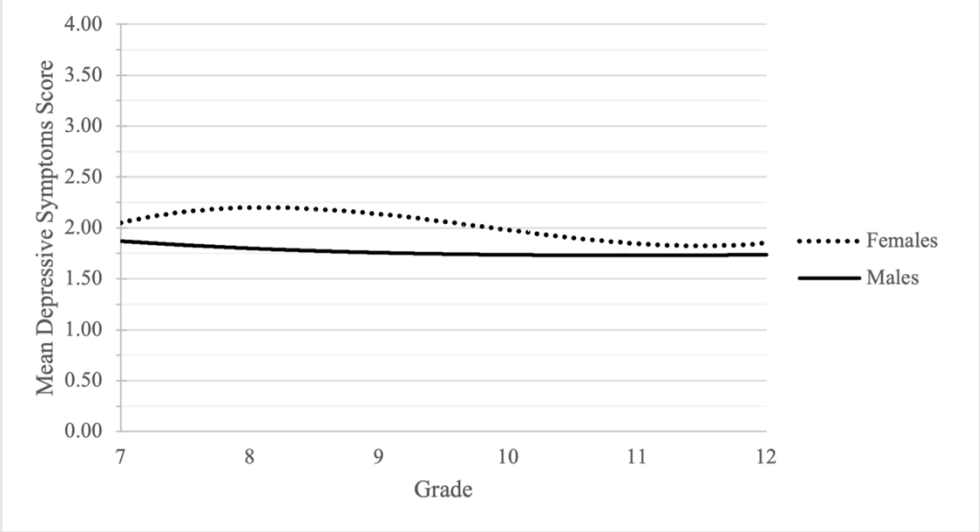


Figure 2

Estimated Mean Levels of Depressive Symptoms



Independent samples t-tests. For both prosocial peers and depressive symptoms, females had a higher estimated mean at all time points. To test whether these differences were significant, all observed means (i.e., means at Grades 7, 8, 9, 10, and 12) were compared in independent-samples t-tests. Results showed significant differences at all points, for both measures. The mean difference on prosocial peers was significant at Grade 7 ($t_{1254.86} = -.45$, $p < .001$), Grade 8 ($t_{1249.85} = -.47$, $p < .001$), Grade 9 ($t_{1204} = -.32$, $p < .001$), Grade 10 ($t_{1315} = -.28$, $p < .001$), and Grade 12 ($t_{1262} = -.13$, $p = .024$). Using Levene's test, equal variances were assumed only at Grades 9, 10, and 12. For depressive symptoms, independent-samples t-tests showed the mean difference was significant at Grade 7 ($t_{1257} = -.18$, $p < .001$), Grade 8 ($t_{1227.30} = -.38$, $p < .001$), Grade 9 ($t_{1175.04} = -.40$, $p < .001$), Grade 10 ($t_{1307} = -.23$, $p < .001$), and Grade 12 ($t_{1787} = -.12$, $p = .002$). Equal variances were assumed only at Grades 7, 10, and 12.

Research Question One (Association) Results

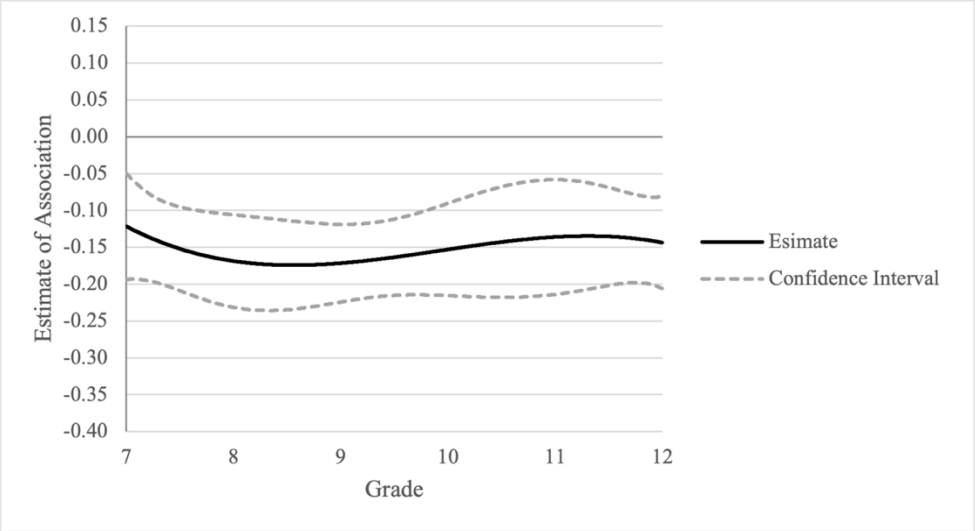
Regarding the first research question *(Is the association between prosocial peers and depressive symptoms negative, both for males and females?)*, Models 1, 2, and 3 were estimated separately by gender and results are presented in detail below. In summary, Model 1 tested the basic association of prosocial peers and depressive symptoms over time with sociodemographic covariates only and showed that the association between prosocial peers and depressive symptoms was negative for both males and females at all time points. Secondary analyses (Models 2 and 3) introduced covariates for previous depressive symptoms. Model 2, which controlled for baseline depressive symptoms, also showed a significant negative association for both males and

females at all age points, though the estimates were slightly weaker than in Model 1. Model 3 showed a significant negative association for females at all time points, but not for males; for males, the association was significant and negative for Grades 7, 8, and 9, but nonsignificant at Grades 10, 11, and 12.

Model one (basic association) results. In this model which estimated depressive symptoms as a function of an intercept, prosocial peers (the focal variable), and covariates of parental education, race, and ethnicity, there was sufficient evidence to reject the null hypothesis (of no significant association between prosocial peers and depressive symptoms). There was a statistically significant negative association across time for both males (estimate range: -.12 to -.17) and females (estimate range: -.22 to -.33). Figures 3 and 4 show the TVEM plots of the estimated association between prosocial peers and depressive symptoms over time, separately by gender. The association was fairly consistent across time for males but undulated for females (i.e., strongest in some of the earlier time points, then weaker, before becoming stronger again approaching Grade 12). The estimated association appeared to be somewhat stronger overall for females versus males, but this was not tested in the model; these estimates were produced separately, so comparisons about moderation of the association by gender are only addressed in the second research question that utilized the pooled sample. Further information on interpreting point estimates is provided following the figures.

Figure 3

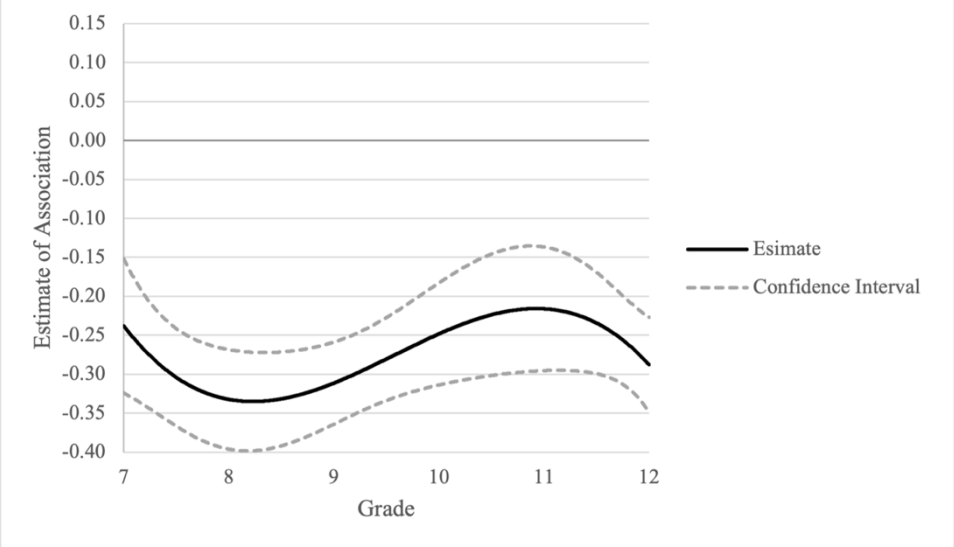
Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Males



Note. Covariates included parental education, race, and ethnicity.

Figure 4

Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Females



Note. Covariates included parental education, race, and ethnicity.

Any given point estimate on the plot can be interpreted as the relative increase or decrease in depressive symptoms for a one-unit increase in prosocial peers. For example, in Figure 4, at the lowest area of the plot between Grades 8 and 9 for females, the point estimate of approximately -0.33 represents that for each one unit increase in prosocial peers (measure range: 0-4) at that time, there is an associated decrease by 0.33 units on the depressive symptoms score (measure range: 1-4). A one-unit increase in prosocial peers for females is approximately equivalent to the average one standard deviation of change on that measure for females (SD_{female} = .93), and it represents an increase of approximately five endorsements of prosocial behavior on the prosocial peers measure. These five endorsements could come from the change of having a closest friend with zero prosocial behaviors now be a friend who does all five while all other friends' information remains constant, or a combination of endorsing an average of 1.25 more prosocial behaviors across each of the four closest friends, etc.

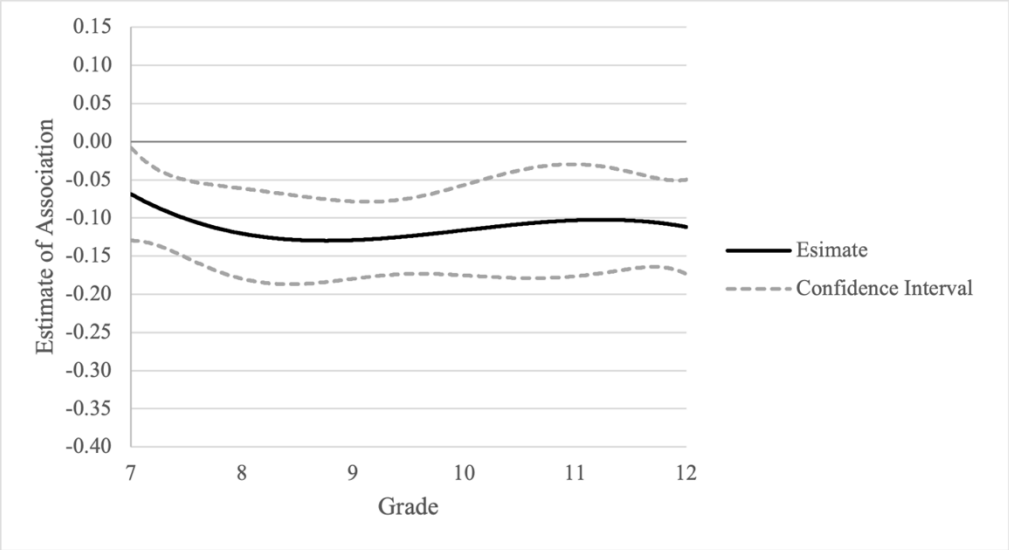
The corresponding decrease in depressive symptoms is equivalent between one-third and one-half of the typical standard deviation for females (.85) on the depressive symptoms measure. In terms of the scale, since each increasing label on the scale contributes .25 to the overall scale score, this decrease translates conservatively to one "less depressive" response to an item; for example, this means on a question such as "I am inclined to think I am a failure" the response would be "little no" instead of "little yes." It could also mean a difference between a "BIG YES!" and "little yes" on a more severe symptom item such as "Sometimes I think that life is not worth it." For

interpretation the male estimates, note the standard deviation for prosocial peers and depression are similar (prosocial peers: SD_{male} = .93; depressive symptoms: SD_{male} = .77).

Model two (association with baseline depressive symptoms) results. The null hypothesis was also rejected in Model 2, which again showed a significant and consistent negative estimate for the prosocial peers and depressive symptoms association for both males and females. The results of Model 2 are shown in Figures 5 and 6. The overall shape of the plotted coefficient estimates was similar to the results from Model 1 (i.e., flat for males, undulating for females). However, controlling for baseline depressive symptoms weakened the value of the estimates. The range of the estimate varied for males between -0.07 to -0.13 (versus -0.12 to -0.17 in Model 1), and for females it was -0.16 to -0.26 (versus -0.22 to -0.33 in Model 1).

Figure 5

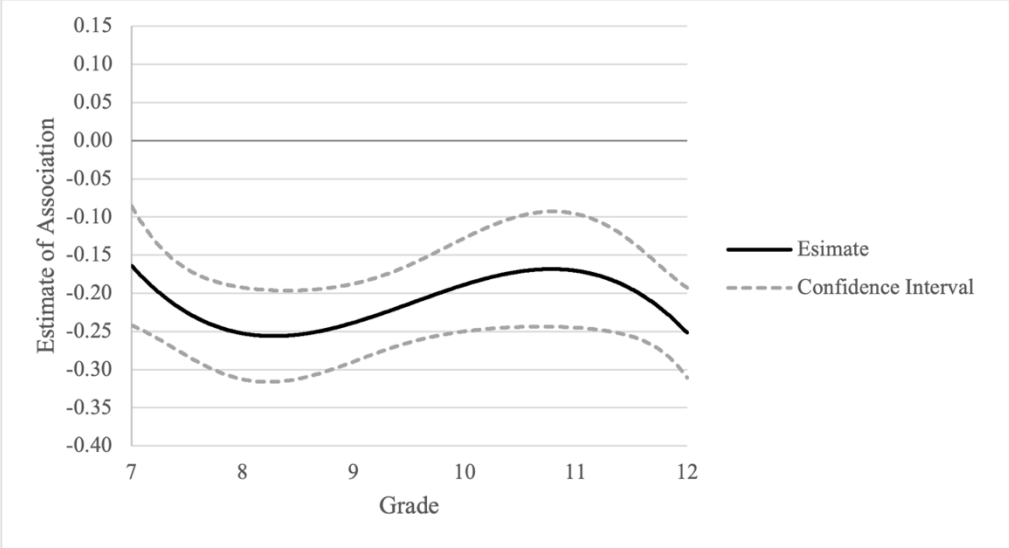
Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Males, Controlling for Baseline Depressive Symptoms



Note. Covariates included parental education, race, ethnicity, and baseline depressive symptoms.

Figure 6

Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Females, Controlling for Baseline Depressive Symptoms



Note. Covariates included parental education, race, ethnicity, and baseline depressive symptoms.

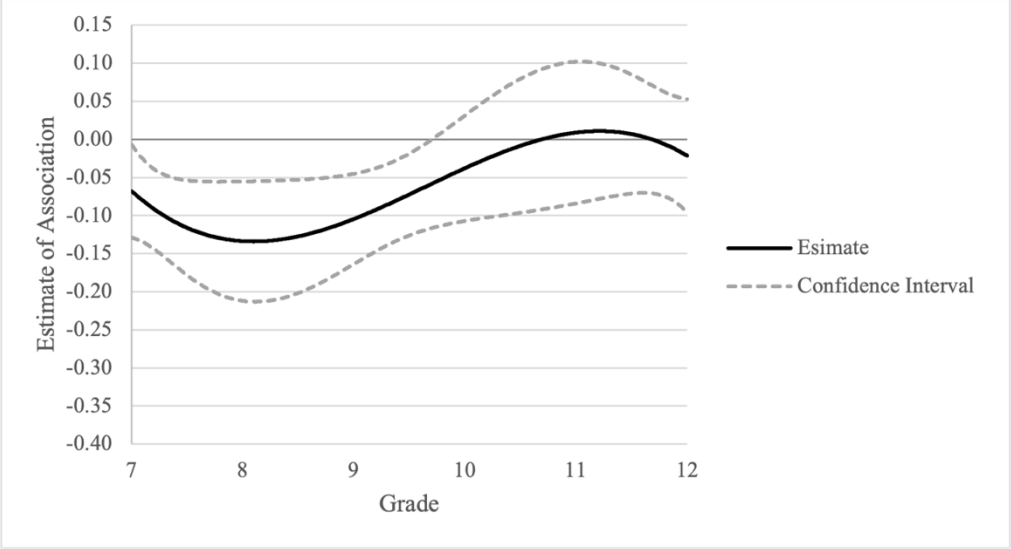
Model three (association with year-prior depressive symptoms) results. Due to the stringent covariate that included the year-prior depressive symptoms at each time point, this model in effect tested the association between prosocial peers and year-to-year differences in depressive symptoms, rather than simply an association between prosocial peers and concurrent depressive symptoms. Overall, when controlling for year-prior depressive symptoms, the association between prosocial peers and depressive symptoms remains significant, and negative, at all points except for males at later time points. Between Grades 9 and 10 for males, the confidence interval begins to overlap with zero

and the estimate remains nonsignificant through Grade 12. The estimate was a significant negative value for females at all time points.

Descriptively, the shapes of these coefficient estimates and their confidence intervals (Figures 7 and 8) changed, with the male estimate now undulating the way the female estimate did (becoming stronger, less strong, and then slightly becoming stronger again), while the female estimate becomes flatter. In terms of the range of the estimate, the estimates overall became less strong. For males it ranged from a low value of -0.13 to a nonsignificant positive value, and for females the estimate ranged from -0.12 to -0.18.

Figure 7

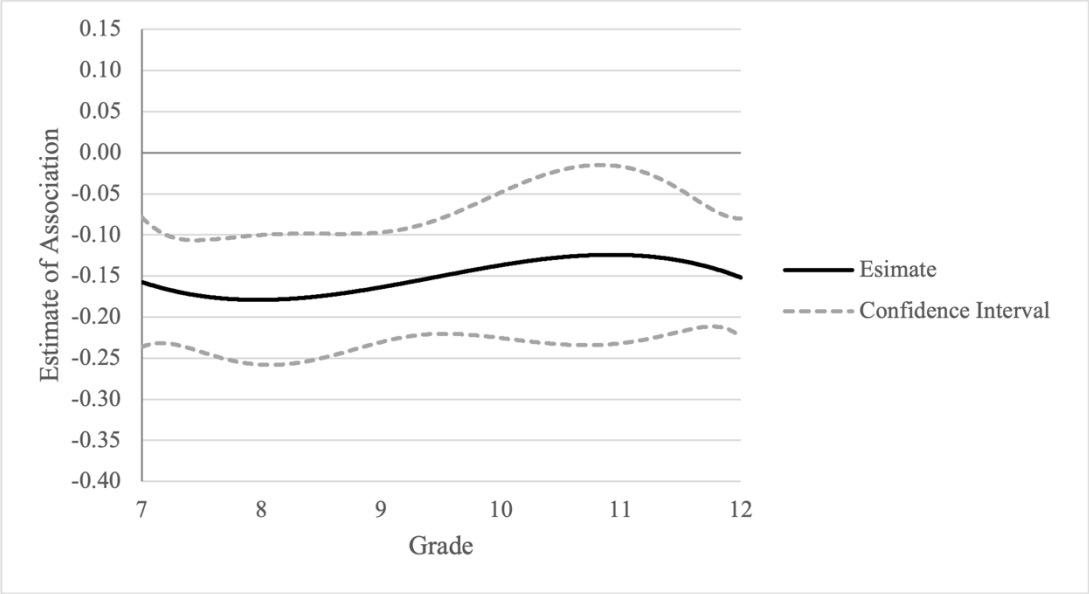
Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Males, Controlling for Year-Prior Depressive Symptoms



Note. Covariates included parental education, race, ethnicity, and year-prior depressive symptoms.

Figure 8

Estimated Coefficient Function for the Association between Prosocial Peers and Depressive Symptoms for Females, Controlling for Year-Prior Depressive Symptoms



Note. Covariates included parental education, race, ethnicity, and year-prior depressive symptoms.

Research Question Two (Moderation) Results

Regarding the second research question *(To what extent does the association between prosocial peers and depressive symptoms differ by gender across developmental time (from Grade 7 to 12)?)*, three interaction models were estimated using the pooled sample: a basic interaction model (Model 4), an interaction model with baseline depressive symptoms (Model 5), and an interaction model with year-prior depressive symptoms (Model 6). The interaction term was tested for significance in order to reject the null (no significant moderation by gender). Gender did appear, as hypothesized, to moderate the association between prosocial peers and depressive symptoms at the time of

transition to high school (Grades 8 and 9) in Models 1 and 2 but not Model 3; however, Grades 8 and 9 were not the only time points where moderation was observed in the various models.

Model four (basic interaction) results. In Model 4, the null (no moderation) was rejected regarding the hypothesis that gender would moderate the association between prosocial peers and depressive symptoms at the time of transition to high school (Grades 8 and 9). The positive and significant prosocial peers *x* gender interaction term at Grade 8 and Grade 9 lends plausibility to the alternative hypothesis that the association between prosocial peers and depressive symptoms was stronger for females than males at this transition; however, the interaction was also significant at other time points beyond what was hypothesized. Discrete time points were examined to determine the significance of the estimate and are listed in Table 3; the interaction term was significant at Grades 7, 8, 9, 10, and 12 and not at Grade 11.

Table 3

Estimates and Confidence Intervals for Interaction Model Predicting Depressive Symptoms, Without Controlling for Previous Depressive Symptoms

	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Intercept [CI]	2.793* [2.525, 3.061]	3.147* [2.946, 3.348]	2.999* [2.825, 3.173]	2.660* [2.461, 2.858]	2.435* [2.203, 2.667]	2.635* [2.441, 2.830]
Prosocial Peers Main Effect [CI]	-0.238* [-0.324, -0.152]	-0.331* [-0.395, -0.268]	-0.310* [-0.362, -0.258]	-0.248* [-0.313, -0.182]	-0.216* [-0.295, -0.136]	-0.287* [-0.348, -0.227]
Gender (Male) Main Effect [CI]	-0.540* [-0.845, -0.235]	-0.868* [-1.100, -0.635]	-0.769* [-0.961, -0.578]	-0.503* [-0.730, -0.277]	-0.322* [-0.602, -0.042]	-0.483* [-0.709, -0.257]
Prosocial Peers *x* Male [CI]	0.116* [0.005, 0.228]	0.162* [0.073, 0.250]	0.138* [0.065, 0.211]	0.094* [0.004, 0.184]	0.080 [-0.031, 0.190]	0.144* [0.057, 0.230]

Note. Covariates included parental education, race, and ethnicity. CI = 95% confidence interval. Male = 1 and Female = 0.

*p < .05

The predicted values from the basic interaction model align closely with the estimates from the original basic association model (Figures 3 and 4 on p. 32). For example, in this basic interaction model, the predicted association between prosocial peers and depressive symptoms at Grade 7 for males (coded "1") is -0.122 and for females (coded "0") is -.238. These values map almost precisely to the plotted coefficient estimates for effects of prosocial peers in the earlier figures (males -.121, females -.238).

Model five (interaction with baseline depressive symptoms) results. When adding baseline depressive symptoms to the model, there was still a significant interaction between prosocial peers and gender in predicting depressive symptoms. This was true at Grades 8 and 9 (transition to high school), as well as Grade 12. The interaction term estimates and confidence intervals are shown in Table 4, below. The predicted values for the effect of prosocial peers were parallel to the association model that controlled for baseline symptoms (plotted in Figures 5 and 7, pp. 34-35).

Table 4

Estimates and Confidence Intervals for Interaction Model Predicting Depressive Symptoms, Controlling for Baseline Depressive Symptoms

	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Intercept [CI]	1.358* [1.080, 1.636]	1.897* [1.666, 2.127]	1.921* [1.718, 2.125]	1.734* [1.509, 1.959]	1.632* [1.369, 1.895]	1.918* [1.689, 2.146]
Prosocial Peers Main Effect [CI]	-0.159* [-0.235, -0.083]	-0.255* [-0.313, -0.196]	-0.240* [-0.289, -0.190]	-0.187* [-0.247, -0.126]	-0.166* [-0.24, -0.093]	-0.252* [-0.310, -0.194]
Gender (Male) Main Effect [CI]	-0.436* [-0.701, -0.171]	-0.737* [-0.951, -0.523]	-0.665* [-0.846, -0.483]	-0.445* [-0.655, -0.235]	-0.300* [-0.559, -0.040]	-0.454* [-0.672, -0.236]
Prosocial Peers *x* Male [CI]	0.088 [-0.009, 0.184]	0.134* [0.053, 0.214]	0.111* [0.042, 0.179]	0.070 [-0.013, 0.153]	0.063 [-0.040, 0.165]	0.140* [0.056, 0.224]

Note. Covariates included parental education, race, ethnicity, and baseline depressive symptoms. CI = 95% confidence interval. Male = 1 and Female = 0.

*p < .05

Model six (interaction with year-prior depressive symptoms) results. This model used the more stringent covariate, controlling for year-prior depressive symptoms and in effect forcing the model to predict year-to-year change in depressive symptoms, rather than simply depressive symptoms at each time point. Results are shown in Table 5. The estimates for the interaction in Model 6, while consistently positive, were only significant at Grades 10, 11, and 12. Regarding the hypothesis about the transition to high school (Grades 8 and 9), it was not possible to reject the null using this model, as the confidence intervals for those estimates included zero. Again, the predicted values from this interaction model of the association between prosocial peers and depressive symptoms are similar to the plotted values in its parallel association model (association with year-prior depressive symptoms, Figures 7 and 8, pp. 36-37).

Table 5

Estimates and Confidence Intervals for Interaction Model Predicting Depressive Symptoms, Controlling for Year-Prior Depressive Symptoms

	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Intercept [CI]	1.414* [1.140, 1.688]	1.467* [1.190, 1.745]	1.361* [1.133, 1.589]	1.224* [0.931, 1.517]	1.183* [0.823, 1.542]	1.365* [1.094, 1.636]
Prosocial Peers Main Effect [CI]	-0.155* [-0.232, -0.079]	-0.180* [-0.256, -0.104]	-0.167* [-0.23, -0.105]	-0.142* [-0.226, -0.058]	-0.128* [-0.231, -0.024]	-0.150* [-0.219, -0.081]
Gender (Male) Main Effect [CI]	-0.431* [-0.695, -0.167]	-0.379* [-0.665, -0.094]	-0.325* [-0.543, -0.107]	-0.281* [-0.552, -0.01]	-0.257 [-0.613, 0.099]	-0.265 [-0.530, 0.00]
Prosocial Peers *x* Male [CI]	0.087 [-0.01, 0.183]	0.048 [-0.059, 0.154]	0.067 [-0.016, 0.149]	0.109* [0.004, 0.213]	0.140* [0.003, 0.276]	0.126* [0.027, 0.225]

Note. Covariates included parental education, race, ethnicity, and year-prior depressive symptoms. CI = 95% confidence interval. Male = 1 and Female = 0.

*p < .05

CHAPTER 6

DISCUSSION

The aim of this study was to estimate the relation between adolescents' levels of prosocial peers and their levels of depressive symptoms, including how this differs over time and by gender. It was expected that (1) prosocial peers and depressive symptoms would have a significant negative association for both males and females throughout Grades 7 to 12, and that (2) the association would be moderated by gender at the time of transition to high school at Grades 8 and 9, wherein the association was hypothesized to be significantly stronger for females. Results showed, overall, prosocial peers did have a negative association with depressive symptoms over time, for both males and females. When controlling for baseline depressive symptoms, this was still the case. When controlling for year-prior depressive symptoms, prosocial peers was no longer significantly associated with depressive symptoms for males across Grades 10 through 12. Results showed that, overall, the association between prosocial peers and depressive symptoms was more strongly negative for females at the time of transition to high school (Grades 8 and 9), but also at Grades 7, 10, and 12. When controlling for baseline depressive symptoms, again it was found that gender moderated the association between prosocial peers and depressive symptoms at the time of transition to high school (Grades 8 and 9), and also at Grade 12. When controlling for year-prior depressive symptoms, gender did not moderate the association at the time of transition to high school, but it did at Grades 10, 11, and 12.

Finding prosocial peers to be negatively associated with depressive symptoms aligned with both the hypotheses and extant literature. For example, this is similar to work from Homel and colleagues (2020) who found that, especially during adolescence, those with friends who engaged in positive activities (i.e., prosocial peers) experienced fewer depressive symptoms. Similar definitions of prosocial peers (i.e., those engaging in activities such as trying to do well in school) were used in a study that found friendships with prosocial peers mediated the positive effects of engaging in extracurricular activities (Fredricks & Eccles, 2005). The negative association is congruent with the social development model (Catalano & Hawkins, 1996; Hawkins & Weis, 1985), which would suggest that affiliating with prosocial peers and bonding with them would result in adoption of healthier norms and ultimately healthier outcomes, including fewer depressive symptoms. The association being strongest at times of transition aligns with the developmental psychopathology perspective and its focus on cognitive vulnerabilities paired with stress (i.e., transition; Abela & Hankin, 2009; Cicchetti & Rogosch, 2002). The gender differences, showing a stronger estimated association for females, may be explained in part by the salience of interpersonal stressors in the context of females' higher affiliative need (Cyranowski et al., 2000).

The secondary analyses that probed the question of possible bidirectionality in the association by controlling for depressive symptoms showed that, while accounting for early depressive symptoms, the association between prosocial peers and depressive symptoms was still negative over time for both genders. From a prevention standpoint, this suggests prosocial peers may be promotive regardless of prior levels of depression,

which is particularly meaningful because literature shows there are likely a number of trajectories for depressive symptoms from early adolescence to later adolescence and into adulthood (e.g., being stable over time, or going from low to high, or high to low; Adkins et al., 2009; Essau et al., 2018; Garber et al., 2002; Shore et al., 2018). Although the estimate of the association became weaker when controlling for baseline depressive symptoms, it is possible that later depressive symptoms may not be due to fewer prosocial peers but having experienced enduringly high depressive symptoms early on in adolescence or in the previous year.

Controlling for year-prior depressive symptoms answered a slightly different question (than controlling for baseline) because it required predicting an association between prosocial peers and year-to-year change in depressive symptoms; this was a highly stringent test given the general stability of depressive symptoms (Tram & Cole, 2006). Even with the strictness, particularly given that depressive symptoms in this community-based sample were generally mild (i.e., as compared to a clinical sample), this suggests that for females that level of prosocial peers could predict year-to-year change in depressive symptoms. For males this was true only in earlier adolescence. There were likely factors not captured by the present study that could explain why the association was not significant for males in the later adolescent years in this most stringent model. For example, in the context of the social development model the prosocial and antisocial pathways are not mutually exclusive (Catalano & Hawkins, 1996); the present study only modeled associations with prosocial peers, but it is possible males may have had higher proportions of antisocial peers or have generally been more

sensitive to antisocial influence. If antisocial or other factors were found to be more highly associated, it is possible that reducing those risks (or increasing different promotive factors) may have a stronger effect in terms of prevention.

Additionally contributing to the strictness of all models was the possibility of increasing stability in peer groups over adolescence; instability is generally higher in early adolescence than childhood, but peer groups become more stable again over the course of adolescence (Poulin & Chan, 2010). Though the stability of friend groups was not specifically examined in the present study, it is possible that the rural context of the sample meant less change of classroom composition which would likely contribute to more friend group stability (Neckerman, 1996).

Gender differences were apparent throughout the study. The estimated association was consistently stronger for females than males, and the moderation analyses showed several points in developmental time when this difference was significant. While this was true at the time of transition to high school (including when controlling for baseline depressive symptoms), it was also significantly stronger for females at Grade 12 across every version of the models (no controls, control for baseline depressive symptoms, and control for year-prior depressive symptoms). There are several possible explanations for why gender moderated the association, both at the time period hypothesized as well as beyond it. It could be that the transition out of high school to another environment or other roles (e.g., workforce, college, military, or other exploration; Arnett, 2007; Eliason et al., 2015; Larose & Boivin, 1998) may be in some ways parallel to the transition into it; thus the anticipation of transition may influence a stronger association at those times

due to the higher affiliative need for females as aligned with the original hypothesis about transition. For many young people, Grade 12 is a time of changes and whether those are changes are positive or negative, they can still increase stress (Folkman, 2008) and stress may contribute to risk for depressive symptoms (Morris et al., 2010). In particular, links to depressive symptoms have been established when adolescents and emerging adults confront failed expectations for their future such as unemployment, unrealized postsecondary education goals, or unplanned parenthood (Feather & Barber, 1983; Mossakowski, 2011; Reynolds & Baird, 2010). The gender difference being pronounced at this time may suggest prosocial peers are more of a promotive factor for females in that stressful context due to the different ways females (vs. males) tend to interact with friends. Specifically, females are more likely than males to use their friendships for problem-solving and social support in early and middle adolescence (Rose et al., 2016; Rose & Rudolph, 2006; Rueger et al., 2008) as well as in emerging adulthood (Martínez-Hernáez et al., 2016) which overlaps with the Grade 12 time point.

The strength of the prosocial peers and depressive symptoms association for females may also be explained by theories of social adversity. This suggests that females are more likely to experience social adversity (an array of stressful life events and circumstances) which places them at greater risk for depressive symptoms (G. W. Brown et al., 1987; Hammen, 2005; Kendler et al., 2001). If social adversity is a primary risk for depressive symptoms, the risk is higher for females, and females are also more likely to use their prosocial friendships for social support, this may explain why the negative association between prosocial peers and depressive symptoms is stronger for females.

This also may explain why the association remains significant for females no matter the covariates, even when controlling for immediate year-prior depressive symptoms. Though use of prosocial peers for problem-solving or social support was not measured explicitly, these are reasonable pathways which may explain the strength of the association for females, in particular.

Limitations and Strengths

The present study examined prosocial peers as a predictor, which is only one piece of the complex ecological context in which adolescents develop. In addition to the prosocial peer context, there is also an antisocial context and myriad other risk factors which can influence depressive symptoms (Saluja et al., 2004). In addition to the peer context, other social contexts can have promotive or protective influences. For example, connectedness to parents or school has been associated with fewer depressive symptoms (Foster et al., 2017). Those contexts can also present increased risk for depressive symptoms; for example, both maternal and paternal depression have been associated with adolescent offspring depressive symptoms in adolescence (Gutierrez-Galve et al., 2019; Hammen & Brennan, 2003). Thus the results from the present study must be contextualized as only one promotive factor amongst many interactive risk, protective, and promotive influences. Some interpretation of the results (e.g., contextualizing results in terms of social support or social adversity) must also be understood as speculative until the different constructs are examined together; for example, future studies examining the association between prosocial peers and depressive symptoms could examine whether a temporal association between the two is mediated by seeking social support.

A primary limitation of the present study was the possibility of bidirectionality of the constructs. Though the covariates were introduced to lend plausibility to levels of prosocial peers temporally predicting levels of depressive symptoms, it is also conceivable that levels of depressive symptoms temporally predict levels of prosocial peers. For example, youth experiencing heightened depressive symptoms may socially withdraw or gravitate toward friendships with those less prosocially involved; however, this may then re-align with the hypotheses if the social withdrawal leads to increased depressive symptoms. Also, the analyses did not address possible other variables such as stress, antisocial peers, or biological etiology for depressive symptoms. It did not measure personal prosocial behavior; however, personal prosocial behavior such as engagement in extracurricular activities has shown benefits to youth mental health via the specific impact of prosocial friendships (Fredricks & Eccles, 2005).

As an additional limitation, the sample was comprised primarily of youth from small-to-medium incorporated towns, which means results might not be generalizable to youth in larger city settings. It is not a representative sample and was drawn from only certain locations in the country (12 communities across seven states). However, because the present study focused on the association between two variables rather than epidemiological prevalence, it is more likely that it could generalize since the fundamental nature of the association is less likely to vary even though prevalence of the variables does. The limited representation of certain racial and ethnic groups also limited the possibility of subgroup analyses based on these characteristics.

In terms of measurement, the scales were brief (four or five items) and thus may not have captured the true variability in the constructs. Additionally, the measure of depressive symptoms focused on primarily cognitive symptoms, some of which are similar to measurement of self-esteem. For example, the Rosenberg Self-Esteem scale (RSE; Rosenberg, 1965) contains two items similar to the present measure: "At times I think I am no good at all" and "All in all, I am inclined to think I am a failure." These measures were also collected not for the purpose of the present analyses, but rather for community-level prevention planning; thus, for example, the depressive symptoms measure does not have the same level of depth as a more intensive and clinically aligned measure for depressive symptoms. For the prosocial peers measure, it is possible that some lower scores on prosocial peers may actually reflect a respondent having fewer close friendships. This means low scores might be due to participants having only one or two close friends, which cannot be determined from the responses alone; regardless of this possibility, low scores did still indicate a lower level of prosocial peers. Last in terms of measurement, gender in the Community Youth Development Study was exclusively binary at the waves utilized in the present study; this was unlikely to have accurately recorded the gender identities of any participant who in later waves of the study identified as nonbinary, transgender, or of another gender identity.

Though the measurement of gender was limited, having a nearly gender-balanced sample allowed for comparisons of associations by gender. This is important when studying internalizing outcomes due to observed gender differences in depressive symptoms over time (Cyranowski et al., 2000; Hankin et al., 2007; Rose & Rudolph,

2006; Shih et al., 2006) and more broadly because the relation between risk and promotive factors, and exposures to risk, can vary between genders (Fagan et al., 2007; Hartman et al., 2009; Walrath et al., 2004). As another strength, the number of time points in the sample covered a broad range of developmental time from Grade 6 at baseline to Grade 12; however, additional time points (i.e., measuring more frequently than once per year) would increase the precision of the TVEM estimates.

Conclusions

Overall, there appears to be a significant negative association between prosocial peers and depressive symptoms over time that is moderated at various points by gender, wherein the association is stronger for females. There are implications for prevention and intervention, as connecting youth with more prosocial peers appears promotive (i.e., encourage development along the prosocial developmental pathway, and lessen the chance of increasing depressive symptoms). The findings also suggest the possibility of differentially targeting by gender and time; for example, the present results suggest early preventative intervention prior to the transition to high school (and possibly again before transitioning out of high school) may be beneficial, because strong early bonding with prosocial peers may be particularly important when approaching times of transition. Because the association was stronger at points for females than males, and there may be more stability in females' peer groups than males' (Poulin & Chan, 2010), this suggests earlier intervention may potentially be particularly beneficial for females. For males, though the negative association was less strong, it is still a potential promotive factor. While other studies examining the most salient risk or protective/promotive factors

regarding depressive symptoms for males may identify other targets for intervention, prosocial peers are still promotive for males and may possibly provide promotion and/or protection regarding outcomes other than depressive symptoms. Intervention may also be promising amongst males given that there is less stability in peer group and perhaps less natural opportunity for prosocial involvement (Catalano et al., 2020), and thus more malleability to intervention. For females, the stronger association between prosocial peers and depressive symptoms and its significance across all grades and at all levels of covariates make a strong case for prosocial peers being particularly promotive for adolescent females.

REFERENCES

Abela, J. R. Z., & Hankin, B. L. (2009). Cognitive vulnerability to depression in children and adolescents: A developmental psychopathology perspective. In S. Nolen-Hoeksema & L. M. Hilt (Eds.), *Handbook of Depression in Adolescents* (pp. 335–376). The Guilford Press. https://doi.org/10.4324/9780203809518

Adkins, D. E., Wang, V., Dupre, M. E., den Oord, E. J. C. G., & Elder Jr, G. H. (2009). Structure and stress: Trajectories of depressive symptoms across adolescence and young adulthood. *Social Forces*, *88*(1), 31–60. https://doi.org/10.1353/sof.0.0238

Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives*, *1*(2), 68–73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

Avenevoli, S., Swendsen, J., He, J.-P., Burstein, M., & Merikangas, K. R. (2015). Major depression in the National Comorbidity Survey-Adolescent Supplement: Prevalence, correlates, and treatment. *Journal of the American Academy of Child and Adolescent Psychiatry*, *54*(1), 37-44.e2. https://doi.org/10.1016/j.jaac.2014.10.010

Bandura, A., & Walters, R. H. (1977). *Social Learning Theory* (Vol. 1). Englewood Cliffs Prentice Hall.

Benner, A. D. (2011). The transition to high school: Current knowledge, future directions. *Educational Psychology Review*, *23*(3), 299–328. https://doi.org/10.1007/s10648-011-9152-0

Brown, E. C., Graham, J. W., Hawkins, J. D., Arthur, M. W., Baldwin, M. M., Oesterle, S., Briney, J. S., Catalano, R. F., & Abbott, R. D. (2009). Design and analysis of the Community Youth Development Study longitudinal cohort sample. *Evaluation Review*, *33*(4), 311–334. https://doi.org/10.1177/0193841x09337356

Brown, G. W., Bifulco, A., & Harris, T. O. (1987). Life events, vulnerability and onset of depression: Some refinements. *The British Journal of Psychiatry*, *150*(1), 30–42. https://doi.org/10.1192/bjp.150.1.30

Catalano, R. F., Fagan, A. A., Gavin, L. E., Greenberg, M. T., Irwin, C. E., Ross, D. A., & Shek, D. T. L. (2012). Worldwide application of prevention science in adolescent health. *The Lancet*, *379*(9826), 1653–1664. https://doi.org/10.1016/s0140-6736(12)60238-4

Catalano, R. F., Haggerty, K. P., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the social development research group. *Journal of School Health*, *74*(7), 252–261.

https://doi.org/10.1111/j.1746-1561.2004.tb08281.x

Catalano, R. F., & Hawkins, J. D. (1996). The social development model: A theory of antisocial behavior. In J. D. Hawkins (Ed.), *Cambridge Criminology Series. Delinquency and Crime: Current Theories.* (pp. 149–197). Cambridge University Press.

Catalano, R. F., Hawkins, J. D., Kosterman, R., Bailey, J. A., Oesterle, S., Cambron, C., & Farrington, D. P. (2020). Applying the social development model in middle childhood to promote healthy development: Effects from primary school through the 30s and across generations. *Journal of Developmental and Life-Course Criminology*, 1–21. https://doi.org/10.1007/s40865-020-00152-6

Chan, A., & Poulin, F. (2009). Monthly instability in early adolescent friendship networks and depressive symptoms. *Social Development*, *18*(1), 1–23. https://doi.org/10.1111/j.1467-9507.2008.00461.x

Cicchetti, D., & Rogosch, F. A. (2002). A developmental psychopathology perspective on adolescence. *Journal of Consulting and Clinical Psychology*, *70*(1), 6–20. https://doi.org/10.1037/0022-006X.70.1.6

Coie, J. D., Miller-Johnson, S., & Bagwell, C. (2000). Prevention Science. In A. J. Sameroff, M. Lewis, & S. M. Miller (Eds.), *Handbook of Developmental Psychopathology* (pp. 93–112). Springer US. https://doi.org/10.1007/978-1-4615-4163-9_6

Cyranowski, J. M., Frank, E., Young, E., & Shear, M. K. (2000). Adolescent onset of the gender difference in lifetime rates of major depression. A theoretical model. *Archives of General Psychiatry*, *57*(1), 21–27. https://doi.org/10.1001/archpsyc.57.1.21

Dierker, L., Braymiller, J., Rose, J., Goodwin, R., & Selya, A. (2018). Nicotine dependence predicts cannabis use disorder symptoms among adolescents and young adults. *Drug and Alcohol Dependence*, *187*, 212–220. https://doi.org/10.1016/j.drugalcdep.2018.02.037

Eccles, J. S., & Roeser, R. W. (2011). Schools as developmental contexts during adolescence. *Journal of Research on Adolescence*, *21*(1), 225–241. https://doi.org/10.1111/j.1532-7795.2010.00725.x

Eliason, S. R., Mortimer, J. T., & Vuolo, M. (2015). The transition to adulthood: Life course structures and subjective perceptions. *Social Psychology Quarterly*, *78*(3), 205–227. https://doi.org/10.1177/0190272515582002

Essau, C. A., Lewinsohn, P. M., Lim, J. X., Ho, M. R., & Rohde, P. (2018). Incidence, recurrence and comorbidity of anxiety disorders in four major developmental stages. *Journal of Affective Disorders*, *228*, 248–253. https://doi.org/10.1016/J.JAD.2017.12.014

Fagan, A. A., Van Horn, M. L., Hawkins, J. D., & Arthur, M. W. (2007). Gender similarities and differences in the association between risk and protective factors and self-reported serious delinquency. *Prevention Science*, *8*(2), 115–124. https://doi.org/10.1007/s11121-006-0062-1

Feather, N. T., & Barber, J. G. (1983). Depressive reactions and unemployment. *Journal of Abnormal Psychology*, *92*(2), 185. https://doi.org/10.1037/0021-843x.92.2.185

Fletcher, J. (2013). Adolescent depression and adult labor market outcomes. *Southern Economic Journal*, *80*(1), 26–49. https://doi.org/10.4284/0038-4038-2011.193

Folkman, S. (2008). The case for positive emotions in the stress process. *Anxiety, Stress, and Coping*, *21*(1), 3–14. https://doi.org/10.1080/10615800701740457

Foster, C. E., Horwitz, A., Thomas, A., Opperman, K., Gipson, P., Burnside, A., Stone, D. M., & King, C. A. (2017). Connectedness to family, school, peers, and community in socially vulnerable adolescents. *Children and Youth Services Review*, *81*, 321–331. https://doi.org/10.1016/j.childyouth.2017.08.011

Fredricks, J. A., & Eccles, J. S. (2005). Developmental benefits of extracurricular involvement: Do peer characteristics mediate the link between activities and youth outcomes? *Journal of Youth and Adolescence*, *34*(6), 507–520.

Garber, J., Keiley, M. K., & Martin, N. C. (2002). Developmental trajectories of adolescents' depressive symptoms: predictors of change. *Journal of Consulting and Clinical Psychology*, *70*(1), 79-95. https://doi.org/10.1037/0022-006x.70.1.79

Ge, X., Conger, R. D., & Elder Jr, G. H. (2001). Pubertal transition, stressful life events, and the emergence of gender differences in adolescent depressive symptoms. *Developmental Psychology*, *37*(3), 404-417/ https://doi.org/10.1037/0012-1649.37.3.404

Glaser, R. R., Horn, M. L. Van, Arthur, M. W., Hawkins, J. D., & Catalano, R. F. (2005). Measurement properties of the Communities That Care®Youth Survey across demographic groups. *Journal of Quantitative Criminology*, *21*(1), 73–102. https://doi.org/10.1007/s10940-004-1788-1

Grazier, K. L. (2019). The economic impact of depression in the workplace. In *Mental Health in the Workplace* (pp. 17–26). Springer. https://doi.org/10.1007/978-3-030-

04266-0_2

Gutierrez-Galve, L., Stein, A., Hanington, L., Heron, J., Lewis, G., O'Farrelly, C., & Ramchandani, P. G. (2019). Association of maternal and paternal depression in the postnatal period with offspring depression at age 18 years. *JAMA Psychiatry*, *76*(3), 290–296. https://doi.org/10.1001/jamapsychiatry.2018.3667

Hammen, C. (2005). Stress and depression. *Annual Review of Clinical Psychology, 1*, 293–319. https://doi.org/10.1146/annurev.clinpsy.1.102803.143938

Hammen, C., & Brennan, P. A. (2003). Severity, chronicity, and timing of maternal depression and risk for adolescent offspring diagnoses in a community sample. *Archives of General Psychiatry*, *60*(3), 253–258. https://doi.org/10.1001/archpsyc.60.3.253

Hankin, B. L., Mermelstein, R., & Roesch, L. (2007). Sex differences in adolescent depression: Stress exposure and reactivity models. *Child Development*, *78*(1), 279–295. https://doi.org/10.1111/j.1467-8624.2007.00997.x

Hartman, J. L., Turner, M. G., Daigle, L. E., Exum, M. L., & Cullen, F. T. (2009). Exploring the gender differences in protective factors: Implications for understanding resiliency. *International Journal of Offender Therapy and Comparative Criminology*, *53*(3), 249–277. https://doi.org/10.1177/0306624x08326910

Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, *112*(1), 64–105. https://doi.org/10.1037/0033-2909.112.1.64

Hawkins, J. D., Guo, J., Hill, K. G., Battin-Pearson, S., & Abbott, R. D. (2001). Long-term effects of the Seattle social development intervention on school bonding trajectories. *Applied Developmental Science*, *5*(4), 225–236. https://doi.org/10.1207/S1532480XADS0504_04

Hawkins, J. D., & Weis, J. G. (1985). The social development model: An integrated approach to delinquency prevention. *Journal of Primary Prevention*, *6*(2), 73–97. https://doi.org/10.4324/9781315094908-1

Hirschi, T. (1969). *Causes of Delinquency.* University of California Press. https://doi.org/10.4324/9781315081649

Holsen, I., Kraft, P., & Vittersø, J. (2000). Stability in depressed mood in adolescence: Results from a 6-year longitudinal panel study. *Journal of Youth and Adolescence*,

29(1), 61–78. https://doi.org/10.1023/a:1005121121721

Homel, J., Thompson, K., & Leadbeater, B. (2020). Changes in positive and negative peer influences and depressive symptoms from adolescence to young adulthood. *Journal of Adolescence*, *84*, 113–122. https://doi.org/10.1016/j.adolescence.2020.08.009

Homman, L. E., Perra, O., Higgins, K., & O'Neill, F. (2019). The longitudinal relationship of alcohol problems and depressive symptoms and the impact of externalising symptoms: Findings from the Belfast Youth Developmental Study. *Social Psychiatry and Psychiatric Epidemiology*, *54*(10), 1231–1241. https://doi.org/10.1007/s00127-019-01696-9

Jones, S. M., McGarrah, M. W., & Kahn, J. (2019). Social and emotional learning: A principled science of human development in context. *Educational Psychologist*, *54*(3), 129–143. https://doi.org/10.1080/00461520.2019.1625776

Keenan-Miller, D., Hammen, C. L., & Brennan, P. A. (2007). Health outcomes related to early adolescent depression. *Journal of Adolescent Health*, *41*(3), 256–262. https://doi.org/https://doi.org/10.1016/j.jadohealth.2007.03.015

Kellam, S. G., & Langevin, D. J. (2003). A framework for understanding "evidence" in prevention research and programs. *Prevention Science*, *4*(3), 137–153. https://doi.org/10.1023/A:1024693321963

Kendler, K. S., Thornton, L. M., & Prescott, C. A. (2001). Gender differences in the rates of exposure to stressful life events and sensitivity to their depressogenic effects. *American Journal of Psychiatry*, *158*(4), 587–593. https://doi.org/10.1176/appi.ajp.158.4.587

Kessler, R. C. (2012). The costs of depression. *Psychiatric Clinics*, *35*(1), 1–14. https://doi.org/10.1016/j.psc.2011.11.005

Kim, B. K. E., Gloppen, K. M., Rhew, I. C., Oesterle, S., & Hawkins, J. D. (2015). Effects of the Communities That Care prevention system on youth reports of protective factors. *Prevention Science*, *16*(5), 652–662. https://doi.org/10.1007/s11121-014-0524-9

Kim, B. K. E., Oesterle, S., Catalano, R. F., & Hawkins, J. D. (2015). Change in protective factors across adolescent development. *Journal of Applied Developmental Psychology*, *40*, 26–37. https://doi.org/10.1016/j.appdev.2015.04.006

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613.

https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Lakdawalla, Z., Hankin, B. L., & Mermelstein, R. (2007). Cognitive theories of depression in children and adolescents: A conceptual and quantitative review. *Clinical Child and Family Psychology Review*, *10*(1), 1–24. https://doi.org/10.1007/s10567-006-0013-1

Lam, C. B., McHale, S. M., & Crouter, A. C. (2014). Time with peers from middle childhood to late adolescence: Developmental course and adjustment correlates. *Child Development*, *85*(4), 1677–1693. https://doi.org/10.1111/cdev.12235

Langenkamp, A. G. (2010). Academic vulnerability and resilience during the transition to high school: The role of social relationships and district context. *Sociology of Education*, *83*(1), 1–19. https://doi.org/10.1177/0038040709356563

Lanza, S. T., Vasilenko, S. A., Liu, X., Li, R., & Piper, M. E. (2014). Advancing the understanding of craving during smoking cessation attempts: A demonstration of the time-varying effect model. *Nicotine and Tobacco Research*, *16*(SUPPL2), 127–134. https://doi.org/10.1093/ntr/ntt128

Lanza, S. T., Vasilenko, S. A., & Russell, M. A. (2016). Time-varying effect modeling to address new questions in behavioral research: Examples in marijuana use. *Psychology of Addictive Behaviors*, *30*(8), 939–954. https://doi.org/10.1037/adb0000208

Larose, S., & Boivin, M. (1998). Attachment to parents, social support expectations, and socioemotional adjustment during the high school-college transition. *Journal of Research on Adolescence*, *8*(1), 1–27. https://doi.org/10.1207/s15327795jra0801_1

Laundra, K. H., Kiger, G., & Bahr, S. J. (2002). A social development model of serious delinquency: Examining gender differences. *Journal of Primary Prevention*, *22*(4), 389–407. https://doi.org/10.1023/A:1015279607215

Leaper, C., & Friedman, C. K. (2007). The Socialization of Gender. In J. E. Grusec & P. D. Hastings (Ed.), *Handbook of socialization: Theory and research* (pp. 561–587). The Guilford Press.

Lee, C. T., Padilla-Walker, L. M., & Memmott-Elison, M. K. (2017). The role of parents and peers on adolescents' prosocial behavior and substance use. *Journal of Social and Personal Relationships*, *34*(7), 1053–1069. https://doi.org/10.1177/0265407516665928

Li, R., Dziak, J. D., Tan, X., Huang, L., Wagner, A. T., & Yang, J. (2017). *TVEM (time-varying effect modeling) SAS macro users' guide (Version 3.1.1). University Park:*

The Methodology Center. http://methodology.psu.edu

Lippman, L. H., Ryberg, R., Terzian, M., Moore, K. A., Humble, J., & McIntosh, H. (2014). Positive and protective factors in adolescent well-being. In A. Ben-Arieh, F. Casas, I. Frønes, & J. Korbin (Eds.), *Handbook of Child Well-being* (pp. 2823–2866). Springer. https://doi.org/10.1007/978-90-481-9063-8_141

Martínez-Hernáez, A., Carceller-Maicas, N., DiGiacomo, S. M., & Ariste, S. (2016). Social support and gender differences in coping with depression among emerging adults: A mixed-methods study. *Child and Adolescent Psychiatry and Mental Health*, *10*(1), 1–11. https://doi.org/10.1186/s13034-015-0088-x

Mason, M., Mennis, J., Mennis, J., Russell, M., Russell, M., Moore, M., Moore, M., Brown, A., & Brown, A. (2019). Adolescent depression and substance use: The protective role of prosocial peer behavior. *Journal of Abnormal Child Psychology*, *47*(6), 1065–1074. https://doi.org/10.1007/s10802-018-0501-z

Mason, W. A., Hawkins, J. D., Kosterman, R., & Catalano, R. F. (2010). Alcohol use disorders and depression: Protective factors in the development of unique versus comorbid outcomes. *Journal of Child & Adolescent Substance Abuse*, *19*(4), 309–323. https://doi.org/10.1080/1067828X.2010.502491

Merikangas, K. R., He, J., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(10), 980–989. https://doi.org/http://dx.doi.org/10.1016/j.jaac.2010.05.017

Monahan, K. C., Oesterle, S., Rhew, I., & Hawkins, J. D. (2014). The relation between risk and protective factors for problem behaviors and depressive symptoms, antisocial behavior, and alcohol use in adolescence. *Journal of Community Psychology*, *42*(5), 621–638. https://doi.org/10.1002/jcop.21642

Morris, M. C., Ciesla, J. A., & Garber, J. (2010). A prospective study of stress autonomy versus stress sensitization in adolescents at varied risk for depression. *Journal of Abnormal Psychology*, *119*(2), 341-354. https://doi.org/10.1037/a0019036

Mossakowski, K. N. (2011). Unfulfilled expectations and symptoms of depression among young adults. *Social Science \& Medicine*, *73*(5), 729–736. https://doi.org/10.1016/j.socscimed.2011.06.021

Narr, R. K., Allen, J. P., Tan, J. S., & Loeb, E. L. (2019). Close friendship strength and broader peer group desirability as differential predictors of adult mental health.

Child Development, *90*(1), 298–313. https://doi.org/10.1111/cdev.12905

Neckerman, H. J. (1996). The stability of social groups in childhood and adolescence: The role of the classroom social environment. *Social Development*, *5*(2), 131–145. https://doi.org/10.1111/j.1467-9507.1996.tb00076.x

Newman, B. M., Newman, P. R., Griffen, S., O Connor, K., & Spas, J. (2007). The relationship of social support to depressive symptoms during the transition to high school. *Adolescence*, *42*(167), 441-459. https://doi.org/10.1080/01612840.2018.1496498

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). McGraw-Hill.

Poulin, F., & Chan, A. (2010). Friendship stability and change in childhood and adolescence. *Developmental Review*, *30*(3), 257–272. https://doi.org/10.1016/j.dr.2009.01.001

Reynolds, J. R., & Baird, C. L. (2010). Is there a downside to shooting for the stars? Unrealized educational expectations and symptoms of depression. *American Sociological Review*, *75*(1), 151–172. https://doi.org/10.1177/0003122409357064

Rhew, I. C., Monahan, K. C., Oesterle, S., & Hawkins, J. D. (2016). The communities that care brief depression scale: Psychometric properties and criterion validity. *Journal of Community Psychology*, *44*(3), 391–398. https://doi.org/10.1002/jcop.21766

Rose, A. J., & Rudolph, K. D. (2006). A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. *Psychological Bulletin*, *132*(1), 98–131. https://doi.org/10.1037/0033-2909.132.1.98

Rose, A. J., Smith, R. L., Glick, G. C., & Schwartz-Mette, R. A. (2016). Girls' and boys' problem talk: Implications for emotional closeness in friendships. *Developmental Psychology*, *52*(4), 629. https://dx.doi.org/10.1037%2Fdev0000096

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press. https://doi.org/10.1515/9781400876136

Rudolph, K. D. (2002). Gender differences in emotional responses to interpersonal stress during adolescence. *Journal of Adolescent Health*, *30*, 3–13. https://doi.org/10.1016/S1054-139X(01)00383-4

Rueger, S. Y., Malecki, C. K., & Demaray, M. K. (2008). Gender differences in the relationship between perceived social support and student adjustment during early

adolescence. *School Psychology Quarterly*, *23*(4), 496. https://doi.org/10.1037/1045-3830.23.4.496

Russell, M. A., Vasilenko, S. A., & Lanza, S. T. (2016). Age-varying links between violence exposure and behavioral, mental, and physical health. *Journal of Adolescent Health*, *59*(2), 189–196. https://doi.org/10.1016/j.jadohealth.2016.03.038

Saluja, G., Iachan, R., Scheidt, P. C., Overpeck, M. D., Sun, W., & Giedd, J. N. (2004). Prevalence of and risk factors for depressive symptoms among young adolescents. *Archives of Pediatrics \& Adolescent Medicine*, *158*(8), 760–765. ttps://doi.org/10.1001/archpedi.158.8.760

Shih, J. H., Eberhart, N. K., Hammen, C. L., & Brennan, P. A. (2006). Differential exposure and reactivity to interpersonal stress predict sex differences in adolescent depression. *Journal of Clinical Child and Adolescent Psychology*, *35*(1), 103–115. https://doi.org/10.1207/s15374424jccp3501_9

Shore, L., Toumbourou, J. W., Lewis, A. J., & Kremer, P. (2018). Longitudinal trajectories of child and adolescent depressive symptoms and their predictors--a systematic review and meta-analysis. *Child and Adolescent Mental Health*, *23*(2), 107–120. https://doi.org/10.1111/camh.12220

Tan, X., Shiyko, M. P., Li, R., Li, Y., & Dierker, L. (2012). A time-varying effect model for intensive longitudinal data. *Psychological Methods*, *17*(1), 61-77. https://doi.org/10.1037/a0025814

Tram, J. M., & Cole, D. A. (2006). A multimethod examination of the stability of depressive symptoms in childhood and adolescence. *Journal of Abnormal Psychology*, *115*(4), 674. https://doi.org/10.1037/0021-843X.115.4.674

Ungar, M., Russell, P., & Connelly, G. (2014). School-based interventions to enhance the resilience of students. *Journal of Educational and Developmental Psychology*, *4*(1), 66–83. https://doi.org/10.5539/jedp.v4n1p66

Uvaas, T., & McKevitt, B. C. (2013). Improving transitions to high school: A review of current research and practice. *Preventing School Failure: Alternative Education for Children and Youth*, *57*(2), 70–76. https://doi.org/10.1080/1045988X.2012.664580

Vasilenko, S. A. (2017). Age-varying associations between nonmarital sexual behavior and depressive symptoms across adolescence and young adulthood. *Developmental Psychology*, *53*(2), 366–378. https://doi.org/10.1037/dev0000229

Vasilenko, S. A., & Lanza, S. T. (2014). Predictors of multiple sexual partners from adolescence through young adulthood. *Journal of Adolescent Health*, *55*(4), 491–

497. https://doi.org/10.1016/j.jadohealth.2013.12.025

Walrath, C., Petras, H., Mandell, D. S., Stephens, R. L., Holden, E. W., & Leaf, P. J. (2004). Gender differences in patterns of risk factors among children receiving mental health services: Latent class analyses. *The Journal of Behavioral Health Services \& Research*, *31*(3), 297–311. https://doi.org/10.1097/00075484-200407000-00006

Wang, M.-T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Development*, *83*(3), 877–895. https://doi.org/10.1111/j.1467-8624.2012.01745.x

Zimmerman, M. A., Stoddard, S. A., Eisman, A. B., Caldwell, C. H., Aiyer, S. M., & Miller, A. (2013). Adolescent resilience: Promotive factors that inform prevention. *Child Development Perspectives*, *7*(4), 215–220. https://doi.org/10.1111/cdep.12042