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The Role of Social Relationships in the Association between Adolescents' Depressive Symptoms and Academic Achievement

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Abstract

While research has established that depression interferes with academic achievement, less is understood about the processes by which social relationships may buffer the relationship between depression and academic outcomes. In this study we examined the role of positive relationships in the school, family and peer contexts in the association between depressive symptoms and academic achievement among 894 adolescents aged 12–17 years living in Santiago, Chile. Depressive symptoms were associated with lower levels of academic achievement; parental monitoring, school belonging, positive mother relationships, and having academically inclined peers moderated this relationship, though some interactions differed by sex and age. Implications for promoting the academic success of adolescents experiencing depressive symptoms are discussed.

Keywords

adolescence; depression; achievement; social support; parent; school; peer

Depression among children and adolescents is one of the most overlooked and undertreated psychological disorders, despite its known devastating impact on academic, social and health outcomes (Cicchetti & Toth, 1998; Herman, Reinke, Parkin, Traylor & Agarwal, 2009). Among adolescents, the point prevalence of Major Depressive Disorder (MDD) ranges from 1% to 27% (see Costello, Erkanli & Angold, 2006 for a review), while the lifetime prevalence of MDD is estimated between 15% and 25% (Kessler, Avenevoli & Merikangas, 2001; Lewinsohn, 1993, 2000). Several studies indicate that symptoms of depression are even more common; between 10% and 49% of adolescents report weekly depressive symptoms with higher levels of depressive symptoms reported among older and female adolescents (Saluja et al., 2004; Scheidt et al., 2000). Such experiences of emotional difficulty during adolescence can interfere with daily functioning, particularly at school (Roeser, Eccles & Strobel, 1998; Shochet et al., 2001; Weist, 1997). As such, adolescents' experience of depressive symptoms represents a pressing social concern.

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The association between depressive symptoms and academic difficulty has been documented among many different populations (e.g. rural U.S. adolescents (Farmer et al., 2009), Chinese adolescents (Li & Zhang, 2008), Finnish adolescents (Pelkonen et al., 2008), Caucasian adolescents (Marcotte, Levesque & Fortin, 2006), diverse, urban youth (Gore & Aseltine, 2003)). Studies find that higher levels of depressive symptoms and loneliness are associated with lower grades and achievement levels (e.g. Fergusson & Woodward, 2002; Frojd et al., 2008; Wampler, Munsch & Adams, 2002). Despite this known relationship between internalizing behaviors like depression and negative academic outcomes, research aimed at discerning factors related to academic difficulty among at-risk youth almost exclusively focuses on externalizing behaviors like truancy and attention problems, largely neglecting examination of protective factors that may mitigate the link between internalizing behaviors and academic difficulty (Reinke & Herman, 2002). Studies that do examine protective factors for academic achievement tend to examine these factors individually without consideration to how these factors may jointly impact academic difficulty (Johnson, McGue & Iacono, 2006) and without thought to whether particular factors might be more salient protective factors in comparison to the others. Further, research aimed at identifying factors that may ameliorate depressive symptoms typically focuses on internal processes that influence depressive symptoms and pays less attention to contextual influences including psychosocial and sociostructural factors (Herman et al., 2009). This study aimed to address this gap in the literature by examining the role that social relationships in different contexts play in the association between depressive symptoms and academic achievement among adolescents.

Importance of social relationships among adolescents

Baumeister and Leary (1995) identify the “need to belong” as a fundamental human motivation crucial to cognitive processes and positive affect. Similarly, Social Determination Theory (SDT; Deci & Ryan, 2000) posits relatedness, a desire for high quality social relationships, as a psychological need central to academic motivation and well-being. Numerous research studies attest to the importance of supportive relationships in the family, school and peer contexts to emotional well-being and academic success, particularly during adolescence (e.g., Han, Grogan-Kaylor, Bares, Ma, Castillo, & Delva, 2012; Woolley & Grogan-Kaylor, 2006). Indeed, Roener, Eccles, and Strobel (1998) posit that the degree to which an environment fulfills individuals' need for relatedness is critical during adolescence when individuals are especially susceptible to poor stage-environment fit.

Within the family context, a positive mother-child relationship has been found to serve as a buffer for depressive symptoms over time (Fanti, Henrich, Brookmeyer & Kuperminc, 2008). Similarly, parental and overall family support are related to lower levels of adolescent depression and more positive affect (Demaray & Malecki, 2002; Kenny, Gallagher, Alvarez-Salvat & Silsby, 2002; Marcotte, Marcotte & Bouffard, 2003). Parental and family support are also related to greater academic orientation, higher grades, greater connection to school and higher overall levels of academic success (Bean, Bush, McKenry & Wilson, 2003; DeGarmo & Martinez, 2006; Kenny et al., 2002; Wentzel, 1998). In keeping with these findings, research also demonstrates that parental monitoring is associated with higher levels of academic success and emotional well-being (Amato & Fowler, 2002; Coley & Hoffman, 1996; Gil-Rivas, Greenberger, Chen & Lopez-Lena, 2003).

Within the school context, research shows that school belonging contributes both to increased academic achievement (Anderman, 2003; Ibanez, Kuperminc, Jurkovic & Perilla, 2004; Sanchez, Colon, & Esparza, 2005) and to lower levels of internalizing behaviors,

depressive symptoms, and feelings of loneliness (Chipuer, 2001; McGraw, Moore, Fuller & Bates, 2008; Ozer, 2005). Teacher support and involvement in the classroom are positively associated with students' sense of school belonging, and also appear to have direct effects on academic engagement and achievement (Brown & Evans, 2002; Faircloth & Hamm, 2005; LaRusso, Romer & Selman, 2008; Roeser, Eccles & Sameroff, 1998). Lower levels of teacher support are also associated with higher levels of depressive symptoms (Colarossi & Eccles, 2003; Demaray & Malecki, 2002; Reddy, Rhodes & Mulhall, 2003; Way, Reddy & Rhodes, 2007).

Within the peer context, lower levels of peer harassment and rejection are associated with higher levels of academic achievement (Eisenberg, Neumark-Sztainer, & Perry, 2003; French & Conrad, 2001). In addition, lower levels of peer victimization, higher levels of peer acceptance and having more friends are associated with fewer depressive and internalizing symptoms (Bauman, 2008; Klima & Repetti, 2008; Schwartz, Gorman, Duong & Nakamoto, 2008). Higher levels of peer support are also associated with lower levels of depressive symptoms (Klima & Repetti, 2008; Way & Chen, 2000).

As they transition through adolescence, there is some evidence that youth may experience decreasing levels of social support (DeWit, Karioja, Rye & Shain, 2011; Way, Reddy & Rhodes, 2007) and increasing levels of depressive symptoms (Kessler, Avenevoli, & Merikangas, 2001; Scheidt et al., 2000). However, there are differences between males and females as well as young and older adolescents that need to be taken into consideration. Although social support is particularly salient for adolescent females (Goodenow & Grady, 1993; Reddy et al., 2003; Schraedley, Gotlib & Hayward, 1999), this does not mean that social relationships are not important for males. In fact, DeWit and colleagues (2011) found that adolescent boys showed a steeper decline in peer support compared to females following the transition to high school, and that this decline was associated with depression. With regard to age, Young, Berenson, Cohen & Garcia (2005) noted a stronger association between peer support and emotional well-being among older versus younger adolescents. Collectively, these findings suggest that it is important to include sex and age when investigating the role of social relationships in the association between depression and academic achievement.

Current Study

Although the importance of supportive relationships in the family, school and peer contexts to adolescents' emotional well-being and academic success has been documented by many studies, few studies have examined the protective role of these social relationships in the association *between* depressive symptoms and academic achievement or have simultaneously compared the role of social relationships from several *different* contexts. Notably, Stice, Ragan & Randall (2004) find that while depression contributes to lower levels of peer support during adolescence, parental support seems to decrease the risk for depression, suggesting that the extent to which social relationships may moderate the relationship between depressive symptoms and academic achievement may vary by context. Due to known sex and age differences in the association between social relationships and both academic achievement and depressive symptoms during adolescence, it is also important to consider whether the protective role of social relationships may vary by age or sex. Finally, given numerous studies pointing to the fact that lower socioeconomic status (SES) is associated with higher levels of depressive symptoms (e.g. Goodman, 1999; Lorant et al., 2003), SES was controlled for in all analyses.

Based on a socio-ecological framework (Bronfenbrenner, 1989) and a strengths-based approach (Cowger & Snively, 2001; Miley, O'Melia & DuBois, 2004), this study sought to

elucidate whether positive relationships and social supports within the family, school and peer contexts may serve as protective factors in the association between depressive symptoms and academic difficulty. This study adds to previous research by considering the influence of social relationships across multiple developmental contexts and how these factors may individually or jointly serve as protective factors in the relationship between depressive symptoms and academic difficulty. Based on previous research, we predict that depressive symptoms will be associated with lower levels of academic achievement. We further expect that positive relationships and social supports in the family, school and peer contexts will moderate the relationship between depressive symptoms and academic achievement. We also anticipate that sex and age may further moderate the observed moderation effects of social relationships on the association between depressive symptoms and academic achievement.

Method

Sample

Data are from an ongoing study funded by the National Institute on Drug Abuse conducted in Santiago Chile with 894 adolescents 12-17 years old ($M = 14.4$ years, 48% female) from municipalities of mid-to-low-SES. The entire Santiago Longitudinal Study (SLS) sample consists of 1068 adolescents and their primary caregiver. 104 adolescents were excluded from analysis because they did not have a father present in their lives and the current analyses included data on father-adolescent relationships. An additional 68 participants were not included in the analyses because they had missing data on one or more study variables. There were no statistically significant differences in the participants' age, gender or socioeconomic status between the analysis and study samples.

Procedure

From 2007-2010, youth completed Wave 1 assessments consisting of a 2-hr interviewer-administered questionnaire with comprehensive questions on demographics, mental health, academic outcomes, family, school and peer characteristics. Surveys were administered at the University of Chile's Institute of Nutrition and Food Technology (Instituto de Nutrición y Tecnología de los Alimentos, INTA) by Chilean psychologists trained in the administration of standardized measurements. Some of the questionnaire items were derived from instruments already used in Chile. Items derived from English language instruments were translated and back translated, reviewed and modified by the research teams Chile and the U.S. Prior to beginning the study, all items were pilot-tested to ensure language and conceptual equivalency. The study was approved by the institutional review boards at both collaborating institutions.

Measures

Academic achievement—Academic achievement was measured with a mean score of four questions from the Child Behavior Checklist Youth Self-Report (CBCL-YSR) asking youth to indicate how well they performed in each of four academic subjects (Spanish/ Language Arts, History/Social Studies, Arithmetic/Math, Science). Response options ranged from 1 (*mostly Ds and Fs*) to 4 (*mostly As*). Scores ranged from 0 to 4 with higher scores indicating higher levels of achievement. Cronbach's alpha (α) was 0.70 for our sample.

Depressive symptoms—The CBCL-YSR was also used to assess adolescents' depressive symptoms using both the withdrawn/depressed and anxious/depressed behavior scales (Achenbach & Rescorla, 2001). Exploratory factor analyses were conducted to establish whether these scales accurately captured depressive symptoms within a Chilean population. Results supported the use of seven items drawn from both scales to most

accurately capture depressive symptoms (for details see Granillo, Grogan-Kaylor, Delva, and Castillo, 2011). The measure asked youth to indicate how true each of seven items was during the past six months. Response options are 0 (*not true*), 1 (*somewhat or sometimes true*) or 2 (*very true or often true*). Example items are, “I am unhappy, sad, or depressed,” “I feel worthless or inferior” and “I cry a lot.” Higher scores indicate more depressive symptoms ($\alpha = 0.71$).

School belonging—Eight items assessed adolescents' sense of school belonging. Adolescents indicated how strongly they agreed with statements like, “I am happy to be at my school,” “I feel close to others at my school,” “I feel safe at my school,” and “I feel like I am a part of my school.” Response options ranged from 1 (*not true at all*) to 4 (*very true*). Items were averaged to create a composite score with higher scores indicating more school belonging ($\alpha = 0.80$).

Relationship with teacher—Quality of relationship with teachers was assessed by 2 items: “My teachers treat me fairly” and “The teachers at my school treat students fairly.” Response options ranged from 1 (*not true at all*) to 4 (*very true*). Items were summed to create a composite score with higher scores indicating higher quality relationships with teachers ($\alpha = 0.73$).

Parental monitoring—Ten items assessed parental monitoring (NICHD, 2008). Sample items included, “How often would your mom/dad or guardian know if you came home an hour late on weekends?” “How often do you check in with your mom/dad or guardian after school, before going to hang out with friends?” and “How often, before you go out, do you tell your mom/dad or guardian when you will be back?” Response options ranged from 1 (*all of the time*) to 5 (*never*). A composite score was created by reverse coding and averaging the responses to the 10 questions with higher scores representing more parental monitoring ($\alpha = 0.66$).

Relationship with mother and father—Quality of the relationship with mother ($\alpha = 0.89$) and father ($\alpha = 0.89$) were assessed separately with 17 items each. Sample items include, “How often does your _ (father/mother)... let you know he/she really cares about you?” “listen carefully to your point of view?” “get angry at you?” and “insult or swear at you?” Response categories also ranged from 1 (*never*) to 4 (*always*). Higher scores indicated a more positive parent-adolescent relationship.

Relationship with peers—Two different measures were used to assess adolescents' relationship with their peers. In the first measure, youth answered four questions indicating whether the youth they spend time with were academically inclined ($\alpha = 0.62$). Sample items included, “They work hard at school,” “They do well in school,” and “They are respectful of teachers.” Response options ranged from 1 = *None of them* to 4 = *All of them*. Higher scores indicate more academically inclined peers. In the second measure, adolescents answered eight questions indicating whether peers engaged in acting out behavior at school ($\alpha = 0.74$). Sample items included, “They get into a lot of trouble at school,” “They cheat on tests,” and “They dislike school.” Response options ranged from 1 (*none of them*) to 4 (*all of them*). Higher scores indicated more peers that act out at school.

Demographic variables—Age, sex, and parent report of their family's socioeconomic status (SES) were included as demographic controls. Recent studies have cautioned against the use of single proxy variables in assessing SES (e.g. Braveman et al., 2005). Based on this research and studies calling for the use of composite measures of SES for Chilean samples (Alvarez, Wurgaft, & Salazar, 1982; Graffar, 1956), the family SES scale for this

study was created using a composite of information on family income, mother education, father education, and parent occupational status completed by the parent who brought the adolescent to the Wave 1 assessment. Scores ranged from -9.20 to 12.6 with higher scores representing higher SES

Analytic strategy—The data were analyzed in three stages. All analyses were conducted with STATA 10.0 (StataCorp, 2008). First, multivariate OLS regression analysis was conducted to examine the association between depressive symptoms and academic achievement. Analyses controlled for sex, age and SES. All variables were then centered and interaction terms between depressive symptoms and relationship measures were created to examine whether social relationships moderated the association between depressive symptoms and academic achievement. In the second set of analyses, three-way interactions adding sex to previous interaction terms and the association of these interactions with academic achievement were tested. In the third set of analyses, three-way interactions between age, social relationships and depressive symptoms were examined. Due to the calculation of interaction terms, all independent variables were standardized for analyses.

Results

Descriptive statistics for all study variables are provided in Table 1. Multivariate regression analyses revealed that, when controlling for sex, age and SES, having depressive symptoms was inversely associated with academic achievement ($\beta = -.15$, $p < .001$).

Two-way interactions with social relationships

Next, positive relationships in the school, family and peer contexts were examined as moderators in the relationship between depressive symptoms and academic achievement (see Figure 1). Results for all moderation analyses are presented in Table 3. Analyses revealed a significant interaction effect for parental monitoring ($\beta = -.08$, $p < .05$). Specifically, at low levels of depressive symptoms, parental monitoring was protective for academic achievement. However, for adolescents with high levels of depressive symptoms, regardless of the amount of parental monitoring levels of achievement remained low (see Figure 2). There were no significant interactions between depressive symptoms and school belonging, teacher support, mother relationship, father relationships or peer relationships.

Three-way interactions with sex

In testing three-way interactions adding sex to the previous two-way interactions between supportive relationships and depressive symptoms, results indicated significant interactions between depressive symptoms, mother relationship and sex ($\beta = .18$, $p < .05$). There was also evidence of a three-way interaction between depressive symptoms, academic peers and sex ($\beta = -.09$, $p < .01$). For male adolescents, at high levels of depressive symptoms a more positive relationship with mother and having more academically inclined peers was associated with lower academic achievement. However, at low levels of depressive symptoms a more positive relationship with mother and having more academically inclined peers was associated with higher academic achievement (Figures 3-4). Simple slope (ss) analyses (Holmbeck, 2002) indicated that for males and females, having a positive relationship with mother ($ss = -.04$, $p = .42$; $ss = -.05$, $p = .13$; respectively) and having more academically inclined peers ($ss = -.01$, $p = .82$; $ss = -.04$, $p = .23$; respectively), and for females, having a less positive relationship with mother ($ss = -.01$, $p = .82$) and more academically inclined peers ($ss = -.01$, $p = .70$) were all similarly related to academic achievement (intercept range: 2.92 to 3.00) at both high and low levels of depressive symptoms, revealing that the interaction effect was significant only for males with a negative mother relationship or less academically inclined peers.

Three-way interactions with age

Analyses that examined the 3-way interaction between age, social relationships and depressive symptoms revealed significant interactions between depressive symptoms, mother relationship and age ($\beta=.08$, $p<.05$), as well as between depressive symptoms, school belonging and age ($\beta=-.08$, $p<.05$). For younger adolescents, at lower levels of depressive symptoms a more positive relationship with mother was associated with higher academic achievement, while at higher levels of depressive symptoms, a more positive relationship with mother was associated with lower academic achievement (Figure 5). For older and younger adolescents, having a more negative relationship with mother ($ss=-.03$, $p=.40$; $ss=-.02$, $p=.72$; respectively), and for older adolescents having a positive relationship with mother ($ss=.01$, $p=.831$), were related to similar levels of academic achievement at both high and low levels of depressive symptoms (intercept range: 2.96 to 2.98). With respect to school belonging, for younger adolescents, low school belonging was a risk factors for low levels of achievement at higher levels of depressive symptoms. For younger adolescents with lower levels of depressive symptoms, both high and low levels of school belonging were associated with approximately equally high levels of achievement (intercepts=3.13, 3.10, respectively). In contrast, for older adolescents, a higher level of school belonging was associated with a higher level of achievement irrespective of level of depressive symptoms ($ss=-.04$, $p=.316$; intercept=3.09), while lower levels of school belonging associated with lower levels of achievement at both high and low of levels of depression ($ss=-.02$, $p=.60$; intercept=2.84) (Figure 6).

Discussion

This study builds upon previous research indicating an association between depressive symptoms and academic achievement among adolescents (e.g. Fergusson & Woodward, 2002; Frojd et al., 2008; Wampler, Munsch & Adams, 2002) by examining the moderating role that social relationships play in this association and whether these roles differ by age and sex. An important contribution of this study is the investigation of these social relationships within the broader framework of adolescents' lives through simultaneous examination of relationships in the school, family and peer contexts. Consistent with previous studies, we found that adolescents displaying depressive symptoms were less likely to do well in school. Additionally, this study found that social relationships in the family, school, and peer context do, indeed, play a moderating role in the association between depressive symptoms and academic achievement. Results further suggest that the role of these social relationships differs according to the severity of depressive symptoms, age and sex of adolescents. These findings emphasize the importance of addressing adolescents' mental health in efforts to promote positive educational outcomes. Given the importance of social relationships during adolescence and the fact that adolescents displaying depressive symptoms are unlikely to seek mental health services at school (Weist et al., 1995), interventions that focus on addressing social relationships may be more appealing to adolescents. As such, findings from this study have important implications for interventions for adolescents with depressive symptoms, who are often at-risk for poor academic achievement.

In examining whether social relationships attenuated the association between depressive symptoms and academic success, we found that parental monitoring was more protective at lower levels of depressive symptoms. This result indicates that while parental monitoring may be protective for academic achievement, it is less protective in the context of higher levels of depressive symptoms suggesting that certain parenting behaviors may be a less effective target for interventions aimed at improving the academic outcomes of adolescents suffering from depressive symptomatology.

Investigation of the role of social relationships as moderators of the association between depressive symptoms and academic achievement revealed that the protective effects of social relationships varied by sex and age. We found that for males and younger adolescents experiencing higher levels of depressive symptoms, a more positive relationship with mother was associated with lower academic achievement while a less positive relationship with mother was associated with higher academic achievement. While this finding may seem counterintuitive, it is possible that the finding that less positive parenting was related to higher levels of achievement among depressed adolescents reflects adolescents' perception of parenting rather than actual parenting behavior. For example, it is possible that a mother who is more lenient with an adolescent displaying depressive symptomatology may be viewed more positively by this adolescent, but that this leniency may result in lower levels of achievement. On the other hand, a mother who pushes a depressed adolescent to engage in school work may be viewed more negatively by this adolescent, although such 'negative' parenting may actually be protective for achievement levels.

Among males, we also found that at higher levels of depressive symptoms, having more academically inclined peers was associated with lower levels of academic achievement while having less academically inclined peers was associated with higher levels of academic achievement. Of note, males with less academically inclined peers experience similar levels achievement regardless of depressive symptoms. While one might assume that having academically inclined peers would be protective for academic achievement, it is possible that males with higher levels of depressive symptoms are more likely to suffer from social comparison and either view their peers as more academically inclined or view their school performance as inadequate. It is also possible that males experiencing academic difficulty who also have more academically inclined peers are more likely to experience depressive symptoms.

In contrast to some previous research we found that SES was not associated with our outcome of interest. These findings may be somewhat surprising given the existence of research from other contexts demonstrating a relationship between measures of income or socio-economic status and academic success (Eamon, 2005; Long, 2007; NCES, 2009). However, it is worth remembering that our sample is entirely a sample of mid- to low- SES families and thus the variability in this sample around SES is relatively constrained. Other research with representation from all levels of SES in Chile may well find relationships between SES and academic success.

Future studies should investigate the longitudinal association between peer relationships, depressive symptomatology and academic difficulty to further elucidate the relationships observed in this study. Given that interactions between mother and peer relationships were found for males, but not females, future research should also examine the mechanisms through which relationships may serve as protective factors for males versus females experiencing depressive symptoms.

Investigation of three-way interactions also revealed that among younger adolescents experiencing high levels of depressive symptoms, lower levels of school belonging were related to lower levels of achievement. In contrast, among younger adolescents with lower levels of depressive symptoms, both high and low levels of school belonging were associated with approximately equally high levels of achievement. These results suggest that while high levels of belonging may not be protective for younger adolescents, experiencing low levels of school belonging may be harmful, putting young adolescents at increased risk for academic difficulty. In contrast, for older adolescents, school belonging was equally protective for academic achievement at low and high levels of depressive symptoms. These outcomes suggest that while school belonging may not attenuate the relationship between

depressive symptoms and academic achievement, school belonging remains a protective factor regardless of symptom severity for older youth and a lack of school belonging may be particularly detrimental to younger adolescents.

As with all research efforts, this study has several limitations. Because this is a cross-sectional study, the causal direction of observed relationships cannot be established. For example, it is possible that parents who engage in more parental monitoring are more likely to be involved in their children's academic lives. This, may, in turn, cause their children to experience more academic success which may lead to lower levels of depressive symptoms. Future research in this area will benefit from the availability of longitudinal data that can begin to disentangle some of the causal ordering of variables. Secondly, reliance on self-report survey measures may inflate some of these associations because of shared-methods variance. Future studies would greatly benefit from multi-informant, multi-method data to address this limitation. Lastly, this study was conducted with a community-based sample of mid-to-low SES adolescents living in Santiago, Chile. While the uniqueness of this sample may be viewed as a strength of this study, it also limits the generalizability of study findings. Additional research should be conducted with other samples of adolescents in order to create the most diverse knowledge base possible from which effective intervention strategies to combat academic difficulty among adolescents may be created.

Despite these limitations, it is evident that adolescents experiencing depressive symptoms are at particular risk for academic difficulty. Interventions aimed at improving adolescents' sense of school belonging or increasing parental monitoring may offer some help, but may not sufficiently address the needs of students who display depressive symptoms. Given that depressed students are less likely to be readily identified as at-risk by school personnel than students exhibiting externalizing behaviors (e.g. aggression, truancy), further research is needed to understand how best to support the academic success of these adolescents who are generally invisible in the school system. By gaining a better understanding of the developmental contexts, risk and protective factors and individual processes that help to explain the relationship between internalizing behaviors and academic outcomes, schools and communities will be better equipped to provide services and resources to those youth suffering from depressive symptomatology.

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Highlights

- We examine the relation between depression and school achievement among Chilean youth
- Social relations in school, family and peer contexts are tested as protective factors
- Mother relationship and school belonging *moderate* the association for younger youth
- Mother relationship and academically inclined peers *moderate* the association for boys

Figure 1. Hypothesized Moderation Models

Figure 2. Two-way interaction of depressive symptoms and parental monitoring predicting academic achievement

Figure 3. Three-way interaction of depressive symptoms, mother relationship and sex predicting academic achievement

Figure 4. Three-way interaction of depressive symptoms, academic peers and sex predicting academic achievement

Figure 5. Three-way interaction of depressive symptoms, mother relationship and age predicting academic achievement

Figure 6. Three-way interaction of depressive symptoms, school belonging and age predicting academic achievement

Table 1**Descriptive Statistics**

Variable	Mean	SD	Percent
Female	--	--	48%
Age	14.4	1.48	
SES	0.15	2.74	
Academic Achievement	2.96	0.56	
Depressive symptoms (DS)	0.33	0.31	
School belonging	3.28	0.43	
Teacher support	3.22	0.58	
Parental monitoring	3.96	0.74	
Relationship with mother	3.27	0.49	
Relationship with father	3.21	0.53	
Peers – acad. oriented	2.94	0.67	
Peers – acting out	2.23	0.65	

Table 2
Two-Way and Three-Way Interaction Terms Predicting Academic Achievement

Variables	Social Relationships * Depressive Symptoms Full 2-way Model		Social Relationships * Depressive Symptoms * Sex Full 3-way Model		Social Relationships * Depressive Symptoms * Age Full 3-way Model	
	B	SE	B	SE	B	SE
Predictors and Controls						
Sex (1=M, 2=F)	-0.02	0.07	0.07	0.07	-0.02	0.07
Age	0.01	0.03	0.00	0.03	0.02	0.04
SES	-0.04	0.03	-0.04	0.03	-0.05	0.03
Depressive symptoms (DS)	-0.08	0.04*	-0.21	0.07**	-0.09	0.04*
School belonging	0.22	0.04***	0.19	0.06**	0.23	0.04***
Teacher support	0.01	0.04	0.06	0.05	0.01	0.04
Parental monitoring	0.12	0.04**	0.08	0.05	0.12	0.04**
Relationship with mother	0.02	0.04	0.02	0.06	0.00	0.04
Relationship with father	0.00	0.04	-0.04	0.06	0.01	0.04
Peers – acad. oriented	-0.02	0.04	-0.15	0.06**	-0.05	0.04
Peers – acting out	-0.06	0.04	-0.09	0.05	-0.02	0.04
2-Way Interaction Terms						
School belonging * DS	0.02	0.04	0.08	0.07	0.03	0.04
Teacher support * DS	-0.01	0.04	-0.05	0.06	-0.01	0.04
Parental monitoring * DS	-0.08	0.03*	-0.13	0.07	-0.08	0.04*
Rel. with mother * DS	0.00	0.03	-0.14	0.07*	-0.04	0.04
Rel. with father * DS	0.01	0.03	0.04	0.06	0.03	0.03
Peers – acad. oriented * DS	-0.01	0.04	-0.19	0.07**	-0.01	0.03
Peers – acting out * DS	-0.03	0.03	-0.07	0.06	0.00	0.04
Depressive symptoms * sex/age			0.17	0.08*	0.07	0.04
School belonging * sex/age			0.08	0.08	0.00	0.04
Teacher support * sex/age			-0.12	0.08	0.04	0.04
Parental monitoring * sex/age			0.04	0.08	-0.04	0.04
Rel. with mother * sex/age			-0.05	0.09	0.02	0.04
Rel. with father * sex/age			0.07	0.08	0.00	0.04

Variables	Social Relationships * Depressive Symptoms Full 2-way Model		Social Relationships * Depressive Symptoms * Sex Full 3-way Model		Social Relationships * Depressive Symptoms * Age Full 3-way Model	
	B	SE	B	SE	B	SE
Peers – acad. oriented * sex/age			0.17	0.08*	-0.04	0.04
Peers – acting out * sex/age			0.04	0.07	-0.01	0.04
3-Way Interaction Terms						
School belonging * DS * sex/age			-0.10	0.08	-0.08	0.04*
Teacher support * DS * sex/age			0.08	0.08	-0.01	0.04
Parental monitoring * DS * sex/age			0.05	0.08	0.01	0.04
Rel. with mother * DS * sex/age			0.18	0.08*	0.08	0.04*
Rel. with father * DS * sex/age			-0.04	0.08	-0.02	0.04
Peers – acad. oriented * DS * sex/age			-0.09	0.05**	-0.04	0.04
Peers – acting out * DS * sex/age			0.05	0.07	0.00	0.04

p<001,

**
p<01,

*
p<05