Associations between Social Support from Family, Friends, and Teachers and Depressive Symptoms in
Adolescents

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Abstract

Approximately 20% of adolescents develop depressive symptoms. Family, friends, and teachers are crucial sources of social support for adolescents, but it is unclear whether social support impacts adolescents directly (principle-effect model) or by moderating the effect of stress (stress-buffer model) and whether each source of social support remains meaningful when their influence is studied simultaneously. To help fill this gap, we followed 1,452 Australian students (average age at enrollment = 13.1, $SD = 0.5$; range: 11-16 years; 51.9% female) for five years. Based on our findings, each source of support is negatively related to depressive symptoms one year later when studied independently but when combined, only family and teacher support predicted depressive symptoms. Family support in all grades and teacher support in grade 8 to 10 but not in grade 11 directly impacted adolescent depressive symptoms one year later. Family support in grades 8 and 11 also buffered against the negative impact of stress on depressive symptoms one year later. Based on the unexpected findings, the most important limitations seem to be that the used instruments do not allow for a separation of different groups of friends (e.g., classmates, same-gender peers, romantic partners), types of social support, and stress. In addition, the high, nonrandom attrition rate with adolescents reporting less social support, more stressful events, a higher frequency of depressive symptoms, and/or being of Torres Strait Islander or Aboriginal background limits the generalizability of our findings. Summarized, our findings demonstrate that adolescents facing stress might benefit more from family support compared to their peers without stressful life events and that friends may have a weaker presence in adolescent lives than expected.

Keywords: Social support by family, friends, and teachers; Depression; High school students

Introduction

Previous research has shown that approximately 20% of girls and 7% of boys develop depressive symptoms before the end of their adolescent years (Angold, Erkanli, Silberg, Eaves & Costello, 2002; Twenge & Nolen-Hoeksema, 2002), resulting in a total treatment cost of \$5 billion in the U.S. in 2013 alone (Bui et al., 2017). Adolescents who experience subsyndromal or major depression have an increased risk for developing major depressive disorders in adulthood (Patel, Flisher, Hetrick, & McGorry, 2007). In fact, about 27% of individuals experience their first major depressive episode during childhood or adolescence (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Empirical findings suggest that adolescent depressive symptoms are associated with interpersonal distress, low self-efficacy, suicidality (Stewart et al., 2002), social and behavioral problems (McClure, Rogeness, & Thompson, 1997), and substance use and abuse (Patel et al., 2007). Further, depression in adolescence is associated with decreased quality of life, poor to severe functional impairment, and serious emotional disturbances (Kessler, Avenevoli et al., 2012). A recent study found that students demonstrated more school absences due to depression, exceeding that caused by ADHD, anxiety, and conduct disorder (Lawrence et al., 2015). Based on the high prevalence and detrimental long-term consequences of adolescent depression, it is clear that a better understanding of factors influencing the development of depression in youth is crucial.

Social Support and Depressive Symptoms in Adolescents

Bronfenbrenner's bioecological theory (1986) is a useful model guiding the search for etiological factors relevant to the onset of depression. The model emphasizes how social influences can strongly impact one's development, especially during a period of development in which the prevalence of depression increases (National Institute of Mental Health, 2013). Bronfenbrenner and Morris (2006) reported that social influences relevant to depression can stem from an array of sources organized into five environmental systems: the microsystem (individuals), mesosystem (institutions), exosystem (society), macrosystem (culture), and chronosystem (time). As adolescents spend nearly all of their time with family, friends, and teachers (United States Department of Health & Human Services, 2016), these groups are the three main sources of social influence that make up the microsystem (Bronfenbrenner, 1986; Bronfenbrenner & Morris, 2006). This is supported by a growing body of empirical literature that points to the positive impact social support has on depression in adolescence. Rueger, Malecki, Pyun, Aycock, and Coyle (2016) summarized and integrated this research in their recent meta-analysis. The authors identified 342 studies with a total of 273,430 participants and found family, friend, and teacher support to be

significantly related to depressive symptoms, a finding upheld both cross-sectionally and longitudinally. However, many of the included studies did not examine the associations of all three sources of social support on depression within the same study, and Rueger et al. (2016) did not separately analyze the few studies that did examine all three sources. Doing so seems pertinent as it is possible that social support from different sources prevents depressive symptoms in a similar way. Thus, it could be expected that social support from multiple sources is not more beneficial than social support from one source. If this is the case, all three sources of support might appear relevant throughout adolescence when studied independently, yet it is possible that one or more sources of support may become irrelevant when all three sources are examined at once. Moreover, which source of support is most beneficial might change during adolescence.

The few studies that investigate the relations of all three sources of social support with depression within the same analysis seem to point to different patterns depending on the age of the adolescents, further supporting the considerations above. McMahon, Coker, and Parnes (2013) found in their study with 10-15 year olds that when ratings from all three sources of support were included in a single statistical model, only family support significantly predicted depressive symptoms. However, a similar study with 15-18 year olds found that all three sources of social support were significantly associated with depressive symptoms (Colarossi & Eccles, 2003). Thus, based on these two studies, one might conclude that support from friends and teachers become more important in late adolescence.

While these are only two studies, this seeming increase of importance of social support from friends and teachers is consistent with other empirical findings showing that non-parental adults and peers become important sources of social support in the beginning of middle childhood, and same-gender peers become more important during the transition into early adolescence (Buhrmester, 1996; Levitt, Guacci-Franco, & Levitt, 1993). Then, in late adolescence, romantic partners become increasingly more relevant sources of social support (Collins & Laursen, 2004; Meeus, Branje, van der Valk, & de Wied, 2007). Thus, it makes sense that family remains the only relevant source of social support in 5th to 10th graders when all sources are considered simultaneously, while all other sources are relevant for 10th to 12th graders. However, this conclusion is based on only a few studies, none of which conducted a more fine-grained examination to identify when changes regarding primary sources of support truly occur.

The limited research examining social support from all three sources within the same statistical model is problematic, as this seems important in order to better understand the influence each has on the development of

depressive symptoms. Consequently, it is warranted that a study (a) examines each source of support, controlling for the other sources of support, spanning the entirety of adolescence and (b) explore potential changes in the relevance of each source of social support throughout high school.

Principle-Effect and Stress-Buffer Model

Throughout the literature examining the association between social support and depressive symptomatology, two theoretical models have been established: the *principle-effect model* (Dumont & Provost, 1999) and the *stress-buffer model* (Cohen & Willis, 1985). The *principle-effect model*, which is a main effect model, asserts that social support has an equally positive impact on individuals regardless of stressful life situations. There is research to support a main effect between social support and symptoms of depression in adolescence. In fact, family support was negatively related to depressive symptomatology in two studies investigating adolescent females age 12-18 years (Kerr, Preuss, & King, 2006; Trask-Tate, Cunningham, & Lang-DeGrange, 2010). Moreover, there has been longitudinal research indicating that adolescents age 11-15 years who lack family support have an increased likelihood of developing depressive symptoms (Stice, Ragan, & Randall, 2004). Consequently, the principle-effect model may be the best fitting explanation for the relationship between social support and depressive symptomatology in adolescents from 11-18 years of age. If so, social support could be beneficial for every adolescent.

In contrast, the *stress-buffer model*, which is a moderation model, posits that social support's positive impact is magnified for individuals facing stressful life events (Cohen & Willis, 1985). The stress-buffer model is commonly used to explain the development and maintenance of depression. For example, the well established cognitive stress-vulnerability model of depression (Beck, 1976) and the self-esteem vulnerability model (Brown & Harris, 1978) are stress-buffer models. Thus, these models provide a context to examine the stress-buffer model and studies examining either of these two models have repeatedly found support for the stress-buffer effect (e.g., Lewinsohn, Joiner, & Rohde, 2001). Similarly, some studies focusing on social support and depressive symptoms provided support for the stress-buffer model as well. To be precise, Murberg and Bru (2004) and Ystgaard et al. (1999) found that family support buffers against the harmful impact of negative life-events on depressive symptoms in students grade 8 and grade 11, respectively. Further, Desjardins and Leadbeater (2011) found a similar moderating effect of paternal support on the association between relational victimization and depressive symptoms in adolescents ages 12 to 19 years. Finally, Pössel, Rudasill, Sawyer, Spence, and Bjerg (2013) found that teacher

support buffers against the impact of negative life-events on depressive symptoms in students grade 8 to 10 but not grade 11 and 12. However, based on Rueger and colleagues' (2016) meta-analysis, there were no differences regarding the role of social support between adolescents who were stressed and non-stressed, lending support to the principle-effect rather than the stress-buffer model. Nevertheless, the empirical literature regarding principle-effect versus stress-buffer effect seems somewhat inconsistent.

Current Study

Previous literature examined two different models of how social support might have a positive effect on depressive symptoms in adolescence. On the one hand, the principle-effect model, a main effect model, asserts that social support has an equally positive impact on individuals regardless of stressful life situations (Dumont & Provost, 1999). On the other hand, the stress-buffer model, a moderation model, posits that social support's positive impact is magnified for individuals facing stressful life events (Cohen & Willis, 1985). Because the majority of the empirical findings seem to favor the principle-effect model over the stress-buffer model (Kerr et al., 2006; Rueger et al., 2016; Stice et al., 2004; Trask-Tate et al., 2010), we proposed that the principle-effect model will be a better fit for each of the sources of social support. In other words, we propose that social support from family, friends, and teachers are negatively related to later depressive symptoms in all adolescents (hypothesis 1). Further, based on previous empirical findings (Colarossi & Eccles, 2003; McMahon et al., 2013), we proposed that all three sources of social support are negatively related to later depressive symptoms in adolescence when tested independently (hypothesis 2). However, we finally proposed that when all three sources of social support are included in one model, only family support remains significant in adolescents up to grade 10, while all three sources remain significant in the last grades of high school (hypothesis 3).

Methods

Participants

Participants were 1,452 Australian students from 24 secondary schools that were part of the control condition of a large-scale depression prevention study entitled *beyondblue* (for a detailed description of the prevention program see Sawyer et al., 2010). Over the 5-year period, there were no significant differences in depressive symptoms, risk factors, or protective factors between students in the intervention and control group (Sawyer et al., 2010). Nevertheless, for the purpose of this paper, only the students of the control condition were included.

Researchers obtained informed consent from all participating students and their parents before the baseline assessment. Students in the *beyondblue* study completed a baseline assessment in grade 8 and were followed until grade 12. Students' average age at the time of the baseline assessment was 13.1 ($SD = 0.5$; range: 11-16 years) years old and 51.9% of the students identified as female (grade 9: 52.2%; grade 10: 53.2%; grade 11: 54.0% grade 12: 56.9%). At baseline about 92.5% of participants were born in Australia (grade 9: 93.0%; grade 10: 93.7%; grade 11: 94.2% grade 12: 92.3%), while 4.4% identified as Aboriginal or Torres Strait Islander (grade 9: 3.9%; grade 10: 3.8%; grade 11: 2.6% grade 12: 2.8%). In addition, the majority of participants (88.8%) had at least one parent that was a full-time employee at baseline (grade 9: 89.8%; grade 10: 90.4%; grade 11: 91.3% grade 12: 91.2%).

In Australia, grade 8 is generally the first academic year of high school, and students attend school from February to early December. All participating students in grade 8 completed the baseline assessment during the second of four terms (May to June) and the assessments in grades 9 to 12 during the last term of the school year (October to December). At baseline 2,545 students ($n = 1314$; 51.6% female) participated and 2,405 or 94.5% ($n = 1251$; 52.0% female) of them completed the follow-up assessments in grade 9, 2,219 or 87.2% ($n = 1165$; 52.5% female) in grade 10, 1,717 or 67.5% ($n = 936$; 54.5% female) in grade 11, and 1,452 or 57.1% ($n = 826$; 56.9% female) in grade 12. This retention rate is consistent with other Australian longitudinal studies with high school students and reflects the attrition rates of students in Australia (e.g., Caldwell, Rudolph, Troop-Gordon, & Kim, 2004; Heaven & Ciarrochi, 2008).

Altogether, 437 students (21.1%) left their baseline school during the course of the study. The 1,452 students who did not leave their baseline school made up the sample in the present study. Students left their school for a variety of reasons (e.g., family relocated, transferred to vocational school, dropped out). There were no baseline differences between students who left their baseline school and students who did not on sex [$\chi^2(1) = 2.06, p = .358$], age [$t(2333.39) = 0.94, p = .350$], or whether or not participants were born in Australia [$\chi^2(1) = 1.01, p = .604$]. However, significantly more students who left their baseline school identified as Aboriginal and/or Torres Strait Islander [$\chi^2(1) = 21.06, p < .001$], perceived less social support from family [$t(2527) = 19.38, p < .001$], friends [$t(2527) = 48.24, p < .001$], and teachers [$t(2527) = 8.23, p < .001$] at the baseline assessment, underwent more stressful events [$t(1999.84) = -6.57, p < .001$], and experienced a higher frequency of depressive symptoms [$t(2180.28) = -5.14, p < .001$].

Measures

Depressive symptoms. At each wave of data collection, the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1991) was used to describe and evaluate depressive symptomatology. The CES-D is comprised of 20 items (e.g., “I felt lonely.”), whereby students use a 4-point scale to rate the degree to which they experienced each symptom in the last week (1 = *Rarely or none of the time [less than 1 day]* to 4 = *Most or all of the time [5–7 days]*). Items 4, 8, 12, and 17 are positively worded and need to be reverse coded. After that, the scores are summed to create an overall score, with higher scores signifying increased amounts of depressive symptoms in the last week. The CES-D scores have demonstrated strong construct validity and reliability in this age group (Garrison, Schluchter, Schoenbach, & Kaplan, 1989). Table 1 shows means, standard deviations, and internal consistencies of CES-D scores, by grade level.

Stressful life-events. The List of Threatening Experiences Questionnaire (LTEQ) was adapted to evaluate 13 events identified as having a potential long-term impact (e.g., pregnancy; illness or death; Brugha, Bebbington, Tennant, & Hurry, 1985). Items were adapted from the original scale to better fit an adolescent age group (e.g. break-up from partner rather than divorce). Students responded with *yes* or *no* to indicate whether each event had occurred in their life in the last 6 months. The items are then summed to create an overall score between 0 and 13, with higher scores signifying a higher level of life events. Sawyer, Pfeffer, and Spence (2009) found that the modified LTEQ was not only predictive of depressive symptoms at baseline but also of depressive symptoms one year later in high school students. Table 1 shows means, standard deviations, and internal consistencies of stressful events by grade level.

Social support. An instrument to measure general *social support from teachers* was developed for the current study (for the details about the instrument development see Pössel et al., 2013). The instrument is comprised of 9 items (e.g., “I feel I can go to my teacher with the things that are on my mind”), selected from several pre-existing scales (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Bond et al., 2004; Epstein & McPartland, 1976; Goodenow, 1993; Roeser, Midgley, & Urdan, 1996). Via a 4-point scale (1 = NO! to 4 = YES!), students indicate their agreement with each statement. The items are then summed to calculate an overall score. Table 1 shows means, standard deviations, and internal consistencies of stressful events by grade level.

Social support from family and friends was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS is one of the three most commonly used instruments to measure perceived general social support from family and friends (Rueger et al., 2016). Students are

asked to rate how strongly they agree or disagree with each statement on a 7-point Likert type scale (1 = *very strongly disagree* to 7 = *very strongly agree*). For the present study only the family and peer items were used including 4 items measuring family support (e.g. “My family really tries to help me.”) and 4 items measuring friend support (e.g. “I can count on my friends when things go wrong.”). Table 1 shows means and standard deviations of stressful events, by grade level.

Design and Procedure

After obtaining ethics approval in each state, a letter explaining the study was sent to each parent with a student enrolled in grade 8 in all schools that agreed to participate (see Sawyer et al., 2009, 2010), for a detailed description of the demographics, selection protocol, and eligibility criteria). Of the 8,837 students invited to participate, parental consent for 5,633 (participation rate: 63%) was received. Researchers administered the measures, while the teachers supervised the students during data collection. Participants completed the measures in approximately 30 minutes and were assessed in assembly halls or classrooms during school hours. To reduce missing data, absent students were re-contacted. Neither teachers, students, nor parents were compensated for participating in the study.

Data Analysis

HLM 6.03 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) was used to test for effects of between-school differences, as students were nested in schools. The unconditional means model demonstrated that differences in social support from teachers between schools is .0575 as measured by the ICC. In other words, 5.75% of the total variability in social support from teachers can be explained by school-level variability. Further, only 1.36% of the variability in depressive symptoms can be attributed to schools. Because the variance in social support from teachers and depressive symptoms explained by schools is < 10%, using school as the nesting variable was regarded as unnecessary in subsequent analyses (Lee, 2000).

To perform path analyses, AMOS 21.0 with full information maximum likelihood (FIML) estimation was used (Arbuckle, 1999), as FIML is not affected by missing data (Enders, 2001). Moreover, χ^2 , the RMSEA, and the CFI were used to examine goodness of fit of models. When interpreting findings, nonsignificant χ^2 values are preferred. Further, RMSEA values of <.05 are interpreted as sign for a good model fit and values of <.08 demonstrate an acceptable fit (Hu & Bentler, 1999). Finally, CFI values of > .95 are considered good model fit and values of > .90 are interpreted as acceptable (Hu & Bentler, 1999).

To identify the best fitting model, χ^2 difference tests were used to compare nested models. In this test, the χ^2 and dfs values of the compared models are subtracted from each other. The models are significantly different from each other when $\Delta\chi^2$ is significant for Δdf . In this case, the model with fewer dfs has better model fit compared to the competing model. When the $\Delta\chi^2$ is non-significant, this indicates that there is no difference in model fit and the model with more dfs (the more parsimonious model) should be retained.

First, the principle-effect model (associations from source of support at wave X to depressive symptoms at wave X+1) and the stress-buffer model (associations from source of social support, and source of social support by stressful events interactions, at wave X to depressive symptoms at wave X+1) were calculated separately for each source of social support. Second, and as described above, χ^2 difference tests were used to compare the models with each other separately by source of social support. The purpose of this step was to identify the best fitting model for each individual source of social support. As it is possible that the best fitting model for the different sources of support are not identical, these analyses were calculated separately for each source of social support. Finally, the best fitting models for each source of social support (principle-effect or stress-buffer model) were integrated into one model and the individual paths within this model were examined. Because girls are more likely to develop depressive symptoms than boys (Angold et al., 2002; Twenge & Nolen-Hoeksema, 2002), sex was used as covariates in all tested models.

Results

Preliminary Analyses

Descriptive statistics and correlations are shown in Table 1. As expected, while most constructs correlated moderately with each other, age did not correlate significantly with most other constructs. Further, friends' social support was largely unrelated to stress in grades 8 and 9, but in later years stress and social support from friends had a small negative correlation ($r = -.04$ to $-.11$). However, it should be noted that these correlations are likely only significant because of the large sample size, as stress and social support from friends share maximal 1.2% variance.

Hypothesis Testing

Model comparisons separated by sources of social support. To identify the model that fit the data best and to examine hypotheses 1 and 2, six different models were tested separately by source of social support and pair-wise compared with each other. First, the comparison of the principle-effect model with family as source of social support, $\chi^2 (136, N = 2076) = 1017.57, p < .001$, CFI = 0.898, RMSEA = 0.056, (explained variance [EV] in

adolescents' depressive symptoms in the subsequent year: grade 9: 28.4%; grade 10: 34.5%; grade 11: 29.3%; grade 12: 32.2%) and the stress-buffer model with family as source of social support, $\chi^2 (132, N = 2076) = 1007.95, p < .001$, CFI = 0.898, RMSEA = 0.057, (EV in adolescents' depressive symptoms in the subsequent year: grade 9: 28.8%; grade 10: 34.6%; grade 11: 29.4%; grade 12: 32.3%) supported the stress-buffer model, $\Delta\chi^2 (4, N = 2076) = 9.62, p = .047$. However, the stress-buffer model explained only up to 0.4% more variance in adolescents' depressive symptoms.

Second, the principle-effect model with friends as source of social support, $\chi^2 (136, N = 2076) = 833.45, p < .001$, CFI = 0.905, RMSEA = 0.050, (EV in adolescents' depressive symptoms in the subsequent year: grade 9: 28.5%; grade 10: 35.6%; grade 11: 29.7%; grade 12: 33.4%) and the stress-buffer model with friends as source of social support, $\chi^2 (132, N = 2076) = 827.11, p < .001$, CFI = 0.906, RMSEA = 0.050, (EV in adolescents' depressive symptoms in the subsequent year: grade 9: 28.6%; grade 10: 35.6%; grade 11: 29.6%; grade 12: 33.4%) were calculated. The principle-effect model explained maximal 0.1% more variance in adolescents' depressive symptoms, and the χ^2 difference test comparing the two models also supported the principle-effect model, $\Delta\chi^2 (4, N = 2076) = 6.34, p = .175$.

Finally, the principle-effect model with teachers as source of social support, $\chi^2 (136, N = 2076) = 823.85, p < .001$, CFI = 0.921, RMSEA = 0.049, (EV in adolescents' depressive symptoms: grade 9: 29.4%; grade 10: 35.7%; grade 11: 31.2%; grade 12: 33.4%) and the stress-buffer model with teachers as source of social support, $\chi^2 (132, N = 2076) = 818.87, p < .001$, CFI = 0.922, RMSEA = 0.050, (EV in adolescents' depressive symptoms: grade 9: 29.5%; grade 10: 35.7%; grade 11: 31.2%; grade 12: 33.4%) were calculated and compared. As the χ^2 difference test was not significant, $\Delta\chi^2 (4, N = 2076) = 4.98, p = .289$, the principle-effect model, which explained up to 0.1% less variance of adolescents' depressive symptoms, was retained. Consistent with hypothesis 2 social support from each source are associated with later depression. However, contrary to our hypothesis 1, only social support from friends and teachers impacts depressive symptoms directly (principle-effect model). Social support from family, however, reduces the negative impact of stress on later depressive symptoms in our sample of adolescents (stress-buffer model).

Combining all sources of support into an integrated model. Next, the stress-buffer models with family as source of social support and the principle-effect model with friends and teachers as source of social support were integrated into one model, $\chi^2 (316, N = 2076) = 1672.74, p < .001$, CFI = 0.922, RMSEA = 0.045 (EV in

adolescents' depressive symptoms: grade 9: 28.5%; grade 10: 33.4%; grade 11: 28.6%; grade 12: 31.3%) to examine the effects when all three sources of social support were entered simultaneously.

Additionally, we predicted that, when all three sources of social support are included in one model, only family support remains significant in adolescents up to grade 10, while all three sources remain significant in the last grades of high school (hypothesis 3). To examine this, we inspected the individual paths between waves in the integrated model. Contrary to our hypothesis, friend support was not significantly associated with levels of depressive symptoms in the combined model at any grade. Thus, we removed the associations between friend support and depressive symptoms from the combined model, $\chi^2 (320, N = 2076) = 1673.42, p < .001, CFI = 0.922, RMSEA = 0.045$ (EV in adolescents' depressive symptoms: grade 9: 28.5%; grade 10: 33.4%; grade 11: 28.5%; grade 12: 31.4%), and compared it with the original combined model in which all three sources of support are associated with levels of depressive symptoms. As the χ^2 difference test was not significant, $\Delta\chi^2 (4, N = 2076) = 0.68, p = .954$, the combined model without friend support was retained.

A close inspection of the cross-wave paths revealed that teacher support and stress at grade 11 were not significantly associated with the levels of depressive symptoms in the next grade and teacher support at grade 8 was only marginally significantly associated with depressive symptoms one year later. In addition, the family support by stress interactions at grades 9 and 10 were not significantly associated with levels of depressive symptoms in the next grade. Thus, we compared the previously described integrated model, including both main effects of family and teacher support as well as family by stress interaction effects, to an integrated model with exclusively main effects of family and teacher support, $\chi^2 (324, N = 2076) = 1684.80, p < .001, CFI = 0.922, RMSEA = 0.045$, (EV in adolescents' depressive symptoms: grade 9: 28.1%; grade 10: 33.4%; grade 11: 28.4%; grade 12: 31.3%). As the χ^2 difference test was significant, $\chi^2 (4, N = 2076) = 11.38, p = .023$, the integrated model with family support by stress interaction, which explained maximal 0.4% more variance of adolescents' depressive symptoms, was retained.

Description of the final integrated model. The individual paths between waves of the integrated model without friend support are presented in Table 2 and Figure 1, and the correlations between constructs within the waves are presented in Table 3. Model-implied graphs were then constructed to further examine the association between the family support by stress interactions at grade 8 and 11 and later depressive symptoms (Figure 2). The graphs demonstrate that stress was associated with depressive symptoms one year later but also that family support

reduced the negative effect of stress on depressive symptoms. In other words, these findings are consistent with the stress-buffer model.

Discussion

Based on the high prevalence of adolescent depression (Angold, Erkanli, Silberg, Eaves & Costello, 2002; Twenge & Nolen-Hoeksema, 2002), the costs associated with it (Bui et al., 2017), and its detrimental long-term consequences (Kessler, Avenevoli et al., 2012; Kessler, Petukhova et al., 2012; Lawrence et al., 2015; McClure et al., 1997; Patel et al., 2007; Stewart et al., 2002), it is clear that a thorough understanding of factors influencing the development of depression in youth is imperative. Following Bronfenbrenner's bioecological theory (1986) and a multitude of empirical studies (for a meta-analysis see Rueger et al., 2016), family, friend, and teacher support seem to be crucial for depressive symptoms in adolescence. However, significant gaps in our knowledge exist regarding how relevant these three sources of support are throughout adolescence, which source(s) are relevant when all three are examined simultaneously, if they influence depressive symptoms directly (principle-effect model; Dumont & Provost, 1999) or by reducing the negative impact of stress (stress-buffer model; Cohen & Willis, 1985) on depressive symptoms, and if the relevance of the individual sources of social support changes during adolescence (Buhrmester, 1996; Colarossi & Eccles, 2003; Collins & Laursen, 2004; Levitt et al., 1993; McMahon et al., 2013; Meeus et al., 2007). The present 5-year longitudinal study helps to fill in these gaps by following 1,452 Australian students from grade 8 to 12.

Based on the above described literature, we proposed that the main effects of social support from family, friends, and teachers, but not the interactions between support from those sources and stressful events, would be related to later depressive symptoms (hypothesis 1). Further, we proposed that, when each source of social support is independently examined, all three sources of support would be negatively related to later depressive symptoms (hypothesis 2). When integrated into one model, we proposed that only family support would remain significant in adolescents up to grade 10, while all three sources would remain significant in grades 11 and 12 (hypothesis 3).

As proposed, when independently examined, each source of social support explained a meaningful and similar amount of variance of depressive symptoms. However, when all three sources of social support were combined and examined, friend support did not contribute in a meaningful way to adolescent depressive symptoms across the examined grades. Further, only teacher support at grade 9 and 10 were significant and teacher support at grade 8 was only marginally significant in their association with the levels of depressive symptoms in the next

grade. Finally, as predicted, the principle-effect model (Dumont & Provost, 1999) fit the data better for friend and teacher support. Inconsistent with our prediction, the stress-buffer model (Cohen & Willis, 1985) fit the data better for family support. Associated with that finding, only the family support by stress interactions at grade 8 and 11, though not at grade 9 and 10, were related to depressive symptoms one year later. Inspecting the interactions in more detail revealed that family support reduced the negative effect of stress on depressive symptoms (see Figure 2).

While most findings are consistent with our hypotheses, friend support did not contribute meaningfully to depressive symptoms throughout adolescence while teaching support in fact lost relevance throughout adolescence. As stated above, peers become important sources of social support in the beginning of middle childhood, and same-gender peers become more important during the transition into early adolescence (Buhrmester, 1996; Levitt et al., 1993) while romantic partners become relevant sources of social support in late adolescence (Collins & Laursen, 2004; Meeus et al., 2007). One possible reason for lack of relevance of friend support when combined with other sources of social support might be that we did not define “friend” (e.g., classmates, same-gender peers, romantic partners). Thus, it might be that different students interpreted friendship differently which consequently defused the influence of friend social support. With this in mind, future studies should utilize instruments that include all three types of friends but intentionally separate them out. Similarly, at least for college-bound individuals, it is likely that all types of friends become more important when they leave home as the frequency of social interactions with family may decrease. Future studies should therefore build on our study to examine the influence of family and friend support in late adolescence/early adulthood.

One possible explanation for decreased teacher influence toward the end of high school, despite family support moderating the effect of stress on depressive symptoms during the same developmental period, might be a change in the source of stress adolescents typically experience close to graduation. For example, Byrne, Davenport, and Mazanov (2007) found in a sample of Australian adolescents grades 7 to 12 that stress was related to family, future uncertainty, financial pressure, and emerging adult responsibilities, while stressors related to school and teachers remained stable. As the stress students experience in late adolescence is less related to the sphere in which teachers can provide support, families remain relevant and might even gain influence. This highlights another possible explanation related to why family support moderates the effect of stress on adolescents’ depressive symptoms at the end of high school, but not during all of adolescence. Social support can be separated into different types (e.g., appraisal, emotional, informational, and instrumental; Malecki & Demaray, 2003). Depending on the

type of stress, some types of social support may impact depressive symptoms directly while others may moderate the effect of stress. While we are unaware of empirical studies examining these proposed differences, one can speculate that instrumental (family) support (incl. spending resources like time, materials, or money; Malecki & Demaray, 2003) might be particularly beneficial for adolescents under a lot of financial pressure (e.g., costs for college) than for their peers with less financial pressure (e.g., working a full-time job). However, without studies examining these possible explanations in more detail, these considerations must remain speculative.

The current study had several strengths that should be noted. For instance, the study included a large community sample, which helped reduce selection bias, making the results more generalizable. This is because findings on individuals with depressive symptoms in a community sample are more generalizable to the general population than findings on individuals with depressive disorders as these individuals have systematic differences from those in the general population (Cohen & Cohen, 1984). Further, the current study used a 5-wave longitudinal design, so data were collected throughout the students' entire high school career.

In addition to its strengths, the current study had several limitations. First, as mentioned above, this study measured "general" social support and negative life events as this might be associated with some unexpected findings it can be seen as a limitation. As already outlined, instruments that better differentiate between different types of social support and different types of stress might be able to explain unexpected findings and therefore build on our study. For example, the Child and Adolescent Social Support Scale (CASSS; Malecki, Demaray, & Elliott, 2000) separated four types of social support from four different sources (classmates, close friends, parents, & teachers) and the Adolescent Stress Questionnaire (ASQ; Byrne et al., 2007) measures 10 different types of stress typical for adolescents. Second, and related to the first limitation, there is limited information regarding the validity of the support instrument used in this study. Pössel et al. (2013) provide some evidence for construct validity via two factor analyses, and practical metric invariance across sex (girls vs. boys), condition (prevention vs. control condition), and time (grade 8 vs. grade 12). However, further investigation into this instrument is needed, as all analyses examining the validity of the support measure were conducted using the *beyondblue* sample. Therefore, future studies should investigate the validity of the instrument using other samples. Third, our study relied on the sole use of student-report measures, which might result in an overestimation of the relationships between family, friend, and teacher support, stressful events, and depressive symptoms. Fourth, and related to this limitation, depressive symptoms were measured using a self-report checklist as opposed to a diagnostic interview; thus, it is

unclear if our findings are generalizable to adolescents experiencing clinical levels of depression. However, research demonstrates that adolescent depression is best conceptualized dimensionally (e.g., Hankin, Fraley, Lahey, & Waldman, 2005), which makes it likely that the findings of the current study could be replicated in a sample of adolescents with depressive disorders.

Moreover, a fifth limitation is that the study's longitudinal design was characterized by a high, nonrandom attrition rate of 46.63% between grade 8 and grade 12. As stated above, those who left their baseline school reported less family, friend, and teacher support at baseline, more stressful events, a higher frequency of depressive symptoms, and/or were of Torres Strait Islander or Aboriginal background. It is important to note that Australian students who wish to eventually have a vocational career leave traditional high school after grade 10 in lieu of specialized vocational high schools, or they undertake apprenticeships or some other form of employment, partially explaining the 20% attrition rate from grades 10 to 11. In particular, students who come from an Aboriginal background are more likely to transfer to a vocational school or drop out altogether (Gray, Huber, & Schwab, 2000). Adolescents who report more negative events (Dyregrov, 2004), less teacher support (Davis & Dupper, 2004), and more depressive symptomatology (Lewinsohn & Clarke, 1999) are also more likely to change schools or drop out compared to other students. With these patterns in mind, the generalizability of the findings is limited for these groups and future research regarding family, friend, and teacher support should focus on these students.

Finally, some might see it as a limitation that biological sex was not considered as a potential moderator in these analyses. However, we decided not to do so as Rueger et al. (2016) found negligibly small differences in the effects of social support on depression in female and male adolescents. In particular, for girls, social support explained only 0.09% more variance in cross-sectional studies and 0.25% more variance in longitudinal studies compared to boys. This is also reflected in the primary literature, as one group of studies found sex differences (12-18 years, Kerr et al., 2006), another found sex differences in some but not all examined associations (13-18 years, Pössel et al., 2013), and a final group of studies found no sex differences (15-18 years, Colarossi & Eccles, 2003; 14-15 years, Murberg & Bru, 2004; 12-14 years, Shochet, Smith, Furlong, & Homel, 2011). The age of participants did not seem to impact whether sex differences were found or not. While it is understandable that one might expect the biological sex of the students to moderate the associations between social support and depressive symptoms in adolescents, there is no consistent empirical support for such an effect.

Conclusions

Considering the crucial developmental changes occurring in adolescence, our findings provide a concrete foundation that future work can build on to better understand the impact different sources of social support have on depressive symptoms in high school students. Combined with previous studies examining the relationships between support from family, friends, and teachers and depressive symptoms in youth (Colarossi & Eccles, 2003; McMahon et al., 2013; Rueger et al., 2016), our findings demonstrate that support from family and teachers is related to later depressive symptoms in adolescence, while support from friends appear irrelevant when studied in combination with the other two sources of social support. Additionally, it is important to note that family is the most stable source of support throughout adolescence. Further, our study found that the stress-buffer model was the best fit for support from family only, demonstrating the possibility that adolescents facing stress might benefit more from family support compared to their peers without stressful life events. If replicated, our findings emphasize the relevance of adult social support throughout high school, begging the question: how can these findings be implicated in applied work?

When discussing the implications of our findings, we must first acknowledge that the outcomes from the current study contribute to the well-known fact that adolescence can be summarized in one word—*change*. With radical biological, social, and intrapersonal change occurring (Cole et al., 2008), it is important to hone in on the details that occur in adolescent lives. In a high school world that seems governed by peer interactions and pressures where the reward circuitry of the brain is activated simply by having peer influences around (Chein, Albert, O'Brien, Uckert, & Steinberg, 2010), it is easy to assume that peers should be targeted as social supports in preventing depressive symptoms. However, our findings demonstrate that peers may have a weaker presence in adolescent lives than expected. Only when we begin to raise insight about the extent of the role that these individuals play in adolescents' lives will we be able to contribute to not only the understanding of the implications of adolescent developmental change on social support, but we may also begin the process of positive change in preventing depressive symptoms.

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Table 1

Descriptive Statistics, Internal Consistencies, and Correlations between Age, Social support from Teachers, Family, and Friends, Stressful Events, and Depressive Symptoms at each Grade (N ≥ 1528).

	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex												
2. Stressg8	.03											
3. Stressg9	.07***	.44***										
4. Stressg10	.06*	.32***	.48***									
5. Stressg11	.07*	.26***	.40***	.43***								
6. Stressg12	.05	.24***	.32***	.35***	.38***							
7. Familyg8	.01	-.22***	-.16***	-.13***	-.05	-.10***						
8. Familyg9	-.04	-.18***	-.23***	-.20***	-.17***	-.08**	.49***					
9. Familyg10	.03	-.11***	-.18***	-.21***	-.14***	-.12***	.40***	.50***				
10. Familyg11	.05	-.13***	-.12***	-.16***	-.17***	-.13***	.35***	.43***	.51***			
11. Familyg12	.07*	-.06*	-.18***	-.18***	-.15***	-.18***	.32***	.40***	.43***	.53***		
12. Friendg8	.32***	-.06*	.00	.00	-.03	-.04	.46***	.21***	.16***	.13***	.15***	
13. Friendg9	.25***	-.04	-.06**	-.03	-.07*	-.02	.23***	.50***	.20***	.20***	.26***	.44***
14. Friendg10	.26***	-.04	-.04	-.07**	-.01	-.03	.18***	.20***	.58***	.25***	.21***	.33***
15. Friendg11	.22***	-.06*	-.02	-.07*	-.09**	-.03	.14***	.18***	.25***	.62***	.29***	.23***
16. Friendg12	.17***	-.03	-.11***	-.10***	-.03	-.09**	.10***	.15***	.19***	.25***	.65***	.18***
17. Teacherg8	.12***	-.22***	-.16***	-.13***	-.10***	-.10***	.40***	.29***	.27***	.28***	.23***	.24***
18. Teacherg9	.08***	-.14***	-.16***	-.13***	-.09**	-.09**	.25***	.33***	.27***	.27***	.17***	.15***
19. Teacherg10	.04	-.12***	-.13***	-.15***	-.11***	-.12***	.21***	.29***	.33***	.28***	.28***	.14***
20. Teacherg11	.07*	-.09**	-.10***	-.11***	-.09**	-.08**	.20***	.22***	.25***	.31***	.29***	.14***
21. Teacherg12	.11***	-.10***	-.08**	-.09**	-.06	-.14***	.18***	.16***	.19***	.23***	.29***	.12***
22. Depressiong8	.10***	.40***	.26***	.19***	.15***	.17***	-.38***	-.29***	-.25***	-.22***	-.17***	-.22***

23. Depression _{g9}	.18***	.28***	.40***	.29***	.21***	.18***	-.28***	-.41***	-.32***	-.24***	-.24***	-.09***
24. Depression _{g10}	.15***	.23***	.31***	.37***	.21***	.24***	-.25***	-.32***	-.38***	-.30***	-.31***	-.11***
25. Depression _{g11}	.10***	.19***	.25***	.25***	.35***	.26***	-.22***	-.28***	-.29***	-.38***	-.32***	-.11***
26. Depression _{g12}	.09**	.18***	.21***	.20***	.22***	.33***	-.22***	-.22***	-.27***	-.29***	-.36***	-.08**
Mean	-	1.64	1.57	1.52	1.39	1.30	22.94	21.86	21.47	21.41	21.47	22.27
SD	-	1.63	1.55	1.61	1.49	1.45	4.60	5.03	5.31	5.42	5.39	4.69
Cronbach's α	-	-	-	-	-	-	.87	.90	.92	.93	.93	.90

Note. Cronbach's α cannot be calculated for age or LTEQ. Stress = List of Threatening Experiences Questionnaire; Family = social support from family score; Friends = social support from friends score; Teacher = social support from teachers score; Depression = Center for Epidemiological Studies Depression Scale; g8 = grade 8; g9 = grade 9; g10 = grade 10; g11 = grade 11; g12 = grade 12.

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

Table 1 CONTINUE

	13	14	15	16	17	18	19	20	21	22	23	24	25	26
14. Friendg10	.37***													
15. Friendg11	.30***	.42***												
16. Friendg12	.30***	.33***	.40***											
17. Teacherg8	.20***	.18***	.15***	.12***										
18. Teacherg9	.22***	.18***	.22***	.12***	.57***									
19. Teacherg10	.18***	.21***	.18***	.20***	.48***	.62***								
20. Teacherg11	.18***	.16***	.21***	.20***	.41***	.51***	.60***							
21. Teacherg12	.14***	.16***	.17***	.21***	.35***	.45***	.51***	.60***						
22. Depressiong8	-.16***	.19***	-.11***	-.10***	-.32***	-.21***	-.22***	-.19***	-.17***					
23. Depressiong9	-.18***	-.17***	-.13***	-.13***	-.23***	-.28***	-.28***	-.21***	-.18***	.51***				
24. Depressiong10	-.11***	-.21***	-.17***	-.18***	-.22***	-.24***	-.32***	-.26***	-.22***	.42***	.59***			
25. Depressiong11	-.12***	-.12***	-.26***	-.19***	-.22***	-.23***	-.30***	-.35***	-.25***	.36***	.46***	.55***		
26. Depressiong12	-.11***	-.16***	-.16***	-.21***	-.16***	-.14***	-.21***	-.24***	-.28***	.34***	.42***	.51***	.58***	
Mean	22.14	22.03	22.14	22.53	25.35	23.81	23.99	25.37	26.02	13.61	13.91	14.14	13.80	13.32
SD	4.76	5.01	4.88	4.88	5.75	5.74	5.42	5.04	4.92	10.82	11.27	11.85	11.02	10.81
Cronbach's α	.92	.94	.94	.94	.89	.90	.89	.89	.89	.90	.92	.93	.92	.92

Note. Stress = List of Threatening Experiences Questionnaire; Family = social support from family score; Friends = social support from friends score; Teacher = social support from teachers score; Depression = Center for Epidemiological Studies Depression Scale; g8 = grade 8; g9 = grade 9; g10 = grade 10; g11 = grade 11; g12 = grade 12.

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

Table 2

Standardized Regression Weights for Associations between Grades in the Integrated Model without Friend Support.

Sex	Stressg8	.061**
Sex	Teacherg8	.008
Sex	Familyg8	-.050*
Sex	Familyg8 by Stressg8	-.019
Sex	Depressiong8	.151***
Stressg8	Stressg9	.440***
Stressg8	Depressiong9	.078***
Teacherg8	Teacherg9	.553***
Teacherg8	Depressiong9	-.035+
Familyg8	Familyg9	.474***
Familyg8	Depressiong9	-.088***
Familyg8 by Stressg8	Familyg9 by Stressg9	.258***
Familyg8 by Stressg8	Depressiong9	-.048*
Depressiong8	Depressiong9	.394***
Sex	Stressg9	.061**
Sex	Teacherg9	.008
Sex	Familyg9	-.050*
Sex	Familyg9 by Stressg9	-.019
Sex	Depressiong9	.151***
Stressg9	Stressg10	.493***
Stressg9	Depressiong10	.094***
Teacherg9	Teacherg10	.608***
Teacherg9	Depressiong10	-.048*
Familyg9	Familyg10	.493***
Familyg9	Depressiong10	-.046*
Familyg9 by Stressg9	Familyg10 by Stressg10	.336***
Familyg9 by Stressg9	Depressiong10	-.010

Depressiong9	Depressiong10	.483***
Sex	Stressg10	.009
Sex	Teacherg10	-.015
Sex	Familyg10	.046*
Sex	Familyg10 by Stressg10	-.013
Sex	Depressiong10	.076***
Stressg10	Stressg11	.445***
Stressg10	Depressiong11	.050*
Teacherg10	Teacherg11	.604***
Teacherg10	Depressiong11	-.096***
Familyg10	Familyg11	.508***
Familyg10	Depressiong11	-.076**
Familyg10 by Stressg10	Familyg11 by Stressg11	.274***
Familyg10 by Stressg10	Depressiong11	.036
Depressiong10	Depressiong11	.444***
Sex	Stressg11	.057*
Sex	Teacherg11	.031
Sex	Familyg11	.026
Sex	Familyg11 by Stressg11	-.039
Sex	Depressiong11	.073**
Stressg11	Stressg12	.401***
Stressg11	Depressiong12	.020
Teacherg11	Teacherg12	.592***
Teacherg11	Depressiong12	-.012
Familyg11	Familyg12	.525***
Familyg11	Depressiong12	-.087***
Familyg11 by Stressg11	Familyg12 by Stressg12	.230***
Familyg11 by Stressg11	Depressiong12	.049*
Depressiong11	Depressiong12	.513***
Sex	Stressg12	.018

Sex	Teacher _{g12}	.076**
Sex	Family _{g12}	.035
Sex	Family _{g12} by Stress _{g12}	-.011
Sex	Depression _{g12}	.041

Note. Stress = List of Threatening Experiences Questionnaire; Family = social support from family score; Teacher = social support from teachers score; Depression = Center for Epidemiological Studies Depression Scale; g8 = grade 8; g9 = grade 9; g10 = grade 10; g11 = grade 11; g12 = grade 12.

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

Table 3

Correlations of Error Terms of the Constructs, Within Each Grade of the Integrated Model without Friend Support.

Stressg8	Teacherg8	-.221***
Stressg8	Familyg8	-.219***
Stressg8	Familyg8 by Stressg8	-.205***
Stressg8	Depressiong8	.404***
Teacherg8	Familyg8	.402***
Teacherg8	Familyg8 by Stressg8	.123***
Teacherg8	Depressiong8	-.331***
Familyg8	Familyg8 by Stressg8	.292***
Familyg8	Depressiong8	-.385***
Familyg8 by Stressg8	Depressiong8	-.197***
Stressg9	Teacherg9	-.091***
Stressg9	Familyg9	-.154***
Stressg9	Familyg9 by Stressg9	-.171***
Stressg9	Depressiong9	.304***
Teacherg9	Familyg9	.225***
Teacherg9	Familyg9 by Stressg9	.085***
Teacherg9	Depressiong9	-.197***
Familyg9	Familyg9 by Stressg9	.194***
Familyg9	Depressiong9	-.297***
Familyg9 by Stressg9	Depressiong9	-.151***
Stressg10	Teacherg10	-.078**
Stressg10	Familyg10	-.106***
Stressg10	Familyg10 by Stressg10	-.188***
Stressg10	Depressiong10	.228***
Teacherg10	Familyg10	.181***
Teacherg10	Familyg10 by Stressg10	.038

Teacher _{g10}	Depression _{g10}	-.198***
Family _{g10}	Family _{g10} by Stress _{g10}	.080***
Family _{g10}	Depression _{g10}	-.246***
Family _{g10} by Stress _{g10}	Depression _{g10}	-.079***
Stress _{g11}	Teacher _{g11}	-.010
Stress _{g11}	Family _{g11}	-.117***
Stress _{g11}	Family _{g11} by Stress _{g11}	-.107***
Stress _{g11}	Depression _{g11}	.294***
Teacher _{g11}	Family _{g11}	.184***
Teacher _{g11}	Family _{g11} by Stress _{g11}	-.069*
Teacher _{g11}	Depression _{g11}	-.210***
Family _{g11}	Family _{g11} by Stress _{g11}	.122***
Family _{g11}	Depression _{g11}	-.254***
Family _{g11} by Stress _{g11}	Depression _{g11}	-.061*
Stress _{g12}	Teacher _{g12}	-.121***
Stress _{g12}	Family _{g12}	-.129***
Stress _{g12}	Family _{g12} by Stress _{g12}	-.187***
Stress _{g12}	Depression _{g12}	.247***
Teacher _{g12}	Family _{g12}	.152***
Teacher _{g12}	Family _{g12} by Stress _{g12}	.075*
Teacher _{g12}	Depression _{g12}	-.188***
Family _{g12}	Family _{g12} by Stress _{g12}	.208***
Family _{g12}	Depression _{g12}	-.227***
Family _{g12} by Stress _{g12}	Depression _{g12}	-.073*

Note. Stress = List of Threatening Experiences Questionnaire; Family = social support from family score; Teacher = social support from teachers score; Depression = Center for Epidemiological Studies Depression Scale; g8 = grade 8; g9 = grade 9; g10 = grade 10; g11 = grade 11; g12 = grade 12.

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

Figure 1. Significant marginally significant (dashed arrow) associations between constructs across grades in the integrated model without friends as source of social support (the stress-buffer model with family as source of social support and the principle-effect model with teachers as source of social support). Strengths and p-values of associations between constructs across grades and error terms of constructs within grades are presented in Tables 2 and 3, respectively.

Figure 2. Model implied graphs of the standardized interaction effect between family support and stressful events at grade 8 predicting depressive symptoms in grade 9 (top) as well as between family support and stressful events at grade 11 predicting depressive symptoms in grade 12 (bottom).