Published in final edited form as:
J Abnorm Child Psychol. 2010 February ; 38(2): 261–272. doi:10.1007/s10802-009-9362-9.

Protective Effects of Maternal and Peer Support on Depressive Symptoms during Adolescence

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Abstract

The current study examined the contributions of maternal and peer support to depressive symptoms in early to mid-adolescence and variation in these contributions across age, gender, and race. Five waves of data on maternal support, peer support, and depressive symptoms were collected on rural youth (N = 3,444) at six month intervals. Multilevel modeling was used to evaluate within and between-person effects of maternal and peer support on depressive symptoms. Within-person effects of peer support did not vary by age, gender, or race. At the between-person level, peer support predicted levels of depressive symptoms at age 12, but this effect became nonsignificant after controlling for maternal support. Within-person effects of maternal support did not vary with age but were qualified by gender and race. Between-person effects of maternal support on depressive symptom levels at age 12 and slopes varied across race and gender, respectively. Findings highlight the robustness of the protective effects of maternal and peer support during adolescence among girls and white youth.

Keywords

depression; adolescence; maternal support; peer support; rural youth

During the transition to adolescence, there is an increase in clinical diagnoses of depression (Kessler, Avenevoli, & Merikangas, 2001) and depressive symptoms (Fauth, Roth, & Brooks-Gunn, 2007; Ge, Conger, & Elder, 2001; Gutman & Eccles, 2007). The psychosocial factors related to depressive symptoms during this vulnerable period should be elucidated to inform prevention and intervention protocols and identify individuals most in need of intervention. According to interpersonal theories (e.g., Sacco & Vaughan, 2006), depressive symptoms are more likely to develop when individuals perceive a lack of support in close interpersonal relationships (e.g., friends, parents, romantic partners). Moreover, deficits in social support have been linked to higher depressive symptoms in youth (e.g., Allen et al., 2006; Brown, Meadows, & Elder, 2007; Meadows, Brown, & Elder, 2006). To advance this line of inquiry, the primary aims of the current study are to evaluate the

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protection afforded by social support from two key sources, peers and parents (Furman & Burhmester, 1992), against depressive symptoms during early to mid-adolescence.

Primary Aims

Most research has focused on the protective effects of maternal support. Although peers and romantic partners ascend in the social hierarchy during adolescence, these sources of social support supplement but do not supplant the nurturant role of mothers (Furman & Buhrmester, 1992). Accordingly, higher quality maternal relationships predict lower depressive symptoms in cross-sectional (Eberhart, Shih, Hammen, & Brennan, 2006; Field, Diego, & Sanders, 2001; MacPhee & Andrews, 2006) and prospective, longitudinal studies (Allen et al., 2006; Sheeber, Hops, Alpert, Davis, & Andrews, 1997; Videon, 2005). Furthermore, higher levels of maternal support predict slower growth in depressive symptoms during adolescence (e.g., Ge, Lorenz, Conger, Elder, & Simons, 1994; Stice, Ragan, & Randall, 2004).

Empirical research also conforms to theoretical expectation by highlighting the relationship between peer relations and depressive symptoms during adolescence. Higher levels of peer support predict lower levels of depression cross-sectionally (Chester, Jones, Zalot, & Sterrett, 2007; Field et al., 2001; Lewinsohn et al., 1994; MacPhee & Andrews, 2006) and longitudinally while controlling for baseline levels of depressive symptoms (Allen et al., 2006; Gore & Aseltine, 2003; Slavin & Rainer, 1990). Higher levels of peer support also predict slower growth in depressive symptoms over time (Burton, Stice, & Seeley, 2004).

To date, empirical findings converge in demonstrating the contributions of parent and peer support to depressive symptoms in adolescence. However, there are compelling theoretical and empirical reasons to expect the relationships between each type of social support and depressive symptoms to vary as youth age in adolescence. Developmental theory and research suggest that, during the transition from early to mid-adolescence, youth become less strongly influenced by parents and more strongly influenced by peers (Berndt, 1979). It should not be surprising then, that, as parents come to exert less influence, protective effects of parental support on depressive symptoms weaken toward the end of adolescence (Meadows et al., 2006). In contrast, protective effects of peer support on depressive symptoms have been shown to be negligible during early adolescence but present in middle adolescence (Makri-Botsari, 2005; Young, Berenson, Cohen, & Garcia, 2005).

With a few notable exceptions (e.g., Chester et al., 2007; Young et al., 2005), studies have seldom explored variation in the relationships of both types of social support to depressive symptoms according to age during adolescence. The scarcity of this research may be attributable to an insufficient range of ages or time points over which to evaluate age-related variation in these relationships. In addition, small sample sizes may have precluded a sufficiently powerful test of age as a moderator. Moreover, the vast majority of studies have been cross-sectional or longitudinal with only two time points. In these studies, the focus is typically on the estimation of interindividual or between-person effects, which reveal the degree of correspondence between the individual's standing on the predictor and standing on the outcome relative to other individuals within the group (Curran, 2000). However, it is

also of interest, particularly in developmental research, to estimate intraindividual or within-person effects, which convey the degree of correspondence between the predictor and outcome within the individual assessed on multiple occasions. In multilevel modeling, both intraindividual (i.e., within-person) and interindividual (i.e., between-person) effects can be estimated. From a clinical perspective, intraindividual effects may illuminate the individual characteristics that should be targeted in interventions. Interindividual effects, by contrast, reveal the individual characteristics that suggest heightened risk of an outcome relative to other individuals, thereby facilitating selection of individuals most in need of intervention.

To fill these gaps in the literature, multilevel modeling will be used to examine the relationships between each of two key types of social support, maternal and peer support, and depressive symptoms during early to mid-adolescence in a large sample of rural youth. Understanding the psychosocial predictors of depressive symptoms of rural youth may be especially important given the higher rates of anxiety and depression in this demographic group (Horn, Dino, & Momani, 1998).

It is expected that depressive symptoms will increase from early to middle adolescence. It is also hypothesized that the relationship between youths' own maternal support and depressive symptoms will decline in magnitude as youth move from early to mid-adolescence (intraindividual effects). In contrast, intraindividual effects of peer support on depressive symptoms are expected to intensify with age. Youth with lower levels of maternal and peer support during this transition relative to their peers are expected to endorse higher levels of depressive symptoms in early adolescence and experience steeper increases in depressive symptoms as they age than their peers with greater social support (i.e., interindividual effects). In addition, unique, independent contributions of maternal and peer support to depressive symptoms are expected, underscoring that social support from each source maintains relevance throughout adolescence. Moreover, the contributions of both maternal and peer support to depressive symptoms are expected to persist while controlling for demographic variables such as parent education, family structure, and cohort.

Secondary Aims

Research on gender differences in the relationships between social support and depressive symptoms is inconsistent, and research on racial differences is relatively scarce. Thus, secondary aims of the current investigation are to evaluate variation in the relationships between each type of social support and depressive symptoms across gender and race.

Given the stronger interpersonal orientation manifested by girls (Cyranowski, Frank, Young, & Shear, 2000), both parent and peer support might be expected to predict depressive symptoms more powerfully among girls than boys. However, evidence of a moderating effect of gender is equivocal: Some research has confirmed it, demonstrating a stronger association between parental support and depressive symptoms in girls than boys (Avison & McAlpine, 1992; Meadows et al., 2006; Meadows, 2007), whereas other studies have not (Allen et al., 2006; Chester et al., 2007; Eberhart et al., 2006; Gutman & Eccles, 2007; Leadbeater, Kuperminc, Blatt, & Hertzog, 1999; Sheeber et al., 1997). Of note, most studies that found a moderating effect of gender utilized an adolescent self-report measure of

maternal support. In contrast, studies in which gender failed to moderate employed a broader definition of parental support, i.e., support from the family (Gutman & Eccles, 2007; Young et al., 2005) or both parents combined (Licitra-Kleckler & Waas, 1993). Thus, theoretical expectations have more often been satisfied when measuring *adolescent-perceived maternal* support. In the current study, therefore, a measure of adolescent-perceived maternal support is employed, with the expectation that deficits in maternal support will more strongly predict depressive symptoms in girls than boys.

The expectation that peer support deficits would more strongly predict depressive symptoms in girls than boys has received some support (Licitra-Kleckler & Waas, 1993; Slavin & Rainer, 1990). However, in other studies gender did not moderate the relationship between peer support and depressive symptoms (Allen et al., 2006; Chester et al., 2007; Lewinsohn et al., 1994; Meadows, 2007; Young et al., 2005). In the absence of clearer guidance from empirical research, relevant theory (e.g., Cyranowski et al., 2000) serves as the basis for the hypothesis that deficits in peer support will more strongly predict depressive symptoms among girls than boys.

Racial variation in the relationship between each type of social support and depressive symptoms has seldom been studied, as most samples have been predominantly white. However, the relationships between deficits in maternal and peer support and depressive symptoms have been documented in an exclusively African American sample (Chester et al., 2007). Moreover, racial variation in the links between social support and depressive symptoms has not been found in the few studies that have examined it (Brown et al., 2007; Gutman & Eccles, 2007). Similarly, a relationship between deficits in peer support and depressive symptoms has been demonstrated in racially/ethnically diverse samples (Allen et al., 2006; Gore & Aseltine, 2003; Meadows, 2007). These findings are collectively consistent with the notion of commensurate psychological benefits of social support for black and white youth. Large proportions of black and white youth in the current study create propitious conditions to evaluate moderating effects of race and augment this limited literature.

Method

Sample and Procedure

The current analysis was based on five waves of data collected for the *Context of Adolescent Substance Use* study. A cohort-sequential design was utilized, with three cohorts of students in the sixth, seventh, and eighth grades enrolled in the study at Wave 1 in the Spring of 2002. Students were assessed biannually at six-month intervals.

The sample was comprised of youth enrolled in all of the schools (n = 19) with the targeted grade levels in three rural counties in a Southeastern state. With the exception of students who were in self-contained classrooms for exceptional children or had limited English language reading skills, all students in the targeted grade levels were eligible for participation. Of all eligible students, 88.4% enrolled in the study at Wave 1. Participation rates were similar across counties, with between 80 and 84% of eligible students participating across counties. The counties had similar gender distributions (all 49% male)

but varied in racial/ethnic representation. Two counties were predominantly white (i.e., 65%, 58%), with lower proportions of youth of black (22%, 35%), Hispanic (5%, 2%), or other racial/ethnic background (8%, 5%). By contrast, the remaining county was predominantly black (65%), with white (26%), Hispanic (4%), and youth of other racial/ethnic backgrounds (4%) in the minority.

Four weeks prior to data collection, parents were informed about the study through a letter sent both by first-class mail and home with the child. Parents could refuse their child's participation by returning a postage-paid form or by calling a toll free number (i.e., passive consent). Written adolescent assent was obtained in school by trained data collectors at the time of data collection. Reasons for not participating and the range of percentages of eligible students who cited each reason across the five waves were: parent refusal (8-10%), adolescent refusal (1-6%), absenteeism (1-7%), lost due to administrative errors (0-4%), and moving away from the study counties (0-3%). Study questionnaires were administered in group settings (e.g., cafeteria) at school by trained data collectors. Adolescents completed study questionnaires in approximately one hour.

To be included in the current analysis, participants had to be present at Wave 1, of black or white race, no more than two years older than the expected age for their grade, and between the ages of 12 and 16 for all points of data collection to restrict this analysis to early to mid-adolescence. There were 3,704 youth who met these inclusion criteria. A key advantage of multilevel modeling, the statistical technique used here, over more traditional statistical techniques for analyzing longitudinal data (e.g., within-subjects ANOVA) is that participants can be included in the analysis as long as they provide complete data on all study variables for at least one wave, thereby maximizing use of available data. Approximately 93% (3,444) of the 3,704 participants who met the aforementioned inclusion criteria provided complete data on all study variables at Wave 1. Thus, the final sample size for substantive analyses was 3,444. An examination of participant retention revealed that most participants also contributed data to at least one wave after the first: Of the 3,444 participants with complete data at Wave 1, 75% also provided complete data at Wave 2, 71% provided complete data at Wave 3, 61% provided complete data at Wave 4, and 54% provided complete data at Wave 5.

The final sample for substantive analyses (n = 3,444) was comprised of nearly equal proportions of boys and girls (51% female, n = 1,761). Black youth (41%, n = 1429), although less well-represented than white youth, nonetheless constituted a sizable minority. For the majority of participants (63%, n = 2,166), the highest level of education for at least one of their parents was completion of at least some college, community college, or technical school courses. Approximately 50% (n = 1,715) of participants lived with both parents. At Wave 1, participants were, on average, 13.36 years old (SD = .80), and 21% were in the sixth grade (n = 737), 41% were in the seventh grade (n = 1,408), and 38% were in the eighth grade (n = 1,299).

Analyses were conducted to determine the extent of sample bias resulting from study attrition. To this end, the 3,444 participants who met the study's inclusion criteria and had complete Wave 1 data were divided into two groups: One group, termed *study completers*,

consisted of the 54% of participants who remained in the study at Wave 5 (n = 1,848), and the other group, termed *study non-completers*, consisted of the 46% of participants who had dropped out of the study by Wave 5 (n = 1,596). The means and proportions of these two groups on study variables at Wave 1 were compared with t-tests and chi-square tests, respectively, to see if they were significantly different from each other. These comparisons revealed significant differences between study completers and non-completers on all study variables, for which p-values were all .01 or less, except for maternal support (p = .09): depressive symptoms (completers: M = .75, SD = 1.06; non-completers: M = .91, SD = 1.14; t = 4.25), maternal support (completers: M = 2.35, SD = .78; non-completers: M = 2.30, SD = .84; t = −1.71), peer support (completers: M = 2.49, SD = .31; non-completers: M = 2.46, SD = .37; t = −2.59), parent education (completers: M = 2.68, SD = 1.54; non-completers: M = 2.29, SD = 1.58; t = −7.37), age (completers: M = 13.25, SD = .73; non-completers: M = 13.38, SD = .81; t = 4.94), proportion male (completers: .43, non-completers: .56; χ^2 = 59.75), proportion black (completers: .34, non-completers: .51; χ^2 = 105.05), proportion living with both biological parents (completers: .58, non-completers: .40; χ^2 = 110.42). Thus, study non-completers endorsed higher levels of depressive symptoms, lower peer support, lower parent education, were more likely to be male and black, and were less likely to be living with both biological parents than study completers.

Measures

All measures used in the current analysis were based on the adolescent's self-report. In this study, 55 minutes were allowed by the school system for data collection. Because of these time limits, prior to conducting this study, we conducted a psychometric pilot study with 424 adolescents from one middle school to inform selection of items for the measures of depressive symptoms and maternal support to be used in the larger study. Two hours were allowed for data collection in the pilot study. Students were given full standardized scales of depressive symptoms and maternal support. Factor analyses were then conducted on full scales. It was estimated that students could complete all of the questionnaires in the time allotted for data collection if these measures were limited to three items each. Thus, for each abbreviated measure, the three items with the highest factor loadings in the pilot study were selected.

Demographics—Demographic characteristics included age in years, gender, race, cohort (i.e., grade at study entry), parent education, and family structure. Gender (male = 1, female = 0) and race (black = 1, white = 0) were coded so that girls and white youth, respectively, were reference groups. Parent education, a grand mean-centered time-invariant covariate measured as the youth's report at Wave I of the highest level of education attained by one of the youth's parents, was rated on a scale of 0 (*did not graduate from high school*) to 5 (*graduate or professional school*). Family structure was a dichotomous variable (1 = resides with both mother and father, 0 = other family structure) that was modeled as a time-varying covariate to allow for change in family structure (e.g., marital dissolution) over time. Cohort, the youth's grade at the study's outset (i.e., 6th, 7th, or 8th grade), was modeled as a time-invariant covariate represented by two dummy coded variables, with 7th grade as the reference group.

Depressive symptoms—Depressive symptomatology was assessed by self-report with three items selected from the Short Mood and Feelings Questionnaire (SMFQ; Angold, Costello, Messer, & Pickles, 1995), a 13-item measure designed for use in epidemiological studies of depression in children and adolescents. In past research the unifactorial nature of the entire SMFQ was demonstrated through principal components analysis (Angold et al., 1995). Internal consistency reliability for the SMFQ was acceptable (Cronbach's alpha = .85) in past research (Angold et al., 1995) and in the current study (Cronbach's alpha for the five waves ranged from .85 to .93). The criterion validity of the SMFQ was established via its moderately high, positive correlation (r = .67) with the Children's Depression Inventory (CDI; Kovacs, 1983), a widely used measure of children's depressive symptomatology (Angold et al., 1995). In addition, the SMFQ performed comparably to the CDI in the prediction of youths' depression diagnostic status (SMFQ: *OR* = 1.26, CDI: *OR* = 1.16), which was assessed using the Diagnostic Interview Schedule for Children (DISC; Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) (Angold et al., 1995). For the current study, respondents were asked to indicate, on a scale ranging from 0 (strongly disagree) to 4 (strongly agree), how much they agreed or disagreed with the following descriptions of how they had felt in the past three months: *I hated myself*, *I was a bad person*, and *I did everything wrong*. These items collectively tap affective and cognitive components of depression, which were the best predictors of depression diagnostic status (relative to physical components) and so are heavily represented in the SMFQ (Angold et al., 1995). The three items used in the current study loaded highly on the factor (i.e., all factor loadings > .60) (Angold et al., 1995), and they had the highest factor loading in the psychometric study that we conducted prior to this study. Moreover, each of these three items significantly discriminated depressed from nondepressed youth in individual logistic regression analyses to predict DISC depression diagnosis (all *OR*s 3.0 or higher) (Angold et al., 1995). Finally, these three items have demonstrated considerable discriminating power in item response theory (IRT) analyses (Sharp, Goodyer, & Croudace, 2006), further supporting the selection of these three SMFQ items to measure depressive symptoms. At every wave, a composite depression score was obtained by averaging scores on the subset of SMFQ items. Higher scores indicate greater levels of depressive symptoms.

Maternal support—Maternal support was assessed with three items from the Authoritative Parenting Index (API; Jackson, Henrikson, & Foshee, 1998), a measure of authoritative parenting style designed for use in survey research. The API assesses the two primary dimensions of authoritative parenting style, responsive and demanding behaviors. The responsiveness dimension subsumes the provision of emotional support (Jackson et al., 1998), the construct of primary interest in the current study. The API has evidenced adequate reliability and construct validity in samples of early (e.g., 6^{th} grade) and middle (e.g., 9^{th}, 10^{th} grade) adolescents consisting of black and white youth of both genders (Jackson et al., 1998). The selection of three API items from the original scale for use in this study was based on a principal components analysis with oblique rotation conducted on data from the pilot study described above; relative to the full set of items on the maternal responsiveness scale, the following three items exhibited the highest factor loadings, which were .85, .87, and .88, respectively: She tells me when I do a good job on things, she makes me feel better when I am upset, and *she wants to hear about my problems*. Further

supporting the selection of these three items were their high item-total correlations (all .77 or higher) in the pilot study. These items were rated on a scale ranging from 0 (*Not like her*) to 3 (*Just like her*). Youth responded to these items in reference to their mother, the individual most like a mother, or, if there were multiple mother-like figures, the mother figure with whom they live most of the time. Individual item scores were averaged to obtain a composite scale score at each wave, with higher scores indicating greater perceived maternal support. Internal consistency reliability was adequate at every wave, with Cronbach's alpha ranging from .82 to .89 across waves.

Peer support—Participants provided the names of as many as five of their closest friends at every wave and indicated how close they felt to each friend on a scale of 0 (*Not close at all*) to 3 (*Very close*). At every wave, youths' ratings of closeness to each friend were averaged to derive a composite scale score. Friendship closeness appears to correspond closely to the "intimacy" aspect of friendships captured in other widely used measures of peer relations such as the Network of Relationships Inventory (Furman, 1996). Although participants could list fewer than five friends, the great majority, i.e., between 83 and 89% for Waves 1-5, reported their level of closeness to five friends. Good coherence of individuals' ratings of closeness to each friend at every wave was suggested collectively by estimates of Cronbach's alpha, which ranged from .72 to .80 across the five waves. To provide some evidence of the convergent validity of the measure of peer support that was created for this study, within-wave correlations between peer support and other indicators of involvement with the same friends about whom they reported closeness were computed. Using a yes/no format, these indicators assess whether the participant had ever gone somewhere or done something with their friend outside of school in the last week and whether the participant's parents had ever met their friend. Within each wave, participants' endorsements of extracurricular involvement with their friend during the past week were averaged, and their indications of parental acquaintance with their friend were also averaged. As expected, peer support evidenced significant, positive correlations of a modest magnitude with each of these indicators at each wave, demonstrating that youth who reported greater closeness to their friends were also more likely to have spent time with their friends outside of school in the past week and to report that their parents had met their friends. Across waves, correlations between peer support and friend involvement during the past week ranged from .18 to .26 (all ps < .001), and correlations between peer support and parental acquaintance with friends ranged from .22 to .32 (all ps < .001).

Overview of Analyses—To accomplish the study's aims, growth curve modeling was conducted using the Proc Mixed procedure for multilevel modeling in SAS. A two-level model in which time was nested within persons was employed. Although individuals were technically nested in schools, schools were not included as a third level because estimation of a three-level model (time nested within persons nested within schools) for depressive symptoms revealed that the variance attributable to schools (.002) was of negligible import relative to the Level 1 residual variance (.79).

First, unconditional growth models for depressive symptoms were estimated to determine its functional form. Growth models were age-based, i.e., age was used to mark the passage of

time. This strategy capitalizes on the study's cohort sequential design to merge data from multiple cohorts (i.e., cohorts enrolled at grades 6, 7, and 8), thereby allowing accelerated trajectories of depressive symptoms to be modeled over approximately five years from ages 12 through 16. Age did not interact with cohort, further justifying the appropriateness of an accelerated longitudinal design (Miyazaki & Raudenbush, 2000).

The demographic variables parent education, family structure, and cohort were evaluated as possible covariates in preliminary analyses. Separate models were run for each demographic variable to evaluate their main effects and interactions with age as predictors of depressive symptoms. These analyses revealed significant main effects of parent education, family structure, and cohort and demonstrated that none of these variables interacted significantly with age. Thus, main effects of the aforementioned demographic variables were included as covariates in all conditional growth models. In addition, main effects of gender and race, an interaction between gender and age, and an interaction between race and age were included in all models to control for their effects in the evaluation of higher-order interactions involving gender, race, and age.

Both within and between-person effects of each type of social support on depressive symptoms and their interactions with age, gender, and race were examined in substantive analyses. Within and between-person effects of a variable can be disentangled from one another in multilevel modeling by modeling the variable as a person mean-centered, time-varying (i.e., Level 1) covariate and as a time-invariant (i.e., Level 2) covariate, respectively. Time-invariant covariates were grand mean-centered. All models were estimated under the assumption of independent residuals.

To arrive at a final, parsimonious conditional growth model of depressive symptoms, model-building proceeded in four phases. In the first phase of model-building, within-person effects of peer support and its interactions with age, gender, and race were estimated. In the second phase, between-person effects of peer support and its interactions with age, gender, and race were added to the model. At the between-person level, the estimation of interactions between each type of social support and age tests each type of social support as a predictor of growth in depressive symptoms. Within-person effects of maternal support and its interactions with age, gender, and race were evaluated in the third phase. In the fourth phase, between-person effects of maternal support and its interactions with age, gender, and race were evaluated. The final model[1] would potentially include demographic covariates; main effects of within and between-effects of peer support and maternal support; and interactions of each social support variable with age, gender, race, age and gender, and/or age and race.

The strategy for model-building was one of model-trimming, in which the most complex model was estimated first and then reduced to a simpler model through an iterative process

[1]To explore the possibility that peer and maternal support interact to predict depressive symptoms, a block of two-way interactions between the within-subjects effects of peer support and each of the within and between-subjects effects of maternal support and between the between-subjects effects of peer support and each of the within and between-subjects effects of maternal support was evaluated. In another block of three-way interactions, age was included in each of these four interaction terms. Neither of these blocks was significant at $p < .05$ (nor were any of the individual interaction terms in each block), indicating that peer and maternal support did not interact to predict initial levels of or growth in depressive symptoms.

in which nonsignificant terms were discarded until arriving at the most parsimonious model. Thus, for each phase of analysis, the first model estimated consisted of the highest-order interactions, all lower-order interactions necessary to provide an appropriate test of the highest-order interactions, main effects, and demographic covariates. To protect Type 1 error, when there were multiple interaction terms of the same order (e.g., multiple two-way interactions) to be tested, all interactions of the same order were evaluated collectively for significance as a block of terms using a multiple degree of freedom *F* test. If the block attained significance, the significance of its individual interaction terms were then inspected; interaction terms were retained if significant. This iterative process was repeated until all interaction terms of interest had been tested, resulting in a final model that consisted of the demographic covariates, main effects, and only significant interaction terms. From one phase of analysis to the next, all significant predictors from the earlier phase were retained for subsequent phases.

Results

Unconditional Growth Models

Unconditional growth models were estimated for depressive symptoms to determine its functional form. At level 1, depressive symptoms were modeled as a function of age, measured as a continuous variable ranging from 12 to 16, to examine levels of depressive symptoms at age 12 (i.e., the intercept, where age = 0), and growth in depressive symptoms over time (i.e., slope). At level 2, the intercept and slope as outcomes were each defined by a fixed effect to allow for estimation of the average intercept and slope across all individuals and a random effect to model variability in the intercepts and slopes among individuals.

The functional form of change in depressive symptoms was optimally captured by a linear growth model. Estimation of a model that included only the intercept and linear slope revealed that the predicted level of depressive symptoms at age 12 differed significantly from zero (fixed effects coefficient = .67, *SE* = .03, $p < .001$), and the significant, positive linear slope (fixed effects coefficient = .14, *SE* = .01, $p < .001$) indicated that, on average, depressive symptoms increased by .14 units per year. There was also significant interindividual variability in youths' predicted levels of depressive symptoms at age 12 (random effects variance = .66, *SE* = .06, $p < .001$) and rates of change of depressive symptoms (random effects variance = .07, *SE* = .01, $p < .001$). A quadratic growth model was also considered by evaluating the addition of fixed and random quadratic growth parameters to the model. However, there was neither a significant quadratic slope on average (fixed effects coefficient = −.01, *SE* = .008, *ns*) nor significant interindividual variability in the quadratic curvature of growth trajectories (random effects variance = .002, *SE* = .005, *ns*), thereby rejecting a quadratic growth model.

Conditional Growth Models

Peer support and depressive symptoms—Within-person effects of peer support and its interactions with age, gender, and race were examined in the first phase of analysis. The first model included demographic covariates, main effects, and interactions of peer support with age, gender, race, and age and gender and age and race. The block of two three-way

interactions between peer support, age, and gender and peer support, age, and race was not significant, $F(2, 8857) = 1.54$, *ns*. Both three-way interactions were therefore discarded, and the model was rerun to evaluate the block of three two-way interactions between peer support and age, peer support and gender, and peer support and race. This block of two-way interactions was not significant, $F(3, 8859) = 2.24$, *ns*, and so was eliminated. The final model for this phase of analysis consisted of control variables and the main effect of peer support, which was significant (see Table 1). Thus, although the within-person effect of peer support on depressive symptoms did not vary as a function of age, gender, or race, the hypothesis that higher levels of peer support would predict lower levels of depressive symptoms was supported at the within-person level.

In the second phase of analysis, the between-person effects of peer support and its interactions with age, gender, race, age and gender, and age and race were added to the final model from the first phase of analysis. The block of two three-way interactions between peer support, age, and gender and peer support, age, and race was not significant, $F(2, 8859) = .07$, *ns*, and so was eliminated. The block of two-way interactions between peer support and age, peer support and gender, and peer support and race was also not significant, $F(3, 3434) = 2.12$, *ns*, and so was eliminated. The main effect of peer support on depressive symptoms at the between-person level of analysis was significant (see Table 1), indicating that, at age 12, youth who perceived higher average levels of peer support experienced lower levels of depressive symptoms. Therefore, the final model for the second phase of analysis consisted of demographic covariates and the main effects of peer support at both the within and between-person levels of analysis.

Maternal support and depressive symptoms—Proceeding to the third analytic phase, within-person effects of maternal support and its interactions with age, gender, and race on depressive symptoms were added to the model. The block of two three-way interactions between maternal support, age, and gender and maternal support, age, and race was not significant, $F(2, 8856) = .43$, *ns*, and was eliminated. However, the block of three two-way interactions between maternal support and age, maternal support and gender, and maternal support and race was significant, $F(3, 8858) = 4.85$, $p < .01$. Inspection of these two-way interactions revealed significant interactions between maternal support and gender and maternal support and race. The final model for this phase of analysis consisted of the demographic covariates, main effects of both within and between-person effects of peer support, a within-person main effect of maternal support, and two-way interactions between maternal support and gender and maternal support and race (see Table 1). To interpret the two-way interactions, a simple slopes analysis was conducted to estimate the within-person effect of maternal support for each gender and for each racial group. Exploration of the moderating effect of gender indicated that, consistent with hypotheses, maternal support more strongly predicted lower depressive symptoms within persons among females (coefficient = −.13, $SE = .02$, $p < .001$) than males (coefficient = −.06, $SE = .02$, $p < .05$). Probing the interaction between maternal support and race revealed a significant within-person effect of maternal support on depressive symptoms for white (coefficient = −.14, $SE = .02$, $p < .001$) but not black youth (coefficient = −.04, $SE = .03$, *ns*).

For the fourth and final phase of model-building, the between-person effects of maternal support and its interactions with age, race, and gender were added to the final model from the previous phase of analysis. The block of two three-way interactions between maternal support, age, and gender and maternal support, age, and race was significant, $F(2, 8856) = 3.9$, $p < .05$. Inspection of the three-way interactions revealed that only the interaction between maternal support, age, and gender was significant (coefficient = .08, $SE = .03$, $p < .05$). The interaction between maternal support, age, and race was discarded, and the model was rerun. In the final model, all two-way interactions of maternal support with age and gender were retained due to the significant interaction of maternal support, age, and gender, and the two-way interaction between maternal support and race, which was significant, was also retained (see Table 1).

To interpret the significant interactions in the final model, simple slopes analyses were conducted. The slopes of depressive symptoms (i.e., growth in depressive symptoms) for girls and boys were estimated at the 25^{th}, 50^{th}, and 75^{th} percentiles of average maternal support. These points were chosen over the more commonly chosen points of the mean and one standard deviation above and below the mean to ensure that all of the points fall within the range of observed data. Although gender moderated the between-person effect of maternal support on growth in depressive symptoms, as expected, this moderating effect, shown in Figure 1, was of a slightly unanticipated nature. Among girls, increases in depressive symptoms were sharpest at the 25^{th} percentile of average maternal support (coefficient = .18, $SE = .02$, $p < .001$) and became less steep as the average level of maternal support increased (median: coefficient = .16, $SE = .02$, $p < .001$; 75^{th} percentile: coefficient = .14, $SE = .02$, $p < .001$). In contrast, among boys, increases in depressive symptoms were sharper at the 75^{th} percentile of maternal support (coefficient = .16, $SE = .02$, $p < .001$) and became less steep as the level of average maternal support decreased (median: coefficient = .14, $SE = .02$, $p < .001$; 25^{th} percentile: coefficient = .11, $SE = .02$, $p < .001$). Thus, depressive symptoms increased most sharply among girls who were lower on maternal support relative to other youth, whereas depressive symptoms increased most sharply among boys who were higher on maternal support relative to other youth. However, it is more noteworthy that, for both boys and girls, lower levels of maternal support were predictive of sharper increases in depressive symptoms.

Probing the interaction between race and maternal support demonstrated that, although between-person effects of maternal support on the level of depressive symptoms at age 12 were apparent for youth of both races, the effects were stronger for white (coefficient = −.33, $SE = .04$, $p < .001$) than black (coefficient = −.19, $SE = .05$, $p < .001$) youth.

Peer and maternal support and depressive symptoms—Peer and maternal support made significant, independent contributions to the prediction of depressive symptoms at the within-person level, as hypothesized. However, findings at the between-person level contradicted the hypothesis of unique, independent contributions of maternal and peer support to the prediction of depressive symptoms: The between-person main effect of peer support on depressive symptoms was no longer significant after including maternal support in the model (see Table 1).

Discussion

The current study evaluated the contributions of deficits in maternal and peer support to depressive symptoms during the developmental transition from early to middle adolescence. In addition, variation in these contributions according to age, gender, and race at the within and between-person levels of analysis was examined. Several noteworthy findings emerged, including the independent, protective effects of peer and maternal support on depressive symptoms within individuals and gender and racial differences in the protective effects of maternal support on depressive symptoms both within and between individuals.

Consistent with past research (Fauth et al., 2007; Ge et al., 2001; Gutman & Eccles, 2007), depressive symptom trajectories were characterized by linear growth during the transition from early to middle adolescence. This growth further underscores the vulnerability of mental health during this period. Consistent with hypotheses, individuals' own levels of maternal and peer support were reliably, inversely related to their own levels of depressive symptoms during early to mid-adolescence (i.e., within-person effects). Moreover, maternal and peer support simultaneously predicted lower depressive symptoms within individuals, affirming the continued relevance of social support from each source during adolescence. However, contrary to hypotheses, the prediction of depressive symptoms by low maternal and peer support did not vary as a function of age within youth. These findings contribute to theory by demonstrating that both parents and peers warrant consideration in the conceptualization of interpersonal models of adolescent depressive symptoms.

Examination of the extent to which youths' standing on maternal and peer support predicted their standing on depressive symptoms relative to other youth (i.e., between-persons' effects) revealed a different pattern of findings. Although youth with deficits in peer support had greater depressive symptoms at age 12 relative to youth with higher average levels of peer support, as expected, this effect was reduced to nonsignificance after controlling for maternal support. In addition, individual differences in average peer support failed to explain individual differences in growth trajectories of depressive symptoms. In contrast, individual differences in average maternal support did account for individual differences in depressive symptom trajectories. These findings collectively indicate that the better predictor of youths' relative standing on depressive symptoms, both in terms of level and growth, is youths' standing on maternal support.

The continued significance of maternal support in the presence of peer support was expected given the ongoing valuation of mothers as a source of emotional support by adolescents (Furman & Buhrmester, 1992). However, it was surprising that peer support did not maintain significance in the presence of maternal support in interindividual analyses given developmental theory and research asserting the intensification of peer influences during adolescence (Furman & Buhrmester, 1992). The current findings may be a veritable representation of the interindividual contributions of average maternal and peer support to depressive symptoms. However, it is also possible that the measure of peer support did not fully capture the facets of peer relations relevant to depressive symptoms. The measure of peer support focuses on closeness to friends, providing no information about perceptions of peers' trustworthiness, companionship, or helpfulness as resources for problem-solving.

Negative aspects of peer relations, such as conflict with or criticism from peers, may be especially relevant to depression, but are not represented. In addition, given its emphasis on emotional closeness, the measure of peer support may be better capturing this construct in girls than boys; other aspects of peer relations, such as companionship, may be more relevant to boys. Assessing these facets of peer relations may have enhanced the construct validity of the measure of peer support, thereby potentially bolstering its predictive utility in substantive analyses and revealing stronger effects of peer support.

As hypothesized, gender moderated the intraindividual effects of maternal support on depressive symptoms, indicating that deficits in maternal support more strongly predicted depressive symptoms for girls than boys. Thus, within-person variation in depressive symptoms is more tightly tied to variation in levels of maternal support among girls than boys. Consonant with theoretical claims of girls' stronger interpersonal orientation (Cyranowski et al., 2000), this finding dovetails with research showing girls' greater susceptibility to the influence of maternal support (Avison & McAlpine, 1992; Ge et al., 1994; Leadbeater et al., 1999; Meadows et al., 2006; Meadows, 2007; Windle, 1992). This finding adds to the growing body of evidence indicating that attention to the interpersonal domain is essential for understanding influences on females' mental health.

Gender also moderated the interindividual effect of maternal support on growth in depressive symptoms. Girls with deficits in average maternal support relative to other youth are more vulnerable to increases in depressive symptoms. In contrast, boys with *higher* levels of average maternal support relative to other youth are more prone to increases in depressive symptoms. These gender differences, although intriguing at first blush, are less critical than the finding that both boys and girls with higher levels of maternal support experience less steep increases in depressive symptoms than youth with lower levels of maternal support. This finding converges with past research demonstrating a protective effect of maternal support on depressive symptoms during adolescence (e.g., Stice et al., 2004). Thus, as youths' standing on maternal but not peer support predicted increases in depressive symptoms relative to other youth, maternal support may better facilitate identification of youth at risk of experiencing increases in depressive symptoms.

Protective effects of maternal support on depressive symptoms varied by race. Individuals' own variation in depressive symptoms was explained by variation in their own deficits in maternal support among white but not black youth (i.e., intraindividual effects). In addition, youths' relative standing on depressive symptoms at age 12 was predicted by their relative standing on maternal support among both white and black youth, but the effect was stronger among white youth. This finding is somewhat surprising. However, it may be that the depressive symptoms of black youth are simply better predicted by other factors not examined here, such as stressful events in general (e.g., Brown et al., 2007), the stress of poverty (Costello, Keeler, & Angold, 2001), and a type of stress that is specific to black youth, that of racial prejudice and discrimination (Dubois, Burk-Braxton, Swenson, Tevendale, & Hardesty, 2002), all of which are important predictors of psychological adjustment in black youth. The experience of racial prejudice may be particularly relevant to rural black youth in the South, as lower racial tolerance has been documented among nonurban and Southern individuals (Tuch, 1987). In sum, more research is needed to

improve our understanding of the psychosocial factors that contribute to depressive symptoms among rural black youth.

Disentangling the within and between-person effects of maternal and peer support permits the extraction of clear clinical implications. Given that youth of both genders and races who are low on peer support tend to have higher levels of depressive symptoms in early adolescence relative to other youth, deficits in peer support may indicate that an individual should be targeted for inclusion in interventions to reduce or prevent depression in adolescents. However, maternal support appears to be the better marker of the need for intervention. After identifying those individuals who are most in need of intervention, peer support may then serve as a viable target of intervention efforts to reduce depressive symptoms in youth of both genders and races. Maternal support may also be a worthwhile target of intervention, particularly for girls and white youth. Targeting peer support directly in clinical settings may be a challenge given that peers are not typically included in psychotherapy. However, peer support may be indirectly addressed by improving social skills of the intervention recipient, which may then improve peer support. In addition, peer support may be more easily targeted in a school setting through a widely disseminated prevention protocol that includes a focus on peer relations. However, as youths' peer relations are likely more vulnerable to dissolution in the face of naturally occurring changes, such as the transition from middle to high school, moving, etc., the relatively greater stability of the maternal relationship may render it a more viable, pragmatic focus of intervention efforts. Moreover, the more common inclusion of mothers in adolescents' psychotherapy also spotlights maternal support as a more feasible target of intervention in clinical practice.

The limits on these conclusions deserve mention. The study's design and analysis of concurrent effects do not permit inferences of causality or the temporal precedence of social support over depressive symptoms. Although this study emphasizes the temporal precedence of social support over depressive symptoms, prospective, erosive effects of depressive symptoms on peer (Stice et al., 2004) and family support (Slavin & Rainer, 1990) have been demonstrated. Thus, although not examined here, reciprocal influences between social support and depressive symptoms are likely operative. Also, given that youth who remained in the study at the final wave appeared more psychologically and socioeconomically advantaged than those who dropped out, the study's results may not generalize to the most vulnerable youth. In addition, the exclusive reliance on self-report measures may have inflated observed relationships among study variables due to common method variance and the use of a single informant. Moreover, as with any abbreviated measures, the measures may not have effectively tapped their constructs. However, some support for the validity of the items that comprise this study's measures is found in the items' associations with other measures of the same or similar constructs in our psychometric analyses and those from other research (e.g., Angold et al., 1995). Nonetheless, although the measures appear to represent reasonable proxies for their constructs, the correspondence between the current findings and the true relationships among maternal and peer support and depressive symptoms is likely attenuated by imperfections in measurement.

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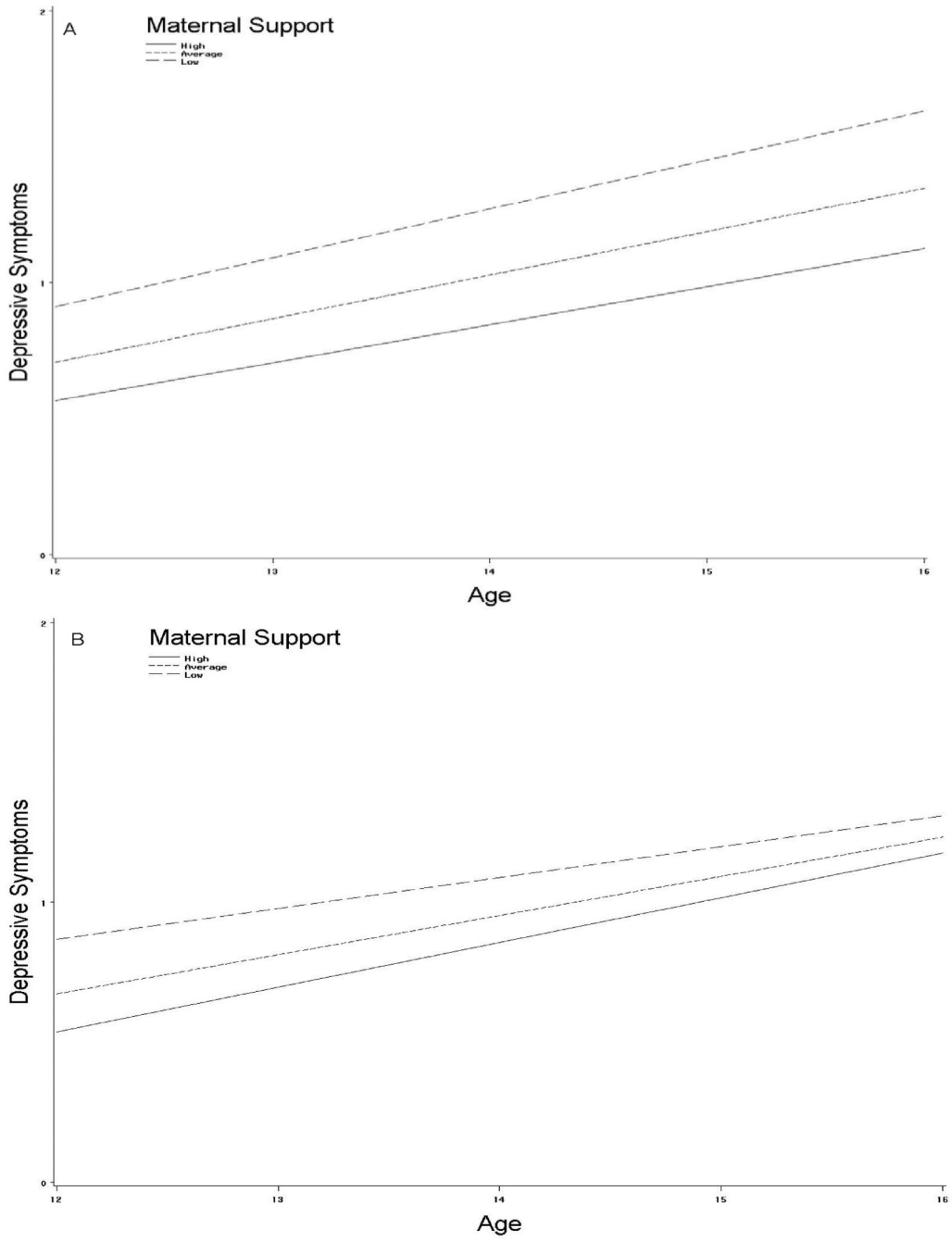

Figure 1.

Line graphs depicting the average growth trajectories of depressive symptoms for females and males at high, average, and low levels of maternal support at the between-persons level of analysis. High, average, and low levels of maternal support correspond to the 75th, 50th, and 25th percentiles of maternal support, respectively. Growth trajectories for females and males are displayed in Panels A and B, respectively.

Table 1

Coefficients and Standard Errors for the Final Model of Depressive Symptoms within Each Phase of Analysis (N = 3,444)

Variable	Peer support		Maternal support	
	Phase 1	Phase 2	Phase 3	Phase 4
Intercept	.78(05)***	.78(05)***	.80(.05)***	.78(05)***
Age	.20(.02)***	.20(.02)***	.20(.02)***	.19(02)***
Gender × Age	−.04(.02)	−.04(.02)	−.03(.02)	−.04(.02)
Race × Age	−.08(.02)***	−.08(.02)***	−.07(.02)**	−.07(.02)**
Peer support (*WP*)	−.07(.03)*	−.07(.03)**	−.07(.03)*	−.07(.03)*
Peer support (*BP*)		−15(.05)**	−.15(.05)**	−.07(.05)
Maternal support (*WP*)			−.17(.03)***	−.17(.03)***
Maternal support (*WP*) × Gender			.08(.03)*	.07(.03)*
Maternal support (*WP*) × Race			.10(.03)**	.10(.03)**
Maternal support (*BP*)				−.32(.05)***
Maternal support (*BP*) × Gender				−.02(.08)
Maternal support (*BP*) × Race				.15(04)***
Maternal support (*BP*) × Age				−.03(.02)
Maternal support (*BP*) × Gender × Age				.08(.03)*

Note. All models control for gender, race, parent education, family structure, and cohort. Coefficients are outside parentheses, standard errors are inside parentheses. All coefficients represent fixed effects. *WP* = within-person effect, *BP* = between-person effect.

* $p < .05$.

** $p < .01$.

*** $p < .001$.