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EMPIRICAL RESEARCH

Developmental changes in associations between depressive symptoms and peer relationships: a four-year follow-up of Chinese adolescents

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Abstract
Interpersonal theories have suggested that depressive symptoms influence and are influenced by peer relationships, but little is known about how depressive symptoms-peer relationships associations change with age. This study examined the longitudinal associations between both group- and dyadic-level peer relationships and depressive symptoms in a community sample of Chinese youth ($n = 2179$; 47.9% girls) from grades 6 to 9. Results demonstrated correlations between stable trait-like components of peer acceptance/rejection and depressive symptoms, with no dynamic state-like associations being observed. The results also suggested that conflict with friends operated as a consistent interpersonal risk for subsequent depressive symptoms across late childhood to middle adolescence. Support from friends was not significantly associated with depressive symptoms in early adolescence, but influenced and was influenced by depressive symptoms in middle adolescence. This study highlights that depressive symptoms are associated with youth's peer social status and friendship in different ways and that the interactions between friendship and depressive symptoms get strengthened with the transition to adolescence.

Keywords Depressive symptoms · Peer social status · Friendship · Adolescence

Introduction

Depressive symptoms are among the most prevalent mental health problems during childhood and adolescence and undermine youth's social and mental functioning (World Health Organization 2012). It has been well documented that depressive symptoms are often expressed within, and intricately linked to, interpersonal interactions and relationships (Rudolph et al. 2016). While depressive symptoms increase dramatically from preadolescence (Hankin et al. 2015), youth experience significant changes in their peer relationships, including the declining need for group affiliation and the increasing reliance on intimate relationships (Poulin and Chan 2010). In recent years, several longitudinal studies have been conducted in an effort to elucidate how different aspects of peer relationships influence and are influenced by depressive symptoms during childhood and adolescence (e.g., Burke et al. 2017; Kochel et al. 2012; Sentse et al. 2017), but few have paid special attention to the period of youth's transition to adolescence, and no study has yet investigated how depressive symptoms-peer relationships associations change from childhood to adolescence. To address this gap, this study examined developmental changes in the transactional associations between depressive symptoms and peer relationships (including peer acceptance/rejection and support from and conflict with friends) using an urban community sample of Chinese youth followed annually from grades 6 to 9, thus covering the transition toward adolescence.

Transactional Associations Between Depressive Symptoms and Peer Relationships

Three theoretical models have been proposed regarding the longitudinal associations between interpersonal relationships and depressive symptoms: the *interpersonal risk* model, the *symptom-driven* model and the *transactional*

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model (Kochel et al. 2012). According to the interpersonal risk model, children who are involved in a negative interpersonal context may have less support and lack a sense of belonging, which are further related to depressive symptoms (Witvliet et al. 2010). In addition, stressful life events, such as poor experiences with peers, can be internalized into maladaptive schemas and negative cognition, and subsequently cause increases in depressive symptoms (Ladd and Troop-Gordon 2003). In contrast, the symptom-driven model suggests the possibility that depressive symptoms antecede the development of poor peer relationships. According to the stress generation theory, depressive symptoms interfere with adolescent development of adaptive social skills and elicit conflict with and negative responses from peers, because they are less likeable and less attractive and are perceived as being too sensitive to play with (Hammen 2006). Based on these two models, the transactional model indicates that interpersonal relationships and depressive symptoms are reciprocally related across time (Rudolph et al. 2016). Joiner and Timmons (2009) referred to an idea of "self-propagatory processes" that depression and its sequelae induce one another and thus propagate themselves. Specifically, depressed individuals act in ways that generate stresses and conflicts in their relationships, seek negative feedbacks and excessive reassurance, elicit negative responses from the environment, and in turn increase the likelihood of further depressive symptoms.

Drawing on these points, researchers have tested the direction of the effects between depressive symptoms and peer relationships using time-lagged panel design. Among these studies, evidence has been reported respectively for the interpersonal risk effect of peer rejection (Nolan et al. 2003), the symptom-driven effect on peer rejection (Agoston and Rudolph 2013; Krygsman and Vaillancourt 2017), peer acceptance (Kochel et al. 2012), and friends' support (Klima and Repetti 2008), as well as transactional associations between depressive symptoms and friends' support (Burke et al. 2017) and peer rejection (Hoglund and Chisholm 2014). Although there was some discrepancy in the supported direction of effects across these studies, collectively they provided a strong case for the plausibility that peer relationships and depressive symptoms are related in a transactional way.

Despite the important contributions of the studies mentioned above, there are still some limitations. First, most of the previous studies focused on only one type of peer relationships (e.g., peer rejection, peer acceptance, or friends' support). As group- and dyadic-level relationships serve distinct functions in satisfying youth's psychological needs, both levels of peer relationships should be considered for understanding the different links between specific kinds of peer experience and depressive symptoms. Second, the extant studies mainly examined the negative aspects of peer relationships (e.g., peer rejection and victimization), with few efforts on positive aspects of relationships. While negative peer interactions operate as interpersonal stressors, the lack of positive peer relationships (e.g., peer acceptance and support from friends) impairs children's psychological functioning which may also lead to depressive symptoms. Both aspects should be covered for an integrated understanding of the depressive symptoms-peer relationships associations. Third, the previous studies mainly focused on one particular developmental stage (e.g., middle childhood or early adolescence), failing to examine the possible changes in the transactional associations between peer relationships and depressive symptoms across stages. According to the developmentally informed model of the interpersonal context of adolescent depression, normative transitions create an interpersonal context of risk for depression (Rudolph 2009). Thus, more studies with long-term longitudinal design covering both childhood and adolescence and with comprehensive indices of peer relationships are needed to elucidate how depressive symptoms are associated with stage-specific peer relationships.

Peer Social Status and Friendship Quality as Distinct Interpersonal Correlates of Depressive Symptoms

It has been suggested that peer social status (e.g., peer acceptance and peer rejection) and dyadic friendship (e.g., friendship quality) operate as crucial interpersonal correlates of depressive symptoms (Burke et al. 2017; Cao et al. 2018; La Greca and Harrison 2005). Whereas peer social status provides a sense of inclusion and belonging, friendship is a unique source of affection, intimacy, and nurturance (Ladd 2005). Given these distinct functions, peer social status and friendship might be related to depressive symptoms in different ways (Klima and Repetti 2008; La Greca and Harrison 2005).

As indices of peer social status, peer acceptance and rejection represent the degree to which youth are liked or disliked by their classmates, respectively (Ladd 2005). Although negatively correlated, they are separate constructs of peer social status. Both were indicated to be linked to childhood and adolescent depressive symptoms (Agoston and Rudolph 2013; Kochel et al. 2012; Sentse et al. 2010). More specifically, longitudinal studies mainly supported the symptom-driven effects on peer rejection and acceptance. For example, studies on middle childhood and early adolescence have found that previous depressive symptoms predicted subsequent peer rejection (Agoston and Rudolph 2013; Krygsman and Vaillancourt 2017) and low peer acceptance (a latent composite index including both peer acceptance and rejection; Kochel et al. 2012), but not vice

versa. Only a few studies have indicated reciprocal associations between peer rejection and internalizing problems —a construct containing depressive symptoms (Hoglund and Chisholm 2014). Other few studies found no associations between depressive symptoms and peer rejection in middle childhood (Klima and Repetti 2008) and peer acceptance in early adolescence (Sentse et al. 2017).

Friendship represents children's dyadic relationships with peers, characterized by companionship, intimacy, and conflict between the youth and his or her intimate friends (Ladd 2005). High-quality friendship protects youth from depressive symptoms (Burke et al. 2017; Liu et al. 2019), while conflict with friends confers a risk for depressive symptoms (La Greca and Harrison 2005). In turn, children with depressive symptoms not only elicit fewer positive reactions from their friends (Klima and Repetti 2008), but also engage in more negative behaviors with friends (Oppenheimer and Hankin 2011), according to the stress generation theory (Hammen 2006). Thus, both positive and negative features of adolescents' friendship quality (i.e., support from and conflict with friends) should be considered to illustrate the friendship-depressive symptoms linkages. Existing studies on the temporal ordering of friendship quality and depressive symptoms have provided inconsistent findings. Some found symptom-driven pathways with depressive symptoms predicting subsequent friends' support (Klima and Repetti 2008; Oppenheimer and Hankin 2011) and conflict with friends (Oppenheimer and Hankin 2011), while others reported bidirectional longitudinal associations between friendship quality and depressive symptoms (Burke et al. 2017; Vannucci et al. 2018).

Taken together, preliminary evidence has been reported that peer social status and friendship quality operate as distinct interpersonal correlates of depressive symptoms. Note that the extant studies focused mainly on the associations between depressive symptoms and peer group status, with little attention being paid to friendship. Studies with more comprehensive indices of peer relationships are needed.

Developmental Changes in the Depressive Symptoms-Peer Relationship Associations

Researchers following transactional model would anticipate that associations between peer relationships and depressive symptoms change across the course of development (Serbin et al. 2015). Despite of the bulk of research on the temporal ordering of peer relationships and depressive symptoms, few have considered the developmental changes in the magnitude and even the nature of these associations.

The transition from childhood to adolescence is accompanied by significant shifts in personal emotional needs and social groups and relationships (Poulin and Chan 2010). The relative importance of group- and dyadic-level peer relationships changes across development as new social needs emerge. To the extent that children's need for group affiliation gives ways to an increasing reliance on intimate friendship as they enter preadolescence, the function of peer social status on depressive symptoms tends to decline but the impact of intimate friends tends to increase with age.

Literature has implied the potential developmental changes in the interpersonal risk pathways. Peer rejection was found to be predictive of depressive symptoms in early childhood (from kindergarten to third grade; Hoglund and Chisholm 2014), but did not predict depressive symptoms in middle childhood and adolescence (i.e., grades 5–12; Agoston and Rudolph 2013; Krygsman and Vaillancourt 2017; Sentse et al. 2017). Peer acceptance also showed no impact on depressive symptoms in middle and late childhood (i.e., grades 4–6; Kochel et al. 2012; Klima and Repetti 2008), except that only one study found peer acceptance predicting subsequent internalizing problems in early adolescence (i.e., between ages 11–13; Sentse et al. 2010). In contrast, although support from friends did not predict depressive symptoms in childhood (i.e., grade 4–6; Kingery et al. 2011; Klima and Repetti 2008) or in early adolescence (i.e., grades 6–8; Oppenheimer and Hankin 2011; Prinstein et al. 2005), both low friends' support and high conflict with friends increased risks for depressive symptoms after early adolescence (between ages 13–17; Burke et al. 2017; Vannucci et al. 2018). Taken together, previous literature suggested that the interpersonal risk effects unfold for peer social status before middle childhood and for friendship after early adolescence.

The symptom-driven effects may also change over time. First, as part of normative maturation, youth's ability to understand the emotion of others, to resolve interpersonal conflict, and to regulate emotion increases with age (Rudolph et al. 2016). However, the weakness of depressed children and adolescents in the above abilities runs contrary to the age norms and expectations for social interactions, which may result in serious peer problems (Hoglund and Chisholm 2014). Second, when children enter middle school, they have to adapt to larger peer groups and need to establish new relationships with unfamiliar peers. Children with elevated depressive symptoms, unfortunately, do not have sufficient social skills and are more sensitive to social failure, thus experiencing more difficulties and interpersonal stressors in peer interactions within this transition period (Rudolph 2009). Accordingly, the symptom-driven effects might become stronger with age.

Unfortunately, the extant literature is too limited to lend sufficient supports for this hypothesis. Depressive symptoms were found to be consistently predictive of peer rejection before middle adolescence (i.e., before seventh

grade; Agoston and Rudolph 2013; Krygsman and Vaillancourt 2017), but not in later stages (i.e., after age 11; Sentse et al. 2017). In contrast, literature is unavailable to make comparisons between stages about the symptom-driven effects on peer acceptance, because existing studies mainly focused on middle childhood (i.e., grades 4–6; Klima and Repetti 2008; Kochel et al. 2012). Regarding friendship quality, symptom-driven effects were evident in research on middle childhood (i.e., grades 4–6; Klima and Repetti 2008) as well as early and middle adolescence (i.e., between ages 13–17; Burke et al. 2017; Oppenheimer and Hankin 2011; Vannucci et al. 2018; see Prinstein et al. 2005 for an exception). No research has yet examined whether the symptom-driven effects change across stages.

Gender Differences

Gender is an important factor to consider when testing the associations between peer relationships and depressive symptoms, given that depressive symptoms are more prevalent among girls (Hankin and Abramson 2001). Besides, in terms of peer interaction, girls attach more salience to dyadic friendships while boys normally prefer interactions in larger groups (Rose and Rudolph 2006). Thus, interpersonal theories suggest that youth's depressive symptoms are linked with peer relationships in gender-specific ways (see Rudolph 2009 for a review). Empirical studies have reported greater interpersonal risk effect of peer rejection on girls' internalizing problems (Sentse et al. 2010), and stronger symptom-driven effect on boys' peer acceptance (Klima and Repetti 2008). Most of the extant studies, however, have not found gender differences in the longitudinal associations between depressive symptoms and peer rejection (Agoston and Rudolph 2013; Hoglund and Chisholm 2014; Krygsman and Vaillancourt 2017; Sentse et al. 2017) and friendship quality (Klima and Repetti 2008; Oppenheimer and Hankin 2011; Prinstein et al. 2005; Vannucci et al. 2018). Again, more studies are in need to test whether girls and boys differed in the associations between peer relationships and depressive symptoms.

Current Study

Although the studies described above have expanded the knowledge of the longitudinal associations between depressive symptoms and peer relationships, it remains unclear whether the depressive symptoms-peer relationships links change with age. To address this gap, the current study examined the dynamic transactions between depressive symptoms and two aspects of peer relationships—peer acceptance/rejection and friendship quality—using a longitudinal design annually from grades 6–9, thus covering the transition from childhood to adolescence. Based on theoretical considerations and empirical evidence, it is reasonable to hypothesize that the interpersonal risk effect of peer rejection/acceptance on depressive symptoms would become weaker or even disappear, while the symptom-driven effect would become stronger with age. For the friendship-depressive symptoms associations, there was reason to expect that both effects would become stronger with age as friendship become increasingly salient for adolescents. Additionally, the present study tested for possible gender differences in these associations for an exploration purpose, given the inconsistent findings in previous studies.

Methods

Participants

The participants were 2179 young adolescents (1044 girls; M_{age} at the first wave = 11.64 years; $SD = 0.52$) who participated in the Longitudinal Study of Chinese Children and Adolescents (LSCCA). Data from this study were collected annually in the spring semesters across grades 6–9. The participants transitioned from elementary schools to middle schools in grade 7. Nearly all the participants were of Chinese Han ethnicity (the vast majority ethnic group in China, at 92% of the total population) and were native Mandarin speakers (the majority language in China, spoken by 70% of the total population). All the participants lived in the urban area of Jinan, the capital city of Shandong Province in eastern China. Due to the one-child per family policy that has been implemented in China since the late 1970s, 87.9% of the participants had no siblings. In this sample, 61.3% of the mothers and 71.0% of the fathers had an educational attainment ranging from vocational school to a college or university degree. Most of the parents worked in occupations ranging from peasants or jobless (7.4% for mothers and 3.3% for fathers), blue collar (24.4% of the mothers and 27.8% of the fathers) to professional (68.2% of the mothers and 69.0% of the fathers). Both the median and mean monthly combined family income were between about US $650 and 800. Based on demographics, the sample was representative of the urban population in East and South China (National Bureau of Statistics of China 2009). Due to sample attrition, the valid numbers of the participants at each wave were 2171, 2015, 1988, and 1938, respectively.

Procedure

The current study was approved by the local ethics committee. Informed assent (children) and consent (parents and school principals) were obtained prior to data collection. At each wave, during a single class period in the schools (about

40 min), the children completed a battery of self-report measures regarding their depressive symptoms and social experiences and peer nominations about peer social status. Each child received a gift worth about $1.

Measures

Depressive symptoms

Depressive symptoms were assessed annually from grades 6–9 with the Chinese version of the Children's Depression Inventory (CDI; Kovacs 1992; Zhang et al. 2019), a 27-item self-report measure assessing depressive symptoms experienced in the previous two weeks on a 3-point scale from 0 (*absence of symptoms*; e.g., "I am sad occasionally") to 2 (*definite symptoms*; e.g., "I am sad all the time"). The Chinese version of the CDI has demonstrated good construct validity in Chinese children and adolescents (e.g., Zhang et al. 2019). The Cronbach's alphas were consistently 0.89 across all waves in this study.

Peer acceptance and rejection

Participants' peer acceptance and rejection were assessed annually from grades 6 to 9. A standardized peer-nomination procedure was used to collect information on individuals' social status. Each participant was asked to nominate up to three classmates as (a) being liked most, and (b) being liked least. The nominations received were summed and then standardized within each class to permit appropriate comparisons.

Friendship quality

The Network of Relationships Inventory (NRI; Furman and Buhrmester 1985) was used to assess the target adolescents' perceived friendship quality with their desired best friends from grades 6 to 9. Using a 5-point Likert scale, the NRI comprises 5 three-item subscales that load on two broad factors: (a) support (companionship, affection, intimacy, and instrumental help) and (b) conflict. Participants responded to all 15 items according to the interactions between them and their desired best friends. This inventory has been used repeatedly with Chinese populations, and has yielded good reliability (Liu et al. 2019). In this study, the Cronbach's alphas for support and conflict from grades 6 to 9 were 0.92, 0.91, 0.92, 0.93 and 0.81, 0.84, 0.84, 0.84, respectively.

Analytical Strategy

To address the above aims, both the cross-lagged panel model (CLPM) and the random intercepts cross-lagged panel model (RI-CLPM) were employed in this study. The CLPM has been used extensively in contemporary longitudinal studies. Compared with the CLPM, the RI-CLPM disentangles the within-person process from stable between-person differences, through the inclusion of random intercepts (i.e., the trait-like components and time-invariant nature of each construct; Hamaker et al. 2015). Correlations between the random intercepts capture the between-person effects. The lagged paths between the dynamic residuals (containing measurement errors) left by the random intercepts represent the time-specific within-person effects. In the present study, the CLPM results would be directly comparable to the literature, and the RI-CLPM results would be more accurate and provide an example for future studies. Based on the available literature, this study remained open as to whether the dynamic processes between peer relationships and depressive symptoms would change when the trait-like components were controlled.

Peer social status and friendship quality was examined in separate models. In order to avoid biases in model estimation caused by measurement errors, in both strategies, friend support, conflict and depressive symptoms were modeled as latent variables. Four indicators of friend support were parceled according to the companionship, affection, intimacy, and instrumental help subscales of the NRI measure, with the three original items assessing friend conflict being used as the indicators of latent construct. Using the factorial algorithm, depressive symptoms were indicated by three parceled indicators from the 27 CDI items (Rogers and Schmitt 2004). The longitudinal metric invariance was examined and established, therefore the factor loadings of each latent variable were fixed to be equal across the four waves in the following analyses. Residuals of the same indicators of corresponding latent variables were correlated over time to minimize biases (Zhang et al. 2019). Peer acceptance and rejection were modeled as manifest variables, because they were measured by single items.

Based on the above modeling specifications, the hypotheses were examined by testing a series of nested models (Zhang et al. 2019). First, a stability model (Model 0) that only included the within-time correlations and autoregressive paths of each construct was estimated. The subsequent models contained additional cross-lagged paths. Models 1a and 1b estimated paths from peer relationship indices (i.e., peer acceptance and rejection, friend support and conflict) to depressive symptoms, whereas Models 2a and 2b estimated paths in the opposite directions. Models 1a-2b were all compared with the baseline stability model to examine the presence of the interpersonal risk effect and the symptom-driven effect.

To test the hypotheses regarding the developmental changes in the interpersonal risk and symptom-driven effects, the cross-lagged paths were constrained as time

invariant respectively (Models 1a-1, 1b-1, 2a-1, 2b-1) and compared with the unconstraint models. Based on model comparisons thus far, a combined model was specified (Model 3) to demonstrate the dynamic transactions between depressive symptoms and peer relationships. Finally, if Model 3 did not show a worse model fit than a full model (Model 4) where all possible cross-lagged paths were freely estimated, then it would be selected as the final model.

The same series of nested model comparisons were used to test the RI-CLPM models but also included correlations among the random intercepts of each construct. Finally, the cross-lagged paths (and correlations between the random intercepts in the RI-CLPM) in the final models were examined for gender-invariance by multiple-group analyses.

The models were estimated using Mplus 7.0 (Muthén and Muthén 1998–2012). The maximum likelihood robust estimator (MLR) was used to account for nonnormally distributed data. Models were deemed to have adequate fit when the comparative fit index (CFI) and the Tucker-Lewis index (TLI) > 0.95 and the root mean square error of approximation (RMSEA) < 0.05 (Little 2013). The Satorra–Bentler scaled chi-square difference test was used for comparisons between nested models (Satorra and Bentler 2001).

Results

Missing Data

Missing data was evaluated at three levels in this study, including the unit level (i.e., sample attrition), the construct level (i.e., one member not completing the questionnaire), and the item level (i.e., some items not being answered). As is typical in longitudinal studies, sample attrition existed and was mainly due to transferring to other schools, school absence, and long-term sick leave. Of the total sample, 1928 participants had complete data at all four waves, while 62 (2.8%) participated in three waves, 25 (1.1%) participated in two waves, and 164 (7.5%) participated in one wave. Controlling for the unit level of missingness, the percentages of missing data at construct level ranged from 0.01 to 12.7%, with the highest being for peer social status at seventh grade. At the item level, missing data across all measures was largely below the 5% threshold point (Kline 2016).

Little's Missing Completely at Random test indicated that missingness at the unit and construct levels was not missing completely at random (Little 2013), χ^2 (733) = 1135.77, $p < 0.001$. At the unit level, the respondents with missing data scored relatively higher in depressive symptoms and peer rejection (between $d = 0.20$ and $d = 0.54$) but lower in peer acceptance than the others (between $d = -0.43$ and $d = -0.45$). Turning to the construct level, the participants with missing data scored relatively lower in eighth grade peer acceptance ($d = -0.14$) and higher in peer rejection at grades 7–9 (between $d = 0.17$ and $d = 0.25$), with no significant differences being found in other variables. The correlations between missing data indicators (0 = *not missing*, 1 = *missing*) and the only-child status, family socioeconomic status, and academic achievement at unit and construct levels were significant ($ps < 0.01$). Accordingly, missingness at both levels in this study can be treated as being missing at random.

Missing data at unit and construct levels were handled using the full information maximum likelihood (FIML) method with the MLR estimation in Mplus. The FIML method can yield unbiased estimations of coefficients, particularly when latent variables and auxiliary variables (i.e., only child status, family socioeconomic status, and academic achievement in this study) are present (Little et al. 2014). Given the trivial amount of item level missingness, missing data was replaced by the average scores of other items from a same dimension, which would not bias the estimates.

Preliminary Analyses

Full metric invariance for the latent constructs of friend support and partial metric measurement invariance for the latent constructs of friend conflict (allowing the loading of one item to be freely estimated at the first wave) and depressive symptoms (allowing the loadings of two indicators to be freely estimated at the first wave) were established. Model fit indices were acceptable across genders and waves: friend support, gender, $\Delta\chi^2$ (12) = 16.99, $p = 0.150$, and wave, $\Delta\chi^2$ (9) = 15.07, $p = 0.089$; friend conflict, gender, $\Delta\chi^2$ (8) = 12.88, $p = 0.116$, and wave, $\Delta\chi^2$(5) = 5.36, $p = 0.373$; depressive symptoms, gender, $\Delta\chi^2$(8) = 9.59, $p = 0.295$, and wave, $\Delta\chi^2$(4) = 7.19, $p = 0.126$.

As shown in Table 1, bivariate correlations between the latent constructs revealed that depressive symptoms showed high consecutive-year stability over time (*r*s range = 0.66–0.78), and peer social status and friendship quality showed moderate to high consecutive-year stability over time (*r*s range = 0.35–0.80). Additionally, there was evidence for low to moderate concurrent (|*r*|s range = 0.11–0.33) and longitudinal (|*r*|s range = 0.10–0.27) associations between peer relationships and depressive symptoms.

Associations Between Peer Acceptance, Rejection and Depressive Symptoms

Model fit indices and model comparisons for the nested models are presented in Table 2. For the CLPM models, Model 1a

Table 1 Correlations between depressive symptoms, peer social status and friendship quality

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Dep G6	–																		
2. Dep G7	**0.66*****	–																	
3. Dep G8	0.61***	**0.74*****	–																
4. Dep G9	0.53***	0.65***	**0.78*****	–															
5. Acp G6	−0.17***	−0.15***	−0.13***	−0.14***	–														
6. Acp G7	−0.14***	−0.16***	−0.15***	−0.13***	**0.48*****	–													
7. Acp G8	−0.16***	−0.18***	−0.18***	−0.17***	0.41***	**0.53*****	–												
8. Acp G9	−0.11***	−0.13***	−0.13***	−0.13***	0.35***	0.45***	**0.59*****	–											
9. Rej G6	0.20***	0.15***	0.15***	0.11***	−0.30***	−0.25***	−0.25***	−0.22***	–										
10. Rej G7	0.19***	0.22***	0.18***	0.14***	−0.29***	−0.36***	−0.33***	−0.31***	**0.64*****	–									
11. Rej G8	0.16***	0.18***	0.17***	0.14***	−0.26***	−0.30***	−0.35***	−0.31***	0.58***	**0.76*****	–								
12. Rej G9	0.13***	0.14***	0.14***	0.11***	−0.24***	−0.29***	−0.32***	−0.33***	0.51***	0.68***	**0.80*****	–							
13. Sup G6	−0.26***	−0.19***	−0.20***	−0.16***	0.21***	0.15***	0.14***	0.11***	−0.10***	−0.10***	−0.06*	−0.06*	–						
14. Sup G7	−0.23***	−0.32***	−0.24***	−0.23***	0.20***	0.18***	0.19***	0.14***	−0.14***	−0.14***	−0.14***	−0.13***	**0.51*****	–					
15. Sup G8	−0.19***	−0.20***	−0.20***	−0.23***	0.19***	0.16***	0.19***	0.17***	−0.09***	−0.12***	−0.11***	−0.11***	0.43***	**0.54*****	–				
16. Sup G9	−0.23***	−0.26***	−0.27***	−0.33***	0.15***	0.13***	0.12***	0.14***	−0.08**	−0.09**	−0.08**	−0.07*	0.40***	0.51***	**0.65*****	–			
17. Con G6	0.23***	0.20***	0.18***	0.19***	−0.03	−0.05	−0.01	−0.001	0.10***	0.08**	0.05	0.04	−0.22***	−0.14***	−0.09**	−0.12***	–		
18. Con G7	0.13***	0.18***	0.16***	0.16***	−0.02	0.00	0.01	0.04	0.05*	0.01	0.02	−0.001	−0.09***	−0.14***	−0.06*	−0.11***	**0.35*****	–	
19. Con G8	0.10***	0.11***	0.12***	0.18***	−0.02	−0.02	−0.02	−0.02	0.11***	0.06*	0.07*	0.04	−0.04	−0.04	−0.06*	−0.07*	0.24***	**0.38*****	–
20. Con G9	0.13***	0.14***	0.16***	0.24***	−0.03	0.01	−0.01	0.03	0.11***	0.08**	0.08**	0.05*	−0.04	−0.10***	−0.07*	−0.09**	0.27***	0.34***	**0.48*****

Depressive symptoms, friend support and friend conflict are latent constructs. Peer acceptance and rejection are manifest variables. Stability coefficients are shown in bold

G6 sixth grade, *G7* seventh grade, *G8* eighth grade, *G9* ninth grade, *Dep* depressive symptoms, *Acp* peer acceptance, *Rej* peer rejection, *Sup* friend support, *Con* friend conflict

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

(peer acceptance to depressive symptoms), Model 2a (depressive symptoms to peer acceptance), and Model 2b (depressive symptoms to peer rejection) fit the data better compared with the baseline model (Model 0). Thus, a better fit required the estimation of the reciprocal associations between peer acceptance and depressive symptoms and the unidirectional paths from depressive symptoms to peer rejection.

To examine the differences in the longitudinal associations between depressive symptoms and peer social status, as shown in the top half of Table 2, setting the cross-lagged paths to be equal across the time intervals decreased the fit of Model 2a (Model 2a vs. Model 2a-1) but not that of Model 1a or 2b (Model 1a vs. Model 1a-1, and Model 2b vs. Model 2b-1). Thus, the longitudinal associations from depressive symptoms to peer acceptance varied with age, but the other cross-lagged paths (i.e., peer acceptance to depressive symptoms, and depressive symptoms to peer rejection) did not change over time. Then the three symptom-driven paths to peer acceptance were allowed to be estimated freely. Based on the above comparisons, Model 3 was specified, which included freely estimated cross-lagged paths of depressive symptoms to peer acceptance and constraint cross-lagged paths from peer acceptance to depressive symptoms and depressive symptoms to peer rejection. As shown in Table 2, Model 3 had a commensurate fit with the full model, and thus was chosen as the final CLPM model given its parsimony (see Fig. 1).

As to the developmental changes in the cross-lagged paths, the coefficients of the paths from depressive symptoms to peer acceptance decreased to be nonsignificant since the eighth grade. Pairwise Wald test showed that the nonsignificant path from eighth grade depressive symptoms to ninth grade peer acceptance was different with the path between grades 7–8 (Wald's $\chi^2(1) = 6.97$, $p = 0.008$), but was not different with the path between grades 6–7 (Wald's $\chi^2(1) = 1.30$, $p = 0.255$). In brief, the CLPM model indicated that depressive symptoms increased risks for subsequent peer rejection consistently, and peer acceptance mainly before eighth grade.

As shown in the bottom half of Table 2, following the same procedure of model comparisons, the best fitting RI-CLPM model (Model 3) was identified. The final model showed that there were no significant cross-lagged paths between peer acceptance/rejection and depressive symptoms after controlling for both the between- and within-person stability (see Fig. 2). However, the random intercept of depressive symptoms was negatively correlated with the random intercept of peer acceptance ($r = -0.30$, $p < 0.001$) and positively correlated with the random intercept of peer rejection ($r = 0.26$, $p < 0.001$). These correlations suggested stable associations between the individual differences in peer social status and depressive symptoms.

Table 2 Fit statistics and model comparisons for nested models between peer acceptance, peer rejection and depressive symptoms

Model	*df*	*c*	χ^2	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	Δdf	*p*
CLPM models										
0 Stability model	143	1.22	606.93	0.978	0.970	0.039				
1a Acp → Dep	140	1.22	597.62	0.978	0.970	0.039	1a vs. 0	8.52	3	0.036
1b Rej → Dep	140	1.21	606.59	0.978	0.970	0.039	1b vs. 0	1.16	3	0.764
2a Dep → Acp	140	1.22	579.92	0.979	0.971	0.038	2a vs. 0	33.35	3	<0.001
2b Dep → Rej	140	1.21	598.85	0.978	0.970	0.039	2b vs. 0	8.34	3	0.040
1a-1 Acp → Dep (path fixed)	142	1.22	598.71	0.978	0.971	0.038	1a-1 vs. 1a	0.01	2	0.993
2a-1 Dep → Acp (path fixed)	142	1.22	587.15	0.979	0.971	0.038	2a-1 vs. 2a	6.81	2	0.033
2b-1 Dep → Rej (path fixed)	142	1.22	602.80	0.978	0.970	0.039	2b-1 vs. 2b	4.51	2	0.105
3 Combined model	138	1.23	564.07	0.980	0.972	0.038				
4 Full model	131	1.23	557.81	0.979	0.970	0.039	4 vs. 3	6.69	7	0.462
RI-CLPM models										
0 Stability model	154	1.21	447.23	0.986	0.983	0.030				
1a Acp → Dep	151	1.21	445.03	0.986	0.982	0.030	1a vs. 0	0.79	3	0.853
1b Rej → Dep	151	1.21	447.08	0.986	0.982	0.030	1b vs. 0	0.47	3	0.926
2a Dep → Acp	151	1.21	444.48	0.986	0.982	0.030	2a vs. 0	0.93	3	0.817
2b Dep → Rej	151	1.21	443.12	0.986	0.982	0.030	2b vs. 0	4.28	3	0.233
3 Combined model	154	1.21	447.23	0.986	0.983	0.030				
4 Full model	142	1.21	437.03	0.986	0.981	0.031	4 vs. 3	8.19	12	0.770

$\Delta\chi^2$ has been corrected according to the Satorra–Bentler's procedure

Dep depressive symptoms; *Acp* peer acceptance, *Rej* peer rejection

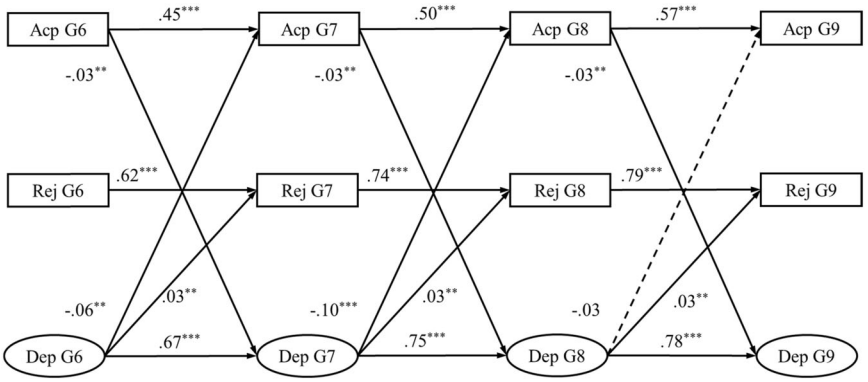

Fig. 1 Standardized path coefficients of the final CLPM model for peer acceptance, peer rejection and depressive symptoms. Dotted lines represent nonsignificant paths; solid lines represent significant paths. Dep depressive symptoms; Acp peer acceptance; Rej peer rejection. Within-wave correlations were estimated but not displayed. $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

Associations Between Friendship Quality and Depressive Symptoms

Similar procedures were used to examine the longitudinal associations between friendship quality and depressive symptoms. As shown in Table 3, model 3 was identified as the final CLPM model. Path coefficients were presented in Fig. 3. Depressive symptoms were reciprocally associated with both friend support and conflict. Furthermore, the depressive symptoms-conflict associations were time-invariant, while the depressive symptoms-support associations differed across time intervals (see Table 3). The interpersonal risk paths from friend support to depressive symptoms increased to be significant since the eighth grade. Pairwise Wald test showed that the cross-lagged path from eighth grade friend support to ninth grade depressive symptoms was significantly different from the paths between grades 6–7 (Wald's $\chi^2(1) = 5.80$, $p = 0.016$) and grades 7–8 (Wald's $\chi^2(1) = 6.98$, $p = 0.008$). The symptoms-driven paths to friend support were significant between grades 6–7 and grades 8–9, but nonsignificant between grades 7–8. The path between grades 8–9 was

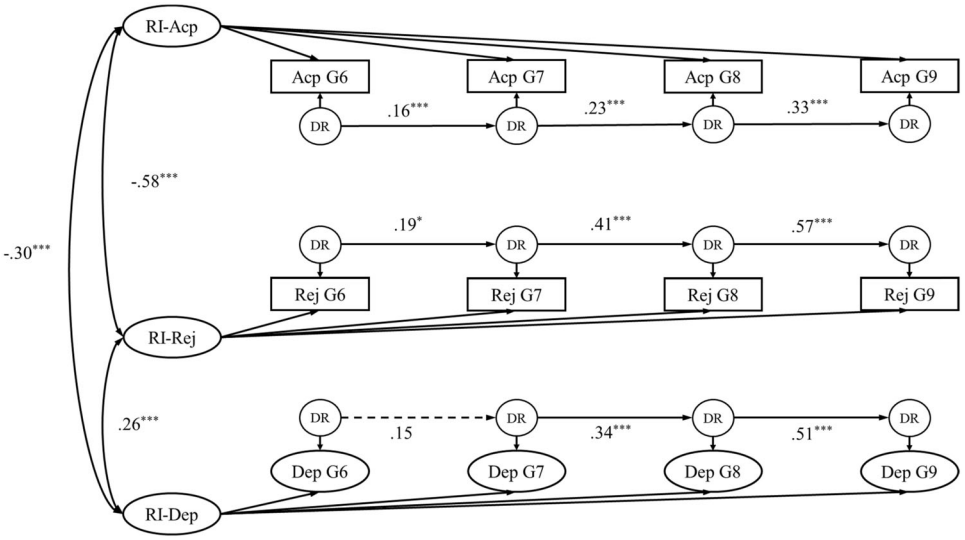

Fig. 2 Standardized path coefficients of the final RI-CLPM model for peer acceptance, peer rejection and depressive symptoms. Dotted lines represent nonsignificant paths; solid lines represent significant paths. Dep depressive symptoms; Acp peer acceptance; Rej peer rejection; DR dynamic residual. Each DR was specific to the construct and time point. Paths from random intercepts and DRs to repeated measures were fixed as 1. Within-wave correlations among the DRs were estimated but not displayed. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

significantly different with the path between grades 7–8 (Wald's $\chi^2(1) = 11.45$, $p < 0.001$), but not grades 6–7 (Wald's $\chi^2(1) = 2.14$, $p = 0.144$). In brief, according to the CLPM models, depressive symptoms interact with friend conflict in a transactional way between grades 6 and 9, but reciprocally associated with friend support only between grades 8 and 9.

Turning to the RI-CLPM analyses, Model 3 was also suggested as the best model based on a series of model comparisons (see Table 3), in which reciprocal paths between friend support/conflict and depressive symptoms were allowed to be freely estimated. However, the cross-lagged paths from prior depressive symptoms to friend conflict were nonsignificant. To be parsimonious, these symptom-driven paths to conflict were removed from Model 3, resulting in a simplified model (Model 5), which had commensurate fit with the full model (Fig. 4).

The random intercept of depressive symptoms was negatively correlated with the random intercept of friend support ($r = -0.43$, $p < 0.001$) and positively correlated with the random intercept of friend conflict ($r = 0.35$, $p < 0.001$), indicating stable correlations between the individual differences in depressive symptoms and friendship. After the between-person stability being partialled out, depressive symptoms were predicted by friend conflict, but were still associated with friend support in bidirectional ways between grades 8 and 9. Pairwise Wald test showed that the cross-lagged path from eighth grade friend support to ninth grade depressive symptoms was significantly different with the paths between grades 6–7 (Wald's $\chi^2(1) = 10.79$, $p = 0.001$) and grades 7–8 (Wald's $\chi^2(1) = 5.55$, $p = 0.019$). The symptoms-driven path on friend support between grades 8 and 9 was significantly different with the path between grades 7–8 (Wald's $\chi^2(1) = 7.24$, $p = 0.007$), but not grades 6–7 (Wald's $\chi^2(1) = 3.19$, $p = 0.074$). Overall, the interpersonal risk paths of conflict on depressive symptoms remained time-invariant, whereas the reciprocal associations between support and depressive symptoms became significant since the eighth grade.

Gender Differences

Multi-group modeling techniques were used to test whether the cross-lagged paths and the correlations among random intercepts in the RI-CLPM differed across genders. For the models of peer status and depressive symptoms, the cross-lagged paths were invariant in the CLPM model across genders, $\Delta\chi^2(5) = 9.13$, $p = 0.104$. But the correlations among the random intercepts in the RI-CLPM models differed between the two genders, $\Delta\chi^2(3) = 33.46$, $p < 0.001$. The correlations between peer social status and depressive symptoms were greater for boys: Wald's $\chi^2(1) = 5.89$, $p = 0.015$ for peer acceptance; and Wald's $\chi^2(1) = 8.54$, $p = 0.004$ for peer rejection. For the final models regarding friendship quality and depressive symptoms, the cross-lagged paths (the CLPM model: $\Delta\chi^2(8) = 14.44$, $p = 0.071$; the RI-CLPM model: $\Delta\chi^2(7) = 6.49$, $p = 0.484$) and the correlations among the random intercepts ($\Delta\chi^2(3) = 2.98$, $p = 0.395$) were invariant across genders.

Supplementary Analysis

The current study also estimated the longitudinal associations between peer social status (peer acceptance and rejection), friendship quality (friend support and conflict), and depressive symptoms in an integrated model, to test the relative importance of peer social status and friendship quality on depressive symptoms. The findings were

Table 3 Fit statistics and model comparisons between nested models for friend support, friend conflict and depressive symptoms

Model	*df*	*c*	χ^2	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	Δdf	*p*
CLPM models										
0 Stability model	677	1.16	1487.88	0.981	0.978	0.023				
1a Sup → Dep	674	1.16	1467.91	0.981	0.978	0.023	1a vs. 0	19.98	3	<0.001
1b Con → Dep	674	1.16	1464.72	0.981	0.978	0.023	1b vs. 0	18.68	3	<0.001
2a Dep → Sup	674	1.16	1424.62	0.982	0.980	0.023	2a vs. 0	59.16	3	<0.001
2b Dep → Con	674	1.16	1470.49	0.981	0.978	0.023	2b vs. 0	15.49	3	0.001
1a-1 Sup → Dep (path fixed)	676	1.16	1477.66	0.981	0.978	0.023	1a-1 vs. 1a	9.32	2	0.009
1b-1 Con → Dep (path fixed)	676	1.16	1466.98	0.981	0.978	0.023	1b-1 vs. 1b	2.83	2	0.243
2a-1 Dep → Sup (path fixed)	676	1.16	1437.74	0.982	0.979	0.023	2a-1 vs. 2a	11.99	2	0.002
2b-1 Dep → Con (path fixed)	676	1.16	1474.33	0.981	0.978	0.023	2b-1 vs. 2b	3.94	2	0.139
3 Combined model	669	1.16	1369.36	0.983	0.981	0.022				
4 Full model	665	1.15	1364.02	0.984	0.981	0.022	4 vs. 3	5.97	4	0.201
RI-CLPM models										
0 Stability model	729	1.21	1928.69	0.972	0.970	0.027				
1a Sup → Dep	726	1.21	1914.61	0.972	0.970	0.027	1a vs. 0	14.92	3	0.002
1b Con → Dep	726	1.20	1919.54	0.972	0.970	0.027	1b vs. 0	8.96	3	0.030
2a Dep → Sup	726	1.21	1916.31	0.972	0.970	0.027	2a vs. 0	12.20	3	0.007
2b Dep → Con	726	1.21	1920.72	0.972	0.970	0.027	2b vs. 0	7.97	3	0.047
1a-1 Sup → Dep (path fixed)	728	1.21	1928.34	0.972	0.970	0.028	1a-1 vs. 1a	15.60	2	<0.001
1b-1 Con → Dep (path fixed)	728	1.20	1922.25	0.972	0.970	0.027	1b-1 vs. 1b	2.99	2	0.224
2a-1 Dep → Sup (path fixed)	728	1.21	1926.24	0.972	0.970	0.027	2a-1 vs. 2a	9.93	2	0.007
2b-1 Dep → Con (path fixed)	728	1.21	1927.27	0.972	0.970	0.028	2b-1 vs. 2b	6.42	2	0.040
3 Combined model (fixed)	719	1.20	1893.69	0.972	0.970	0.027				
4 Full model	717	1.20	1892.74	0.972	0.970	0.027	4 vs. 3	1.70	2	0.427
5 Modifed Combined model (Model3—Dep → Con)	722	1.21	1897.84	0.972	0.970	0.027	4 vs. 5	6.19	5	0.288

$\Delta\chi^2$ has been corrected according to the Satorra–Bentler's procedure

Dep depressive symptoms, *Sup* friend support, *Con* friend conflict

generally the same with the results reported above, with only an exception for the nonsignificant paths from peer acceptance to subsequent depressive symptoms in the CLPM model. This finding provided further evidence that the links between depressive symptoms and friendship quality were stronger during adolescence.

In addition, a sensitivity analysis was conducted by 1465 (67%) participants who had complete data on all items across waves. A very similar pattern of statistical significance of the cross-lagged paths (and the correlations between random intercepts in the RI-CLPM approach) was observed, evidencing the robustness of the results.

Discussion

To extend and refine the knowledge about the developmental dynamics between depressive symptoms and peer relationships in the transition from childhood to adolescence, the present study examined the longitudinal associations between depressive symptoms and peer relationships from grades 6 to 9 in an urban community sample using two modeling approaches—the traditional cross-lagged panel model and the random intercept cross-lagged panel model. The findings shed light on the developmental changes in the longitudinal associations between

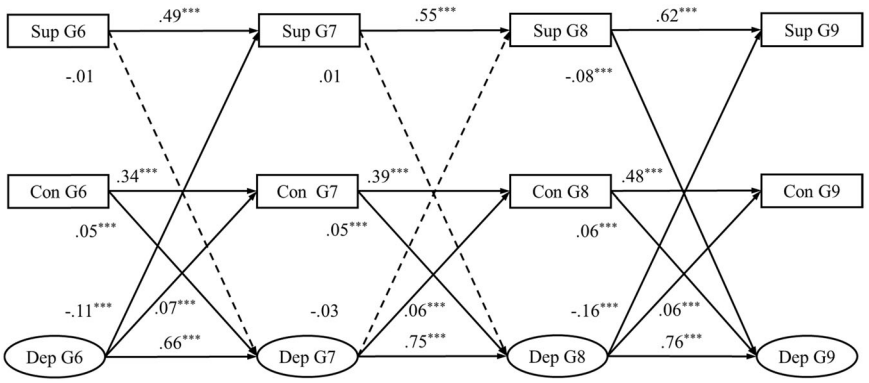

Fig. 3 Standardized path coefficients of the final CLPM model for friend support, friend conflict and depressive symptoms. Dotted lines represent nonsignificant paths; solid lines represent significant paths. Dep depressive symptoms; Sup friend support; Con friend conflict. Within-wave correlations were estimated but not displayed. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

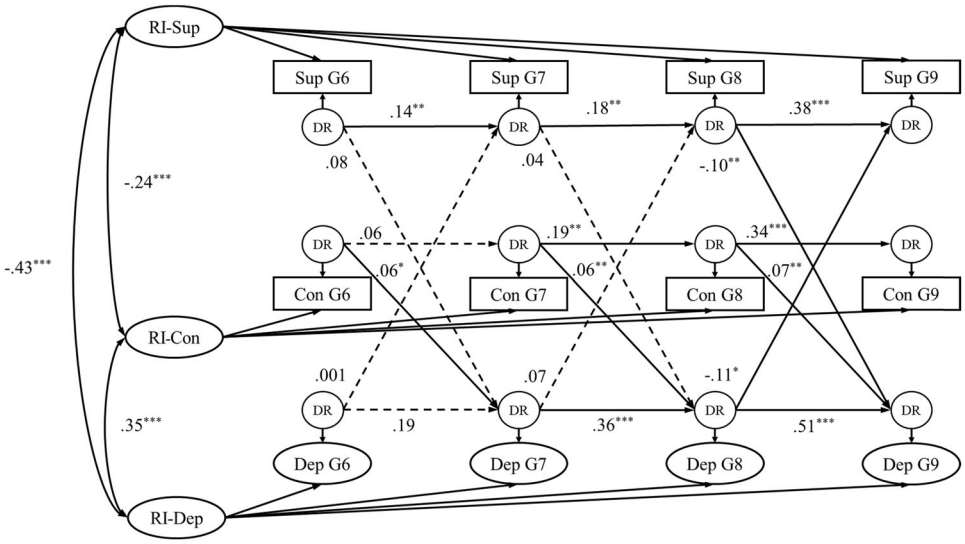

Fig. 4 Standardized path coefficients of the final RI-CLPM model for friend support, friend conflict and depressive symptoms. Dotted lines represent nonsignificant paths; solid lines represent significant paths. Dep depressive symptoms; Sup friend support; Con friend conflict; DR dynamic residual. Each DR was specific to the construct and time point. Paths from random intercepts and DRs to repeated measures were fixed as 1. Within-wave correlations among the DRs were estimated but not displayed. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

depressive symptoms and group- versus dyadic-level peer relationships. We discuss the major results, highlighting the implications of the findings for theory, practice, and future directions.

Peer Acceptance, Peer Rejection and Depressive Symptoms

Regarding the longitudinal associations between peer acceptance, rejection and depressive symptoms, the findings did not converge between the traditional cross-lagged panel model and the random intercept cross-lagged panel model. The findings based upon the traditional models were basically consistent with previous studies (Agoston and Rudolph 2013; Krygsman and Vaillancourt 2017; Sentse et al. 2010). In brief, depressive symptoms operated as antecedents rather than consequences of peer rejection (i.e., the symptom-driven effect), but were associated with peer acceptance in bidirectional ways (i.e., both interpersonal risk and symptom-driven effects). However, the results of the random intercept cross-lagged panel model did not support any dynamic relations between peer acceptance, peer rejection and depressive symptoms during this period after controlling for both the within- and between-person stabilities. Specifically, during middle childhood through early adolescence, peer acceptance and peer rejection were associated with depressive symptoms in the manner of trait-like correlations, rather than in a dynamic transactional way.

Based upon the findings of present and previous studies (Hoglund and Chisholm 2014), it seems that the reciprocal influences between peer social status and depressive symptoms may occur before late childhood. On the one hand, peer social status has already become increasingly salient for children's psychosocial adjustment since early childhood (Rubin et al. 2008). On the other hand, early-onset depressive symptoms have the potential to drive youth into peer group relationship difficulties from early childhood (Hoglund and Chisholm 2014). These findings indicated that early and middle childhood might be the crucial stages for the establishment of the linkages between peer social status and depressive symptoms. Meanwhile, the correlations between peer social status and depressive symptoms since late childhood bring about great difficulties for depressed children to improve their social status in

peers. Given the limited age span of this study, more researches should be conducted to directly examine the longitudinal associations between social status and depressive symptoms in earlier stages.

Friendship Quality and Depressive Symptoms

Developmental changes were observed in the longitudinal associations between friends' support and depressive symptoms, such that support from friends began to be predictive of and predicted by depressive symptoms when youth enter middle adolescence, whereas no significant associations existed during late childhood and early adolescence. Despite the relatively small effect sizes of these significant paths, the sensitivity analysis supported the robustness of the results. This is in line with the hypothesis of this study and previous studies showing bidirectional friendship-depressive symptoms associations (Burke et al. 2017; Vannucci et al. 2018). Note that the two previous studies mainly focused on middle adolescence, whereas this study extended this knowledge by covering earlier stages. Friends' support did not protect youth from depressive symptoms until middle adolescence when the supports from friends, such as empathy, accompanying and instrumental help, become sophisticated and efficient (Gifford-Smith and Brownell 2003). These findings also indicated the erosion effects of depressive symptoms on youth friendship. Particularly, as the stability of adolescent friendship increases with age, depressed adolescents would get harder to acquire support from friends.

After controlling for both the within- and between-person stabilities, conflict with friends conferred risks for depressive symptoms, but depressive symptoms did not contribute to subsequent conflict between friends. This is perhaps because adolescents with depressive symptoms tend to be withdrawn and blame themselves for peer problems (Allen et al. 2006), thereby limiting their chance to be involved in conflict with friends. To be noted, the lack of nonsignificant symptom-driven paths to conflict with friends, which is contrary to the stress generation theory, should be recognized with cautions. These nonsignificant paths might underestimate the actual effects due to the research design. For example, the friendship measurement in present study was not sensitive to friendship quality, and the one-year follow-up interval may be too long to suit well to the processes by which symptom-driven effect occurs. Given the scarce evidence in literature, more studies should be conducted to provide further evidence in the future. Contrary to the hypotheses of this study, no developmental changes were found in the conflict-depressive symptoms links. Conflict with friends was consistently predictive of subsequent depressive symptoms from late childhood to middle adolescence. A possible reason may be that conflict with friends brings immediate interpersonal stresses and lead to depressive symptoms, even in early stages.

It is noteworthy that support and conflict can coexist in the friendship. Youth may receive both support and stress from the same friend, and frequent conflicts between friends may weaken their intimate interactions with friends. Although support from friends becomes a substantial correlate of depressive symptoms in middle adolescence, high quality of friendship in earlier stages is still important for youth well-being. Both positive and negative aspects of friendship should be considered in understanding the interpersonal context of adolescent depressive symptoms.

To summarize, findings of this study suggest that peer social status and friendship operate as stage-specific correlates of depressive symptoms. Specifically, friendship confers a risk for depressive symptoms in adolescence, while the links between peer social status and depressive symptoms unfold in earlier stages (e.g., early childhood). With the change of social context and youth's psychological needs, the transition from childhood to adolescence intensifies interpersonal risks for depressive symptoms. These findings lend preliminary support to the developmentally informed model of the interpersonal context of adolescent depression (Rudolph 2009).

Gender Differences

Significant gender differences were only found in the correlations between the random intercepts of peer status and depressive symptoms, with greater effect sizes for boys. This finding concurs with prior results that boys place more importance on and are more vulnerable to adverse group status (Klima and Repetti 2008; LaFontana and Cillessen 2010; Rose and Rudolph 2006). Regarding friendship quality, the null gender differences in this study is contrary to the general portrait in literature, which indicated stronger associations between friendship and depressive symptoms among girls because girls experienced more friendship-related risk processes such as co-rumination (Spendelow et al. 2016). In fact, recent meta-analysis revealed that the associations between co-rumination and depressive symptoms did not vary by gender (Spendelow et al. 2016). In addition, culture features should be considered. Chinese culture is characterized by its emphasis on interpersonal harmony. Within such a cultural context, both genders are prone to be distressed or depressed when facing stressful social interactions. Ryder et al. (2012) have proposed that there is a lack of gender-specific cognitive risk factors of depressive symptoms in Chinese samples. Overall, consistent with most extant studies (e.g., Oppenheimer and Hankin 2011; Prinstein et al. 2005), this study indicated that the longitudinal associations between depressive symptoms and peer relationships were similar for girls and boys.

Strengths, Implications, Limitations and Future Directions

The present study has several strengths. First, this study directly examined the developmental changes in depressive symptoms-peer relationships associations for the first time in literature, extending the knowledge that interpersonal risk and symptom-driven effects change during the transition to adolescence, and highlighting the developmental timing of the dynamic associations between depressive symptoms and peer relationships. Second, both group- and dyadic-level peer relationships were examined in the study. In doing so, this study provides evidence for the change in the relative importance of group- and dyadic- level peer relationships across development as different social needs emerge. Third, both traditional and random intercept cross-lagged panel models were employed, providing more accurate and convincing findings. This study is comparable with previous studies. Moreover, the findings using the random intercept cross-lagged panel models were stricter and more robust after controlling for the within- and between-person stabilities.

The findings of this study inform decisions regarding the timing of the prevention and intervention efforts for depressive symptoms. First, to prevent depressive symptoms in childhood, researchers and practitioners should pay attention to children's peer social status as early as possible, at least no later than middle childhood. Second, to prevent depressive symptoms in adolescence, attention should be paid to adolescents' dyadic friendships by directing youth to resolve conflict with friends appropriately and provide support to their friends efficiently. These efforts should be made no later than middle adolescence.

Despite the above strengths, this study should be interpreted in the context of some limitations. First, although this study is among the long-term longitudinal studies, it focused on the period from late childhood to middle adolescence, failing to cover early and middle childhood. Thus, the present study cannot examine how the associations between peer social status-depressive symptoms change during early stages. Further research is needed to fully understand the developmental changes in these longitudinal associations by covering a more extensive age span from early childhood through late adolescence. Second, this study mainly focused on youth's perceived friendship with their desired best friend, making no distinctions between unilateral versus reciprocal friendships. Given that reciprocal and unilateral friendship may have different influences on youth's adjustment (Ciairano et al. 2007), future studies should pay attention to the differential associations between different patterns of friendship (i.e., unilateral and reciprocal friendships) with adolescent depressive symptoms. Finally, the participants were mainly from urban areas in China, and a more diverse sample with broader socioeconomic background should be studied in the future.

Conclusion

The present study examined the developmental changes in the longitudinal associations between peer relationships and depressive symptoms during the transition to adolescence for the first time. The results indicated that the patterns of depressive symptoms-peer relationships associations varied across development stages. Specifically, there was a stable correlation between peer social status and depressive symptoms from late childhood to early adolescence with no dynamic associations. Friendship quality showed consistent (conflict with friends) and increasing (support from friends) prospective effects on youth depressive symptoms, and in turn, prior depressive symptoms weakened subsequent friends' support since middle adolescence. These findings were similar for boys and girls except that the correlations between peer social status and depressive symptoms were stronger among boys. In sum, this study highlighted that social status and friendship operate as stage-specific correlates of depressive symptoms as youth's social needs develop with age.

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Authors' Contributions Y.Y. conceived of the study and participated in the interpretation of the data, performed the statistical analysis and drafted the manuscript; L.C. conceived of the study, participated in the interpretation of the data and drafted the manuscript; L.Z. helped to performed the statistical analysis; L.J. participated in the design and help to draft the manuscript; W.Z. conceived of the study, participated in the design and coordination and drafted the manuscript. All authors read and approved the final manuscript.

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Data Sharing and Declaration This manuscript's data will not be deposited

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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