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ORIGINAL PAPER

Direct and Interactive Effects of Peer Attachment and Grit on Mitigating Problem Behaviors Among Urban Left-Behind Adolescents

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Abstract

Objectives With the rise of internal migration in China, research has shown parental migration is linked to adolescent psychological adjustment, but little is known about the corresponding adjustment among left-behind adolescents in urban areas. More importantly, the protective factors for their adjustment are still sparsely covered in the literature. Guided by a risk and resilience ecological framework, the current study compares internalizing problem behavior (IPB) and externalizing problem behavior (EPB) between urban left-behind adolescents and their non-left-behind counterparts in mainland China. It also examines whether the direct and interactive effects of peer attachment and two facets of grit—perseverance of effort (PE) and consistency of interests (CI)—can mitigate problem behaviors in urban left-behind adolescents.

Methods A propensity score matching analysis was used to balance the two groups concerning age, gender, socioeconomic status, and family functioning. Finally, 246 left-behind adolescents (53.6% girls) and 492 non-left-behind counterparts (55.1% girls) aged 13–18 years were involved in this study.

Results Urban left-behind adolescents perceived higher levels of IPB and EPB compared to non-left-behind peers. Moreover, higher levels of PE buffered the association between peer attachment and IPB, whereas lower levels of PE exacerbated the association between peer attachment and EPB for urban left-behind adolescents only. Additionally, higher levels of CI buffered the association between peer attachment and EPB for both groups.

Conclusions This study concludes that peer attachment and PE have protective roles in mitigating problem behaviors among urban left-behind adolescents.

Keywords Internalizing problem behavior · Externalizing problem behavior · Peer attachment · Grit, urban left-behind adolescent

With the current imbalanced regional economic situation in China (i.e., Eastern coastal cities vs. Western inland cities), many adults from urban areas migrate to other cities for better job opportunities. Based on a recent report in China (2017), 245 million people migrated across the country, of whom about 100 million from Western mainland China migrated to big Eastern metropolitan cities (e.g., Beijing, Shanghai, Guangzhou, and Shenzhen; National Health and Family Planning Commission 2017). Likewise, the economic relevance of big cities increases internal migration across different cities. A side effect of this migration is that school-aged adolescents are being left behind in the local cities by one or both parents.

Urban left-behind adolescents refers to those holding permanent residence in an urban context and who have been cared for by grandparents, relatives, or other appointed guardians due to one or both parents migrating to another urban city for at least 6 months (Ge et al. 2014). Such adolescents are, to some extent, similar to left-behind

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adolescents in rural contexts. For example, both groups have experienced the following: one or both parents leaving their homes for another city, owing to better job opportunities; separation of family members for prolonged periods of time; and grandparents, relatives, or other appointed guardians assuming childcare responsibility (Lan and Moscardino 2019). However, the two groups also differ in important aspects, such as socioeconomic status (SES) and educational resources. Indeed, urban left-behind adolescents are generally wealthier and have better educational opportunities than their rural left-behind peers. Despite these differences, urban left-behind adolescents may also have emotional and behavioral difficulties because they often lack supportive parental involvement (Sun et al. 2017). Given the limited number of studies on this potentially vulnerable group, the current study examines problem behaviors of urban left-behind adolescents to shed light on the possible difficulties they encounter and to inform educational policy and practice.

In this study, we operationalized problem behaviors as internalizing problem behavior (IPB) and externalizing problem behavior (EPB). IPB is generally considered to belong to the subgroup of psychopathology that involves disturbances in emotion (e.g., depressive and anxiety symptoms), whereas EPB tends to refer to dysregulation in behavior (e.g., substance abuse, aggression, and risky sexual behaviors; Achenbach 1991). Prior research elucidated that IPB and EPB are influenced by different underlying mechanisms during adolescence (e.g., Pan et al. 2016). Thus, this study differentiated the outcome variable by separating IPB and EPB in order to identify any discrepancies and fully capture urban left-behind adolescent emotional-behavioral adjustment.

With regard to left-behind youth in rural contexts, abundant studies indicated that this group is disadvantaged with respect to psychological functioning (Tang et al. 2018; Zhao and Yu 2016). For instance, a recent meta-analytical review has shown that acculturation stress and disrupted parent–child relations lead to a risk for left-behind children; specifically, left-behind children show higher levels of emotional and behavioral problems than their non-left-behind peers (Zhao and Yu 2016). More recently, Tang et al. (2018) have found that left-behind children report higher levels of mental health problems (i.e., depression and somatic symptoms) and lower levels of self-esteem compared to their local rural peers. Despite such findings, little is known about urban left-behind adolescents' emotional-behavioral adjustment. Although adolescents in urban areas often have higher levels of SES and educational resources than their rural peers in China (Lan and Moscardino 2019), less parental involvement may pose a risk for adolescents' psychological functioning (Ştefan and Avram 2017; Sun et al. 2017). Given that, exploring the potential protective factors for problem behaviors among urban left-behind adolescents is essential to designing effective targeted intervention or prevention programs.

This study was guided by a risk and resilience ecological framework (Corcoran and Nichols-Casebolt 2004) that has been successfully applied to identify protective factors in left-behind populations (Lan et al. 2019). Within this framework, the interaction between risk and resilience factors grouped in micro, mezzo, and macro levels can explain the variation of psychological adjustment in an unfavorable population. Given the critical role of peer relationships in adolescence (La Greca and Harrison 2005), we proposed that peer relationships can compensate urban left-behind adolescents' poor social support systems to mitigate their problem behavior. Moreover, attachment theory suggests that the quality of attachment (i.e., the long-lasting emotional bond that a child forms with an attachment figure) sets the stage for late psychological functioning (Armsden and Greenberg 1987; Bowlby 1979). Thus, this study assumed that peer attachment as a contextual level resiliency may mitigate the levels of problem behaviors among urban left-behind adolescents.

During adolescence, close friends begin to surpass parents as a primary source of social support and contribute in important ways to adolescents' psychosocial adjustment (La Greca and Harrison 2005). Moreover, peer relationships become the central arena in which attachment processes are likely to materialize during adolescence (Gorrese and Ruggieri 2012). Peer attachment refers to affectional bonding between peers, involving elements such as trust, reliance, and the sharing of personal thoughts and emotions (Armsden and Greenberg 1987). Based on the existing literature, a recent meta-analysis has revealed that peer attachment is inversely related to depression and anxiety symptoms in adolescence (Gorrese 2016). Similarly, a meta-analysis has illustrated that disorganized attachment is positively associated with IPB and EPB in children and adolescents (Madiganet al. 2016). Such findings indicate that the quality of peer attachment has a protective role in problem behaviors among adolescents.

Although peer attachment is often regarded as an essential determinant of development in Western contexts, little attention has been given to its role in development in collective societies (Madigan et al. 2016). This research gap is significant given that Chinese culture is embedded in Confucianism and attaches special importance to social interactions and interdependence (Gold et al. 2002). Especially, establishing peer networks outside of the family is treated as an essential socialization goal for Chinese adolescents. In view of poor parental involvement in the lives of urban left-behind adolescents in China, we proposed that peer attachment may extenuate problem behaviors among this group.

Aligned with a risk and resilience ecological framework (Corcoran and Nichols-Casebolt 2004), this study explored the socio-ecological interactions grounded in different levels of mitigating problem behaviors among urban left-behind adolescents. Apart from environmental influence, personal assets at the micro-level were considered, and the variable selection was informed by self-regulatory theory (Carver and Scheier 2011; de Ridder and de Wit 2006). Within this theory, self-regulatory traits refer to efforts by humans to alter their thoughts, feelings, desires, and actions from the perspective of goal pursuit. Central to Carver and Scheier's (2011) approach, goal orientations (approach vs. avoidance) have the potential to induce positive and negative adjustment. Thus, this study examined whether grit as a self-regulatory trait (i.e., aspirations for long-term goal pursuit; Ivcevic and Brackett 2014) may interact with peer attachment to ameliorate problem behaviors in urban left-behind adolescents.

Grit involves perseverance and passion for long-term goals, especially when encountering obstacles and adversities (Duckworth et al. 2007). In collective societies, a burgeoning body of research has shown that grit is negatively associated with depression (Datu et al. 2018) and positively associated with better academic performance and well-being (Datu, Valdez, and King, 2016a, 2016b). However, researchers have argued about the construct validity of grit (Credé et al. 2017; Datu et al. 2017). Among these arguments, one critical issue is that grit is highly correlated with other self-regulatory traits, such as conscientiousness and self-control. However, this study proposed that grit is more appropriate than other self-regulatory traits to fulfill our research objectives due to the following considerations. First, aligning with self-regulation theory (de Ridder and de Wit 2006), adaptive competencies draw on long-term volitional processes of goal striving, whereas conscientiousness and self-control refer to short-term goal orientations (Duckworth and Gross 2014). Second, emerging empirical implications further support the protective role of grit in unfavorable conditions. For example, Blalock et al. (2015) found that grit can buffer the relationship between negative life events and suicidal ideation among adults. Similarly, research showed that grit is an essential protective factor against suicide (White et al. 2017). In view of the vulnerabilities of left-behind adolescents, we proposed that grit can minimize their problem behaviors. Third, diligence and perseverance are underscored when encountering adversities and challenges in Chinese societies (Lan et al. 2019). Considering these factors collectively, this study examines the potential moderating role of grit in the association between peer attachment and problem behaviors.

Grit consists of two facets: perseverance of effort (PE) and consistency of interests (CI; Duckworth et al. 2007). PE refers to the extent to which individuals can endure challenges and adversity while sustaining personal effort and determination to attain long-term ambitions, whereas CI concerns the degree to which individuals continuously focus on achieving long-term aspirations (Datu et al. 2017). However, informed by a recent meta-analysis, the primary utility of the grit construct lies in PE (Credé et al. 2017). Similarly, research also showed that, in collective cultures, PE is more relevant than CI (Datu et al. 2018, 2016a). Additionally, pertinent studies examining the differential roles of PE and CI suggest that these two facets have different effects on psychological functioning. For example, a recent study has demonstrated that Chinese primary school students with high PE and low CI show high positive activating emotions (i.e., hope) and reduced levels of negative activating emotional states (i.e., anxiety and shame) when taking academic tests (Datu and Fong 2018). Likewise, research showed that PE is moderately associated with subjective well-being and personality strengths, whereas CI is weakly and negatively related to these outcomes (Disabato et al. 2019). In view of these empirical implications and the possible discrepancy between PE and CI, this study explored the moderating role of grit in the association between peer attachment and problem behaviors by separating these two facets.

In sum, the current study had two main goals: (a) to compare IPB and EPB between urban left-behind adolescents and their non-left-behind counterparts in China, and (b) to examine the direct and interactive effects of peer attachment and two facets of grit (i.e., PE and/or CI) on mitigating problem behaviors in urban left-behind adolescents. On the basis of our theoretical perspective and previous findings (Corcoran and Nichols-Casebolt 2004; Lan and Moscardino 2019), we hypothesized that: (H1) urban left-behind adolescents report higher levels of IPB and EPB compared to their non-left-behind peers; (H2) adolescents reporting a higher quality of peer attachment and higher levels of PE and/or CI demonstrate lower levels of IPB and EPB compared to adolescents reporting lower levels of PE and/or CI (i.e., two-way interaction; H2a), and these associations are stronger for urban left-behind adolescents (i.e., three-way interaction; H2b). Moreover, informed by prior research examining the association between socio-demographic characteristics (e.g., age, gender, and SES) and problem behaviors among Chinese adolescents, this study regarded these variables as potential covariates. For example, age is negatively related to problem behaviors (Ai et al. 2017); low SES is positively associated with both internalizing and externalizing problems; and boys report higher levels of externalizing problems than girls (Cheung et al. 2018). Likewise, family functioning is inversely associated with problem behaviors (Shek 2002). To avoid the confounding linkage between family functioning and

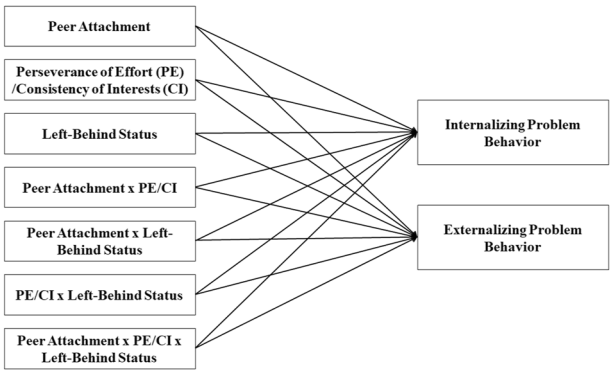

Fig. 1 A hypothesized model. Left-behind status = urban left-behind adolescents vis-à-vis non-left-behind counterparts. Age, gender, socioeconomic status, and family functioning were considered as potential covariates

parental migration, this study also controlled for family functioning in both groups. A graphical representation of our hypothesized model is depicted in Fig. 1.

Method

Participants

To balance sociodemographic characteristics (i.e., age, gender, and SES) and family functioning between urban left-behind adolescents and their counterparts, a propensity score matching analysis was performed. The results showed that the two groups matched well (see Supplementary Materials).

Finally, participants in this study involved 246 urban left-behind (53.6% girls; 76.8% of adolescents were being left behind by one parent) and 492 non-left-behind (55.1% girls) Chinese adolescents aged 13–18 years ($M_{age} = 15.87$; $SD = 1.45$). During data collection, participants were attending 7th, 8th, 10th, and 11th grades in eight public middle and high schools in north mainland China. We excluded 9th and 12th graders because they were highly involved in preparation for the entrance examination during the last year of middle and high schools. The average duration of parental migration was 5 years and 6 months for urban left-behind adolescents (Range = 1–10 years, $SD = 2.34$). With regard to SES, the family income of these adolescents was relatively moderate based on the report released by the National Bureau of Statistics, with an average income equivalent to 800–1,200 US dollars per month. Likewise, the perception of living standard that these adolescents reported was moderate (86.7%) as rated on a 5-point Likert scale. Most fathers (63.2%) had completed a high school education, and most mothers (61.7%) had received a middle school education. In addition, 83.6% of the adolescents came from single-child families, and 98.2% of the adolescents belonged to the Han ethnic group, which is the majority ethnic group in China.

Procedure

Prior to data collection, ethical approval for the study was granted by the relevant university and schools. The authors contacted public schools located in different regions of north mainland China. After obtaining permission from school principals, the authors gave informed consent forms to the adolescents, who were asked to secure their parents' or guardian's signature. Only on condition that written consent was obtained from parents or guardians and verbal assent was obtained from each participant were the adolescents permitted to participate in this study. Overall, the participation rate was 95%, which is in line with previous studies among Chinese populations (e.g., Dong et al. 2018). During school hours, a trained research assistant provided standardized instructions, and the adolescents were asked to complete the questionnaires during a 30-min period in the classroom. Upon completion of the survey, the adolescents received a small stationery gift to thank them for their participation.

Measures

Peer attachment

Peer attachment was assessed using the 15-item Inventory of Peer Attachment—Short Form (IPPA; Armsden and Greenberg 1987). The IPPA has been validated in Chinese adolescents by Zhang et al. (2011), showing adequate properties. One of the examples is, "I share thoughts and feelings with friends." Participants were asked to assess the quality of their relationships with peers on a 5-point Likert-type ranging from 1 (*almost never or never true*) to 5 (*almost always or always true*). The average score was yielded to represent the score of peer attachment, with a higher score indicating higher levels of attachment to peers. Previous research has demonstrated good internal coefficients of this scale in Chinese adolescents (Pan et al. 2016). In this study, Cronbach's alphas were 0.94 and 0.95 for urban left-behind adolescents and their counterparts, respectively.

Grit

Grit was measured by the 8-item Grit Scale (Duckworth and Quinn 2009). This scale has been validated in Chinese adolescents by Li and colleagues (2018). It consists of two dimensions: PE (4 items; e.g., "Setbacks do not discourage me") and CI (4 items; e.g., "New ideas and projects

sometimes distract me from previous ones"). Participants were asked to rate each item from 1 (*not like me at all*) to 5 (*very much like me*) on the Likert scale. The average score of 8 items was calculated separately to yield the score of PE and CI, with a higher score indicating higher levels of PE and CI. In this study, Cronbach's alphas for PE were 0.78 and 0.81 in urban left-behind adolescents and their counterparts, respectively. In terms of CI, Cronbach's alphas were 0.79 and 0.81 for both groups, respectively.

As previous studies have raised issues about the psychometric validity of the Grit Scale, especially in non-Western contexts (e.g., Datu et al. 2016a), Confirmatory Factor Analysis (CFA) was used to ensure the construct validity of grit in this study. Results showed the acceptable model fit: $\chi^2(19) = 14.63$, $p > 0.05$; Tucker Lewis Index (TLI) = 0.89; Comparative Fit Index (CFI) = 0.90; Standardized Root Mean Square Residual (SRMR) = 0.05. Additionally, Multigroup CFA was used to test for measurement invariance between urban left-behind adolescents and their counterparts. The procedure of this analysis was the same as that followed by prior research (e.g., Lan et al. 2019). Results showed a non-significant *p*-value and no more than 0.01 of CFI difference, indicating that the construct was invariant across the two groups.

Problem behaviors

Problem behaviors were measured by a Chinese adaptation of the Child Behavior Checklist (CBCL; Achenbach 1991; Li et al. 2009), in which items were reworded by the first author and showed good test–retest reliability and criterion validity. This scale consists of two dimensions: IPB (15 items; e.g., "I am too fearful or anxious") and EPB (15 items; e.g., "I destroy my own things"). Participants were asked to rate each item on a Likert scale ranging from 1 (*definitely does not apply to me*) to 4 (*definitely applies to me*). Suggested by previous research (Li et al. 2009), the total score was calculated by averaging all items, with a higher score indicating more IPB and EPB, respectively. Prior research showed good internal coefficients in Chinese adolescents (Lan et al. 2019). In this study, Cronbach's alphas for IPB were 0.92 and 0.93 in urban left-behind adolescents and their counterparts, respectively. As for EPB, Cronbach's alphas were 0.89 and 0.90 for both groups, respectively.

Control variables

Demographic information collected from participants involved gender, age, parental educational level and occupation, and monthly family income. Socioeconomic indicators were assessed via maternal and paternal education background, parental occupation, and monthly family income. With regard to parental education, four categories were available: (1) middle school graduation or lower, (2) high school graduation, (3) bachelor's degree graduation, and (4) master's degree graduation or higher. As for parental occupation and monthly family income, adolescents could choose among seven different response options based on occupational classification and residents' income criteria in China (adapted from Shi and Shen 2007). Suggested by prior research (Lan and Moscardino 2019), these three scores were standardized and subsequently summed to yield an overall SES score.

Family functioning was measured by a subscale of the Chinese Family Assessment Instrument (FAI-C; Shek 2002). This subscale consists of 6 items. One of the examples is "my family relationships are harmonious." Participants were asked to rate each item from 1 (*fully disagree*) to 5 (*fully agree*) on the Likert scale. The average score of 6 items was calculated, with a higher score indicating higher levels of family functioning. In this study, Cronbach's alphas were 0.93 and 0.94 for urban left-behind adolescents and their counterparts, respectively.

Data Analyses

Data analyses were performed using R software (R Core Team 2017). Prior to data analyses, 76 cases were excluded due to high rates of missing data (more than 20%) in at least one of the questionnaires in our battery. To investigate the impact of missing data (less than 20%), we performed a Little's Missing Completely at Random (MCAR) test. Results supported the MCAR assumption, $\chi^2(48) = 51.76$, $p = 0.33$. The remaining missing values were inputted for each subject according to each adolescent's mean score on the corresponding measure.

Descriptive information was summarized using means and standard deviations for continuous variables. Pearson's correlations were used to evaluate associations among the study variables. To examine group differences in the two outcome variables, Multivariate Analysis of Covariance (MANCOVA) was used.

Furthermore, path analyses were used to examine the direct and interactive effects of peer attachment and two facets of grit on IPB and EPB. Although a latent variable modeling approach would have been valuable considering the nature of our data, the relatively small sample size prevented us from using this approach as it would have resulted in too many estimated parameters in relation to the number of study participants. Furthermore, all measures in this study had been previously validated in Chinese adolescents, thus ensuring reliable estimates. For these reasons, we chose to apply a more parsimonious SEM approach in which, for each latent variable, we considered the aggregated score of the associated observed indicator. Based on

the hypothesized model (see Fig. 1), two separated models for each dimension of grit were tested using the R package lavaan (Rosseel 2012). Direct and interactive path coefficients were estimated using the maximum likelihood method, with a single observed score (i.e., centered mean score) for each variable. To test for moderation, products between centered variables were computed and included in the model as interaction terms. In addition to the main effects of peer attachment, PE/CI, and left-behind status, we also included two- and three-way interactions among these variables. Additionally, these interaction effects were examined by follow-up simple slope analysis.

Results

First, means and standard deviations for study variables and bivariate correlations are reported in Table 1, separately for urban left-behind adolescents and their non-left-behind counterparts. As shown in Table 1, peer attachment and two facets of grit were each significantly and negatively associated with IPB and EPB in both groups.

Second, MANCOVA—after controlling age, gender, SES, and family functioning—showed that urban left-behind adolescents reported higher levels of IPB (F (5, 732) = 18.90, $p < 0.001$, partial $\eta^2 = 0.114$) and EPB (F (5, 732) = 19.83, $p < 0.001$, partial $\eta^2 = 0.119$) in comparison with their non-left-behind peers.

Third, the baseline model was tested (see Fig. 1) by path analyses, and the results showed many nonsignificant links between interaction terms and outcome variables. For the sake of parsimony, these links were removed step by step based on p-value at the level of 0.05, and the model was re-evaluated. The final model (PE as a moderator) is presented in Fig. 2. Results showed that the model fit the data well, χ^2 (2) = 0.20, $p = 0.90$; TLI = 1.02; CFI = 1.00; Root Mean Square Error of Approximation (RMSEA) < 0.001. The R^2 for the endogenous variables indicated that the model accounted for 18.0% of the variance in IPB and 15.6% in EPB.

As shown in Fig. 2, peer attachment and PE were each significantly and negatively associated with IPB and EPB. Moreover, the interaction effect among peer attachment, PE, and left-behind status on IPB and EPB was significant.

Follow-up simple slope analysis showed that the negative association between peer attachment and IPB was significant at higher ($B = -0.25$, $SE = 0.07$, $t = -3.43$, $p < 0.001$) but not at lower levels of PE ($B = -0.05$, $SE = 0.07$, $t = -0.71$, $p = 0.48$) in urban left-behind adolescents. The negative association between peer attachment and IPB was independent of PE in non-left-behind adolescents ($B = -0.16$, $SE = 0.05$, $t = -3.05$, $p < 0.001$ for higher PE; $B = -0.18$, $SE = 0.05$, $t = -3.71$, $p < 0.001$ for lower PE; see Fig. 3).

Table 1 Descriptive statistics and bivariate correlations of study variables between urban left-behind adolescents and their non-left-behind counterparts

	LBA ($n = 246$)			non-LBA ($n = 492$)										
	M	*SD*	Range	*M*	*SD*	Range	1	2	3	4	5	6	7	8	9
1. PA	3.90	0.76	1–5	3.94	0.76	1–5	–	0.32***	0.32***	−0.29***	−0.25***	0.03	0.07	−0.01	0.33***
2. PE	3.58	0.82	1–5	3.64	0.83	1–5	0.26***	–	0.55***	−0.21***	−0.24***	−0.13**	−0.06	0.07	0.30***
3. CI	3.45	0.79	1–5	3.51	0.81	1–5	0.25***	0.54***	–	−0.20***	−0.24***	−0.11**	−0.08	0.09*	0.32***
4. IPB	1.92	0.63	1–4	1.80	0.62	1–4	−0.26***	−0.34***	−0.31***	–	0.67***	0.07	0.07	−0.05	−0.30***
5. EPB	1.60	0.45	1–4	1.51	0.44.	1–4	−0.10***	−0.21***	−0.20***	0.62***	–	0.04	−0.08	0.01	−0.28***
6. Age	15.78	1.50	13–18	15.91	1.43	13–18	0.09**	−0.07	−0.04	−0.02	−0.14*	–	−0.01	−0.10*	0.01
7. Gender[a]	–	–	1–2	–	–	1–2	0.21***	0.11	0.10	0.04	−0.14*	0.07	–	−0.08	−0.02
8. SES	0.32	1.84	−5.95–6.12	0.26	1.85	−5.18–8.15	−0.002	−0.11	−0.07	−0.04	−0.11	0.05	0.09	–	0.05
9. FF	3.72	0.91	1–5	3.99	0.87	1–5	0.23***	0.22***	0.23***	−0.33***	−0.38***	0.14*	0.08	0.05	–

Correlation coefficients displayed above the diagonal are for non-left-behind adolescents (non-LBA), below for urban left-behind adolescents (LBA)

PA peer attachment, *PE* perseverance of effort, *CI* consistency of interests, *IPB* internalizing problem behavior, *EPB* externalizing problem behavior, *SES* socioeconomic status, *FF* family functioning

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

[a]Coded as 1 = male, 2 = female

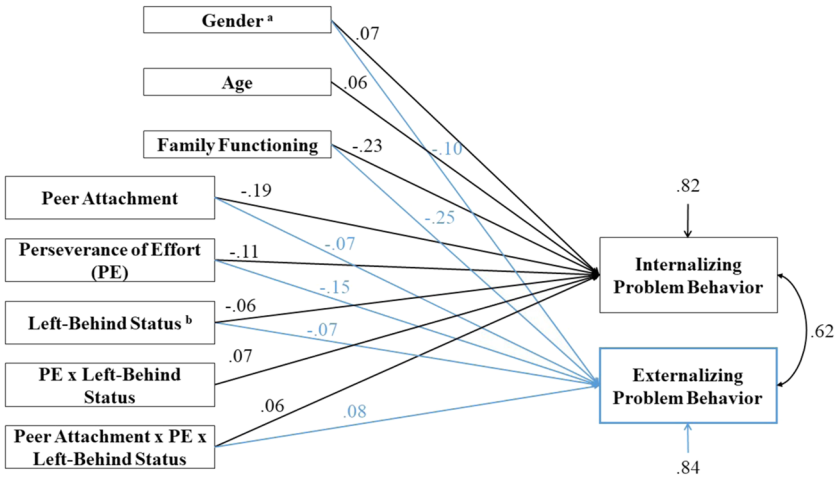

Fig. 2 Structural path diagram of the final model—PE as a moderator. [a]Coded as 1 = male, 2 = female, [b]coded as 1 = urban left-behind adolescents, 2 = non-left-behind counterparts. Only significant paths are shown with $p < 0.05$

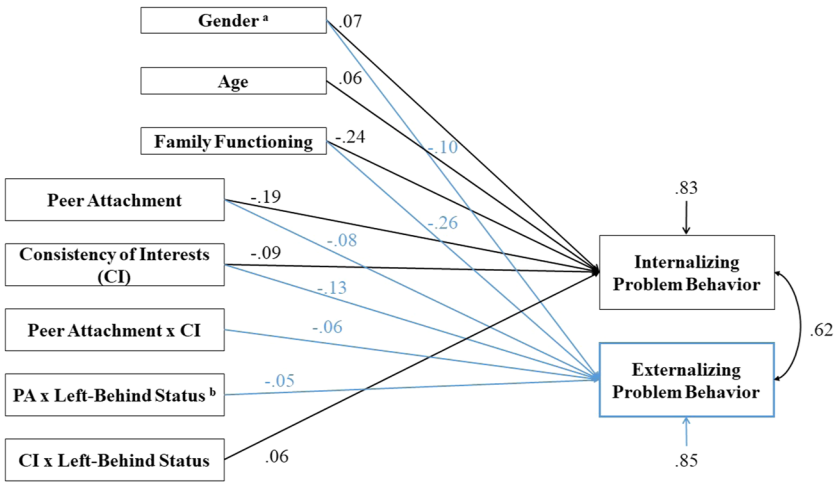

Fig. 3 Structural path diagram of the final model—CI as a moderator. [a]Coded as 1 = male, 2 = female, [b]coded as 1 = urban left-behind adolescents, 2 = non-left-behind counterparts. Only significant paths are shown with $p < 0.05$

Conversely, the association between peer attachment and EPB was significantly positive at lower ($B = 0.11$, $SE = 0.05$, $t = 2.20$, $p < 0.05$) but not at higher levels of PE ($B = -0.10$, $SE = 0.05$, $t = -1.84$, $p = 0.07$) in urban left-behind adolescents; the negative association between peer attachment and EPB was regardless of PE in non-left-behind adolescents ($B = -0.08$, $SE = 0.04$, $t = -2.22$, $p < 0.05$ for higher PE; $B = -0.06$, $SE = 0.03$, $t = -1.77$, $p < 0.05$ for lower PE; see Fig. 4).

With regard to the moderating role of CI, the final model is presented in Fig. 5. Results showed that the model fit the data well, $\chi^2(4) = 3.39$, $p = 0.49$; TLI = 1.00; CFI = 1.00; RMSEA < 0.001. The R^2 for the endogenous variables indicated that the model accounted for 16.9% of the variance in IPB and 15.2% in EPB.

As shown in Fig. 5, peer attachment and CI were each significantly and negatively associated with IPB and EPB. Moreover, the interaction effect of peer attachment and CI on EPB was significant.

Follow-up simple slope analysis showed that the negative association between peer attachment and EPB was significant at higher ($B = -0.10$, $SE = 0.03$, $t = -3.32$, $p < 0.001$) but not at lower levels of CI ($B = -0.001$, $SE = 0.03$, $t = -0.03$, $p = 0.97$; see Fig. 6). According to our research hypothesis, other pertinent significant interaction effects nested in path analyses were not interpreted here (see Supplementary Materials).

Discussion

The main objectives of this study were to compare IPB and EPB between urban left-behind adolescents and their counterparts and to examine direct and interactive roles of peer attachment and two facets of grit in IPB and EPB in both groups. Although abundant research suggests that left-behind youth in rural contexts are often vulnerable concerning psychological functioning, little is known about left-behind youth's adjustment in urban settings. The current findings showed that urban left-behind adolescents reported higher levels of IPB and EPB than their non-left-behind counterparts. Importantly, the interaction effects

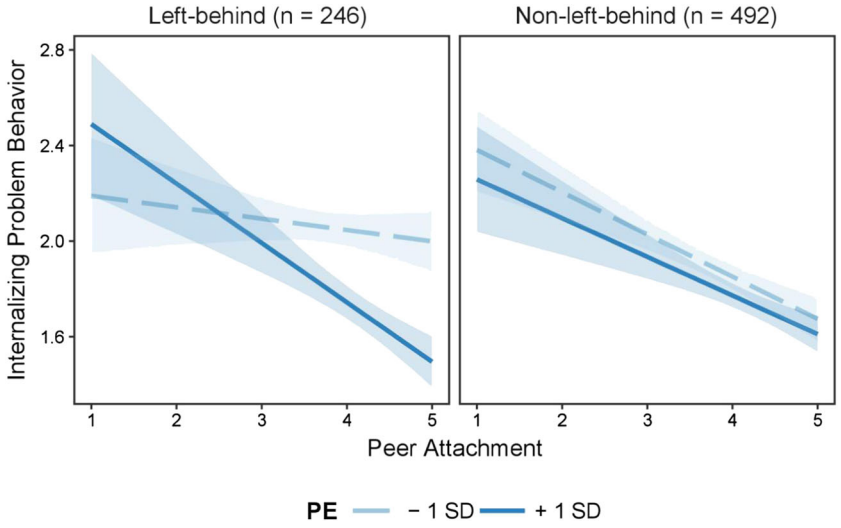

Fig. 4 Interaction effect of peer attachment, perseverance of effort (PE), and left-behind status on internalizing problem behavior. PE was divided into two levels based on mean: low $= M - 1\ SD$, high $= M + 1\ SD$. Light blue bands represent 95% confidence intervals

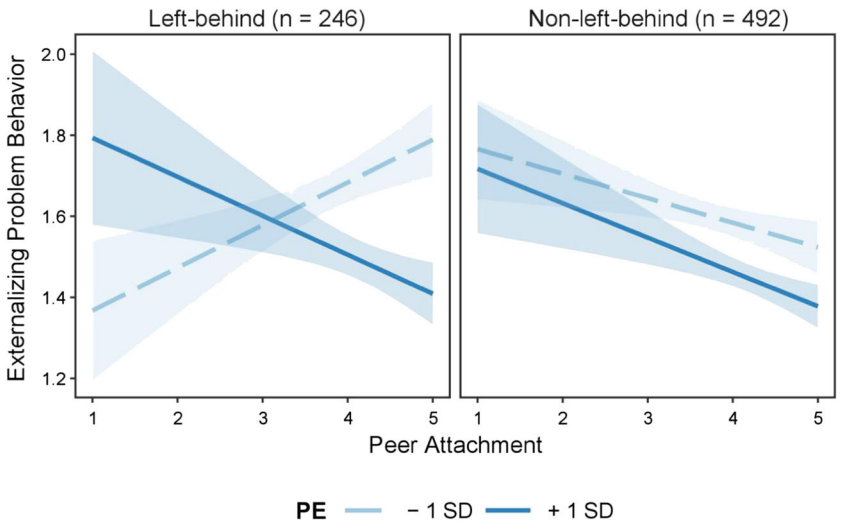

Fig. 5 Interaction effect of peer attachment, perseverance of effort (PE), and left-behind status on externalizing problem behavior. PE was divided into two levels based on mean: low $= M - 1\ SD$, high $= M + 1\ SD$. Light blue bands represent 95% confidence intervals

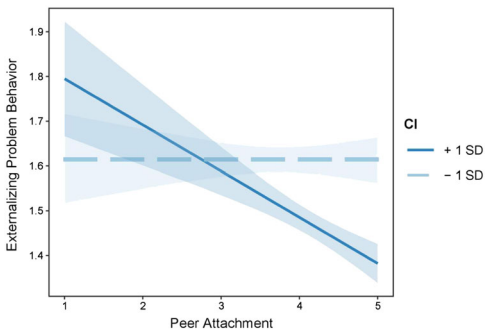

Fig. 6 Interaction effect of peer attachment and consistency of interests (CI) on externalizing problem behavior. CI was divided into two levels based on mean: low $= M - 1\ SD$, high $= M + 1\ SD$. Light blue bands represent 95% confidence intervals

showed that PE moderated the association between peer attachment and problem behaviors, with a stronger association for urban left-behind adolescents than for their counterparts, and that CI moderated the association between peer attachment and EPB.

Our first purpose was to compare IPB and EPB between urban left-behind adolescents and their counterparts. Aligned with the first hypothesis, the current findings showed that urban left-behind adolescents perceived higher levels of IPB and EPB. The findings were also consistent with prior research in left-behind youth in rural contexts given that, in this study, urban left-behind adolescents also showed higher levels of problem behaviors. For instance, Wang and colleagues (2015) found a high prevalence of depressive symptoms in left-behind adolescents in rural China. Similarly, Wang et al. (2017) found that left-behind youth in rural China show higher levels of externalizing problems (e.g., cheating on exams, stealing, and bullying) than non-left-behind peers. One possible explanation for our findings is that they are attributable to less parental involvement in left-behind adolescents. Indeed, parental

migration and the low frequency of follow-up parent–child communication pose a risk for adolescents' internalizing and externalizing problems. Another possible explanation is that the study participants are ascribed to Chinese cultural values highlighting achievement and academic success. Thus, high levels of academic stress during adolescence can easily give rise to emotional and behavioral difficulties, particularly for left-behind adolescents who lack a sufficient support system compared to their counterparts. Likewise, most left-behind adolescents in this study resided with one of their parents. As indicated by prior research (see a meta-analysis by Teubert and Pinquart 2010), co-parenting is crucial for adolescent psychological adjustment, and this factor may also partially explain the differences in problem behaviors between urban left-behind adolescents and their counterparts.

Our second goal was to examine the direct and interactive effects of peer attachment and two facets of grit on problem behaviors. In accordance with the second hypothesis, PE moderated the association between peer attachment and problem behaviors, and this association was stronger for urban left-behind adolescents than for their counterparts. More specifically, higher levels of PE and peer attachment can mitigate IPB among urban left-behind adolescents. However, for non-left-behind adolescents, the association between peer attachment and IPB occurred regardless of PE. Aligned with prior research (Blalock et al. 2015; White et al. 2017), our findings also highlighted the protective role of grit in unfavorable conditions. One possible explanation for this is that urban left-behind adolescents can benefit from high-quality peer relationships due to the relative lack of parental involvement, and PE involving long-term ambitions can enable individuals to overcome potential difficulties in their daily lives. However, for non-left-behind peers, the negative conditions of their daily lives may mostly be ameliorated by seeking help from their parents.

In terms of EPB, the results showed that, in the context of higher levels of peer attachment, lower levels of PE were a risk factor among urban left-behind adolescents. However, the association between peer attachment and EPB was significantly negative in non-left-behind adolescents, and this association was independent of the PE level. One possible explanation is that most externalizing behaviors (e.g., aggressive behavior and substance use) tend to affiliate with group activities, but not individual ones. Thus, in the context of peer networks among urban left-behind adolescents, low perseverance poses a risk for EPB. Moreover, these three-way interactions confirmed a risk and resilience ecological framework (Corcoran and Nichols-Casebolt 2004), suggesting that less parental involvement is a risk factor for adolescent health behavior. The interactions also confirmed that the interaction effect between resilience factors grounded in different levels (environmental influence—peer attachment, individual influence—grit) and risk factors can further explain the variation of these behaviors. Additionally, the current findings corroborated attachment theory (Armsden and Greenberg 1987; Bowlby 1979), suggesting that secure attachment is crucial to facilitating optimal functioning in adolescence, as well as self-regulation theory (Carver and Scheier 2011; de Ridder and de Wit 2006), indicating that adaptive competencies draw on longer volitional processes of goal striving.

Regarding the moderating role of CI, the results showed that CI moderated the association between peer attachment and EPB but not that between peer attachment and IPB. More specifically, higher peer attachment and CI can mitigate EPB in both adolescent groups. One possible interpretation aligns with the fact that CI emphasizes achieving long-term aspirations by focusing on personal interests and assigned tasks. However, the lack of these factors creates more behavioral dysregulation. It may be, for example, that individuals who do not focus on consistent interests tend to have behavioral symptoms (e.g., attention deficits and hyperactivity), which in turn intensify externalizing problems.

Finally, distinct from the second hypothesis, our study did not find a three-way interaction effect among peer attachment, CI, and left-behind status on problem behaviors. Instead, the current findings showed that the moderating effect of CI on the association between peer attachment and EPB was independent of left-behind status. One possible explanation aligns with prior research (Datu et al. 2016a) suggesting that consistency shows a weak effect on psychological functioning, compared to perseverance in collective societies. Thus, consistency may not effectively ameliorate problem behaviors in urban left-behind adolescents. Another possible explanation is that the two groups were relatively homogeneous in terms of family background (i.e., SES and family functioning), which further weakened the association between CI and problem behaviors in urban left-behind adolescents. Likewise, as suggested by prior research (Lan, Marci, and Moscardino 2019), Chinese cultural values highlighting perseverance and diligence may also explain the discrepancy, whereas consistency is not fully nested in core Chinese cultural values.

In sum, our research contributes to the existing literature by illustrating the direct and interactive effects of peer attachment and grit in problem behaviors among urban left-behind adolescents. Particularly, our findings highlight the interactive effect of peer attachment and perseverance that appears to have an important buffering role for emotional disturbance among urban left-behind adolescents in a collective setting. Indeed, in Chinese society, social interactions with peers and perseverance as resilient resources are emphasized when encountering emotional difficulties. Likewise, the interaction effect of peer attachment and consistency in EPB is underscored. This indicates that

consistency of interests has the potential to regulate appropriate behaviors, which in turn mitigate EPB. Overall, the current findings enrich attachment theory and self-regulation theory, as well as pertinent literature that explains how and why peer attachment and two facets of grit are associated with IPB and EPB in a non-Western society.

Limitations

While this study contributes to school-based intervention or prevention programs by documenting the direct and interactive effects of peer attachment and two facets of grit on mitigating problem behaviors among urban left-behind adolescents, a number of limitations should be considered when interpreting the results. First, the current study builds on cross-sectional self-report surveys, which only permit an examination of associations between validated measures without inferring directionality, and such methods are subject to the common method bias. The common method bias often occurs in behavioral research when participants are asked to report on their perceived experiences for multiple constructs in the same survey, which may lead to results confounded by report biases (e.g., response style and/or social desirability) rather than true associations (Podsakoff et al. 2003). Second, this study does not involve left-behind adolescents in rural China. Thus, we cannot conclude whether being left behind in rural and urban contexts has similar effects on adolescent psychological functioning. Future investigations should recruit a comparison group of left-behind children in rural China to disentangle this effect. Third, the high correlation between PE and CI indicates the limitation of using self-report questionnaires only. Future studies are warranted to use a multi-informant or mixed-methods approach that avoids potential multicollinearity. Meanwhile, although grit scale has been validated and the two constructs of grit were confirmed in Chinese adolescents, the high correlation of these two facets and the relatively acceptable CFA model fit put a limit on differentiating two facets of grit in problem behaviors. This indicates that future studies may adopt more appropriate measurements of grit in collective societies. Fourth, this study adopts a relatively small sample size, which delimits the "power" of our research. Future studies are encouraged to use a larger sample size to confirm the current findings. Fifth, the use of a monocultural dataset in this study delimits the cross-cultural applicability of the findings. For example, whether urban left-behind adolescents in individualism societies have emotional-behavioral difficulties deserves prospective future investigation.

Authors' Contributions X.L. designed and executed the study, conducted data analyses, and drafted the paper. R.R. assisted with preparation for the manuscript.

Compliance with Ethical Standards

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

Ethical Approval All procedures followed were in accordance with the ethical standards of the relevant committee on human research.

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

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