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Profiles of interpersonal relationship qualities and trajectories of internalizing problems among Chinese adolescents

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Abstract

Adolescence is a significant period for the formation of relationship networks and the development of internalizing problems. With a sample of Chinese adolescents ($N = 3,834$, 52.01% girls, $M_{\text{age}} = 16.68$ at Wave 1), the present study aimed to identify the configuration of adolescents' relationship qualities from four important domains (i.e., relationship quality with mother, father, peers, and teachers) and how distinct profiles were associated with the development of internalizing problems (indicated by depressive and anxiety symptoms) across high school years. Latent profile analysis identified a five-profile configuration with four convergent profiles (i.e., relationship qualities with others were generally good or bad) and one "Father estrangement" profile (i.e., the relationship quality with others were relatively good but that with father was particularly poor). Further conditional latent growth curve analysis indicated the "Father estrangement" profile was especially vulnerable to an increase in the internalizing problems as compared with other relationship profiles. This study contributes to understanding the characteristics of interpersonal relationship qualities and their influences on adolescent internalizing problems in a non-Western context. Results were further discussed from a culturally specific perspective.

Keywords: Chinese adolescents; internalizing problems; latent growth curve modeling; latent profile analysis; relationship qualities

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Introduction

Being at the period when significant biological, cognitive, and socio-emotional developments take place, adolescents are faced with plenty of challenges and are thus vulnerable to internalizing problems (Dahl et al., 2018). Research has found that around 30% of Chinese adolescents exhibited depressive and anxiety symptoms above the cutoff point (Yu et al., 2017), and these symptoms remain relatively stable or worsen across time (Petersen et al., 2018; Xin et al., 2012). Internalizing problems not only have comorbidity with other mental health problems (Graber & Sontag, 2009), but also exert negative influences on adolescent social functioning (Köhler et al., 2019) and physical health (Jamnik & DiLalla, 2019) both concurrently and longitudinally. Therefore, researchers have extensively investigated protective factors of internalizing problems in adolescents (e.g., Liu et al., 2017; Rothenberg et al., 2020).

High-quality interpersonal relationships (e.g., mother-adolescent, father-adolescent, teacher-student, and peer relationships) are widely verified as effective in protecting adolescents from internalizing problems both theoretically (Baumeister & Leary, 1995) and empirically (Kiuru et al., 2020; Morgan et al., 2011). Although important relationships have their separate impacts on

adolescent development, Hinde (1987) proposed that specific relationships are nested within networks of other relationships which are further influenced by culture. Therefore, investigating the interpersonal environment from a holistic perspective and with a culturally specific scope is needed. Although several researchers have identified interpersonal relationship profiles in adolescents (e.g., Laursen et al., 2006; Scholte et al., 2001), these studies were predominantly conducted through a lens of Western culture which embraces independence and encourages conflicts (Hofstede & Minkov, 2010). These studies failed to account for the differences in interpersonal relationship networks in a Confucian-Asian country such as China. Chinese culture tends to place a much higher value on interdependence and harmony in interpersonal relationships when compared to Western cultures. Moreover, when discovering the effect of relationship profiles on adolescents internalizing problems, most research solely considered this effect from a fixed-time perspective (i.e., measuring adolescent internalizing problems at a single point in time; e.g., Jager, 2011; Shin & Yu, 2012) which ignores the potential changes of internalizing problems across time. To address these gaps, the present study aimed to identify *patterns* of interpersonal relationship qualities and their influences on *trajectories* of internalizing problems in Chinese adolescents from a person-centered perspective with a longitudinal design.

Characteristics of important relationships in China

Unlike the individualistic-leaning Western countries encouraging independence, equality, and viewing conflicts as normal and

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inevitable, collectivistic-leaning Asian countries (e.g., China) are characterized by interdependence and hierarchy, meaning they highly value harmony in relationships and respect for authorities (Hofstede & Minkov, 2010). These cultural values then permeate the most important environments for adolescents (i.e., family and school), which contributes to the formation of unique parent-adolescent, peer, and teacher-student relationships in China.

Inheriting Confucius ideas, parent-child relationships in China are typically governed by the ethic of *filial piety*, asking children to obey and honor their parents and to take the responsibility of supporting them (Ho, 1994, p. 287). This authoritative role of parents may strengthen the importance of parental influences on Chinese adolescents and, as a result, parent-adolescent relationships may have a more salient effect on adolescent development when compared with Western counterparts (Yeh & Bedford, 2004). Specifically, due to an emphasis on Confucian patriarchy which empowers fathers with extreme authority over children (Santos & Harrell, 2017), father-adolescent relationships may be especially influential to the development of Chinese adolescents. Indeed, father-adolescent relationship quality has been found to have long-term influences on the depressive and anxiety symptoms in Chinese adolescents (Quach et al., 2015; Zhang, Pan, et al., 2021). Despite this significance, father-adolescent relationship may be highly alienated in some families greatly valuing patriarchal authority. On the one hand, the clear hierarchical relationship between fathers and adolescents prevents them from equal and open communication (Zhang, Shek, et al., 2021), which may lead to an alienated relationship. Fathers may even strive to keep this alienation to maintain their authoritative image. On the other hand, holding the conventional conception of Chinese parenthood “严父慈母 (yanfu cimü)” (i.e., father being strict and mother being kind; Wilson, 1974) may imply that fathers are expected to withhold explicit expressions of warmth, which may lead to a typically alienated father-child relationship.

Similar to parents, teachers are also viewed as authorities by many Chinese adolescents mainly due to the Chinese traditional valuing of “尊师重教 (zunshi zhongjiao)” (i.e., value education and respect for teachers; Elliot & Phuong-Mai, 2010). Consistent with this traditional value, many sayings in China express respect to teachers, such as “一日为师, 终生为父” (i.e., A teacher for a day is a father for a lifetime). Moreover, in traditional Chinese society, the importance of teachers is also strengthened through parental socialization which conveys “respecting teachers and elders” (Lan & Moscardino, 2019). Therefore, teacher-student relationships may play an especially salient role in adolescents’ internalizing problems under a Chinese cultural context.

Peer relationships also show their own features under the Chinese cultural context. Unlike individualistic cultures where conflict is viewed as inevitable due to the encouragement of individualism and self-expression, Chinese culture, which holds collectivistic cultural values, usually emphasizes harmonious relationships with others. As a result, peer interactions and relationships are usually characterized by more cooperation and affiliation (Chen et al., 2018; Chen, 2000). In addition, Chinese adolescents’ choices of friendships are typically influenced by parents due to the emphasis placed on the authority of parents in Chinese culture with family relationships typically being valued over friendships (Oh et al., 2021). Dealing with the conflict between parent-child and peer relationship might be a challenging task during adolescence (Brown, 2004), but there might be less of a problem for Chinese adolescents due to the clearly defined hierarchy of relationships within Chinese culture. However, peer

relationships may still play an important role in the development of Chinese adolescents due to the cultural value of considering the views of others as more important than those of the self (Dong et al., 1994).

Profiles of relationship qualities in Chinese adolescents

Instead of functioning separately, important interpersonal relationships are interdependent and should be considered holistically as they are embedded in a larger interpersonal relationship network (Hinde, 1997). In addition, these networks are further influenced by the larger cultural context, which determines the meaning of different relationships as well as how they influence adolescent development (Hinde, 1987). Therefore, not only the patterns of interpersonal relationships, but also their influences on adolescent developmental outcomes may differ between Western and Chinese culture.

Although several studies about relationship profiles have been conducted, previous studies either failed to consider the qualities of important relationships with mothers, fathers, peers, and teachers *simultaneously* (e.g., Laursen et al., 2006; Oh et al., 2021) or were conducted in individualistic-leaning Western countries (Jager, 2011; Laursen & Mooney, 2008). The configurations of relationships in Chinese culture remains to be discovered. Based on the aforementioned unique characteristics of parent-adolescent, peer, and teacher-student relationships for Chinese adolescents, it is likely that the patterns of interpersonal relationship qualities in Chinese adolescents may differ from that in adolescents from Western countries. Despite the lack of research on Chinese adolescents, some reasonable deductions can be made based on results from Western culture-based studies, which may show some universal characteristics of relationship networks among adolescents. These studies generally illustrated that adolescents have both convergent and divergent relationship profiles.

Convergent relationship profiles

According to the attachment theory, relationships from different sources are most likely to be *congruent* (Bowlby, 1973). Based on the early experience with caregivers, children gradually develop their internal working models (IWMs) about how people view themselves and whether they deserve care. These IWMs may generalize to later interpersonal relationships, including those with peers and teachers. In support of this notion, researchers have found that perceived supportive relationships of adolescents are consistent across contexts with mothers and peers (Laursen et al., 2006). Similarly, children with a close parent-child attachment are more likely to establish close attachment to teachers (Veríssimo et al., 2017).

In fact, all studies investigating profiles of interpersonal relationship qualities in adolescents have found configurations with consistently high or low relationship qualities in all significant domains with over half of the samples falling into these profiles (e.g., Jager, 2011; Oh et al., 2021). Given the universality of the attachment theory (Keller, 2018), Chinese adolescents should also exhibit at least two profiles with consistently high or low qualities of relationships with mothers, fathers, peers, and teachers.

Divergent relationship profiles

Although it is common to have convergent relationship profiles, this might not be true for all since adolescents will experience difficulty in balancing relationships from different sources, that is, between peers and parents (Brown, 2004). According to the

context-choice theory (Kerr et al., 2003), adolescents gradually gain more control over their social environments so that those with poor relationship qualities with parents can actively devote more time to peer-oriented contexts to build positive peer relationships. Prior studies on relationship profiles consistently found configurations with high-quality parent-child relationships but poor peer relationships (parent-dominated) and high-quality peer relationship but poor parent-child relationships (peer-dominated; e.g., Jager, 2011; Laursen & Mooney, 2008; Oh et al., 2021). We expect to find both configurations in Chinese adolescents as well. However, the peer-dominated one might be less prevalent than the parent-dominated one due to the control of some Chinese parents over the choice of friendships as mentioned previously.

Additionally, we expect the emergence of profiles specialized to fit within Chinese culture. Firstly, a configuration characterized by significantly low-quality father-child relationship is expected to emerge because some families still hold the traditional view that Chinese fathers should be strict to and alienated from their children to keep an authoritative image. Secondly, a teacher-dominated profile is likely to appear given the respect and authority teachers hold in many Chinese families. Told to always obey and respect teachers, Chinese adolescents may have a relatively positive teacher-student relationship regardless of the quality of other relationships.

The impact of relationship profiles on adolescent internalizing problems

The belongingness hypothesis (Baumeister & Leary, 1995) proposed that feeling related to others is an innate human need across life span, which indicates that establishing good relationships is essential for one's healthy emotional development. High-quality relationships are usually characterized by high closeness, high supportiveness, low conflict, low hostility, etc. (Canevello & Crocker, 2010; Tamm et al., 2018). With adolescents being in the period of establishing a social self, having good interpersonal relationships is especially important and has been found to alleviate adolescent internalizing problems (e.g., Hawley & Cacioppo, 2010; Heinrich & Gullone, 2006).

Several cross-sectional studies have discovered the effect of interpersonal relationship profiles on adolescent internalizing problems. For convergent profiles, Oh and colleagues (2021) considered relationship qualities with mothers, fathers, and friends simultaneously and found that constellations with consistently high-quality relationships from all sources were less likely to be anxious-withdrawn in South Korean, United States, and Portugal samples. Similarly, focusing on father-child, mother-child, and peer relationship quality, Laursen and Mooney (2008) categorized adolescents into four subgroups based on the number of positive relationships, suggesting that adolescents with more positive relationships had less adjustment problems. As for divergent profiles, Jager (2011) examined relationship profiles in adolescents based on mother-child, father-child, teacher-student, and peer relationship qualities and found that adolescents with good peer relationships but poor parent-child relationships showed more adjustment problems when compared to those that had good relationships with parents but poor relationships with peers. Consistently, other researchers focused on relationships with parents and friends found that adolescents with above average relationship qualities with parents but not with friends showed better adjustment outcomes than those with above average relationship qualities with friends but not with parents (Rosenfeld et al., 2000; Scholte et al.,

2001). However, these cross-sectional studies failed to discover the long-term difference among adolescents characterized by different interpersonal relationship quality profiles.

Although many variable-centered studies have verified the long-term effect of interpersonal relationships on adolescent mental health (Brumariu & Kerns, 2010; Fortuin et al., 2015; Pakarinen et al., 2018), to the best of our knowledge, little research examined the long-term effect of relationship profiles on adolescent internalizing problems. One exception is that Ciarrochi et al. (2017) investigated the profiles of supportive relationships from parents, teachers, and peers, and examined their influence on adolescent psychological ill-health outcomes. They found that adolescents who received consistently higher support from all sources showed lower mental health problems and higher well-being at a fixed time point (i.e., 3 years later). However, research evidence has shown that adolescents' internalizing problems also develop with time (Petersen et al., 2018; Rothenberg et al., 2020), indicating the importance of focusing on the *trajectory* of internalizing problems rather than that at a fixed time point. In fact, applying a trajectory-based method provides a more in-depth understanding of the relationship between interpersonal relationships and adolescent internalizing problems. It can not only elucidate the effect of interpersonal relationships on the level of internalizing problems at different time points, but also reveals its influence on the changes in adolescent internalizing problems. Additionally, it more precisely captures the adaptability of development over time. For instance, a low starting level of internalizing problems is typically viewed as adaptive in cross-sectional studies, yet it becomes maladaptive if it is followed by a significantly increasing trend. Furthermore, investigating the trajectory of internalizing problems of different relationship subgroups helps identify the most at-risk population (e.g., the group with high starting level and increasing internalizing problems) so that targeted intervention on specific relationship patterns could be conducted. Therefore, it is essential to discover the effect of relationship profiles on the trajectory of internalizing problems in Chinese adolescents.

The present study

In this study, we applied a person-centered approach to examine the relationship profiles and to discover their impacts on the trajectory of internalizing problems among Chinese adolescents (see Figure 1). Anxiety and depressive symptoms were considered as indicators of internalizing problems since they captured its central feature of disordered mood or emotion (Kovacs & Devlin, 1998), which was also widely used in empirical studies (e.g., Psychogiou et al., 2022; Stadelmann et al., 2018). High school is the essential period for adolescents to establish their relationship network and to learn about balancing different relationships with each other (Merikangas et al., 2009). During this time, Chinese adolescents are also faced with heavy study pressure and high expectations from families and are thus especially susceptible to internalizing problems (Sun et al., 2012). Therefore, we used a sample of Chinese high school students and tracked their internalizing problems from Grade 10 to Grade 12.

We expect to find both convergent and divergent relationship quality profiles in Chinese adolescents. Specifically, for convergent profiles, we expect to discover at least one profile with high overall qualities in relationships from all sources and one with low overall qualities. As for divergent profiles, we expect to discover (a) a parent-dominated profile (i.e., high-quality relationships with parents but not peers), (b) a peer-dominated profile (i.e., high-quality

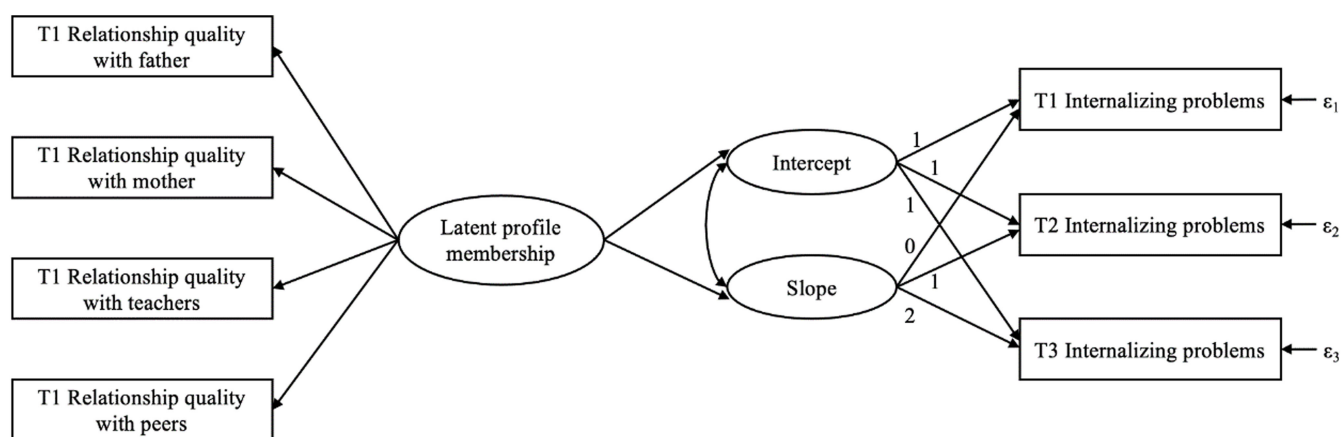


Figure 1. Conceptual model for the present study.

relationships with peers but not parents), (c) a father-alienated profile (i.e., especially low-quality relationships with fathers), and (d) a teacher-dominated profile (i.e., especially high-quality relationships with teachers).

Moreover, based on previous cross-sectional profile studies, we expect that these profiles will impact adolescent internalizing problem trajectories in the following ways. (A) For convergent profiles, according to the findings from cross-sectional studies (e.g., Jager, 2011; Laursen & Mooney, 2008), Chinese adolescents with high relationship qualities in all significant domains will have a more positive change in internalizing problems (i.e., increasing more slowly or decreasing more quickly). (B) For divergent profiles, due to many Chinese parents' control over choices of friendships in adolescents (Oh et al., 2021), parent-dominated constellations may have a more positive change in internalizing problems than peer-dominated constellations. The effects of father-alienated and teacher-dominated constellations remain exploratory since neither of them was discovered in prior studies.

Method

Participants and procedures

Data for the present study was drawn from a large longitudinal study which focused on the developmental guidance for Chinese high school students in Guangdong province, southern China. Selection of schools was stratified based on their levels of teaching (i.e., provincial key high school, district key high school, and ordinary high school) proportionally. A total of five schools (one provincial key, two district key, and two ordinary high school) were selected. All school boards granted approval and committed to the 3-year study. All 10th graders from these five schools were the target participants of this study. The research assistants went through all the classrooms and asked the students whether they would like to participate in the study. An active consent procedure was taken, such that the informed consent forms were taken home by students and completed by both parents and adolescents at each wave. Data collection began in 2015 and was completed in 2017 annually. Students were asked to complete paper-based surveys in the classroom setting in the first 2 years and a web-based survey in the third year. The study was approved by the institutional ethical committee of the authors' host university.

A total of 3,837 adolescents and their parents agreed and engaged in our study in the first wave in October 2015 when they

were in 10th grade. Three students were excluded from the sample because they did not respond to questions for the key variables, yielding a total of 3,834 participants (1,840 boys and 1,994 girls) at Wave 1. Students' ages ranged from 14.58 to 19.56 years old ($M = 16.68$, $SD = 0.45$). In October 2016, 3,243 students (84.59%; 1,536 boys and 1,707 girls) participated in the second wave. In October 2017, 2,596 students (67.71%; 1,223 boys and 1,373 girls) participated in the third wave. In all, 2,311 students (60.28%, 1,086 boys and 1,225 girls) completed all three waves. Given the longitudinal nature of the study, attrition analysis was conducted with t -tests on a series of demographics and key study variables. In comparison with students who participated in all three waves, students who dropped out of the study at Wave 2 or Wave 3 were older, reported poorer relationships with father, mother, and teacher, had higher levels of anxiety symptoms at T1 and T2, and higher levels of depressive symptoms across three time points. However, the relevant effect sizes were quite small with partial η^2 ranging from .001 to .006, indicating a minimal impact on the results.

Measures

Internalizing problems from Wave 1 to Wave 3

Anxiety symptoms were assessed using the 20-item Self-Rating Anxiety Scale (Zung, 1971). Adolescents indicated the extent of each feeling (e.g., "I feel afraid for no reason at all.") within a week on a four-point scale (1 = rarely or none of the time, 4 = most or all of the time). Item scores were averaged to create a mean score, with higher scores indicating higher levels of anxiety symptoms. This scale has been well validated among Chinese adolescents in prior studies (Wang et al., 1999; Xu et al., 2012). The Cronbach's alpha values were 0.85, 0.85, and 0.87 at Wave 1, Wave 2, and Wave 3, respectively.

Depressive symptoms were assessed using the 10-item Center for Epidemiologic Studies Depression Scale-short form (Andresen et al., 1994). Adolescents indicated the frequency of the feelings (e.g., "I was bothered by things that usually don't bother me.") within a week on a four-point scale (1 = rarely or none of the time, 4 = most or all of the time). Depressive symptoms were operationalized by averaging the item scores to create a mean score, with higher scores indicating higher levels of depressive symptoms. This scale has been well validated among Chinese adolescents in prior studies (Yang et al., 2018). The Cronbach's alpha values were 0.84, 0.85, and 0.86 at Wave 1, Wave 2, and Wave 3, respectively.

Qualities of relationships at Wave 1

The relationship qualities with parents were assessed using the 18-item Closeness to Parents Scale (Buchanan et al., 1991). Father-adolescent and mother-adolescent relationship qualities were assessed separately with the same expressions in nine items. Adolescents were asked to answer each question (e.g., “How close do you feel to your mother/father?”) on a five-point scale (1 = *not at all*, 5 = *very*). The relationship score was an average of the nine items, with higher scores indicating higher relationship quality with father or mother. The Chinese version used in the present study was previously proven to be valid and reliable (Liu et al., 2013). The Cronbach’s alpha values were 0.90 for father-adolescent and 0.88 for mother-adolescent relationship.

The relationship quality with teacher was measured with the 23-item Student-Teacher Relationship Scale, developed by Pianta (1994) and adapted by Zou and her colleagues (2007). Adolescents were asked to rate their agreement with each item (e.g., “The current relationship with my teacher is exactly what I hope for.”) on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The higher average scores indicated higher relationship quality with the teacher. This scale has been well validated among Chinese adolescents in prior studies (Li et al., 2018). The Cronbach’s alpha value was 0.85.

The relationship quality with peers was measured with the 25-item Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987), which typically captures the general quality of relationship with friends. Adolescents were asked to indicate how often each statement was true for them (e.g., “My friends sense when I’m upset about something.”) on a five-point scale (1 = *almost never or never*, 5 = *almost always or always*). The higher average scores indicated higher relationship quality with peers. The Chinese version used in the present was previously proven to be valid and reliable (Lan & Radin, 2020; Pan et al., 2017). The Cronbach’s alpha value was 0.89.

Statistical Analyses

Descriptive analyses were performed via SPSS 26.0. Latent profile analyses (LPA) were conducted using Mplus 8.3 to identify subgroups of adolescents with different interpersonal relationship patterns based on their relationship qualities with father, mother, peers, and teachers. As suggested by previous studies (e.g., Dalimonte-Merckling & Brophy-Herb, 2019; Willoughby et al., 2020), the optimal number of subgroups was determined by several criteria including the interpretability of the subgroups, the log likelihood (LogL), the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), the sample-size-adjusted BIC (aBIC), entropy, the Lo–Mendell–Rubin (LMR) test, and the Bootstrap Likelihood Ratio Test (BLRT) test. A higher value on the entropy and a lower value on the LogL, AIC, BIC, aBIC indicate a better-fitting model. A significant LMR or BLRT indicates the addition of one more latent profile improves the overall model fit. In addition, given that the aforementioned indexes and tests are heavily influenced by sample size, leading to the inability of reaching a minimum (Marsh et al., 2009), the “elbow plots” of information criteria’s graphically presentation were considered (Morin et al., 2011). Specifically, the point after which the slope flattens represents the optimal number of subgroups (Ciarrochi et al., 2017). In order to examine whether the LPA created distinct subgroups, we performed multivariate analysis of variance (MANOVA) to compare group differences on indicators of LPA (i.e., relationship qualities with father,

mother, peers, and teachers). We also examined the potential differences in socio-demographic information (i.e., gender, age, parents’ educational levels, and family wealth) across subgroups. Bonferroni post hoc analyses were conducted if the MANOVA were significant.

We proceeded to conduct a latent growth curve model to capture the development of internalizing problems. Each year’s internalizing problem was calculated as the mean score of depressive and anxiety symptoms.¹ By setting the path from the latent slope to Wave 1 internalizing problems at zero, the latent intercept could be interpreted as the level of internalizing problems at Grade 10 (Duncan et al., 1999). To describe the internalizing problems at Grade 12, we re-centered the latent slopes (i.e., setting the path from the latent slope to Wave 3 internalizing problems at zero), so that the latent intercept could be interpreted as the level of internalizing problems at Grade 12 (Little et al., 2005).

In order to compare the development of internalizing problems across different subgroups, we conducted the Bolck-Croon-Hagenaars (BCH) method, which is a preferred approach to compare continuous outcomes from profile memberships (Asparouhov & Muthén, 2021). The BCH method considers classification error while estimating the means of outcomes, and therefore has relatively high statistical power (Bakk & Vermunt, 2016).

Results

Preliminary analyses

Means, standard deviations, and zero-order correlations for the study variables are shown in Table 1. Four types of adolescent interpersonal relationships (i.e., relationships with father, mother, peers, and teachers) positively correlated with each other ($r_s = .30 \sim .77$). Indicators of adolescent interpersonal relationships negatively correlated with anxiety and depressive symptoms at each wave ($r_s = -.17 \sim -.33$).

Latent profile analyses

The LPA was conducted for 1–7 profiles. As shown in Table 2, the AIC, BIC, and aBIC kept decreasing with increase in the number of profiles, and the LMR and BLRT kept being significant. We then examined the elbow plots of the criteria, the graph of which illustrated the curve became flattened after adding the sixth profile. The sixth profile also did not have unique characteristics as compared with the previous five profiles. Therefore, the five-profile solution was chosen for further analyses. Figure 2 depicted the profiles of adolescent interpersonal relationship qualities based on standardized mean scores of indicators. Most adolescents were classified as “Moderately high quality” ($n = 1465$, 38.21%; having relatively

¹We first considered each year’s internalizing problems as a latent factor which was composed of two indicators (i.e., depressive and anxiety symptoms). Measurement invariance of internalizing problems across time illustrated a good configural invariance (The fit indexes of the unconstrained model: $\chi^2(2) = 35.027$, CFI = 0.996, RMSEA = 0.066, SRMR = 0.008). Further constraint illustrated full metric invariance ($\Delta CFI = 0.007$) and partial scalar invariance ($\Delta CFI = 0.009$, freeing the intercept of anxiety at Grade 10). The final multiple indicator latent growth model of internalizing problems had an adequate model fit: $\chi^2(6) = 109.519$, CFI = 0.986, RMSEA = 0.067, SRMR = 0.029. However, the model with BCH method cannot converge appropriately, this is potentially due to the complex model. Considering that the correlations between anxiety and depressive symptoms were high within each wave ($r_s = .65 \sim .73$, $p_s < .001$), and that the mean scores of internalizing problems highly correlated with the factor scores across time ($r_s > .98$, $p_s < .001$), we decided to average the levels of depressive and anxiety symptoms at each time to create the new internalizing problems scores. The BCH model with the mean internalizing problems score converged after constraining the variances of slope of the “High-quality” and “Father estrangement” subgroup to zero and constraining the residuals of internalizing problems to be equal across time within the “Father estrangement” subgroup.

Table 1. Descriptive statistics of covariates and key variables

	1	2	3	4	5	6	7	8	9	10
1. Relationship quality with father	–									
2. Relationship quality with mother	.77***	–								
3. Relationship quality with peers	.30***	.36***	–							
4. Relationship quality with teachers	.33***	.36***	.42***	–						
5. Anxiety symptoms (Grade 10)	–.22***	–.24***	–.33***	–.36***	–					
6. Anxiety symptoms (Grade 11)	–.18***	–.17***	–.22***	–.24***	–.46***	–				
7. Anxiety symptoms (Grade 12)	–.19***	–.17***	–.20***	–.23***	.38***	.43***	–			
8. Depressive symptoms (Grade 10)	–.25***	–.24***	–.27***	–.33***	.65***	.40***	.32***	–		
9. Depressive symptoms (Grade 11)	–.22***	–.19***	–.22***	–.27***	.40***	.65***	.37***	.50***	–	
10. Depressive symptoms (Grade 12)	–.19***	–.16***	–.20***	–.23***	.34***	.37***	.73***	.36***	.44***	–
<i>M</i>	3.44	3.67	3.46	3.37	1.93	1.86	1.91	2.15	2.08	2.15
<i>SD</i>	0.84	0.78	0.50	0.49	0.43	0.40	0.47	0.56	0.53	0.56

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2. Results from the latent profile analysis models

Model	LogL	AIC	BIC	aBIC	Entropy	p LMR	p BLRT
One-profile	–21,760.84	43,537.68	43,587.70	43,562.28	–	–	–
Two-profile	–20,232.89	40,491.78	40,573.06	40,531.75	0.757	<.001	<.001
Three-profile	–19,685.82	39,407.63	39,520.16	39,462.96	0.834	<.001	<.001
Four-profile	–19,386.73	38,819.47	38,963.26	38,890.17	0.798	<.001	<.001
Five-profile	–19,010.45	38,076.90	38,251.95	38,162.98	0.854	<.001	<.001
Six-profile	–18,841.68	37,749.35	37,955.66	37,850.80	0.868	<.001	<.001
Seven-profile	–18,741.30	37,558.60	37,796.16	37,675.42	0.843	<.001	<.001

Note. The bolded entries represent the selected solution in the current study. LogL = Model Log Likelihood; AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; aBIC = Sample-Size-adjusted BIC; LMR = Lo-Mendel-Rubin likelihood ratio test; BLRT = Bootstrap Likelihood ratio test.

high levels of all relationship qualities with others) or “Moderately low quality” ($n = 1318$, 34.38%; having relatively low levels of all relationship qualities with others). In addition, 742 (19.35%) adolescents were classified as “High quality,” who have the best relationship qualities across four domains, whereas 214 (5.58%) of adolescents were “Low quality,” who generally have low relationship qualities with their parents, peers, and teachers. Notably, a small but truly existent group was identified as “Father estrangement” ($n = 95$, 2.48%), because adolescents in this group had the worst relationship quality ($M = -2.23$, $SD = 0.53$) with their fathers as compared with those in other subgroups ($M_s = -1.93 \sim 1.28$, $SD_s = 0.32 \sim 0.44$), whereas their relationship qualities with others are similar to those in “Moderately high-quality” group. The comparison of levels of relationship qualities among subgroups are shown in Table 3.²

²We also re-classified the participants as “Convergent” (including “High-quality,” “Moderately high-quality,” “Moderately low-quality,” and “Low-quality” groups) and “Divergent” subgroups (including “Father estrangement” group) and compared the trajectory indicators between the two groups. In addition, we examined the associations between each indicator of relationship qualities and trajectory terms and compared the estimates between “Convergent” and “Divergent” groups. We summarized the results in Tables S4 & S5 in the supplementary file for researchers interested in them.

Adolescents in the five subgroups of relationship qualities also differ in socio-demographic variables. Specifically, girls were more likely to be classified as “Father estrangement,” “Moderately high quality,” and “High quality.” Subgroups with better relationship qualities tended to have parents with higher educational levels and richer families.

Profiles’ link to the development of internalizing problems

For the overall sample, adolescents’ internalizing problems decreased across high school years ($B = -0.014$, $SE = 0.005$, $p = .004$). Further BCH approach indicated that the trajectories of internalizing problems were quite different among adolescents in different subgroups of relationship profiles. As shown in Table 4,³ internalizing problems in the “Father estrangement” and “High-quality” subgroups decreased more slowly as compared with those in “Low-quality” and “Moderately low-quality” subgroups. As for the comparison of intercepts, “Low-quality” students consistently had the highest levels of internalizing problems at Grade 10 and Grade 12, whereas “High-quality”

³For researchers who are interested in the separate developmental trajectories of anxiety and depressive symptoms across groups, we have summarized the comparisons of trajectory indicators across groups in Table S1.

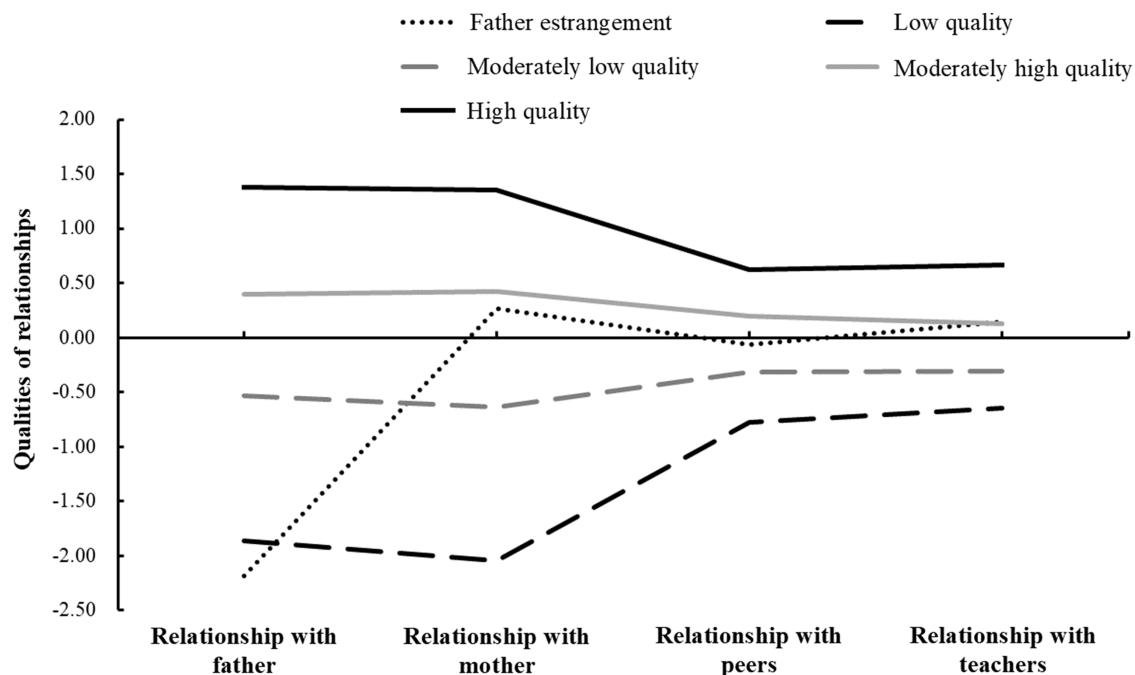


Figure 2. Estimated standardized means of perceived relationship quality with mother, father, peers, and teachers for each relationship profile.

students consistently had the lowest levels of internalizing problems across time. The “Moderately high-quality” and “Moderately low-quality” adolescents fell into the middle, with “Moderately high-quality” adolescents consistently having lower internalizing problems than “Moderately low-quality” adolescents across high school years. In addition, “Father estrangement” adolescents had fewer internalizing problems than those in the “Low-quality” group and had similar level of internalizing problems as compared with “Moderately low-quality” peers at Grade 10. However, at Grade 12, adolescents in the “Father estrangement” subgroup had higher internalizing problems than “Moderately low-quality” adolescents and their internalizing problems did not differ from “Low-quality” peers. The effect sizes of the comparisons (i.e., Cohens’ *d* values) were reported in the supplementary file (Table S3).

Discussion

Guided by the holistic and culturally embedded perspective of interpersonal environment (Hinde, 1997), the present study aimed to identify interpersonal relationship profiles in Chinese adolescents with a person-centered approach. Moreover, we examined how the development of internalizing problems across high school years varied among different relationship quality profiles. Five profiles were identified, with four convergent relationship profiles (e.g., consistently high or consistently low relationship quality in all significant domains) and one “Father estrangement” profile (poor relationship quality with father but relatively high relationship quality with others). Further conditional latent growth models indicated this “Father estrangement” group is at risk for the increase of internalizing problems when compared with other relationship subgroups.

Characteristics of relationship profiles in Chinese adolescents

Consistent with previous studies (e.g., Ciarrochi et al., 2017; Oh et al., 2021; Scholte et al., 2001; Shin & Yu, 2012), in our sample, most adolescents (97.5%, four out of five profiles) had convergent

relationship profiles with 57.6% having generally high-quality relationships with others (i.e., the “High-quality” group and the “Moderately high-quality” group) and about 40% having generally low-quality relationship with others (i.e., “Moderately low-quality” group and “Low-quality” group). The proportion of the convergent profiles in our study (97.5%) is larger than that of previous related studies (37 ~ 84%; e.g., Ciarrochi et al., 2017; Jager, 2011). In addition, about 60% of adolescents in our sample had generally good relationships with others. The proportion of which is also larger than the adolescents (33.8 ~ 50%) in other cultural groups (e.g., American, Australian, and Korean adolescents; Ciarrochi et al., 2017; Rose et al., 2019; Shin & Yu, 2012).

Previous theory has suggested that adolescents may face huge challenge in achieving high-quality relationships in all domains simultaneously (Bourdieu, 1986). Constrained by a finite amount of “social capital,” most adolescents have to decide how to distribute the social capital and put it into different relationships based on the profits they could get from them, and thus may not be able to successfully balance and manage all their relationships (Jager, 2011). However, this seems to not be as difficult for most Chinese adolescents when compared to their Western counterparts. One possible explanation could be that the group-oriented Chinese culture has driven individuals to devote more energy and resources to promote and balance their relationships in different domains in order to achieve relationship harmony (Chen et al., 2018).

For the divergent profile, a “Father estrangement” pattern emerged. In this pattern, adolescents’ relationship quality with the father was especially low while their relationship qualities with other significant persons were relatively high. Further MANOVAs illustrated that the level of relationship quality with father in the “Father estrangement” subgroup was the lowest among all five subgroups and was even lower than that of the “Low-quality” subgroup. In contrast, the relationship qualities with mothers, peers, and teachers of the “Father estrangement” adolescents were at the same level as those in the “Moderately high-quality” subgroup. This is consistent with our hypothesis based on Chinese

Table 3. Comparisons of subgroups of adolescent interpersonal relationship qualities on the demographic variables and profile indicators

Variables	Father estrangement (n = 95)		Low quality (n = 214)		Moderately low quality (n = 1318)		Moderately high quality (n = 1465)		High quality (n = 742)		F
	M	SD	M	SD	M	SD	M	SD	M	SD	
Gender ^a	68.42% _c	0.47	36.92% _a	0.49	47.27% _b	0.50	54.68% _c	0.50	57.41% _c	0.50	13.65***
Age	16.70	0.52	16.72	0.43	16.70	0.45	16.67	0.46	16.67	0.43	1.11
Mother's education	2.37 _a	1.03	2.76 _{a,b,c}	1.63	2.63 _a	1.34	2.78 _b	1.32	2.99 _c	1.36	10.71***
Father's education	2.62 _a	1.24	2.91 _{a,b}	1.49	2.95 _a	1.36	3.09 _b	1.34	3.27 _c	1.34	10.15***
Family wealth	10.94 _{a,b}	2.44	10.62 _a	3.11	11.19 _b	2.64	11.75 _c	2.30	12.34 _d	1.99	38.72***
Relationship quality with father	-2.23 _a	0.53	-1.93 _b	0.52	-0.61 _c	0.41	0.33 _d	0.43	1.28 _e	0.37	4395.55***
Relationship quality with mother	0.35 _c	0.69	-2.23 _a	0.63	-0.76 _b	0.40	0.36 _c	0.40	1.24 _d	0.32	4623.02***
Relationship quality with peers	0.09 _c	1.01	-0.77 _a	1.02	-0.35 _b	0.86	0.11 _c	0.92	0.63 _d	0.97	177.05***
Relationship quality with teachers	-0.10 _{b,c}	0.98	-0.81 _a	0.96	-0.35 _b	0.81	0.12 _c	0.92	0.64 _d	1.04	189.72***

Note. Means in the same row with different subscripts (i.e., a, b, c, d) differ significantly at the .05 level. Mother's/father's education was measured with a 7-point scale (1 = elementary and below, 7 = doctor's degree). The scores of the four relationship qualities were standardized. Family wealth was measured by asking students to report the availability of 14 different household items at home (e.g., a room of your own), ranged from 0 to 14 (OCED, 2012). *Percentage of girls. *** $p < .001$.

Table 4. Intercepts and slopes of internalizing problems in subgroups of adolescent interpersonal relationships: means (standard errors)

	Groups					
	Total	Father estrangement	Low quality	Moderately low quality	Moderately high quality	High quality
n (%)	3834 (100%)	95 (2.48%)	214 (5.58%)	1318 (34.38%)	1465 (38.21%)	742 (19.35%)
Internalizing problems (Intercept-Grade 10)	1.92 (0.01)	2.11_c (0.11)	2.33_d (0.09)	2.12_c (0.08)	1.99_b (0.11)	1.80_a (0.10)
Internalizing problems (Intercept-Grade 12)	1.92 (0.01)	2.19_d (0.10)	2.22_d (0.12)	2.05_c (0.08)	1.97_b (0.11)	1.88_a (0.10)
Internalizing problems (Slope)	-0.00 (0.01)	0.04 _{b,c} (0.00)	-0.06_a (0.01)	-0.04_a (0.01)	-0.01 _{a,b} (0.02)	0.04_c (0.00)

Note. Bold coefficients indicate significance at $p < .05$ (two-tailed). Means in the same row with different subscripts (i.e., a, b, c, d) differ significantly at the .05 level.

cultures that some Chinese fathers are more punitive and stricter and enjoying a higher status over their children (Li & Lamb, 2015). This may prevent open father-adolescent communication and thus harm their relationship quality. Empirically, Oh et al. (2021) also identified an "uninvolved father" subgroup among adolescents in Portugal which is a country where fathers traditionally played a distant and authoritarian role (Wall, 2015). Specifically, in this "uninvolved father" group, adolescents reported their support from their father was quite low while their support from their mother and friends were relatively high. This provides additional evidence for the existence of this small but unique subgroup.

Different from our hypotheses and previous studies on adolescent relationship profiles (Ciarrochi et al., 2017; León & Liew, 2017; Scholte et al., 2001), the present study failed to find "parent-dominated," "peer-dominated," or "teacher-dominated" subgroups. A possible explanation is that Chinese adolescents tend to balance their relationships from different domains as influenced by the traditional "中庸 (Zhongyong)" value (i.e., the Doctrine of the Mean; Yang et al., 2016). Alternatively, given the emphasis on honoring and obeying parents in the Chinese culture, adolescents' early experience with their parents may have strong influence on their subsequent relationships with others out of the family system (e.g., relationship qualities with peers and teachers). This could indicate a salient family-to-school spillover effect (Liu et al., 2020).

That said, as can be seen from Figure 2, the four convergent subgroups were not only quantitatively different (i.e., each indicator of the relationship qualities levels were different across subgroups) but also qualitatively different as the relationship qualities from different sources still show some extent of divergence.⁴ Specifically, repeated MANOVAs comparing the levels of different relationship qualities within each subgroup suggested that relationship qualities with parents were lower than that of peers and teachers in the two low-quality subgroups. On the other hand, the opposite pattern can be observed in the two subgroups with high relationship qualities, meaning that the levels of parent-child relationship qualities were higher than those seen with peers and teachers in the two subgroups with high relationship qualities. Therefore, our results showed that the relationship qualities with father and mother were more variant across subgroups when compared with the relationship qualities with peers and teachers. These results might account for the extremely high proportions of convergent subgroups in the present study.

⁴To provide more information about the characteristics of each subgroup, we conducted MANOVA to compare levels of four types of relationship qualities within each subgroup. Limited by both scope and space, we did not describe the relevant analytic approaches and results here in the main text (see the Table S2 in the supplemental file for details).

Relationship profiles and the development of internalizing problems in Chinese adolescents

In the current study, the development of internalizing problems across high school years differed among five profiles. In keeping with relevant studies in other cultural backgrounds (Laursen et al., 2006; Laursen & Mooney, 2008; Oh et al., 2021; Rose et al., 2019), adolescents with high-quality relationships across all domains (i.e., the “High-quality” subgroup) consistently have the lowest levels of internalizing problems at both the initial (Grade 10) and the last year (Grade 12) of high school followed by the “Moderately high-quality” subgroup and the “Moderately low-quality” subgroup. The “Low-quality” subgroup reported the highest levels of internalizing problems across time. These findings supported that those high-quality relationships serve as robust factors which protect adolescents from suffering from internalizing problems across cultures (Baumeister & Leary, 1995). However, inconsistent with our hypotheses, adolescents’ internalizing problems in low-quality profiles decreased faster than those in high-quality profiles. The explanation might be twofold. On the one hand, adolescents in somewhat maladaptive relationship profiles may gradually learn how to cope with their situations. For example, by paying more attention to their personal achievement instead of interpersonal affiliation. On the other hand, the first wave of our data was collected at the beginning of the first semester in high school when most adolescents were still in the adapting phase and were struggling with building up new social networks (Benner, 2011; Felmlee et al., 2018). This may account for their heightened internalizing problems. Adolescents’ anxiety and depressive symptoms would gradually reduce after adapting to the new school environment when getting into the second and third years of high school.

The most meaningful and interesting finding in our study is the development of internalizing problems in the “Father estrangement” subgroup. Specifically, at Grade 10, the level of internalizing problems for adolescents in this subgroup was lower than that in the “Low-quality” subgroup and was similar to that in the “Moderately low-quality” subgroup. In contrast, when the participants entered Grade 12 2 years later, “Father estrangement” adolescents had more internalizing problems than “Moderately low-quality” peers and had similar levels of internalizing problems when compared with the “Low-quality” adolescents. The slope of internalizing problems trajectories illustrated those adolescents in “Low-quality” and “Moderately low-quality” subgroups had decreased internalizing problems across the high school years, whereas the internalizing problems level for adolescents in “Father estrangement” subgroup kept relatively stable. Further comparisons showed significant differences between the slope of “Father estrangement” subgroup and the two subgroups with low relationship qualities. This indicates that the former subgroup had a more maladaptive development pattern of internalizing problems (i.e., decreased more slowly) when compared with the latter ones. In addition, the “Father estrangement” subgroup had consistently higher internalizing problems as compared with those in relatively high-quality subgroups.

Prior research found that adolescents who have poor relationships with their parents but relatively good relationships with other significant persons had higher levels of internalizing problems and lower levels of well-being as compared with those that have generally high relationship qualities across domains (Ciarrochi et al., 2017; Shin & Yu, 2012). Considering the relationship with mother and father separately, our findings on the trajectory of the “Father estrangement” subgroup contributes to the literature

by suggesting that having poor relationship quality with the father is sufficient to cause severe internalizing problems for Chinese adolescents. This confirms the significant role of father-child relationships in recent Chinese culture (Li, 2020; Liu et al., 2021). Furthermore, although the “Father estrangement” profile in our study is highly similar to the “uninvolved father” profile in a recent study among Portugal adolescents (Oh et al., 2021), the development of internalizing problems of this subgroup was different between the two studies. In Oh et al.’s work, adolescents’ anxious withdrawal in “uninvolved father” subgroup did not differ from adolescents in other adaptive or maladaptive subgroups (e.g., high-quality subgroup, moderate-quality friendship subgroup) concurrently or longitudinally. Researchers explained their findings with the mother primacy hypothesis, which posits that adolescents’ relationship with the mother is more influential than the relationship with father (Oh et al., 2021). In our study, however, adolescents in the “Father estrangement” subgroup seem to be the most vulnerable to internalizing problems across high school years, which can neither be buffered by high-quality mother-child relationship nor by good relationships in the school context (i.e., relationships with peers and teachers). A possible reason for this difference in developmental outcomes is the emphasis on Confucian patriarchy under a Chinese culture, which reinforces the authority of fathers over their children. Therefore, fathers may have great influences on some adolescents and poor father-adolescent relationships may be especially harmful to adolescent healthy development in China (Santos & Harrell, 2017). The culturally specific results revealed the unique and important role of father for Chinese adolescent development, which needs to be replicated and further examined in future studies.

Limitation and future directions

There are several limitations in the present study. First, all the variables in this study were self-reported. Although self-reported relationships are considered as the best indicators for an individual’s subjective interpersonal environment, it is suggested that a large discrepancy exists between self- and peer-reported adjustment indicators. For example, Scholte et al. (2001) found that adolescents with generally poor relationships across domains had the most severe adjustment problems according to the self-reported data. However, according to peer-reported adjustment indicators, adolescents with generally poor relationships did not differ from those who have generally high relationship qualities in self-confidence and peer acceptance. Therefore, it would be necessary for future studies on this topic to implement multi-informant (e.g., self-reported, peer-nominated, parent-reported, teacher-reported) and multi-approach (e.g., longitudinal design, empirically sampling method, behavioral observation) methods.

Second, only internalizing problems (indicated by anxiety and depressive symptoms) were considered as adolescents’ developmental outcomes in the current study. Prior research indicated that different relationship profiles may be associated with different adjustment outcomes. Specifically, research found that adolescents in low-quality parent-child relationship profiles have more risk for involving externalizing problems (e.g., delinquent behavior and substance use; Jager, 2011), and that adolescents in poor teacher-student relationship profile are characterized by low school engagement (Rosenfeld et al., 2000). Further studies are needed to include a wider scope of adjustment indicators and examine whether different relationship profiles have differential influences on different adjustment domains.

Third, our scopes of relationships, especially peer relationships, were limited as we only measured adolescents' general relationship qualities with friends. In fact, peer relationships have several domains (e.g., relationship with romantic partner, relationship with close friends, relationship with same-/opposite-sex friends, etc.). The peer relationships may also have different aspects such as the quantity versus quality and positive versus negative experiences (Jager, 2011; Oh et al., 2021). This might also be a potential explanation for the low proportion of divergence subgroups in the present study as adolescents may have distinct relationship quantities and qualities with different sources of peer relationships (Jager, 2011). Therefore, it is important for future studies to have a more nuanced assessment of the different domains of relationships in order to have a more comprehensive view of adolescents' relationships configurations and adjustments.

Fourth, this study was unable to capture changes in relationship patterns and its link to the trajectory of internalizing problems. Although relationships in significant domains showed overall stability during the high school period (Baysu et al., 2021; Ebbert et al., 2019; Gorrese & Ruggieri, 2012), individual difference may exist in the changes of interpersonal relationship patterns across time. More attention to the relationship between changes in relationship patterns and the developmental trajectory of internalizing problems is warranted in future studies. This could provide more insight into the dynamic link between interpersonal relationships and adolescent mental health outcomes.

Fifth, although the current study was based on a cultural perspective, we neither measured Chinese culture nor collect data in Western contexts. Therefore, our interpretations related to Chinese culture and comparisons made with western cultures are only inferential and speculative. Cross-cultural studies that measure cultural orientations need to be conducted with adolescents in eastern and western countries to directly examine the similarities and differences of the configurations and functions of differential relationships.

Conclusion

Using a person-centered approach and a longitudinal design, the present study discovered the configuration of interpersonal environments with a large stratified sample of Chinese adolescents and identified four convergent and one divergent ("Father estrangement") profiles of relationships. Moreover, the "Father estrangement" subgroup had the highest risk for the development of internalizing problems across high school years. The present study constituted a valuable contribution to understanding the configuration and influence of adolescents' interpersonal relationships in a non-Western context.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S0954579422001109>

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Conflicts of interest. None.

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