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Attachment and self-evaluation in Chinese adolescents: Age and gender differences

Hairong Song, Ross A. Thompson*, Emilio Ferrer

Department of Psychology, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA

Abstract

This study investigated age and gender differences in the quality of attachment to mothers, fathers, and peers, and the association of attachment with measures of self-evaluation in 584 Chinese adolescents in junior high, high school, and university. Their responses to the Inventory of Parent and Peer Attachment indexed attachment quality, and self-evaluation was measured by the Rosenberg Self-Esteem Scale and the Self-Liking and Self-Competence Scale. Consistent with findings with Western samples, our analyses revealed (a) lower parent–child relationship quality in middle (compared to early) adolescence, (b) a significant association of parental and peer attachment with self-evaluation, and (c) gender differences in attachment to peers, with females reporting stronger attachment than males. Chinese females reported stronger maternal attachment than did males, and for females the quality of maternal attachment was more strongly related to self-evaluation than any other attachment relationship. During high school, peer attachment quality – rather than parental – was preeminently associated with self-evaluation. The findings of this study indicate that in a context of considerable consistency of findings with Western studies, parent–child attachment in Chinese adolescents is also influenced by culture-specific practices that influence parent–youth relationships and their meaning to the child.

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* Corresponding author. Department of Psychology, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA. Tel.: +1 530 754 6663.

E-mail address: rathompson@ucdavis.edu (R.A. Thompson).

In adolescence, parental and peer relationships are important sources of support and self-evaluation. These relationships are influential even though they change considerably as adolescents mature, become increasingly independent, and rely on parents and friends in different ways. Parental and peer relationships are also shaped by broader cultural values that help to define family relationships and their importance to the development of self. Whereas youth in many Western societies perceive peer relationships as increasingly important for establishing independence from the family, parents in many non-Western societies remain important sources of adolescents' self-evaluations, and may even surpass peer influences. Cultural studies of close relationships and their impact on adolescent psychological development, particularly those focused on non-Western societies, can contribute to understanding how social values help to define the significance of these relationships to the developing person.

The research described here contributes to this understanding by examining parental and peer attachment, and the association of these relationships with self-evaluation, in a large sample of Chinese adolescents. This is the first English-language report of adolescent attachment and its correlates in China. Our goals were to (a) describe age differences in the strength of mother–child, father–child, and relationships with friends from early through late adolescence, (b) examine gender differences in these relationships across this developmental period, and (c) understand the extent to which parental and peer relationships predict individual differences on measures of adolescent self-evaluation.

Attachment relationships in China

There have been very few published studies of attachment relationships in China and, to our knowledge, none on adolescent attachment (see [van Ijzendoorn & Sagi-Schwartz, 2008](#)). This is unfortunate because China is the largest society reflecting interdependence, communal cultural values, and also because of the combination of modern values with traditional Confucian beliefs that emphasize filial piety and emotional harmony and control in close relationships, all within the context of the government's one-child policy ([Ho, 1981](#); [van Ijzendoorn & Sagi-Schwartz, 2008](#); [Kagitcibasi, 1996](#)). Although China is a society in transition and there exist considerable individual differences in fidelity to traditional values, recent studies confirm the shared values of collectivism, filial piety, and emotional control in Chinese culture (e.g., [Ho, 1996](#); [Oyserman, Coon, & Kemmelmeier, 2002](#)). It is thus an important setting for examining how non-Western values might differentially influence the growth of close relationships and their developmental impact.

The research on parent–child attachment in China focuses exclusively on infancy and early childhood. Studies of infant–mother attachment, using the Strange Situation procedure (or a modification of this procedure), have consistently found that a high proportion of infants are deemed securely-attached (see [Hu & Meng, 1996](#); [Li et al., 2004](#); [Liang, Chen, & Chen, 2000](#)). [Li et al. \(2004\)](#), for example, studied 75 Cantonese infant–mother dyads in the standard Strange Situation and reliably coded infants' responses using conventional rating criteria. They reported that 65% of the infants were classified as securely-attached, and the proportions of infants in the three insecure classifications were also highly comparable to the distribution of attachment classifications in most Western countries ([van Ijzendoorn & Sagi-Schwartz, 2008](#)). Although some researchers have identified alternative attachment classifications for Chinese samples ([Liang et al.,](#)

2000) and all have noted the apparent indifference displayed by infants deemed avoidantly attached to their mothers, these studies suggest that patterns of infant–mother attachment in the Strange Situation are highly comparable in China to those shown by infants in other cultures.

A similar conclusion can be derived from research using alternative assessment procedures, such as the Attachment Q-sort, for young children (Waters & Deane, 1985; Wu & Zou, 1994). A study by Gao and Wu (cited in Posada, Gao, Wu, & Posada, 1995) found that a sample of 41 Beijing mothers described their young children using this instrument in a manner highly similar to how mothers in Western and their non-Western societies described their own offspring and, furthermore, that their portrayals of the optimally secure child were also culturally comparable. The validity of these Q-sort ratings is supported by research indicating that preschoolers rated as more secure were also less aggressive, more helpful, and more popular in their relationships with peers, similar to findings in the United States and elsewhere (Wu & Zou, 1995; see also Li, 2005; Thompson, 2006). As reassuring as these findings are for the validity of attachment research in China, it is important to keep in mind that these studies tested only some of the theoretical claims of attachment work. Much more work remains for understanding the validity of attachment concepts in China, where cultural differences in parental care and the development of secure attachments may nonetheless be important (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000).

By the time children reach adolescence, however, assessing attachment relationships is complicated by the greater psychological maturity and relational complexity of the child. Attachment researchers have generally used one of two strategies for studying adolescent attachment (Allen & Land, 1999). One is an extended, detailed interview concerning the individual's recollections of parental care in childhood and beliefs about its current significance called the Adult Attachment Interview, which has been adapted for use with adolescents (see Hesse, 1999). The transcribed interview, which can be quite long, is analyzed in detail to yield an attachment classification based on representations of early childhood care experiences. The alternative strategy focuses instead on the adolescent's current experience of the parent–child relationship through a questionnaire assessment. The most widely-used such measure is the Inventory of Parent and Peer Attachment (IPPA) (Armsden & Greenberg, 1987), which has been used extensively in studies of adolescent attachment and its correlates. The IPPA yields subscales reflecting the individual's perception of the extent of trust and communication in the relationship, and the extent of alienation experienced. These subscales are combined (with alienation scores reversed) to yield a summary index of the quality of the attachment relationship. It is important to note that these are very different approaches that do not necessarily lead to comparable portrayals of attachment in adolescents, partly because one focuses on recollections of childhood care and the other on current parent–child relationships. However, because our focus was on characterizing the current status of the parent–adolescent relationship, we used the IPPA in this study. An additional advantage of this measure is that it permits a similar assessment of the individual's peer relationships.

The IPPA has been used in an extensive research literature concerned with adolescent attachment and its correlates, including studies conducted in a variety of Western societies. This research has revealed significant associations between strong parental attachment, adolescent social and emotional well-being, and diminished risk for problematic behavior (see reviews by Kenny & Rice, 1995, and Rice, 1990). There has been surprisingly little research, however, into developmental changes in the perceived strength of parental and peer attachments throughout the

adolescent years. This is surprising in light of prevalent views, receiving mixed empirical support, of the changing importance of relationships with parents and friends to teenagers throughout adolescence (see, e.g., Coleman & Hendry, 1999). In one report, Buist, Dekovic, Meeus, and van Aken (2002) used a cohort-sequential design to assess adolescent attachment on a modified IPPA for a sample of 288 Dutch adolescents age 11–15 years, who were studied on three occasions at 1-year intervals. They found that attachments to mothers were generally stronger than attachments to fathers but, for both parents, there was an overall decline in the quality of these relationships from 11 to 17 years of age (see also Paterson, Field, & Pryor, 1994 for similar conclusions with a New Zealand sample studied from ages 13 to 19 years). We could find no published longitudinal studies on the changing quality of peer attachments in adolescence using the IPPA.

There has also been no published research using the IPPA to study adolescent attachment in non-Western cultures, despite the importance of understanding better the nature of parent–adolescent relationships in societies that place a greater emphasis on communal and interdependent values. In one relevant study, Arbona and Power (2003) compared responses on the IPPA from European American, African American, and Mexican American adolescents living in Houston, and found that on a derived index of avoidance of the mother, Mexican American youth scored significantly lower than the other groups. The present study was designed to deepen understanding of adolescent attachment in non-Western contexts by studying age-related patterns, external correlates, and mean levels of attachment to mothers, fathers, and friends in Chinese adolescents.

We were also interested in gender differences in attachment in light of the very mixed picture of gender differences in maternal and paternal attachments from studies in Western cultures (Kenny & Rice, 1995). These varying results may arise from the different societal contexts in which parental attachments have been assessed for adolescents in Western cultures, as well as complex influences on parent–child relationships for adolescent sons and daughters in the West. We were especially interested, in light of Chinese cultural values concerning gender roles, in understanding whether females' parental attachment was stronger than males', and whether this discrepancy varied according to the sex of the parent. In addition, based on some studies suggesting that females also report stronger peer attachment than do males (Armsden & Greenberg, 1987; Laible, Carlo, & Roesch, 2004; O'Koon, 1997; Wilkinson, 2004), we sought to determine whether this would be true among Chinese adolescents.

Adolescent attachment and self-evaluation

One way of clarifying the relevance of a measure developed in the United States for understanding adolescent attachment in a non-Western culture is to determine whether external correlates of this measure are comparable in each context. One of the central correlates of a strong, secure parent–child relationship is enhanced self-esteem, and perceptions of the self as competent (Thompson, 2008). According to attachment theory, the trust engendered by a supportive parent–child relationship provides children with the confidence to explore and engage in new experiences while knowing that the parent's assistance is readily available. Moreover, the parent's reliable warmth causes children to develop mental representations ("internal working models") of themselves as loveable and worthy of care. Taken together, these

theoretical views lead to the expectation that children in secure, supportive parent–child relationships, are more likely to perceive themselves positively and as competent compared with children in insecure or unsupportive relationships (see Cassidy, 2008; Weinfield, Sroufe, Egeland, & Carlson, 2008). This expectation is confirmed in several studies of attachment and self-esteem in young children, which show that children in secure relationships consistently perceive themselves more positively than do insecurely-attached young children (e.g., Cassidy, 1988; Clark & Symons, 2000; Goodvin, Meyer, Thompson, & Hayes, 2008; Verschueren, Marcoen, & Schoefs, 1996).

Although enhanced self-esteem derived from early parent–child relationships is important, attachment theorists recognize that continued parental support is required to maintain positive self-regard as children mature (Thompson, 2008). This is consistent with the view of adolescence researchers, who likewise regard reliable parental support as important to self-esteem and self-competence in facing the challenges of adolescence and early adulthood (Kenny, 1987; Kenny & Rice, 1995; Rice, 1990). Empirical support for this view comes from many studies that have denoted a significant association of adolescent attachment to parents (assessed by the IPPA) with measures of self-esteem (often the Rosenberg Self-Esteem Scale) and other assessments of self-appraisal (Armsden & Greenberg, 1987; Cotterell, 1992; Laible et al., 2004; Noom, Dekovic, & Meeus, 1999; O’Koon, 1997; Papini & Roggman, 1992; Paterson, Pryor, & Field, 1995; Raja, McGee, & Stanton, 1992; Wilkinson, 2004). The strength of adolescent attachments to mothers and fathers are both important in these studies, and is apparent in studies with respondents from early adolescence through young adulthood. In short, the perceived quality of support from mothers and fathers is an important predictor of adolescent self-esteem and self-competence.

These studies also reveal that the strength of peer attachments is important to adolescent self-esteem (Armsden & Greenberg, 1987; Cotterell, 1992; Laible et al., 2004; Noom et al., 1999; O’Koon, 1997; Papini & Roggman, 1992; Paterson et al., 1995; Raja et al., 1992; Wilkinson, 2004). Indeed, virtually every study in this literature has shown that reports of relationships with *both* parents and friends are associated with differences in adolescent self-evaluation and, although two have indicated that parent attachments are more influential than peer attachments in predicting self-esteem (Laible et al., 2004; Noom et al., 1999), the general conclusion from studies of adolescent attachment in Western societies is that both parental and peer attachments are developmentally crucial.

No published research has examined the association between adolescent attachment to parents and friends and self-evaluation in non-Western cultures, however, and this is an important limitation in our understanding of the importance of close relationships for adolescent development. In a traditional collectivistic culture that emphasizes filial piety and in which parental investment in the positive development of offspring is enhanced by the government’s one-child policy, it is likely that the quality of parent–adolescent relationships is an even more significant influence on adolescent self-evaluation than in Western cultures where there may be more diverse influences on self-evaluation. In the Chinese context, however, the quality of peer relationships may be less influential on developing self-evaluation because of the importance of the parent–child relationship. Thus, one of the goals of the present research was to examine the association between multiple measures of self-evaluation and assessments of maternal, paternal, and peer attachments in a sample of Chinese adolescents with which to compare with the findings of relevant research conducted in Western cultural contexts.

Taken together, we hoped that the findings of this study would contribute to our understanding of adolescent attachment in a non-Western culture in which values of collectivism and filial piety

are likely to influence the nature of parent–child relationships, peer relationships, and their associations with self-evaluation. By enlisting a large sample of Chinese adolescents varying in age, we sought to understand age-related differences in the importance of maternal, paternal, and peer attachments, gender differences in the perceived strength of these relationships, and the extent to which parental and peer attachments predict individual differences in self-evaluation.

Method

Participants

The sample consisted of 584 adolescents recruited from three academic settings in two metropolitan cities of China. The first sample of 200 early adolescents consisted of 88 male and 110 female students (information on 2 missing for gender) from a junior high school in Guangzhou ($M = 13.76$ years, range = 11–16 years, and $SD = 1.02$ years). Among them, 96 were from grade 1, 52 were from grade 2, and 52 were from grade 3 (they are equivalent to grades 7, 8, and 9 in American schools, respectively). The second sample of 114 middle adolescents consisted of 53 male and 61 female students from a high school in Guangzhou ($M = 16.72$ years, range = 14–19 years, and $SD = 0.91$ years). Among them, 41 were from grade 1, 39 were from grade 2, and 34 were from grade 3 (they are equivalent to grades 10, 11, and 12 in American schools, respectively). The third sample of 270 late adolescents consisted of 170 male and 100 female students from the University of Zhejiang ($M = 20.17$ years, range = 17–23 years, and $SD = 1.11$ years; 149 freshmen and 121 sophomore).

Measures

Inventory of Parent and Peer Attachment (IPPA) (Armsden & Greenberg, 1987) is a self-report questionnaire designed to assess respondents' perceptions of the quality of their relationships with mothers, fathers, and peers ("close friends") on a 5-point Likert-type scale format (1 = almost never or never true; 5 = almost always or always true). It consists of 25 items assessing the extent of trust (e.g., "When I am angry about something, my mother tries to be understanding"), communication (e.g., "My mother encourages me to talk about my difficulties"), and feelings of alienation (e.g., "I get upset easily around my mother") from each of the attachment figures, with parallel wordings of items for assessing relationships with mothers and fathers. The IPPA yields a total score based on the sum of item ratings, with some items reverse-scored. Previous research has demonstrated high test–retest reliability for the IPPA (Armsden & Greenberg, 1987), as well as good internal consistency and convergent validity. In the present research, the IPPA was translated into Chinese by the first author in consultation with an American Ph.D. student in psychology fluent in both Chinese and English. Cronbach's alphas in the present study for the maternal, paternal, and peer attachment scores were all above 0.89 for all three samples.

Rosenberg Self-Esteem Scale (SES) (Rosenberg, 1965) is a self-report index of global self-esteem. It consists of 10 items (e.g., "On the whole, I am satisfied with myself") to which respondents indicate their agreement on a 4-point Likert-type scale format (1 = strongly disagree; 4 = strongly agree). After reverse coding the negatively-worded items, high scores on

the scale indicate greater self-esteem. The SES is a widely-used index of self-esteem in adolescents and adults that has shown strong internal consistency and good convergent validity. The Chinese version of SES used in this research was adapted from Yang (1999), which has been demonstrated as reliable and valid in Chinese samples (e.g., Cai, Brown, Deng, & Oakes, 2007). Cronbach's alphas were 0.83, 0.83, and 0.81, respectively, for junior high, high school, and college samples.

Self-Liking and Self-Competence Scale (SLCS-R) (Tafarodi & Swann, 2001) is a measure of self-evaluation consisting of subscales for self-liking (e.g., "I tend to devalue myself") and self-competence (e.g., "I perform very well at a number of things"). Each subscale consists of eight items to which respondents indicate their agreement on a 5-point Likert-type scale format (1 = strongly disagree; 5 = strongly agree). Acceptable levels of convergent and discriminant validity have been demonstrated for this measure (Tafarodi & Swann, 2001). The Chinese version of SLCS-R used in this research was originally made by a bilingual (fluent in English and Chinese) graduate student in psychology. In the present research, Cronbach's alphas for self-liking and self-competence subscales were, respectively, 0.70 and 0.58 in the junior high sample, 0.75 and 0.61 in the high school sample, and 0.70 and 0.56 in the college sample.

Procedure

The junior high school and the high school in which the corresponding samples were collected in this study are located in Guangzhou city in Guangdong province of China. The students attending these schools were from middle class families on average. Before administering the surveys, the first author contacted the dean of educational administration in each school and obtained consent for the investigation. After that, two or three classes of students were randomly selected from each grade and then surveyed in classrooms during class periods. By participating in this study, all students fulfilled a school requirement for developing personal psychological profiles. All college participants in this study were recruited from University of Zhejiang, a top 10 university in China, by on-campus advertisement (e.g., posters). They were all surveyed in groups in a laboratory setting.

Analysis

Our primary interest in this study was to examine the relations among attachment and self-evaluation and, further, to compare those relations across age groups (junior high, high school, and college) and across gender. To this end, a hypothesized model (see Fig. 1) was first proposed to depict these relations and then fit to the data using structural equation modeling (SEM) in Mplus (Muthén & Muthén, 2001). As shown in Fig. 1, there were four latent variables in the model: three predictors (or exogenous variables) including maternal attachment, paternal attachment, peer attachment, and one outcome (or endogenous) variable of self-evaluation, each of them indicated by three manifest variables. Specifically, each type of attachment was indicated by IPPA subscales for trust, communication, and alienation; self-evaluation was represented by the SES, and by self-liking and self-competence scales from the SLCS-R.

To ensure that the same latent variables were identified across age groups and across gender, we first tested for factorial invariance across these groups (Widaman & Reise, 1997). To avoid small

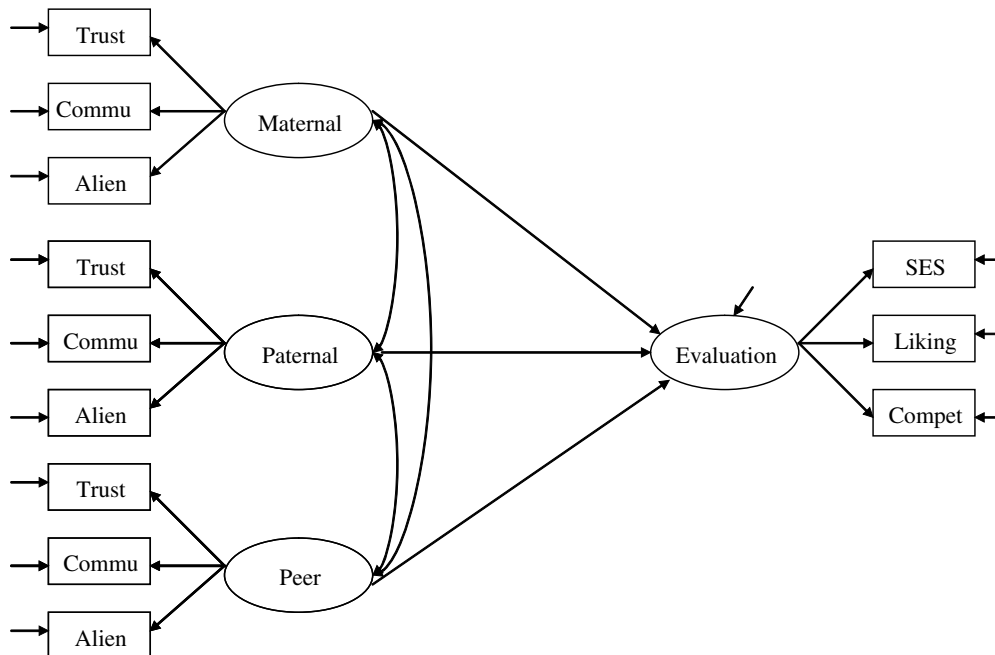


Fig. 1. Theoretical model relating attachments and self-evaluation.

Note: Trust = IPPA trust subscale; Commu = IPPA communication subscale; Alien = IPPA alienation subscale; SES = Rosenberg Self-Esteem Scale; Liking = Self-Liking subscale from SLCS-R; Compet = Self-Competence subscale from SLCS-R.

sample sizes in a six-group analysis based on three age groups by two gender groups (e.g., 53 males in the high school sample), we conducted the factorial invariance analyses across age groups and gender separately.

The following analytic strategies were used for factorial invariance tests. First, we fitted a baseline model (see Fig. 1) in which all latent variables were allowed to correlate freely and only the minimum identification constraints were imposed. After establishing an optimal baseline model, a series of increasingly restrictive models were then evaluated, including models with equal factor loadings across groups (i.e., weak invariance test), equal factor loadings plus equal measurement intercepts across groups (i.e., strong invariance test), and then a strong (or partial strong) invariance model plus equal unique variances across groups (i.e., strict invariance test. See Meredith, 1993 and Widaman & Reise, 1997 for technical information on factorial invariance).

To evaluate the fit of the different models to the data, we examined several standard fit indices. The statistical fit index we used is standard chi-square associated with maximum likelihood estimation. Since the chi-square value is sensitive to sample size, we also examined three alternative fit indexes. The root mean square error of approximation (RMSEA; Browne & Cudeck, 1993) indicates close fit when values are less than 0.05 and reasonable fit when values are between 0.05 and 0.08. The other two indexes that we used are the Tucker–Lewis index (TLI; Tucker & Lewis, 1973) and the comparative fit index (CFI; Bentler, 1990), both indicating acceptable fit for values above 0.90. Finally, when comparing nested models, we examined the change in chi-square, as such difference also follows a chi-square distribution with degrees of freedom equal to the difference in degrees of freedom between both models.

Results

Means and standard deviations for all variables are presented by age groups (indexed by academic settings) and by gender in Table 1. It shows that across age groups, the means of attachment variables appear to be consistently lower for high school students than for the other two groups of students; across gender groups, these means are higher for females than for males. Systematic analyses at the latent level were conducted as follows.

Preliminary analysis

To assess potential confounds due to possible sample differences in gender across age, we conducted four 2×3 (gender by age) ANOVAs on the constructs of maternal, paternal, and peer attachment as well as self-evaluation. These analyses revealed that there were no significant interaction effects, and neither of the main effects was significant for the outcome variable of self-evaluation. Consequently, gender was not included in the model as a covariate in the analyses of age differences that follow, and age was not included as a covariate in the subsequent analyses of gender differences.

Age differences in attachment and in its association with self-evaluation

Tests of factorial invariance across age groups

Multiple-group confirmatory factor analyses were carried out to test the factor structure and invariance across junior high, high school, and college samples. A series of nested models were compared in terms of fit and parsimony. The results from these analyses are reported in Table 2. Across all age groups, model 1f yielded the best fit in the factorial invariance tests. This model's fit

Table 1
Means and standard deviations for all variables by school settings and by gender.

Variable	Junior ($N = 200$)		High ($N = 114$)		College ($N = 270$)		Male ($N = 311$)		Female ($N = 71$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
m_trust	3.74	0.69	3.60	0.66	3.93	0.59	3.74	0.66	3.86	0.64
m_com	3.41	0.71	3.06	0.73	3.37	0.65	3.21	0.64	3.45	0.74
m_alie	3.54	0.74	3.38	0.58	3.61	0.61	3.46	0.64	3.62	0.68
f_trust	3.62	0.74	3.41	0.68	3.83	0.64	3.63	0.66	3.72	0.74
f_com	3.12	0.71	2.71	0.72	3.32	0.64	3.14	0.67	3.12	0.77
f_alie	3.45	0.75	3.06	0.64	3.45	0.69	3.33	0.68	3.42	0.75
p_trust	3.82	0.72	3.79	0.62	3.70	0.63	3.59	0.65	3.94	0.62
p_com	3.69	0.68	3.65	0.62	3.56	0.65	3.43	0.64	3.84	0.60
p_alie	3.42	0.55	3.33	0.52	3.29	0.52	3.24	0.51	3.46	0.53
SES	2.88	0.44	2.83	0.48	2.98	0.39	2.89	0.45	2.95	0.40
liking	3.64	0.57	3.53	0.61	3.57	0.56	3.58	0.58	3.59	0.56
comp	2.92	0.43	2.75	0.44	2.95	0.42	2.92	0.45	2.88	0.41

Note. There were two participants missing gender information in the data; therefore, the total number of participants counted by gender was 582 ($= 311 + 271$); m = mother; f = father; p = peer; com = communication; alie = alienation; comp = competence; SES = Rosenberg Self-Esteem Scale; liking = self-liking subscale of the SLCS-R; comp = self-competence subscale of the SLCS-R.

Table 2

Fit of factorial invariance models (model 1a to model 1f) across age groups.

Model	χ^2	df	RMSEA	CFI	TLI	$\Delta\chi^2$	Δ df	Prob
1a. Four-factor model, minimum constrains	627.39	144	0.131	0.871	0.823			
1b. 1a + 10 residual covariances	236.78	134	0.063	0.973	0.960	390.62	10	<0.001
1c. 1b + invariant factor loadings	264.81	150	0.063	0.969	0.960	28.04	16	0.03
1d. 1c + invariant intercepts	355.39	166	0.077	0.950	0.940	90.57	16	<0.001
1e. 1c + partially invariant intercepts	284.07	163	0.062	0.968	0.961	19.26	13	0.12
1f. 1e + invariant unique variances	312.04	187	0.059	0.967	0.965	27.97	24	0.26
1g. 1f + partially equal regression weights	312.19	190	0.057	0.967	0.966	0.15	3	0.98
1h. 1f + partially equal latent means	312.32	188	0.058	0.967	0.965	0.28	1	0.60

Note. The three age groups correspond to the junior high school, high school, and college samples. RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; CFI = comparative fit index; $\Delta\chi^2$ = change in chi-square from the immediately preceding model; Δ df = change in degrees of freedom from the immediately preceding model; Prob = probability associated with the $\Delta\chi^2$ value.

was not significantly worse than the less restrictive model (model 1e), $\Delta\chi^2(24, N = 584) = 27.97$, $p = 0.26$, and its practical fit indexes were also slightly better, CFI = 0.967, TLI = 0.965, and RMSEA = 0.059. From this model, it is reasonable to conclude that strict factorial invariance holds across these three groups, implying that all the differences in means and covariances of the manifest variables across groups result from differences in the latent variables (Bauer, 2005; Widaman & Reise, 1997). Consequently, testing the restricted structural models and comparing the regression coefficients are valid and meaningful.

Tests of differences in relationships among constructs

The regression weights from the latent attachment variables to self-evaluation were of primary interest because differences among those weights indicate the relative importance of each attachment relationship to the adolescents' self-evaluation. Table 3 shows the parameter estimates from model 1f. These values indicate that maternal attachment and peer attachment were significantly related to self-evaluation in the junior high school sample, peer attachment was the only significant predictor of self-evaluation in the high school sample, and both maternal and paternal attachments were significant predictors of self-evaluation in the college sample. Notice that even though some regression coefficients were significantly different from zero, their magnitudes were relatively small. For example, in the junior high school sample, the coefficient from peer attachment to self-evaluation (0.14) was significant, but it did not seem to be very different from the coefficient from paternal attachment to self-evaluation (0.11), which was not significant.

To examine possible differences in the regression weights across groups, we then tested the equality of such coefficients within each group. In the resulting model (model 1g), the coefficient of paternal attachment was constrained to be identical to that of peer attachment in junior high school sample; the coefficient of maternal attachment was constrained to be identical to that of paternal attachment in both high school and college samples. The fit of model 1g (see Table 2) was as good as model 1f, $\Delta\chi^2(3, N = 584) = 152$, $p = 0.98$, CFI = 0.967, TLI = 0.966, and RMSEA = 0.057, indicating that model 1g was a more parsimonious representation of the data. The regression weights from model 1g are also presented in Table 3. We then tested if all three coefficients were equal within each group. This model fitted significantly worse than model 1g,

Table 3
Parameter estimates from model of attachment and self-evaluation across age groups.

Latent variable	Manifest variable	Intercept	Factor loadings	Unique variance
Maternal	Trust	3.61 (0.06)	0.54 (0.04)	0.11 (0.01)
	Communication	3.05 (0.06) ^a	0.55 (0.05)	0.17 (0.01)
	Alienation	3.38 (0.05)	0.45 (0.04)	0.22 (0.02)
Paternal	Trust	3.41 (0.06) ^a	0.60 (0.05)	0.12 (0.01)
	Communication	2.72 (0.06)	0.57 (0.05)	0.16 (0.02)
	Alienation	3.05 (0.05)	0.44 (0.04)	0.27 (0.02)
Peer	Trust	3.79 (0.06)	0.59 (0.04)	0.06 (0.01)
	Communication	3.65 (0.06)	0.55 (0.04)	0.09 (0.01)
	Alienation	3.36 (0.03)	0.25 (0.02)	0.22 (0.01)
Evaluation	SES	2.81 (0.04)	0.36 (0.03)	0.05 (0.01)
	Liking	3.54 (0.05) ^a	0.45 (0.04)	0.11 (0.01)
	Competence	2.83 (0.03)	0.28 (0.02)	0.11 (0.01)
Covariance among independent latent variables				
	Junior	High	College	
Maternal	1.28 (0.25)	1 ^b	0.82 (0.15)	
Paternal	0.71 (0.14) 1.18 (0.23)	0.47 (0.09) 1 ^b	0.56 (0.10) 0.83 (0.16)	
Peer	0.45 (0.17) 0.33 (0.11) 1.30 (0.24)	0.32 (0.10) 0.25 (0.10) 1 ^b	0.51 (0.09) 0.40 (0.08) 1.02 (0.18)	
Means among independent latent variables				
	Maternal	Paternal	Peer	
Junior	0.25 (0.14)	0.73 (0.15)	0.07 (0.13)	
High	0 ^b	0 ^b	0 ^b	
College	0.57 (0.13)	1.04 (0.15)	-0.16 (0.12)	
Regression coefficients from attachments to self-evaluation				
	Maternal	Paternal	Peer	
Junior	0.36** (0.11)	0.11 (0.10)/0.13*	0.14* (0.07)/0.13*	
High	0.02 (0.14)/0.05	0.07 (0.13)/0.05	0.49** (0.13)	
College	0.29* (0.12)/0.26*	0.24* (0.10)/0.26*	0.04 (0.08)	

Note. Parameter estimates are based on model 1f in Table 2. The three age groups correspond to the junior high school, high school, and college samples. Tabled values in the upper part are parameter estimates for the measurement model, with standard errors in parentheses. The values after slashes in the bottom part are the regression weights after imposing equality constraints. All factor loadings and all unique factor variances were constrained to be invariant across groups. For latent variables, maternal = maternal attachment, paternal = paternal attachment, peer = peer attachment, and evaluation = self-evaluation.

* $p < 0.05$; ** $p < 0.01$.

^a Parameter relaxed to be different across groups as in model 1e. For the junior high and college samples, measurement intercepts of maternal communication are 3.28 (SE = 0.07), intercepts of paternal trust are 3.20 (SE = 0.07), and intercepts of liking are 3.36 (SE = 0.06). Other intercepts are invariant across groups.

^b Parameter fixed at tabled value to identify the model.

$\Delta\chi^2(3, N = 584) = 14.67, p = 0.002$, indicating that these new constraints did not hold. The results from the analyses in this section indicate that, among junior high school students, maternal attachment was the strongest predictor of self-evaluation, whereas paternal and peer attachments were much less important. For high school students, in contrast, peer attachment appeared as the only predictor of self-evaluation. Finally, among college-age students, maternal and paternal

attachment had equal contribution in predicting self-evaluation, with peer attachment showing no predictive value.

Tests of differences in latent variable means

To identify the latent variables in the confirmatory models, we fixed the latent means at zero in the high school sample (see Table 3). This choice enabled us to estimate the latent means in the other two samples and interpret the resulting values as departures from zero. The results revealed that the means of peer attachment did not differ much from the junior high sample to the high school sample. When we then added invariance constraints on the latent means of peer attachment across these two samples (see model 1h), the difference in statistical fit was not significant (reported in Table 2), $\Delta\chi^2(1, N = 584) = 0.280$, $p = 0.60$, CFI = 0.967, TLI = 0.965, and RMSEA = 0.058. Thus, the latent means of peer attachment were similar in the junior high and the high school samples. Additional analyses imposing further equality constraints on the latent means across groups led to a significantly worse model fit. Altogether, college students reported the highest values for both maternal and paternal attachments, followed by junior high school students and by high school students. For peer attachment, junior high and high school students reported similar levels, both higher than those reported by college students.

Evaluating factor loadings and variances/covariances among attachments

The standardized factor loadings for all four latent constructs ranged from 0.65 to 0.93 (except for 0.47 of peer alienation on peer attachment), indicating that the latent constructs were all well defined. The variances and covariances among maternal, paternal, and peer attachments are presented in Table 3 for each of three groups. The corresponding correlations among those latent variables were then computed. Specifically, in the order of the junior high school, the high school, and the college samples, the correlations between maternal and paternal attachments were 0.58, 0.47, and 0.68, respectively, the correlations between maternal and peer attachments were 0.35, 0.32, and 0.56, respectively, and the correlations between paternal and peer attachments were 0.27, 0.25, and 0.43, respectively. These results show that, in each sample, the correlations between maternal and paternal attachments were the highest, and the correlations between paternal and peer attachments were the lowest.

Gender differences in attachment and in its association with self-evaluation

Tests of factorial invariance across gender

Another set of multiple-group confirmatory factor analyses was conducted to test the factor structure and invariance across gender. The results from these analyses are reported in Table 4. These analyses indicate that a model of partial strict factorial invariance (model 2h) provided the best representation of the data. As was the case in the previous analyses, this model implied that the differences in latent means and the regression weights from attachments to self-evaluation can be reasonably compared.

Tests of differences in relationships among constructs

As shown in Table 5, all regression weights from latent attachment variables to self-evaluation were significant in the male sample, and all but the one from paternal attachment to self-evaluation

Table 4

Fit of factorial invariance models (model 1a to model 1f) across gender groups.

Model	$\Delta\chi^2$	df	RMSEA	CFI	TLI	$\Delta\chi^2$	Δ df	Prob
2a. Four-factor model, minimum constrains	559.95	96	0.129	0.874	0.827			
2b. 2a + 9 residual covariances	133.29	87	0.043	0.987	0.981	426.66	9	<0.001
2c. 2b + invariant factor loadings	166.85	95	0.051	0.981	0.973	33.56	8	<0.001
2d. 2b + partially invariant loadings	149.19	94	0.044	0.986	0.980	13.90	7	0.053
2e. 2d + invariant intercepts	183.03	102	0.052	0.978	0.972	35.84	8	<0.001
2f. 2d + partially invariant intercepts	154.66	99	0.044	0.985	0.980	7.47	5	0.19
2g. 2f + invariant unique variances	194.32	111	0.051	0.977	0.973	39.66	12	<0.001
2h. 2f + partially invariant uniqueness	172.45	109	0.045	0.983	0.970	17.79	10	0.059
2i. 2h + partially equal regression weights	172.91	112	0.043	0.983	0.981	0.46	3	0.93
2j. 2i + fully equal regression weights	175.73	113	0.044	0.983	0.980	2.82	1	0.094
2k. 2h + partially equal latent means	176.35	110	0.047	0.982	0.978	3.9	1	0.048

Note. RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; CFI = comparative fit index; $\Delta\chi^2$ = change in chi-square from the immediately preceding model; Δ df = change in degrees of freedom from the immediately preceding model; Prob = probability associated with the $\Delta\chi^2$ value.

were significant in the female sample. We then tested whether those regression weights were equal within each gender group. To do this, we first invoked equality constraints on the coefficients of all three attachment variables in the male sample and on the coefficients of paternal and peer attachment in the female sample. This model (model 2i) fitted as well as the model 2h, $\Delta\chi^2(3, N = 582) = 0.455, p = 0.93$. We then further constrained the coefficients of all three attachment variables to be identical in the female sample. This led to model 2j that did not fit significantly worse than model 2i, $\Delta\chi^2(1, N = 582) = 2.81, p = 0.094$, indicating that model 2j held. The regression weights from fitting this model are presented in Table 5. They indicate that all attachment relationships equally contributed to self-evaluation for male students, and paternal and peer attachments also made an equal contribution for female students, but maternal attachment had a slightly larger contribution to female self-evaluation than did other attachment relationships.

Tests of differences in latent variable means

The latent means were fixed at zero in the male sample to identify the models (see Table 5). We tested whether each of the three latent means were equal across gender. We started from the model (model 2k) in which the means of paternal attachment were invoked to be equal across gender. This model fit slightly worse than model 2h, $\Delta\chi^2(1, N = 582) = 3.90, p < 0.047$. Our additional analyses showed that any further equality constraints on the means of attachments across gender yielded worse fit. These results show that the means of paternal attachment are almost equal for female and male students, but the means of maternal attachment and peer attachment were not, with female students having higher values.

Evaluating factor loadings and variances/covariances among attachments

The standardized factor loadings for all four latent constructs ranged from 0.64 to 0.95 (except for 0.48 of peer alienation on peer attachment). This indicates that the latent constructs were all well defined. The variances and covariances among maternal, paternal, and peer attachments are presented in Table 5 for each gender group. The corresponding correlations among those latent variables were then computed. Specifically, for the male and female samples,

Table 5
Parameter estimates from model of attachment and self-evaluation across gender.

Latent variable	Manifest variable	Intercept	Factor loadings	Unique variance
Maternal	Trust	3.71 (0.03)	0.58 (0.03) ^a	0.11 (0.01)
	Communication	3.22 (0.04)	0.49 (0.03)	0.17 (0.01)
	Alienation	3.46 (0.03)	0.40 (0.03)	0.22 (0.02)
Paternal	Trust	3.62 (0.04)	0.56 (0.03)	0.12 (0.01)
	Communication	3.15 (0.04) ^a	0.55 (0.03)	0.16 (0.02)
	Alienation	3.33 (0.03)	0.43 (0.03)	0.27 (0.02)
Peer	Trust	3.59 (0.04) ^a	0.61 (0.03)	0.04 (0.01)
	Communication	3.43 (0.04)	0.55 (0.03)	0.12 (0.01) ^a
	Alienation	3.25 (0.03)	0.26 (0.02)	0.22 (0.01)
Evaluation	SES	2.88 (0.03) ^a	0.34 (0.02)	0.06 (0.01) ^a
	Liking	3.59 (0.02)	0.41 (0.03)	0.12 (0.01)
	Competence	2.91 (0.02)	0.26 (0.02)	0.11 (0.01)
Covariance among independent latent variables				
	Male		Female	
Maternal	1 ^b		1.71 (0.26)	
Paternal	0.63 (0.04) 1 ^b		0.93 (0.15) 1.39 (0.19)	
Peer	0.39 (0.06) 0.38 (0.06) 1 ^b		0.45 (0.10) 0.26 (0.08) 0.95 (0.12)	
Means among independent latent variables				
	Maternal	Paternal	Peer	
Male	0 ^b	0 ^b	0 ^b	
Female	0.41 (0.11)	0.20 (0.10)	0.76 (0.10)	
Regression coefficients from attachments to self-evaluation				
	Maternal	Paternal	Peer	
Male	0.21* (0.10)/0.20**	0.19* (0.10)/0.20**	0.21** (0.08)/0.20**	
Female	0.31** (0.07)/0.19**	0.08 (0.07)/0.19**	0.15* (0.07)/0.19**	

Note. Parameter estimates are based on model 2h in Table 4. Tabled values in the upper part are parameter estimates for the measurement model, with standard errors in parentheses. The values after slashes in the bottom part are the regression weights after imposing equality constraints. Factor loadings, measurement intercepts, and unique factor variances were constrained to be invariant across groups except for the noted ones. For latent variables, maternal = maternal attachment, paternal = paternal attachment, peer = peer attachment, and evaluation = self-evaluation. * $p < 0.05$; ** $p < 0.01$.

^a Parameter relaxed to be different across groups. The measurement intercept of paternal communication is 3.01 (SE = .05), the intercept of peer trust is 3.48 (SE = .05), and the intercept of SES is 2.96 (SE = .03). The factor loading of maternal trust on maternal attachment is .42 (SE = .03) in the female sample. The unique factor variances for peer communication and SES are .07 (SE = .01) and .02 (SE = .01), respectively, in the female sample

^b Parameter fixed at tabled value to identify the model.

the correlations between maternal and paternal attachments were 0.63 and 0.60, respectively, the correlations between maternal and peer attachments were 0.39 and 0.35, respectively, and the correlations between paternal and peer attachments were 0.38 and 0.23, respectively. The pattern of these correlations was very similar to that found across different school settings, namely that in both male and female samples the correlations between maternal and paternal attachments were the highest and the correlations between paternal and peer attachments were the lowest.

Discussion

The findings of this study identify cultural consistencies, unique cultural influences, and new questions to be addressed in the development of adolescent attachment and its association with self-evaluation.

Attachment relationships with Chinese adolescents

First, in China as in other countries, attachment quality changes throughout adolescence. In China, as in studies in New Zealand and the Netherlands (Buist et al., 2002; Paterson et al., 1994), the perceived strength of parental attachments decline from early through middle adolescence. High school is, in all three societies, the period when adolescents describe the quality of their parental attachments as lowest. This is consistent with Western cultural stereotypes and research evidence of parent–child conflict during this period (Collins & Laursen, 2004), but for Chinese adolescents additional factors may be influential. High school is when Chinese youth face increasingly competitive academic pressures for entry into desirable universities, and when they experience intense pressures to perform in school. Their experience of family pressure to achieve academically, which is likely to be particularly salient in collectivistic cultures like China, may contribute to diminished perceptions of the quality of parent–child relationships.

This research is the first to extend the study of parental attachments to late adolescence, and the findings indicate that collegiate youth in China perceive their attachments to parents more positively than during any preceding period. One reason may be that the late adolescents in this sample had left home for university and, with the distance from home and success in achieving admission, parent–child attachments may now be viewed more positively. In light of the nation's one-child policy, moreover, parents may also have contributed to improved relationships with offspring after the demands of middle adolescence, especially because collegiate youth in China are a highly selective (and thus esteemed) group. Future research is needed to assess this hypothesis, however, and to (a) examine whether a similar upturn in late adolescents' perceptions of their attachments to their parents is apparent in Western university students, and (b) whether this change occurs only for youth having left home for higher education, or is also apparent for late adolescents remaining at home. Studies like these can help elucidate the influences of changing relational dynamics, residential patterns, educational opportunities, and other factors on developmental changes in the perceived quality of parent–child relationships. These findings underscore how parent–child attachment in adolescence can be influenced by culture-specific practices that influence the nature and quality of parent–youth interaction.

This is the only study to examine age differences in the strength of peer attachments using the IPPA. In this Chinese sample, the strength of attachments to friends was higher for students in junior high and high school than for collegiate youth, reversing the pattern for parental attachments. The correlations among the latent variables for maternal, paternal, and peer attachments suggest that the reported strength of adolescents' attachments to their friends is based on different influences than parent–child attachments, including their experience of friends as sources of social support at school and independence from home, as well as the growth of romantic interest (Brown, 2004). Peers also assume somewhat different functions as adolescents mature: friends are less frequently sources of emotional affirmation and intimate self-disclosure and more often

sources of educational and career advice, and these changes may contribute to perceptions of diminished strength of these attachments (Coleman & Hendry, 1999). As measured by the IPPA, peer attachment is based on features of trust, communication, and alienation experienced in relationships with other youth, and these findings suggest that for Chinese youth, these relationships are closer and more emotionally intimate in early and middle adolescence than later. Further research is needed to specify the sources of these differences, and whether similar patterns are apparent for Western adolescents.

Consistent with several studies in Western cultures (Armsden & Greenberg, 1987; Laible et al., 2004; O’Koon, 1997; Wilkinson, 2004), Chinese females reported stronger peer attachment than did males. Furthermore, although studies with Western samples have reported mixed results concerning gender differences in perceptions of parental attachments (Kenny & Rice, 1995), we expected and confirmed that Chinese females would report stronger attachment to their mothers than did males, although this was not apparent for attachment to fathers. There was thus an interaction of the sex of the parent and the sex of the child in the strength of parental attachment. A similar pattern of findings has been reported by Bush (2000), who found that conformity to maternal but not paternal expectations and values was a positive predictor of self-esteem for Chinese adolescent females, but there was no association between conformity and self-esteem for Chinese adolescent males. The authoritarian structure of the Chinese family and traditional gender role expectations (Ho, 1981) are likely each to strengthen mother–daughter ties in adolescence, especially in light of the societal preference for sons before and especially after the one-child policy was adopted in China. In adolescence, daughters may feel closer to their mothers as the adult role model in the family and as the more nurturant parental figure. This may also explain why attachments to mothers, fathers, and friends were comparably associated with self-evaluation for males, but for females the association of self-esteem with maternal attachment was somewhat higher. This offers another illustration of how culture-specific practices that shape parent–adolescent relationships have implications for attachment relationships at this developmental period.

Adolescent attachment and self-evaluation

In this Chinese sample, as in many studies in Western societies, perceptions of strong and secure parent–child attachments in adolescence were associated with enhanced self-regard (Armsden & Greenberg, 1987; Cotterell, 1992; Laible et al., 2004; Noom et al., 1999; O’Koon, 1997; Papini & Roggman, 1992; Paterson et al., 1995; Raja et al., 1992; Wilkinson, 2004). Moreover, the reported strength of peer attachments was also positively associated with self-evaluation, as it is in Western samples (Armsden & Greenberg, 1987; Cotterell, 1992; Laible et al., 2004; Noom et al., 1999; O’Koon, 1997; Papini & Roggman, 1992; Paterson et al., 1995; Raja et al., 1992; Wilkinson, 2004). Contrary to our expectation that parental attachments would be more influential in predicting self-regard than peer attachments in light of cultural values of filial piety and the one-child policy, however, the strength of peer attachments had the preeminent influence on self-evaluation for Chinese high-schoolers. For adolescents in junior high, the quality of maternal attachment was the most important predictor of self-evaluation, and for the Chinese collegiate sample, both maternal and paternal attachments were significantly associated with self-evaluation. By comparison, two studies in Western societies (the United States and the

Netherlands) have reported that parental attachment quality is more influential than peer attachment in predicting adolescent self-esteem (Laible et al., 2004; Noom et al., 1999).

The importance of experiencing a strong, secure relationship to parents for adolescent self-esteem thus appears to be culturally generalizable, reflecting the significance of parental regard for adolescents' self-evaluation (see also Bush, 2000, for similar findings in a study directly comparing U.S. and Beijing adolescent samples). In this light, the exclusive association of peer attachment with self-evaluation in the Chinese high school sample is anomalous, and may derive from emerging patterns of parent–child conflict noted earlier that are also reflected in middle adolescents' lower perceptions of the strength of maternal and paternal attachments. In addition, high school is a period when self-regard may be exceptionally influenced by friends owing to emergence of closer friendships and romantic relationships, and peer networks also become important as sources of independence from the family (Collins & Steinberg, 2006). In this study, it is noteworthy that the significance of peer attachment is neither apparent earlier (in junior high) nor subsequently (in college), suggesting that it is based on some of the unique challenges of the middle adolescent transition. Further exploration of these challenges, and their cultural generalizability, is for future study.

Conclusion

Taken together, this study shows that there are some important consistencies in the development of adolescent attachments and their associations with self-evaluation in Western societies and Chinese culture. In both contexts, there is a progressive decline in the perceived quality of parent–child relationships from early to middle adolescence, perhaps owing to some of the changing expectations and demands of youth within the family in both individualistic and communal cultures. In both contexts, moreover, females report stronger attachments to friends than do males. In addition, in both contexts, attachments to parents and to peers are significantly associated with adolescent self-evaluation, with parents generally having the preeminent influence.

But there are also differences. High school appears to be a period of special challenge to Chinese adolescents that is associated with lower perceptions of parent–child relationship quality and diminished prediction of self-esteem from the quality of these relationships. Chinese females, contrary to adolescent females in Western studies, also report closer relationships with their mothers, and these attachments predict their self-regard somewhat more strongly than do their attachments to others. Although much research remains to elucidate the reasons for these differences, we have suggested that the influence on family relationships of the intense academic competitive pressures experienced by high-schoolers, and the effects of a one-child policy favoring sons in this culture with traditional gender roles, may be important.

There are limitations to this study that influence the interpretation of the results. First, these findings are based on a cross-sectional rather than longitudinal research design in which different age samples were studied in different educational contexts and cities. The consistency of these findings with prior research and theoretical expectations offers some reassurance that these age differences index developmental changes, but longitudinal research is clearly needed. Second, the university sample may not be fully representative of late adolescents in China given competition for admission to university, and the sample as a whole is primarily urban middle class, which may also limit generalizability. Third, the failure to include back-translation of the research

instruments translated into Chinese eliminated an important check on the accuracy of the translation. Finally, it is important to note that these findings are based on adolescent self-reports. This is the standard methodology for assessing self-evaluation, of course, and (by contrast with studies of attachment in infants and young children) is typical for research on adolescent and adult attachment. Nevertheless, these findings reflect the network of belief systems that adolescents reported on these standardized instruments.

The results of this study also raise important questions for future research. The discovery that older adolescents in university report stronger attachment relationships with their parents in China raises interesting questions about whether this is associated with culture (requiring replication in Western societies), residence (requiring study with adolescents who have not left home for university), or other influences. The age differences in the strength of peer attachments also requires further exploration in Western contexts where friends may have similar and different roles in relation to each other by comparison with China.

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