



Relations among Family Dysfunction, Loneliness and Life Satisfaction in Chinese Children: a Longitudinal Mediation Model

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Abstract

Although children's life satisfaction is known to be closely linked to family dysfunction, the nature and magnitude of longitudinal associations between family dysfunction and children's life satisfaction remain to be clarified. This 12-month longitudinal study examined the relations among family dysfunction, loneliness and life satisfaction in children using a longitudinal mediation model. A total of 926 children of ages 8 to 11 (423 males, $M_{age} = 9.52$ years) completed self-report questionnaires assessing family dysfunction, loneliness, and life satisfaction on three occasions at 6-month intervals. After sex, grade, parental education levels, and family economic status were included as covariates, the results showed that family dysfunction negatively predicted later life satisfaction. Moreover, loneliness at Time 2 completely mediated the relation between family dysfunction at Time 1 and life satisfaction at Time 3. However, life satisfaction did not predict subsequent loneliness and family dysfunction. The findings yield implications for interventions to promote children's life satisfaction.

Keywords Family dysfunction · Loneliness · Life satisfaction · Longitudinal mediating role · Chinese children

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1 Introduction

This study is situated within the context of positive psychology. Positive psychology represents a scientifically informed perspective on what makes life worth living (Seligman and Csikszentmihalyi 2000). Research findings from positive psychology have grown from the recognition of an imbalance in traditional psychology, which has been focused more on mental illness, weakness, and disorder. Positive psychology has thus aimed to study well-being, optimal functioning and flourishing (Alex Linley et al. 2006). In other words, the goal of positive psychology is to obtain a more complete and balanced scientific understanding of the human experience, considering both negative and positive aspects (Seligman and Csikszentmihalyi 2000).

With the rise of positive psychology, researchers have been paying greater attention to measures of positive aspects of human functioning, such as life satisfaction (LS) (Leto et al. 2018; Tian et al. 2015). Compared to many traditional psychological health variables (e.g., psychological symptoms), LS refers to a cognitive evaluation of the positivity of one's life as a whole or with specific domains (Diener et al. 1999). LS is an important construct in the field of the positive psychology (Seligman and Csikszentmihalyi 2000), reflecting both negative (lower LS) and positive (higher LS) aspects of human experiences. LS is also an important construct in positive psychology because it closely relates to a wide variety of positive personal, behavioral, and social outcomes (Diener 2009; Dinisman et al. 2015). A positive subjective evaluation of life for children is particularly important because childhood is the foundational stage of individual's lives. When examining children's LS, middle to late childhood is a particularly crucial period marked by biological, cognitive, and socio-emotional changes that set the stage for subsequent development (Eccles 1999). Previous studies have shown that children's LS may forecast their academic outcomes, such as academic performance and engagement (Lewis et al. 2011; Ng et al. 2015). In addition, the literature on children's LS underscores associations with physical and mental health aspects, where higher levels of children's LS relate to better self-rated physical health and positive psychological attributes (Emerson et al. 2018) and mental health (Lyons et al. 2014). In summary, children's LS exerts great impact on their development outcomes.

However, previous studies of children's LS display important limitations. First, research on LS among children has been relatively sparse compared to that of adults and adolescents (Burger and Samuel 2017; Gadermann et al. 2010). Second, relatively little research has addressed the specification of the critical elements of environmental factors (e.g., family environment) for LS in middle to late childhood, especially using longitudinal methods. Compared with cross-sectional studies, longitudinal studies are more systematic and detailed in describing the nature of children's LS development. Third, an important limitation of the previous literature is that the majority of the studies has been conducted in individualistic cultures. Individualistic cultures are oriented around the self, emphasizing the value of independence and personal goals over interdependence and group interests (Hofstede 2001). In contrast, collectivistic cultures can be defined by a greater emphasis on group interdependence, harmony in interpersonal relations, and conformity to group norms (Triandis et al. 1988).

There is a growing recognition that cultural factors may influence individuals' assessments of LS (e.g., Jiang et al. 2019). For example, Chinese culture advocates

interpersonal dependence, the importance of following societal norms and expectations; thus, Chinese individuals evaluate their LS mainly based on these factors rather than independence or freedom (Liu et al. 2013; Schimmack et al. 2005). Considering cultural differences, several cross-national studies have shown that individuals from collectivistic nations (e.g., China) consistently report lower LS than individuals from individualistic nations (e.g., the United States) (Park and Huebner 2005; Stankov 2013). Previous studies have also shown that the factors that affect LS may be different in collectivistic cultures versus individualistic cultures (Chang et al. 2016; Gilman et al. 2008; Park and Huebner 2005; Stankov 2013). For example, Lykes and Kemmelmeier (2014) demonstrated that autonomy and choice have greater implications for well-being in individualistic societies whereas traditional social bonds (e.g., family and peer relationships) are more potent in collectivistic societies. Given the increasing ethno-cultural diversity in the world, it is important to examine the generalizability of the extant findings on LS in children, which to date has largely been based on the more individualistic cultures rather than on the more collectivistic cultures, such as the Chinese culture (Zhang and Leung 2002). More specifically, given the importance of children's LS and the limitations of previous studies, it is necessary to explore how the family environment affects children's LS in China.

Noddings stated, "Home life is a major source of happiness for most people" (2003, pp. 97). Collectivistic cultures strongly emphasize family interdependence and the dominant position of the parents in family (Marin and Marin 1991). Being collective in nature, the Chinese culture is well-known for its emphasis on family relationships and support. Family is a crucial part of the Chinese support network, and it plays a significant role in various aspects of Chinese individuals' social, economic, and emotional lives. Specifically, family provides the primary early environment that ensures the healthy development of children. Young children require substantial support from their caregivers (e.g., parents) to develop a wide array of behaviors and social skills, which provide the foundation for all other aspects of children's functioning, including forming good health habits, meaningful relationships and friendships, and successfully adapting to school and community life (Huang et al. 2018).

In recent years, researchers have explored the major factors in the family system that influence children's LS, such as family dysfunction (Chappel et al. 2014; Gherasim et al. 2017). Theoretical and empirical studies suggest that family dysfunction exerts a substantial impact on children's mental health (Leto et al. 2018; Miller et al. 2000; Park et al. 2005). For example, previous studies demonstrated that family dysfunction relates significantly to psychological problems in children, such as negative affect and life dissatisfaction (Chang et al. 2003; Jongerden and Bögels 2015). However, the majority of the extant literature has been limited to studying the direct (vs. indirect) effects of family dysfunction on LS. Notably, in order to more completely understand how family dysfunction affects LS, a few key studies have underscored the importance of elucidating the psychological mechanisms that account for the association between family dysfunction and LS. According to Maslow's (1970) need-gratification theory of well-being, the degree of basic needs satisfaction should positively correlate with persons' levels of psychological health. Maslow's theory incorporates five hierarchically organized basic needs, including physical, safety, belongingness and love, esteem, and self-actualization needs respectively. Maslow suggested that the satisfaction of the higher needs depends on positive environmental conditions, such as a supportive family life.

When individuals' needs are satisfied, they tend to report higher LS (Oishi et al. 2009). For children, a positive family life appears to be the most important institution necessary to meet children's basic needs (Masten and Monn 2015). From the perspective of cognitive development, children in the lower grades of primary school can already represent complex and concrete relationships among multiple individuals, and they begin to pay more attention to interpersonal relationships. Therefore, the development of a sense of belongingness and love from the family is crucial for children in the middle and late stages of childhood.

For most children in collectivistic cultures, building close relationships with family and peers is an effective way to avoid loneliness (Liu et al. 2013; Lykes and Kemmelmeier 2014). However, dysfunctional families do not create conditions to meet children's sense of belonging. In dysfunctional families, children fail to establish positive intimate relations with family members as well as fail to learn good interpersonal skills from family members, thus such children are less likely to form good peer relations (Wang 2016a). Loneliness appears when children experience a discrepancy between their desired and existing social relationships. According to need-gratification theory, children with poor interpersonal relationships are not likely to satisfy their need belonging; thus, they report lower LS (Cava et al. 2014). From this perspective, loneliness exerts a crucial mediating role in the relation between family dysfunction and LS (Cava et al. 2014; Kong and You 2013). Particularly for children, loneliness is a common emotional problem, especially during middle and late childhood (Liu et al. 2013). Therefore, we examined the role of loneliness in the relation between family dysfunction and LS among children in a three-wave longitudinal mediation study covering 12 months.

1.1 Life Satisfaction

Life satisfaction is not only an important parameter to measure subjective quality of life, but it is also a central construct within the field of positive psychology. Studies of LS have burgeoned over the past several decades, revealing a wide-ranging nomological network of relations with important life outcomes in children. On the one hand, consistent with positive psychology, higher LS is focused on children's strengths and positive development, such as self-efficacy (Luque et al. 2017), positive emotions (Tian et al. 2015), and hope (Gilman and Huebner 2006). On the other hand, lower LS has been shown to be negatively associated with many facets of poor life functioning in children, such as internalizing and externalizing behavior (Lyons et al. 2014; Maggio and Zappulla 2014), substance abuse (Mohamad et al. 2017), and multiple problems in school (Lewis et al. 2011; Ng et al. 2015). As noted above, research suggests that a subjective sense of LS is beneficial for children's effective functioning in multiple contexts (e.g., interpersonal relationships, academic performance). Moreover, children's LS also relates to LS in adulthood, which means that experiencing higher LS in childhood is fundamental to individuals' subsequent psychological development (Jewell and Kambhampati 2015). In order to enrich the study of children's LS and provide more effective prevention and intervention programs, our current longitudinal study sought to further investigate the factors that influence LS. Given that the family provides the earliest environmental context for the socialization of children, family dysfunction should play a foundational role in children's LS.

1.2 Family Dysfunction and its Relations with Life Satisfaction

Family dysfunction (FD) refers to a family system that does not facilitate appropriate functioning (Mousavi 2004). FD is crucial to children's experiences of poor mental health (Chang et al. 2003), and it remains crucial beyond childhood developmental periods. The concept of FD has gained importance in psychological research (Guo et al. 2018; Jiménez-Iglesias et al. 2017; Sari and Dahlia 2018; Wang et al. 2016). Epstein et al. (1978) postulated that a positive family environment is necessary for the healthy development of the physical, psychological, and social functioning of family members. A positive family environment means that various family functions are executed in a favorable manner; it is characterized by effective communication, sufficient support, understanding, and warmth (Sari and Dahlia 2018).

As a basic social unit, the family has the greatest and most direct impact on children. During childhood, children spend most of their time in the family environment. If a family system does not facilitate appropriate functioning, namely, FD, it will more likely lead to various problems among the family members, such as delinquency proneness, substance abuse, negative emotions, aggression and low LS (Chang et al. 2003; Jongerden and Bögels 2015; Pagani et al. 2010). Previous studies have demonstrated that children who live in positive family environments report higher LS than children who live in negative family environments (Chang et al. 2003; Leto et al. 2018; Wang 2016b). Furthermore, Chinese culture has also emphasized that family exerts a profound and lasting influence on children's subjective evaluations of their lives. In China, harmony and filial piety are priority issues. Children are instilled with strong family values and the belief that family and kinship are the basis for a happy life (Leung et al. 2002; Smith 2010). Given the empirical literature as well as cultural influences, a dysfunctional family was expected to be negatively related to the LS of Chinese children. Thus, we proposed the following hypothesis:

Hypothesis 1. FD will negatively predict later LS in Chinese children.

1.3 The Mediating Role of Loneliness between Family Dysfunction and Life Satisfaction

Loneliness refers to unpleasant feelings that emerge when people perceive a discrepancy between desired and existing social relationships (Perlman and Peplau 1981). For children, loneliness has been defined more specifically as the subjective emotional experience of alienation and dissatisfaction based on an individual's self-perceptions of her or his social status and friendship status in a peer group (Maes et al. 2017). Studies in both China and Western societies have shown that a perceived lack of interpersonal interaction is important for one's experience of loneliness (Coplan et al. 2007; Liang and Lv 2014). However, we assume that not all interactions are created equal in individualistic and collectivistic societies. Based on the fact that collectivist societies, such as China, place more emphasis on interpersonal dependence with family and peers, we specifically assume that the effects of social interactions in reducing loneliness are greater in collectivistic societies than in individualistic societies (Lykes and Kimmelmeier 2014). Nevertheless, most of the previous studies on children's

loneliness have been conducted in Western countries, with little attention to collectivistic countries, such as China. It should be noted that loneliness occurs not only as a function of one's personal experiences and personality, but always emerges within the context of a larger society and culture with its perceived normative values and practices (Rokach et al. 2002). For example, compared with Western countries, Chinese culture emphasizes more strongly the importance of the family in the development of the individual's entire life. Children spend most of their time with families, and their families typically provide the greatest source of social support for children, so positive interactions with family members would be expected to reduce loneliness more strongly in China than in individualistic societies (Chen et al. 2014b). Therefore, it seems warranted to examine the antecedents and consequences of individual differences in the loneliness of children, including Chinese children.

Previous studies have shown that dysfunctional families cannot guarantee that the various family functions are executed in a favorable manner, and thus family members in dysfunctional families, especially the children, will experience more negative emotions (Kennedy et al. 2010; Pagani et al. 2008; Park et al. 2005). Further, Maslow's (1970) need-gratification theory posits that the satisfaction of children's belongingness needs depends on external environments, especially the family. In dysfunctional families, when children's needs for belonging are not met, namely, when children feel lonely, they will report lower subjective evaluations of life. Notably, the family is the vital external environment that directly affects children's physical and psychological development, and parents are the first teachers of their children's lives. In dysfunctional families, there is a lack of effective communication, understanding, recognition, and sufficient psychological support among family members. Children in dysfunctional families feel loneliness because there is a discrepancy between their desired and existing relationships with family members; thus, they experience relatively little sense of belonging (Wu and Chow 2013).

Children will also imitate their parents in many ways, such as imitating parents' maladaptive social behaviors. Families are complex, and many of the processes that occur in the family system may directly or indirectly affect the quality of children's peer relations. Family and peer relations are the two main sources of social support for children (Nickerson and Nagle 2004; Wang et al. 2016). Moreover, there is a robust connection between family functioning and peer relationships (Parke and Ladd 2016). According to social learning theory (Bandura 1973), parents serve as role models for their children, and parents' behavior is assumed to influence children's social behavior through modeling positive or negative relational skills. For example, if family members are disengaged from one another and display poor communication skills, children tend to transfer such behaviors to peer interactions, negatively impacting those relationships (Yu et al. 2000). Children will feel lonely when they do not experience positive relationships within either the family or the peer group. It is worth pointing out that the cultural environment, also plays a crucial role in the relation between FD and loneliness. In collectivistic societies, especially in China, the family is highly valued, and more frequent contact with the family is linked to less loneliness.

In addition, loneliness has been observed to be one of the most significant predictors of children's LS (Adamczyk and Segrin 2015). As mentioned above, lonely children lack a sense of belonging. When the need for belongingness is not met, children also are more likely to be dissatisfied with their lives. Numerous studies have shown that

individuals' levels of loneliness may significantly influence the evaluations of their lives as a whole (Adamczyk and Segrin 2015; Huo and Kong 2014; Yildiz 2016). LS decreases as loneliness increases, especially in collectivistic countries (Huo and Kong 2014; Salimi 2011). For instance, Goodwin et al. (2010) observed that the negative relations between loneliness and LS were stronger in Chinese Canadians than in Anglo Canadians. This finding supported the notion that collectivistic cultures pay more attention to social relations than individualistic cultures. As noted above, FD leads to loneliness in children, which in turn yields lower subjective evaluations of life. Based on the literature reviewed above, we proposed the following hypothesis:

Hypothesis 2. Loneliness will mediate the relation between FD and LS in Chinese children.

1.4 The Present Study

The current study aimed to yield a more sophisticated understanding of the potential psychological mechanisms that explain the relations between FD and LS in Chinese elementary school age children. In doing so, we attempted to integrate positive psychology and traditional psychology, using LS as our criterion measure, allowing the assessment of both well-being (i.e., higher LS) and ill-being (lower LS). Building on the existing literature, we examined the longitudinal relations among FD, loneliness, and LS among children in a longitudinal mediation model (see Fig. 1). Specifically, we formulated two hypotheses: (1) FD will negatively predict later LS. (2) Loneliness at Time 2 will mediate the relation between FD at Time 1 and LS at Time 3.

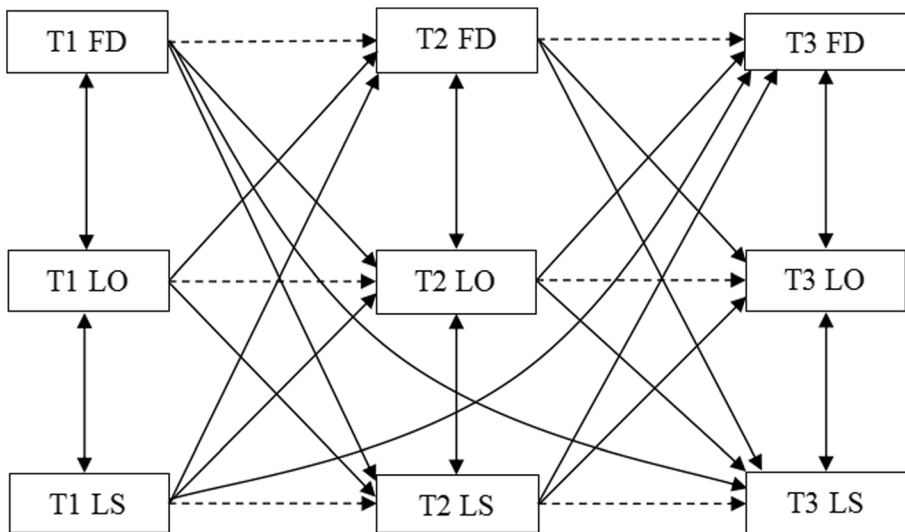


Fig. 1 Conceptual model (Model 1) for the longitudinal associations among family dysfunction, loneliness and life satisfaction. *Note.* FD Family dysfunction, LO Loneliness, LS Life Satisfaction, T1 Time 1; T2 Time 2, T3 Time 3. The solid lines with one-way arrows indicate cross-lagged paths. The solid lines with two-way arrows indicate concurrent paths. The dotted lines indicate autoregressive paths

In addition, the majority of studies cited above addressed the presumed antecedents and correlates of LS, treating LS as an outcome variable. For example, previous studies have shown that positive family functioning fosters happiness (Extremera and Rey 2016; Jiménez-Iglesias et al. 2017; Wang 2016b). However, some studies also have shown that people who report positive subjective assessments of their lives are more likely to acquire favorable life circumstances (Gilman and Huebner 2006; Lyubomirsky et al. 2005; Saha et al. 2010). Thus, we went beyond previous studies by evaluating a cross-lagged model nested within a longitudinal mediation design to investigate whether LS was an antecedent and/or a consequence of FD and loneliness. This approach, which has been rare in studies of children's LS and FD, enhanced our confidence in clarifying the directionality of the relations.

Moreover, demographic variables (i.e., sex, grade, parental education levels and family economic status) were considered in our study. Specifically, previous studies have shown that there are significant grade and sex differences in loneliness and LS (Chang et al. 2003; Coplan et al. 2007; Liu et al. 2013). For example, Liu et al. (2013) observed that elementary students' loneliness showed a decreasing trend from Grade 2 to Grade 5 and girls reported lower loneliness than boys at initial levels. In addition, numerous studies have shown that parental educational levels and family economic status closely related to children's perceptions of FD and LS (Flouri and Buchanan 2002; Zullig et al. 2005). Based on the above findings, the demographic variables of sex, grade, parental educational levels and family economic status were treated as control variables when testing our hypotheses. Notably, neither sex nor grade has often been used as a moderating variable in previous studies when analyzing the relations among FD, loneliness, and LS. Given that different subgroups may present different patterns of relations, we also explored sex and grade differences as moderators in our model.

2 Method

2.1 Participants

The convenience samples used in the present study were from two elementary schools in a city in Southern China. These two elementary schools were coeducational, and almost 95% of the participants were from urban areas. According to the information provided from the local education authorities, there were no significant differences among these schools in terms of the levels of the schools' characteristics (e.g., the quality of students, school size, class size, and teachers' teaching ability). More specifically, almost all of the participants were from middle-income families with parents who earned at least a high school degree. Teachers' teaching ability was generally measured by their educational levels and their years of experience in teaching.

Taking into account that middle and late childhood is a particularly important period, as well as ensuring that participants have the cognitive ability, reading and comprehension ability to complete the measurement, we selected students in Grade 3 to Grade 5 as subjects. We randomly selected five classes respectively from Grades 3, 4, and 5 of each school. Of the participating students, 29.0% were in Grade 3 ($M_{age} = 8.50$; $SD =$

0.34), 33.8% were in Grade 4 ($M_{age}=9.44$; $SD=0.34$), and 37.1% were in Grade 5 ($M_{age}=10.40$; $SD=0.29$). At the baseline assessment (Time 1), 926 children from Grades 3–5 (423 males) participated. Participants' ages ranged from 8 to 11 years ($M_{age}=9.52$ years, $SD=0.96$) at baseline. However, not all participants provided complete data on all measures on the subsequent two measurement occasions (6 months apart). At Time 2 (T2) and Time 3 (T3) assessments, 87.3% and 91.1% of the original Time 1 (T1) children participated, respectively. Overall, a total of 685 children completed the questionnaires on all three occasions. The reasons for attrition were moving out of the school district or being absent from school at one time or the other.

We conducted the Missing Completely at Random (MCAR) test (Little 1988) on all variables included in this study (i.e., sex, grade, parental education levels and family economic status at Wave 1, FD, loneliness and LS across three waves). These analyses of the three waves of longitudinal data revealed a normed χ^2/df of 1.13, which indicated that the missing data were random (Bollen 1989). Therefore, we applied Full Information Maximum Likelihood (FIML) to the subsequent analyses. FIML estimates model parameters using all available information, irrespective of whether the information came from cases with complete or incomplete data (Little and Rubin 2002).

2.2 Procedure

We conducted the study after obtaining approval of the Human Research Committee of University and both parental consent and student assent were obtained. The study was also approved by the relevant school boards, principals, and teachers. A trained graduate assistant administered the study measures to the students in regular classroom environments. The participants were given identical verbal and written instructions across all three occasions. They were also informed of the nature of the study and confidentiality of their responses on all three occasions. Students were allowed to take as much time as needed to complete the questionnaires, and they could refuse to participate at any time.

2.3 Measures

Family Dysfunction Family dysfunction was measured using the General Function subscale of the Family Assessment Device (FAD; Epstein et al. 1983), which is based on the McMaster Model of Family Functioning (MMFF; Epstein et al. 1978). The Chinese version of the FAD shows good psychometric properties (Shek 2002). The General Function subscale consists of 12 self-report items (e.g., “We avoid discussing our fears and concerns.”), which provide a global measure of dysfunctional family functioning. It has been used alone as a brief measure of overall family functioning, with good psychometric properties (Byles et al. 1988). Participants were asked to respond using a 4-point Likert scale, ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). Total scores were analyzed with reverse coding of relevant items, with higher scores reflecting greater levels of dysfunction within the family.

The General Function subscale has shown adequate support for its reliability and validity in Chinese children (Chen et al. 2014a; Kennedy et al. 2010; Shek 2001). In this study, the Cronbach's alpha coefficients were 0.75 at T1, 0.81 at T2, and 0.85 at T3. The omega coefficient were 0.75 at T1, 0.82 at T2, and 0.85 at T3. Confirmatory

factor analysis (CFA) at T1 indicated that the one-factor model fit the data adequately: χ^2/df ($N=926$) = 3.17, CFI = .94, TLI = .92, RMSEA = .05, a 90% RMSEA interval [.04, .06].

Loneliness Loneliness was measured using the Chinese version (Dong and Lin 2011) of the Children's Loneliness Scale (CLS; Asher et al. 1984). Children were asked to rate themselves on a 5-point scale ranging from 1 (*that's not true at all about me*) to 5 (*that's always true about me*) across 24 items, 16 of which assess feelings of loneliness (e.g., "I feel lonely." and "I don't have any friends."). In order to prevent participants from realizing the purpose of the measure and hiding their true answers, eight items were filler items that were not included in the scoring. Higher total scores on the CLS were indicative of greater levels of self-reported loneliness.

This measure has been used extensively with third through sixth grade elementary school children, and it has also shown adequate support for its reliability and validity with Chinese children (Chen et al. 2004; Liu et al. 2013; Maes et al. 2017). The Cronbach's alpha coefficients for the Chinese version of the CLS in this study were 0.93 at T1, 0.92 at T2, and 0.93 at T3. The omega coefficients were 0.92 at T1 and T2, 0.93 at T3. The results of the CFA (T1) indicated that the one-factor model fit the data adequately: χ^2/df ($N=926$) = 4.82, CFI = .94, TLI = .93, RMSEA = .07, a 90% RMSEA interval [.06, .08].

Life Satisfaction Life Satisfaction was measured using the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS). BMSLSS is a self-report inventory developed by Seligson et al. (2003) and translated into Chinese by Tian et al. (2015). The BMSLSS was designed to assess students' general and domain-specific LS. The BMSLSS consists of 5 items, each representing one of the five life satisfaction domains that have been shown to be important to children and adolescents (e.g., "I would describe my satisfaction with myself as..."). The BMSLSS uses a 7-point response option scale with options ranging from 1 (*terrible*) to 7 (*delighted*). A mean score on the BMSLSS, representing general life satisfaction, was calculated by summing the responses to the five items and dividing by five. Higher scores indicated higher life satisfaction.

The BMSLSS has been used with Chinese elementary school students, and the evidence suggested good psychometric properties (Kwan 2010; Tian et al. 2015). In this study, the Cronbach's alpha coefficients were 0.82 at T1, 0.79 at T2, and 0.83 at T3. The omega coefficients were 0.84 at T1, 0.81 at T2, and 0.84 at T3. The results of the CFA (T1) indicated that the one-factor model fit the data adequately: χ^2/df ($N=926$) = 1.28, CFI = 1.00, TLI = 1.00, RMSEA = .02, a 90% RMSEA interval [.00, .05].

Covariates Participants' sex, grade, parental education levels and family economic status were included in the analyses as covariates. The information on parental education levels and family economic status was collected from parents to assist students in responding to the items (i.e., students solicited help from their parents before answering these related items). Participants reported on the parental education levels of their fathers and mothers, separately, according to eight alternative categories from 1 (*never attended school*) to 8 (*doctoral degree*). Family economic status was assessed using a

measure developed by Song et al. (2014) that includes 4 items (e.g., “My family has enough money to buy a good house.”). Participants were asked to respond using a 4-point Likert scale, ranging from 1 (*not at all true*) to 4 (*always true*), indicating how true each item was for the student’s family. Higher mean scores for both parental education levels and family economic status were indicative of greater levels of parental education and family economic status.

2.4 Analysis Plan

The analysis was divided into the following four parts.

First, longitudinal factorial invariance was tested separately for each administered scale by comparing models that constrained factor loadings (*metric invariance*) to models without equality constraints (Little 2013). Differences in the comparative fit index (CFI) that did not exceed a threshold of .01 were considered indicative of invariant measurements (Cheung and Rensvold 2002).

Second, descriptive statistics and Pearson correlations were also analyzed by SPSS 21.0.

Third, according to the Cole and Maxwell (2003) framework, SEM was used to test our mediation hypotheses in Mplus 8.0. Demographic variables of sex, grade level, parental educational level, and family economic status were treated as control variables when testing our mediation hypotheses. Specifically, we controlled for the effects of grade level (grade 3, 4, and 5) by including dummy variables, namely two variables representing the three grades (e.g., dummy variable 1: grade 3 = 1, other grades = 0). All possible autoregressive coefficients, within-time associations between constructs, and cross-lagged paths between constructs were included in the longitudinal mediation model. In addition, according to the modification indices, we added second-order autoregressive paths. Model fit was analyzed using multiple indicators: The chi-square (χ^2) statistic, the comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA) (Anderson and Gerbing 1988). Given that the χ^2 statistic is sensitive to sample size (Jöreskog and Sörbom 1996), it was necessary to consider other indices when evaluating the model. For CFI and TLI, values greater than 0.95 were considered a good fit to the data. For RMSEA, values less than 0.06 were considered indicative of good fit (Byrne 2012). Because the LS scores were not normally distributed in our study, the Maximum Likelihood Robust (MLR) method was used. Furthermore, because bootstrap methods cannot be used to test mediating effects when using MLR as the parameter estimation method (Muthén 2017), the statistical significance of the mediating effects of loneliness was confirmed through the Sobel test.

Fourth, in order to test whether sex or grade level moderated the relations among FD, loneliness and LS, we conducted multiple group analyses. Specifically, we included a series of equality constraints on cross-lagged paths and examined whether these constraints resulted in a significant decrease in model fit by using the chi-square difference test. If the model fit did not significantly change after imposing the constraints, it was assumed that the model did not vary across sex or grade level.

3 Results

3.1 Longitudinal Measurement Invariance

Prior to examining the participants' responses, it was necessary to test whether FD, loneliness, and LS were measured in the same way on different occasions. The fit indices for the tests of measurement invariance are presented in the Table 1. As shown in Table 1, the configural invariance model (Model 1A) for FD fit the data fairly well: $\chi^2/df = 3.578$, CFI = .985, TLI = .983, RMSEA = .053. Then, we tested the metric invariance model (Model 1B) for FD. This model fit the data as well as the previous model: $\chi^2/df = 3.458$, CFI = .985, TLI = .983, RMSEA = .052. The goodness-of-fit of Model 1B was not significantly different from Model 1A: $\Delta CFI < .01$. Similarly, the configural invariance model and the metric invariance model of loneliness and LS all fit the data well. Regarding the CFI differences, metric invariance could thus be assumed for all study constructs. Metric invariance is required for reliably examining across-time associations between variables (Little 2013).

3.2 Descriptive Analyses

Table 2 presents the descriptive statistics for FD, loneliness, and LS, as well as the bivariate correlations among all study variables. The results showed that the correlation coefficients among FD, loneliness, and LS were all statistically significant at the $p < .001$ level. Specifically, FD positively correlated with loneliness, and the correlations were between 0.19 and 0.43. Most of the correlations showed a moderate effect size. FD negatively correlated with LS and the correlations coefficients were between -0.18 and -0.38 , also indicating a moderate effect size. In addition, loneliness negatively correlated with LS. The correlations coefficients were between -0.37 and -0.63 , suggesting moderate to strong effect sizes (Cohen 1992). This pattern of correlations provided initial support for the hypothesized mediation process.

Table 1 Model fit statistics for tests of longitudinal measurement invariance

	Model Tested	χ^2	<i>df</i>	CFI	TLI	RMSEA	[%90 CI]	ΔCFI
Family dysfunction	1A. Configural invariance	1957.268	547	.985	.983	.053	[.050, .055]	
	1B. Metric invariance	1967.521	569	.985	.983	.052	[.049, .054]	.001
Loneliness	2A. Configural invariance	2996.994	1004	.912	.901	.046	[.044, .048]	
	2B. Metric invariance	3078.667	1034	.909	.901	.046	[.044, .048]	.000
Life Satisfaction	3A. Configural invariance	95.096	72	.987	.981	.019	[.005, .028]	
	3B. Metric invariance	94.648	80	.992	.989	.014	[.020, .024]	.005

Table 2 Descriptive statistics and correlations for the main variables

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. T1 FD	20.07	5.89	–							
2. T2 FD	19.14	6.30	.42***	–						
3. T3 FD	19.42	6.85	.35***	.40***	–					
4. T1 LO	26.86	11.79	.43***	.20***	.19***	–				
5. T2 LO	24.57	10.04	.34***	.34***	.21***	.58***	–			
6. T3 LO	25.31	10.96	.24***	.21***	.32***	.50***	.66***	–		
7. T1 LS	6.49	.85	-.38***	-.20***	-.18***	-.57***	-.37***	-.38***	–	
8. T2 LS	6.58	.71	-.38***	-.37***	-.26***	-.50***	-.55***	-.45***	.59***	–
9. T3 LS	6.51	.80	-.28***	-.31***	-.36***	-.42***	-.49***	-.63***	.51***	.55***

FD Family dysfunction, LO Loneliness, LS Life satisfaction, T1 Time 1, T2 Time 2, T3 Time 3

*** $p < 0.001$

3.3 Testing the Longitudinal Mediation Model

After controlling for the baseline values of sex, grade, parental education levels, and family economic status, the longitudinal mediation model displayed adequate fit ($\chi^2/df = .95, p = .56, RMSEA = .00, CFI = 1.00, TLI = 1.00$). Table 3 and Fig. 2 display the main results for our model. Results showed that FD at T1 and T2 positively predicted children’s loneliness at subsequent time points respectively (i.e., assessment at 6 months T2 and 12 months T3) (β range from .09 to .10, $ps < .05$). Also, FD (β range from -.09 to -.13, $ps < .05$) and loneliness (β range from -.22 to -.23, $ps < .001$) at T1 and T2 negatively predicted LS at T2 and T3 respectively. In addition, T2 loneliness was found to mediate the relation between T1 FD and T3 LS. Specifically, as shown in the mediational relations diagrammed in Table 3 (i.e., cross-lagged paths) and Fig. 2, T1 FD positively predicted T2 LO ($\beta = .10, p < .05$), and T2 LO negatively predicted T3 LS ($\beta = -.23, p < .001$). T1 FD was indirectly related to T3 LS via T2 LO and the indirect of pathways achieved significance. The mediating effect was statistically significant ($Z_{ab} = -2.92, p < .01$). The size of the mediating effect was .02, which accounted for 26.32% of the total effects.

In the context of the same set of models, the possibility that the direction of the effect moved from LS to loneliness and FD was also tested. The findings did not reveal significant effects in this direction.

3.4 Multiple Group Analyses

When all corresponding cross-lagged pathways were constrained to be equal across sex and grade, there was non-statistically significant degradation in model fit both for sex ($\Delta\chi^2_{SB} (6) = 7.48, p = .28$) and grade ($\Delta\chi^2_{SB} (12) = 16.06, p = .19$), which indicated that relations among FD, loneliness and LS were similar for boys and girls as well as similar for student from grades 3 to 5.

Table 3 Mediating effects of loneliness on the longitudinal associations between family dysfunction and life satisfaction

Model parameters	β		
Stability paths	T1→T2	T2→T3	Second-order autoregression
FD ↔ FD	.40***	.27***	.21***
LO ↔ LO	.51***	.53***	.15**
LS ↔ LS	.42***	.28***	.23***
Within wave correlations	T1	T2	T3
FD ↔ LO	.41***	.22***	.22***
LO ↔ LS	-.57***	-.41***	-.42***
FD ↔ LS	-.38***	-.25***	-.25***
Cross-lagged paths	T1→T2	T2→T3	
FD → LO	.10*	.09*	
LO → LS	-.22***	-.23***	
FD → LS	-.13**	-.09*	
LS → LO	-.06	-.06	
LO → FD	.03	.02	
LS → FD	-.08	-.08	
Covariates	FD	LO	LS
Gender	.01	-.01	-.03
Grade 3	-.01	-.08*	.18***
Grade 4	-.03	-.04	.12**
PEL	-.04**	.01	.00
FES	-.19***	-.16***	.16

Grades were dummy coded with grade 5 as reference category. *PEL* Parental educational levels, *FES* Family economic status, *FD* Family dysfunction

LO Loneliness, *LS* Life satisfaction, *T1* Time 1, *T2* Time 2, *T3* Time 3

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

4 Discussion

Previous studies have demonstrated that FD is one of the most important determinants of children's LS (Botha et al. 2017; Chappel et al. 2014). However, most prior studies have employed cross-sectional designs and failed to examine the possible underlying psychological mechanisms that account for the relation between FD and LS from a longitudinal perspective. Moreover, previous studies have not considered all of the possible relations among FD, loneliness and LS. Using a three-wave longitudinal design, we examined the possible cross-lagged relations among FD, loneliness and LS in a large sample of Chinese children. The major findings of this study were as follows.

4.1 Family Dysfunction and its Relations with Life Satisfaction

Consistent with *Hypothesis 1*, FD negatively predicted LS in middle and late childhood. Notably, the experience of FD lasted into the next occasion of measurement, in

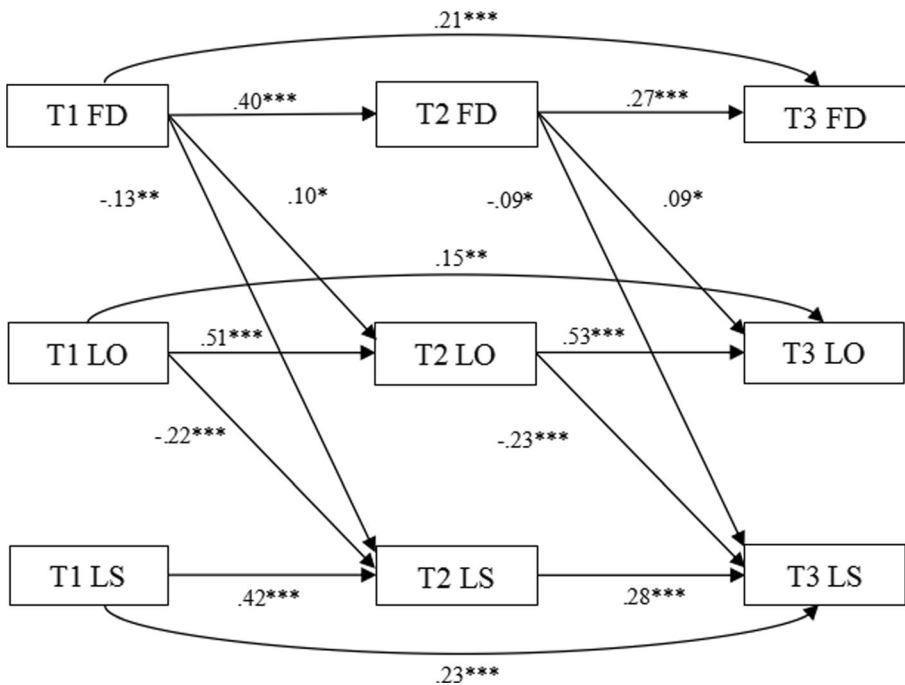


Fig. 2 Mediating effects of loneliness on the longitudinal associations between family dysfunction and Life Satisfaction. Note. *FD* Family dysfunction, *LO* Loneliness, *LS* Life Satisfaction, *T1* Time 1, *T2* Time 2, *T3* Time 3. Covariates, concurrent relations, and non-significant estimates are not shown in the figure to reduce complexity. Because the model with the time-invariant coefficients was retained as the final one, cross-lagged coefficients displayed represent the averaged standardized coefficients over the two time intervals. $*p < 0.05$; $**p < 0.01$; $***p < 0.001$

turn leading to more negative assessments of LS among children. Furthermore, children living in dysfunctional families reported lower LS, and their life dissatisfaction exerted further negative influences on subsequent judgments of LS. This finding was consistent with previous research, which suggested that if the family cannot achieve its basic functions, it can easily lead to various problems among family members, such as lower LS (Botha et al. 2017; Chappel et al. 2014; Leto et al. 2018; Miller et al. 2000). For example, previous studies have shown that LS is related to diverse dimensions of family functioning, such as affective responsiveness and involvement, communication, and general functioning (Cacioppo et al. 2013; Ye 2014).

Notably, researchers have suggested that FD not only affects general LS, but also affects LS in specific domains (i.e., school, family, friends, self, and living environment) (Nickerson and Nagle 2004; Ye 2014). The family environment may structure and shape children’s views of themselves and others, including their sense of self-worth, expectations towards social interactions, and reactions to the world at large (DeKlyen and Greenberg 2016). In dysfunctional families, children perceive more interference, restraint, and refusals and less social support, love, and warmth from their parents. In the long term, they may develop dissatisfaction with themselves and their living environment, including their families (Pannilage 2017). Meanwhile, they may also experience more estrangement and conflict with their family members. Studies have shown that estrangement between children and parents over time destroys the

family's original structure (Liu et al. 2007). In this case, children's needs for safety, love and belonging cannot be fully satisfied, thus triggering a series of psychological problems, such as lower LS (Tian et al. 2014). On the contrary, children living in functional families often have good communication with parents and perceive greater understanding and support from family members in solving their problems. In this way, children tend to report higher LS (Raboteg-Saric and Sakic 2014).

Our findings may also reflect the importance of the interaction between the family and cultural factors, such as the importance of interdependence within collectivistic cultures. More specifically, traditional Chinese culture in particular emphasizes the importance of group interests and group harmony, and group harmony appears to be a determinant of their LS (Kong and You 2013). For the development of Chinese children, an important goal of socialization is to help children to form a sense of belonging and loyalty to the group (Chen 2010). As the first socialization environment and the most important social support system, the family provides the most fundamental source for children's psychological development. Thus, not surprisingly, FD plays a crucial role in Chinese children's LS.

4.2 The Mediating Role of Loneliness between Family Dysfunction and Life Satisfaction

We further explored a possible psychological mediator of the observed link between FD and LS using a relatively stringent, longitudinal mediation design. Consistent with *Hypothesis 2*, loneliness mediated the relation between FD and LS. Families exhibiting significant problems perhaps fail to provide adequate social support, and thus children experience a significant gap between their actual and desired social status, a lack of affective bonding, and an unfulfilled desire for friends. All of these aspects will lead to emotional and social-cognitive loneliness among children (Asher et al. 1990; Bauminger and Kasari 2000).

Maslow's (1970) need-gratification theory provides a plausible explanation for this finding. His theory emphasizes that people at different stages of development have different needs. For middle to late childhood, the need for belongingness is most prominent. His theory also postulates that the external environment (e.g., family) provides important conditions to meet children's needs. According to social learning theory, parental behavior serves as model for social relations, influencing expectations for either positive or negative social interactions with others, including peers (Bandura 1973). In dysfunctional families, parents serve as negative models, and children learn ineffective social skills and transfer them to their peer relationships, thus failing to develop satisfying peer relationships. Moreover, how well children are accepted by peers, how many friends they have, and the quality of their friendships all have a great impact on children's loneliness (Maes et al. 2017). Loneliness appears when children experience alienation within their peer group; that is, when children's needs for belongingness are not met. According to need-gratification theory, when children's needs for belonging are not met, individuals will report lower psychological well-being, such as lower LS. Yan et al. (2018) pointed out that lonely children feel that they do not deserve strong relationships and interpret their surroundings via a lens of insecurity. Children might behave accordingly and elicit rejection from their peer and parents, which in turn increases their unhappy experiences. All of this can make lonely children

experience lower LS. In addition, compared to younger children, children in middle to late childhood pay more attention to their social relationships, with a desire for peer acceptance emerging in elementary school. However, children who experience maladaptive family functioning have fewer positive social interactions to observe and model, so they are unable to develop effective and lasting relationships with peers. Therefore, children's needs for intimate relationships with both family and peer groups are not met, which further results in lower levels of general LS.

We found no significant grade or sex differences in our model. In the context of the Chinese collectivistic culture, the importance of the family thus appears equivalent for boys' and girls' development in childhood. For both boys and girls in middle to late childhood, positive family functioning and good interpersonal relationship appear crucial to LS. Our findings suggest that the importance of the family also appears equally important across middle to late childhood. However, adolescence is a time of rapid change, during which adolescents experience relatively rapid physical and psychological development and transformation. Possible sex and grade differences may therefore occur during adolescence. Thus, future research addressing these possible moderating factors in the FD-loneliness-LS link across multiple age groups would be beneficial.

Furthermore, although our study did not involve a direct comparison of cultural differences, such differences might be a plausible moderator of the observed relations. Consistent with the individualism-collectivism framework, compared to Chinese individuals, Americans are more likely to deflect personal responsibility for their loneliness in an effort to preserve a positive self-view (Lykes and Kimmelmeier 2014). Thus, when Chinese children feel lonely, they tend to attribute their loneliness more to themselves. Furthermore, compared to persons in individualistic countries, strong, intimate interpersonal ties are normative for persons in collectivistic societies. When the quality of their interpersonal relations do not meet cultural expectations, Chinese individuals are more likely to blame themselves and hold negative views of themselves and their world (Perlman and Peplau 1981), reflecting lower overall LS.

Finally, previous studies have not examined the possibility of bidirectional relationship among FD, loneliness and LS in different cultural backgrounds. Our study indicated that loneliness mediated the relation between FD and LS, but it did not mediate the reverse relation, that is, the relation between LS and FD. We speculate that normative social relations, such as family and peer relations, are determinants of LS in collectivistic cultures. However, the benefits of LS may differ in collectivistic cultures, such that higher levels of LS do not promote lower FD and loneliness. The existence of differences in the consequences of varying levels of children's LS as a function of culture is an intriguing possibility that has received little research attention. Cross-cultural studies are needed to address such possible differences.

It should be noted, however, that China has been undergoing a rapid sociopolitical transition with major changes in social and economic structures across the last several decades (Ma 2017). These social and economic changes have corresponded to the introduction of individualistic values and ideologies, such as independence and individual freedom. These values have been gradually accepted by many Chinese people, especially the younger generation (Chen et al. 2005). Within the context of the new market economy, Chinese people are paying more attention to the achievement of

individual goals and the display of more individually-oriented psychological qualities, such as boldness and independence (Shi and Xu 2008). For example, the Ministry of Education of China has called for modifications of educational goals to accommodate the demands of the market-oriented economy (Ministry of Education of the People's Republic of China 2012). Schools and families are beginning to encourage children to pursue personal goals and individual freedoms, and to display greater independence and assertiveness in their efforts to adapt to a more competitive society. Nevertheless, Chinese traditional culture emphasizes interpersonal dependence, such as family and peer relations for children. Chen et al. (2004) suggested that in a cultural context that emphasizes interpersonal dependence, the threshold for the experience of loneliness may be lower because individuals have higher expectations for the quality of interpersonal relationships. In this case, it is possible that the increasing emphasis on the self and the pursuit of personal goals and a relative decline in interpersonal dependence in China may lead to more interpersonal alienation, yielding greater loneliness (Liu et al. 2013) and subsequent lower levels of LS. Although highly speculative, future research aimed at monitoring such possibilities among Chinese children and adolescents seems worthy.

4.3 Strengths, Limitations and Future Direction

Compared to prior studies, our study had several strengths, such as including a large sample of elementary school children, and the employment of a sophisticated three-wave longitudinal design to explore the possibility of bidirectional relations between children's FD and LS. We evaluated direct and indirect effects through the psychological mechanism of loneliness. Differing from cross-sectional research, longitudinal designs yield information about temporal precedence and thus allow examination of which variables are antecedents and which variables are consequences (MacKinnon et al. 2002). Also, compared with traditional psychology models that focus more on negative aspects of functioning, we studied LS as an outcome, which allows for both reports of negative and positive functioning. In this manner, we incorporated a positive psychology perspective as well.

Noteworthy limitations should be acknowledged as well. First, we only surveyed students in two primary schools, which may not be generalizable to all schools in China. Future studies are needed to test the generalizability of the current study's findings. Second, we examined the role of emotions in the relation between FD and LS, but failed to consider more stable characteristics of individuals, such as personality traits. Future studies could pay more attention to the roles of personality traits, (e.g., extraversion, openness to experience) perhaps as moderators of the mediation effects. Third, the qualities of a variety of external environments have been shown to relate to children's LS, such as school, peer, and neighborhood as well as interacting environments (e.g., home-school, school-community). Thus, future research may take other environments into consideration. Forth, self-reporting methods are associated with potential limitations, such as overly positive self-presentations. Future studies should use multiple methods of measurement to address this possibility. Last, given that children's perceptions of themselves and others may be relatively unstable compared to those in adulthood, researchers may wish to track participants for a longer period of time to verify the longer-term effects of FD and loneliness on LS.

4.4 Conclusion

We sought to clarify the connections among FD, loneliness, and LS in Chinese elementary school students in a longitudinal mediation design. Consistent with previous studies, FD was an antecedent of LS. Moreover, loneliness at Time 2 completely mediated the relation between FD at Time 1 and LS at Time 3, with the mediating effect occurring after the assessment of FD and before the assessment of loneliness. This sequence revealed that children's experiences of family functioning translated into difficulties with peer relationships, leading to loneliness, and further leading to a greater sense of dissatisfaction with life as a whole.

Our study enriched the research by highlighting the crucial sequential roles of the family system and peer system in individual differences in Chinese children's LS. Our findings suggest that multi-modal interventions or prevention efforts should include components that address both family and peer relationships. In order to improve children's LS, family members should provide a positive environment, including serving as good role models, to meet children's needs for quality social relationships within and outside of the family (Wang et al. 2016). For example, in functional families, parents may provide children with models for effective affiliative expectations and skills that enhance children's interactions with their peer group. In addition, family members should provide warmth and responsiveness, which should support children's emotional needs, and thus promote their ability to trust and care about all others (Wu and Chow 2013). Such positive experiences within families should set the stage for more positive experiences with peers.

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