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Research Article

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A Three-wave Longitudinal Study on Parental Autonomy Support : An Intermediary Model of Father Presence and basic Psychological Needs in Primary School Students

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Abstract

Background Father presence is an important family relational resource for child development. Understanding the role of fathers is therefore essential for elucidating children's psychological development.**Methods** This study employed a three-wave longitudinal design and followed primary school students in Nanchang, Jiangxi Province, China, across three assessments over one year. A cross-lagged panel model (CLPM) and a random-intercept cross-lagged panel model (RI-CLPM) were estimated sequentially to distinguish overall longitudinal associations at the observed level, stable between-person differences, and dynamic within-person processes.**Results** The final CLPM (CLPM-M4) showed a good fit to the data, $\chi^2(18) = 43.458$, $p < .001$, CFI =0.969, TLI =0.942, RMSEA =0.057, and SRMR =0.051. Father presence positively predicted subsequent parental autonomy support (βs =0.079–0.084, p =0.016) and basic psychological need satisfaction (βs =0.091–0.095, p =0.013). Parental autonomy support and basic psychological need satisfaction prospectively predicted each other (βs =0.144–0.195, $p < .001$), and parental

autonomy support also positively predicted subsequent father presence (βs =0.100–0.116, *p* = .003). The RI-CLPM also demonstrated a good fit, $\chi^2(12) = 13.476$, *p* =0.335, CFI =0.998, TLI =0.995, RMSEA =0.017, and SRMR =0.040. At the between-person level, all three variables were significantly and positively correlated (*r*s =0.418–.635, $p \leq .003$). At the within-person level, parental autonomy support positively predicted subsequent basic psychological need satisfaction (βs =0.135–.143, *p* =0.016), while basic psychological need satisfaction positively predicted subsequent parental autonomy support (βs = 0.157–0.161, *p* =0.004). In contrast, none of the within-person prospective paths involving father presence were statistically significant.**Conclusions** The CLPM revealed broad longitudinal associations among father presence, parental autonomy support, and basic psychological need satisfaction at the observed level and indicated that father presence remained stable across the one-year study period. The RI-CLPM further suggested that father presence primarily represents a stable family relational context, whereas parental autonomy support and basic psychological need satisfaction constitute a proximal reciprocal dynamic system underlying psychological adjustment among primary school students.

Keywords: Father presence; Parental autonomy support; Basic psychological need satisfaction; Random-intercept cross-lagged panel model; Longitudinal study; Primary school students

Background

Previous research has extensively examined mother–child attachment, whereas comparatively less attention has been paid to the role of fathers in children's development. Fathers may play an important role in adolescents' basic psychological need satisfaction, which is a key theoretical construct for understanding children's motivation, mental health, and school adjustment. According to self-determination theory, the needs for autonomy,

competence, and relatedness constitute fundamental psychological conditions for healthy human development. When family and school environments support these needs, children are more likely to develop autonomous motivation, experience positive affect, and demonstrate better adjustment [1–3]. The upper primary school years represent a developmental period during which children's self-systems, parent–child relationships, and school experiences undergo continuous reorganization. Identifying family factors that facilitate basic psychological need satisfaction therefore has important theoretical and practical implications.

The Relationship Between Father Presence and Basic Psychological Need Satisfaction

Father presence refers to children's subjective experience of their father's psychological availability, emotional connection, and relational significance, rather than merely whether the father lives with the child or how much time he spends participating in the child's life [4, 5]. From the perspective of self-determination theory, a stable, warm, and responsive father–child relationship may directly support children's need for relatedness. When fathers respect children's perspectives, acknowledge their feelings, and provide appropriate challenges and assistance, they may also facilitate the satisfaction of children's needs for autonomy and competence [1–3, 6, 7].

Existing evidence generally supports an association between father-related relational resources and positive child development. Longitudinal reviews have shown that sustained paternal involvement is associated with children's social, emotional, behavioral, and cognitive outcomes [8–10]. Reviews of father–child relationships have further argued that research should move beyond a narrow focus on the frequency of paternal involvement and instead examine relational processes such as warmth, sensitive responsiveness, shared play, guidance, and learning support [11]. Research on paternal sensitive responsiveness has likewise emphasized that high-quality father–child interactions more closely reflect the

mechanisms underlying child development than the amount of time fathers are physically present [12]. Among Chinese adolescents, father presence has been positively associated with psychological resilience, psychological security, and the ability to learn from failure [13, 14]. In father–adolescent dyadic research, fathers' intrinsic life aspirations and adolescents' perceptions of paternal autonomy support have both been associated with adolescents' basic psychological need satisfaction [15]. Another longitudinal study found that greater "father hunger" was associated with lower basic psychological need satisfaction [16].

The Relationship Between Father Presence and Parental Autonomy Support

Father presence and parental autonomy support represent different levels of family influence. Father presence primarily reflects children's global and cumulative representation of their relationship with their father, whereas parental autonomy support refers to the specific ways in which parents respect children's preferences, understand their perspectives, provide meaningful choices, and explain the rationales underlying expectations during parent–child interactions [4, 5, 17–21]. According to the process model of parenting and the family systems perspective, fathers who are psychologically available and emotionally engaged may have more opportunities to recognize and respond to their children's needs and may contribute to a more supportive family interaction climate through constructive coparenting [22, 23]. However, a father's psychological presence does not necessarily imply that his parenting is autonomy-supportive, as highly involved fathers may also exhibit controlling or intrusive behaviors.

An observational study of preschool children and their fathers found that the extent of paternal involvement was positively associated with paternal autonomy support. Moreover, the association between paternal autonomy support and children's executive functioning was independent of the amount of time fathers spent participating in childcare activities [24].

Longitudinal research has also demonstrated that paternal autonomy support comprises both stable between-family differences and temporal fluctuations within the same family and is associated with adjustment outcomes among children and adolescents [25].

The Relationship Between Parental Autonomy Support and Basic Psychological Need Satisfaction

The association between parental autonomy support and basic psychological need satisfaction represents a central proposition of self-determination theory in the family context. By acknowledging children's feelings, providing developmentally appropriate choices, explaining the rationales underlying rules, and minimizing psychological control, parents may facilitate children's experiences of volition, effectiveness in task engagement, and connectedness with significant others [1–3, 17–21]. Previous research has shown that parental autonomy support is associated with greater need satisfaction, vitality, academic functioning, and lower psychological distress. Basic psychological need satisfaction may also explain the associations between autonomy support and certain adjustment outcomes [7, 26, 27]. Among Chinese primary school students, basic psychological need satisfaction partially mediated the association between parental autonomy support and children's self-concept, providing culturally relevant evidence for the applicability of this theoretical process during the primary school years [28].

However, this relationship may not be exclusively unidirectional. Transactional models of development propose that children are not only influenced by parental behavior but may also shape parental responses through their own emotions, communication patterns, and cooperative behavior [29]. Daily diary research has shown that autonomy-supportive parenting fluctuates across everyday situations within families and is dynamically associated with both children's well-being and parents' own need satisfaction [30]. Experience-sampling

research has further identified reciprocal associations between autonomy support and adolescents' positive affect over intervals of several hours [31]. When children's needs for autonomy, competence, and relatedness are adequately satisfied, they may be more willing to express their needs, participate in negotiation, and respond to their parents in a less defensive manner, thereby helping to maintain or elicit autonomy-supportive interactions. In contrast, prolonged need frustration may be accompanied by withdrawal, resistance, or conflict and may alter children's perceptions of parental behavior. Therefore, simultaneously examining whether parental autonomy support predicts subsequent basic psychological need satisfaction and whether children's basic psychological need satisfaction predicts subsequent parental autonomy support is more consistent with a transactional developmental perspective than assuming a solely unidirectional process [25, 29–31].

The Mediating Role of Parental Autonomy Support

Taken together, the preceding evidence supports a theoretical pathway linking father presence, parental autonomy support, and basic psychological need satisfaction. The stable emotional connection and psychological availability represented by father presence may create conditions that enable fathers and other caregivers within the family to engage in autonomy-supportive practices, such as taking the child's perspective, acknowledging the child's feelings, and providing meaningful choices. These proximal interactions may, in turn, directly facilitate the satisfaction of children's basic psychological needs [22–24, 27, 28]. Within this framework, father presence represents a relatively distal relational context, whereas parental autonomy support serves as a proximal process through which family relational resources are translated into children's psychological experiences.

The Present Study

Recent research has increasingly demonstrated that fathers' contributions to child development cannot be adequately captured solely by coresidence status or the amount of time they spend participating in their children's lives. Instead, research should simultaneously consider the quality of paternal involvement, emotional sensitivity, relational representations, and the specific mechanisms through which fathers influence development. A recent review of father–child relationships recommended shifting the focus from "how much fathers do" to relational processes such as warmth, sensitivity, shared play, guidance, and learning support [11]. Research on paternal sensitive responsiveness has similarly suggested that fathers' ability to recognize children's signals and respond to them appropriately represents a key interactional quality that supports child development [12]. A recent meta-analysis found a significant overall positive association between paternal involvement and young children's socioemotional development [32]. A systematic review of paternal involvement and children's emotion regulation likewise indicated that warm, responsive, and developmentally appropriate father–child interactions were associated with better emotion regulation. However, the existing evidence remains dominated by cross-sectional designs and maternal reports [33].

Research among Chinese adolescents has further linked father presence with interpersonal relationship quality, social responsibility, psychological security, the ability to learn from failure, and psychological resilience [13, 14, 34, 35]. Meanwhile, a meta-analysis of research on nonresident fathers showed that father–child relationship quality was more consistently associated with child well-being than contact frequency alone [36]. Father–child activation relationship theory proposes that fathers promote the development of autonomy and competence by encouraging exploration, presenting manageable challenges, and regulating children's exposure to risk [37]. Meta-analytic evidence concerning paternal sensitivity and systematic reviews of paternal involvement similarly suggest that the effects

of fathers depend not only on whether they are involved but also on their responsiveness, the quality of their interactions, and the broader family context [38, 39].

With respect to parenting mechanisms, the motivational model of parenting identifies autonomy support, structure, and warmth as core dimensions that promote positive child development [40]. Related theoretical work further clarifies that autonomy support is distinct from permissiveness. Rather, it involves understanding the child's perspective, providing developmentally appropriate choices, explaining the rationales underlying expectations, and minimizing intrusive control [41]. Validation studies of parental autonomy support measures have supported the multidimensional assessment of this construct [42]. Longitudinal research has also shown that maternal autonomy support predicts children's subsequent school adjustment and academic performance [43]. Daily diary and experience-sampling studies have further demonstrated substantial within-family fluctuations in autonomy support and suggested that autonomy support may form short-term reciprocal processes with children's well-being and positive affect [30, 31]. From the perspective of basic psychological needs theory, autonomy support is likely to exert its effects by promoting need satisfaction and reducing need frustration [3, 7, 44]. Recent cross-cultural meta-analytic evidence, multi-informant studies of children, and a four-wave RI-CLPM study among Chinese early adolescents have further suggested that the association between autonomy support and child well-being is relatively consistent across cultures, that children's and parents' perceptions do not completely converge, and that parenting and children's psychological functioning may be reciprocally related at the within-person level [45–47].

Despite these advances, four important gaps remain in the current literature. First, most research on fathers has examined objective involvement, coresidence, paternal absence, paternal sensitivity, or specific parenting behaviors [8–12, 32, 33, 36–39]. Father presence,

conceptualized as a distinct subjective relational experience involving children's perceptions of their father's psychological availability, emotional connection, and relational significance, has rarely been examined at the within-person level using multiwave longitudinal data [4, 5, 13, 14, 34, 35].

Second, existing studies of father presence have primarily focused on university students or adolescents, whereas research on autonomy support has frequently emphasized maternal parenting, parenting by both parents in general, or relatively distal adjustment outcomes [13–16, 25, 26, 33–35, 42, 43, 45–47]. Research simultaneously examining father presence, parental autonomy support, and basic psychological need satisfaction among Chinese children in the upper primary school years remains very limited.

Third, cross-sectional mediation models, two-wave regression analyses, and traditional CLPMs cannot adequately distinguish long-term stable family differences between children from relative changes occurring within the same child over time. Consequently, significant pathways identified at the observed level may not necessarily represent within-person developmental processes [48–51].

Fourth, most previous studies have adopted a unidirectional framework in which parental behavior influences children. Although intensive short-term studies have begun to reveal reciprocal microprocesses between parenting and children's emotions [30, 31], evidence remains insufficient regarding whether children's basic psychological need satisfaction prospectively predicts their subsequent perceptions of parental autonomy support [25, 29, 43, 44, 47].

To address these gaps, the present study employed a three-wave longitudinal design. A modified CLPM was first estimated to describe the overall longitudinal associations among

the three constructs at the observed level. An RI-CLPM was then used to separate stable between-person differences from within-person fluctuations and to examine associations among the three constructs across these distinct analytical levels.

Drawing on father presence theory, self-determination theory, transactional models of development, and existing longitudinal evidence, the following hypotheses were proposed:

H1: At the stable between-person level, the random intercepts of father presence, parental autonomy support, and basic psychological need satisfaction will be significantly and positively correlated.

H2: In the observed-level CLPM, father presence will positively predict subsequent parental autonomy support and basic psychological need satisfaction, while parental autonomy support and basic psychological need satisfaction will positively predict each other over time.

H3: After controlling for stable between-person differences, when children perceive parental autonomy support to be higher than their own usual level, their basic psychological need satisfaction at the subsequent wave will also be higher than their own usual level.

H4: After controlling for stable between-person differences, when children's basic psychological need satisfaction is higher than their own usual level, their perceived parental autonomy support at the subsequent wave will also be higher than their own usual level.

Methods

Participants

This study employed a three-wave prospective longitudinal design. Participants were students in Grades 4–6 recruited from four primary schools in Nanchang, Jiangxi Province, China. A total of 486, 477, and 475 students participated at T1, T2, and T3, respectively. After matching participants across waves, 450 students who completed all three assessments were included in the primary analyses. Based on the T1 sample, the complete three-wave retention rate was 92.59%.

The final sample comprised 244 boys (54.2%) and 206 girls (45.8%). Participants were primarily aged 10 years (n = 202, 44.9%), 11 years (n = 202, 44.9%), or 12 years (n = 46, 10.2%). Seventy-five participants (16.7%) were only children, whereas 375 (83.3%) had one or more siblings. In addition, 433 students (96.2%) came from two-parent families and 17 (3.8%) from single-parent families.

Procedure

The three waves of data collection were conducted in September 2024, March 2025, and September 2025, with an interval of approximately six months between adjacent waves. Questionnaires were administered collectively during regular class periods by trained researchers, with classroom teachers assisting in maintaining order.

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and relevant institutional and national ethical guidelines. Ethical approval was obtained from the Interdisciplinary Human Research Ethics Committee

Shinawatra University，No approval reference number was assigned. Written informed consent was obtained from the parents or legal guardians of all participants before data

collection, and assent was obtained from all participating children. Participation was voluntary, and the participants were informed that they could withdraw from the study at any time without penalty.

Measures

Father presence

Father presence was assessed using the Chinese brief version of the Father Presence Questionnaire–Revised (FPQ-R-B), which evaluates children's subjective experiences of their father's psychological availability, the father–child relationship, intergenerational family relationships, and beliefs about fathers [4, 52]. The questionnaire contains 31 items across eight subscales, which can be grouped into three higher-order dimensions: relationship with the father, intergenerational family relationships, and beliefs about fathers. Item scores were averaged, with higher scores indicating greater father presence. Preliminary analyses demonstrated good internal consistency, with a Cronbach's α of .893.

Parental autonomy support

Children's perceived parental autonomy support was assessed using the Parental Autonomy Support Scale [28, 53]. The scale evaluates parental perspective taking, acknowledgement of children's feelings, provision of choices, and support for autonomous expression. It comprises 12 items rated on a 5-point scale. Item scores were averaged, with higher scores indicating greater perceived parental autonomy support. Preliminary analyses indicated acceptable internal consistency, with a Cronbach's α of .737.

Basic psychological need satisfaction

Basic psychological need satisfaction was assessed using the Chinese version of the Basic Psychological Needs Scale, which measures the satisfaction of the needs for autonomy, competence, and relatedness [7, 54]. The scale contains 19 items. After reverse-scored items had been recoded, total and subscale scores were calculated. Higher scores indicated greater basic psychological need satisfaction. Preliminary analyses showed acceptable internal consistency, with a Cronbach's α of .723.

Longitudinal Measurement Invariance Testing

Before estimating the longitudinal structural models, configural, metric, and scalar invariance were examined separately for father presence and basic psychological need satisfaction. Configural invariance required the same factor structure across the three waves. Metric invariance additionally constrained the factor loadings of corresponding indicators to equality across time, whereas scalar invariance further constrained the intercepts of corresponding indicators to equality across time.

Longitudinal measurement invariance provides an important basis for interpreting structural associations and mean differences across time. Accordingly, the constraints imposed at each level, the criteria used for model comparisons, and any treatment of partial invariance were clearly specified [55]. Model fit was evaluated using the chi-square statistic (χ^2), comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Changes of $\Delta CFI \leq .010$ and $\Delta RMSEA \leq .015$ were used as reference criteria when comparing adjacent models [56, 57].

Data Analysis

SPSS and Mplus version 8.3 were used for data management, descriptive statistics, correlation analyses, and longitudinal structural equation modelling. Descriptive statistics, measurement invariance analyses, and the RI-CLPM analyses were based on the 450 students who completed all three assessments.

Before estimating the primary models, descriptive statistics and correlations were calculated, and the longitudinal measurement invariance of father presence and basic psychological need satisfaction was examined. The temporal stability of the three-wave scores was evaluated using a two-way mixed-effects, consistency, single-measure intraclass correlation coefficient, ICC(C,1), with 95% confidence intervals reported [58]. Following recommendations for assessing common method variance, potential common method bias was initially evaluated using Harman's single-factor test [59].

A series of modified CLPMs was subsequently estimated, followed by a series of RI-CLPMs. The former were used to describe the overall longitudinal associations at the observed level, whereas the latter were used to examine dynamic within-person processes after separating stable between-person differences. Model fit was evaluated comprehensively using χ^2, CFI, TLI, RMSEA, and SRMR, rather than drawing conclusions from any single fit index [60].

Results

Common Method Bias

Because the three core variables were primarily assessed using student self-report questionnaires, Harman's single-factor test was conducted before the primary model analyses to provide an initial assessment of common method bias [59]. All measurement items were entered into an unrotated exploratory factor analysis. The analysis identified 15 factors with

eigenvalues greater than 1, which collectively explained 62.380% of the total variance. The first principal component had an eigenvalue of 12.875 and accounted for 20.766% of the variance, which was below the conventional reference threshold of 40%. These findings indicate that the data did not exhibit an obvious pattern dominated by a single factor; however, they do not completely rule out the presence of common method variance.

Longitudinal Measurement Invariance

The longitudinal measurement invariance results for father presence and basic psychological need satisfaction are presented in Table 1. Overall, both core constructs demonstrated acceptable structural stability across the three measurement occasions, providing a measurement basis for the subsequent comparison of longitudinal structural paths.

The configural invariance model for father presence showed a good fit to the data, $\chi^2(15) = 16.021$, $p = .381$, CFI = .999, TLI = .997, RMSEA = .012, and SRMR = .024. The metric invariance model also demonstrated a good fit, $\chi^2(19) = 16.905$, $p = .596$, CFI = 1.000, TLI = 1.004, RMSEA = .000, and SRMR = .026, with ΔCFI = .001 and ΔRMSEA = −.012. After the indicator intercepts were constrained to equality across time, model fit declined, $\chi^2(23) = 65.660$, $p < .001$, CFI = .952, TLI = .926, RMSEA = .064, and SRMR = .053. Because the present study focused on longitudinal structural paths rather than comparisons of latent means, the establishment of configural and metric invariance supported the subsequent longitudinal analyses at the levels of factor structure and factor loadings.

The configural invariance model for basic psychological need satisfaction demonstrated an acceptable fit, $\chi^2(15) = 34.720$, $p = .003$, CFI = .965, TLI = .916, RMSEA = .054, and SRMR = .032. Changes in fit for the metric invariance model remained within the recommended reference criteria, $\chi^2(19) = 42.263$, $p = .002$, CFI = .959, TLI = .922, RMSEA

= .052, and SRMR = .053, with ΔCFI = −.006 and ΔRMSEA = −.002. After the equality constraint on the intercept of the BPN1 indicator across time was released, the partial scalar invariance model showed a good fit, $\chi^2(21) = 42.306$, $p = .004$, CFI = .962, TLI = .935, RMSEA = .047, and SRMR = .052, with ΔCFI = .003 and ΔRMSEA = −.005. These findings provided further support for the longitudinal comparability of the construct.

Table 1 Longitudinal measurement invariance results

Variable	Model	χ^2	df	p	CFI	TLI	RMSEA	SRMR	ΔCFI	ΔRMSEA
FP	Configural invariance	16.021	15	.381	.999	.997	.012	.024	—	—
FP	Metric invariance	16.905	19	.596	1.000	1.004	.000	.026	+.001	−.012
FP	Scalar invariance	65.660	23	<.001	.952	.926	.064	.053	−.048	+.064
BPN	Configural invariance	34.720	15	.003	.965	.916	.054	.032	—	—
BPN	Metric invariance	42.263	19	.002	.959	.922	.052	.053	−.006	−.002
BPN	Partial scalar invariance	42.306	21	.004	.962	.935	.047	.052	+.003	−.005

Note. FP=father presence; BPN=basic psychological need satisfaction.

Measurement Invariance and Intraclass Correlation Analyses

Longitudinal measurement invariance testing across the three measurement occasions indicated that the measurement models for father presence and basic psychological need satisfaction generally demonstrated acceptable model fit (Table 1). Specifically, father presence achieved configural and metric invariance, whereas basic psychological need satisfaction achieved partial scalar invariance. These findings indicate that the factor structures and measurement relations of the two core constructs were sufficiently comparable across the three waves, thereby providing a measurement basis for the subsequent cross-lagged analyses.

The intraclass correlation coefficients (ICCs) for father presence, parental autonomy support, and basic psychological need satisfaction were 0.511, 0.443, and 0.399, respectively.

Thus, approximately 51.1%, 44.3%, and 39.9% of the variance in these three variables was attributable to relatively stable between-person differences, whereas the remaining 48.9%, 55.7%, and 60.1%, respectively, primarily reflected within-person fluctuations over time. Overall, father presence exhibited relatively greater temporal stability, whereas parental autonomy support and basic psychological need satisfaction showed more substantial within-person variability. These findings supported the use of the RI-CLPM to distinguish stable between-person differences from dynamic within-person processes.

Descriptive Statistics and Correlations

The means, standard deviations, and correlations among the study variables for the complete three-wave sample (n = 450) are presented in Table 2. Within-variable correlations across time were moderate, and the three variables were positively correlated across most concurrent and cross-wave combinations. These findings provided a preliminary basis for examining their longitudinal structural associations.

Table 2 Descriptive statistics and correlation matrix

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. FP1	3.006	0.577	–								
2. FP2	3.156	0.636	.534***	–							
3. FP3	3.209	0.646	.464***	.526***	–						
4. PAS1	3.544	0.660	.338***	.351***	.231***	–					
5. PAS2	3.515	0.643	.272***	.403***	.232***	.510***	–				
6. PAS3	3.581	0.640	.186***	.258***	.287***	.375***	.422***	–			
7. BPN1	3.377	0.536	.345***	.269***	.182***	.441***	.371***	.241***	–		
8. BPN2	3.426	0.547	.270***	.325***	.198***	.354***	.507***	.351***	.422***	–	
9. BPN3	3.368	0.542	.146**	.224***	.314***	.220***	.303***	.417***	.328***	.377***	–

Note. The table is based on the 450 participants who completed all three waves. FP=father presence; PAS=parental autonomy support; BPN=basic psychological need satisfaction. **p<.01, ***p<.001.

Cross-Lagged Panel Model Results

Four cross-lagged panel models (CLPM-M1 to CLPM-M4) were estimated. The complete model fit indices are presented in Table 3, and the final model is illustrated in Fig. 1. All four models demonstrated good or acceptable fit. CLPM-M4 showed the following fit indices: $\chi^2(18) = 43.458$, $p < .001$, CFI = .969, TLI = .942, RMSEA = .057, 90% CI [.036, .079], and SRMR = .051. Compared with M1, M4 yielded changes of ΔCFI = −.008 and ΔRMSEA = −.009, both of which were within the recommended reference criteria. Although M1 had a slightly lower AIC, M4 produced the lowest BIC and sample-size-adjusted BIC and provided a more parsimonious and temporally stable structure. Therefore, M4 was selected as the final modified CLPM.

In CLPM-M4, all autoregressive paths between adjacent waves were statistically significant. The standardized coefficients were β = .445 and .421 for father presence, β = .348 and .333 for parental autonomy support, and β = .348 and .300 for basic psychological need satisfaction, respectively (all $p < .001$). Father presence also exhibited a significant second-order autoregressive path from T1 to T3 ($B = .228$, $SE = .056$, $p < .001$, β = .201), indicating that its stability across the one-year period was not fully explained by the autoregressive paths between adjacent waves.

The cross-lagged results showed that father presence positively predicted subsequent parental autonomy support (βs = .079–.084, $p = .016$) and basic psychological need satisfaction (βs = .091–.095, $p = .013$). Parental autonomy support positively predicted subsequent father presence (βs = .100–.116, $p = .003$) and basic psychological need satisfaction (βs = .144–.166, $p < .001$). Basic psychological need satisfaction also positively predicted subsequent parental autonomy support (βs = .185–.195, $p < .001$).The random-

intercept correlations and within-person path estimates for the final CLPM-M4 are presented in Table 4.

Table 3 Fit statistics and model comparisons for the modified CLPMs

Model	χ^2	df	p	CFI	TLI	SRMR	RMSEA	AIC	BIC
M1 Unconstrained model	28.548	10	.002	.977	.924	.026	.066	5756.840	5935.544
M2 Equal autoregressive paths	33.637	13	.001	.975	.935	.038	.061	5757.995	5924.515
M3 Equal cross-lagged paths	38.990	15	<.001	.970	.935	.036	.061	5757.876	5916.273
M4 Both path sets equal	43.458	18	<.001	.969	.942	.051	.057	5757.724	5903.936

Note. All four models were based on the 429 participants retained after range checks. Each model included the FP1→FP3 second-order autoregressive path and fixed the BPN→FP path to zero. Relative to M1, the ΔCFI values for M2, M3, and M4 were −.002, −.007, and −.008, and the corresponding ΔRMSEA values were −.005, −.005, and −.009. M4 had the lowest BIC and sample-size-adjusted BIC.

Table 4 Key path estimates for the modified CLPM-M4

Path	B	SE	p	βT1→T2	βT2→T3
FP → FP	.462	.045	<.001	.445	.421
PAS → PAS	.327	.042	<.001	.348	.333
BPN → BPN	.325	.042	<.001	.348	.300
FP → PAS	.085	.035	.016	.079	.084
FP → BPN	.081	.033	.013	.095	.091
PAS → FP	.106	.035	.003	.116	.100
PAS → BPN	.126	.031	<.001	.166	.144
BPN → FP	0 (fixed)	—	—	.000	.000
BPN → PAS	.227	.041	<.001	.195	.185

Note. B=unstandardized coefficient; β=STDYX standardized coefficient. Unstandardized paths were constrained to equality across time.

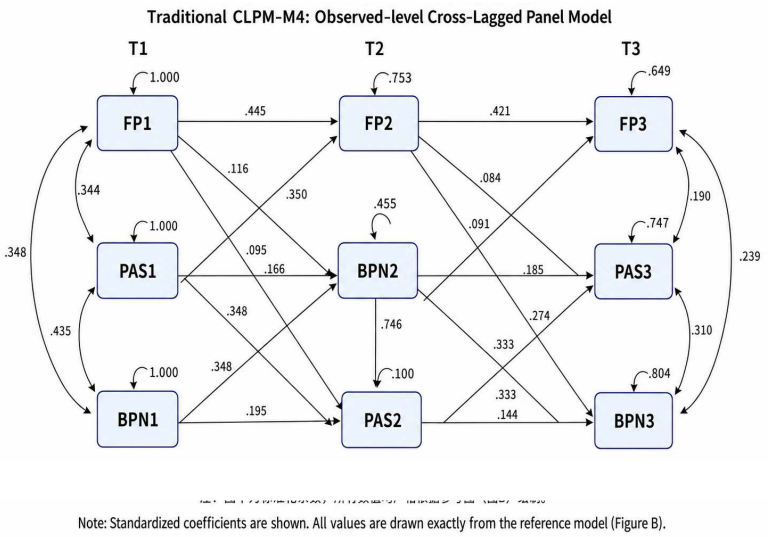


Figure 1 Observed-level cross-lagged panel model (CLPM-M4)

RI-CLPM Model Comparisons

The comparative results for the four RI-CLPMs are presented in Table 5. All four models (M1–M4) demonstrated good absolute fit. Compared with M3, in which the cross-lagged paths were constrained to equality across time, M4 additionally constrained the autoregressive paths to be equal across the two time intervals without producing any deterioration in model fit (ΔCFI = .000, ΔRMSEA = −.002). M4 also yielded the lowest AIC and BIC values among the four models. These findings suggest that the principal autoregressive and cross-lagged associations could be regarded as approximately stable across the two intervals of approximately six months. Therefore, considering model fit, parsimony, information criteria, and parameter stability, M4 was selected as the final model for interpretation.

The final RI-CLPM-M4 showed significant positive correlations among all three random intercepts. Father presence was positively correlated with parental autonomy support (r = .470, p = .001) and basic psychological need satisfaction (r = .418, p = .003), while parental

autonomy support was positively correlated with basic psychological need satisfaction (r = .635, p < .001). These correlations reflect relatively stable differences between children: children who consistently perceived greater father presence also tended to report persistently higher levels of parental autonomy support and basic psychological need satisfaction. Because correlations among random intercepts do not provide evidence of directionality, they cannot be interpreted as indicating that father presence unidirectionally causes increases in the other two variables.

At the within-person level, when children perceived parental autonomy support to be higher than their own usual level at one wave, their basic psychological need satisfaction was also higher at the subsequent wave (B = .121, SE = .050, p = .016; βs = .143 and .135). The reverse path was also significant: when children's basic psychological need satisfaction was higher than their own usual level, their perceived parental autonomy support was higher at the subsequent wave (B = .188, SE = .066, p = .004; βs = .161 and .157). Both sets of effects were small but consistent in direction across the two adjacent time intervals.The random-intercept correlations and within-person path estimates for the final RI-CLPM-M4 are presented in Table 6

The within-person path from parental autonomy support to subsequent father presence did not reach statistical significance (p = .065). Father presence did not significantly predict subsequent parental autonomy support (p = .253) or basic psychological need satisfaction (p = .142), and basic psychological need satisfaction did not significantly predict subsequent father presence (p = .506). Thus, the findings supported a reciprocal prospective within-person association between parental autonomy support and basic psychological need satisfaction. However, they did not support a prospective within-person effect of father presence over a six-month interval, nor did they support interpreting parental autonomy

support as an established longitudinal mediator of the association between father presence and basic psychological need satisfaction..The final RI-CLPM, including the random intercepts and within-person cross-lagged paths, is presented in Figure 2.

Table 5 Fit statistics and model comparisons for the RI-CLPMs

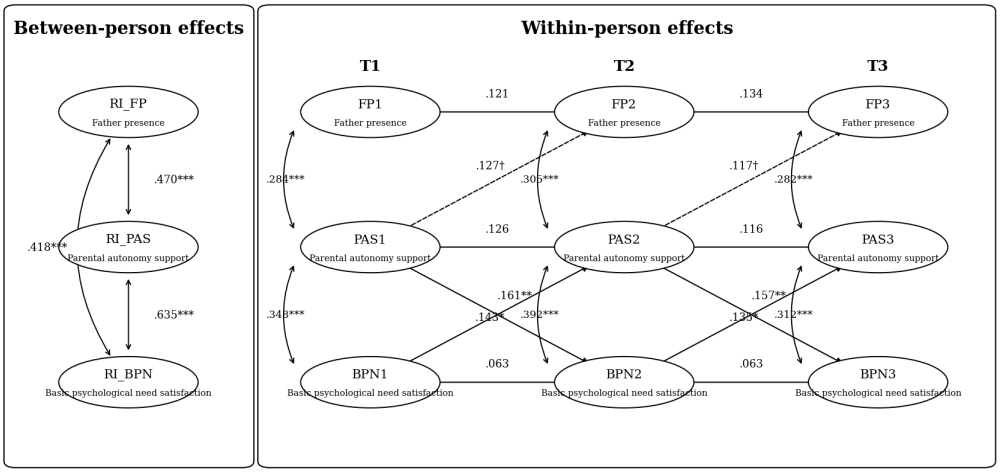
Model	χ^2	df	p	CFI	TLI	SRMR	RMSEA [90% CI]	A							C	B						C
M1	1.651	3	.648	1.000	1.019	.008	.000 [.000, .063]	6	2	8	4	.	8	2	4	6	4	9	4	.	3	9	5
M2	6.977	6	.323	.999	.993	.026	.019 [.000, .066]	6	2	8	4	.	9	9	9	6	4	8	2	.	2	4	2
M3	10.444	9	.316	.998	.993	.029	.019 [.000, .058]	6	2	8	1	.	5	9	5	6	4	6	6	.	5	1	1
M4	13.476	12	.335	.998	.995	.040	.017 [.000, .052]	6	2	7	9	.	3	0	1	6	4	5	1	.	8	8	9

Note. M1=unconstrained model; M2=autoregressive paths constrained equal over time; M3=cross-lagged paths constrained equal over time; M4=autoregressive and cross-lagged paths simultaneously constrained equal over time. Relative to M3, M4 yielded ΔCFI=.000 and ΔRMSEA=−.002.

Table 6 Random-intercept correlations and within-person paths in RI-CLPM-M4

Path	B	SE	p	βT1→T2	βT2→T3	Interpretation
RI_FP WITH RI_PAS	.071	.021	.001	.470***	—	Stable positive between-person correlation
RI_FP WITH RI_BPN	.050	.017	.003	.418***	—	Stable positive between-person correlation
RI_PAS WITH RI_BPN	.069	.020	<.001	.635***	—	Stable positive between-person correlation
wFP → wPAS	.077	.068	.253	.062	.069	Nonsignificant
wFP → wBPN	.098	.067	.142	.090	.101	Nonsignificant
wPAS → wFP	.114	.062	.065	.127†	.117†	Nonsignificant (p=.065)
wPAS → wBPN	.121	.050	.016	.143*	.135*	Significant
wBPN → wFP	.044	.066	.506	.040	.039	Nonsignificant
wBPN → wPAS	.188	.066	.004	.161**	.157**	Significant

Note. B=unstandardized coefficient; β=STDYX standardized coefficient. †p<.10, *p<.05, **p<.01, ***p<.001. Because the unstandardized paths were constrained to equality across time, standardized coefficients may differ slightly between the two adjacent intervals.



Note. Solid lines indicate significant paths; dashed lines indicate marginally significant paths. Coefficients are standardized estimates.

* p < .05, ** p < .01, *** p < .001, † p < .10.

Figure 2 Final RI-CLPM of father presence, parental autonomy support, and basic psychological need satisfaction

Note. Values in the figure are STDYX standardized coefficients.

Comparison of the CLPM and RI-CLPM Results

The modified CLPM and RI-CLPM yielded complementary findings. At the observed-score level, the modified CLPM showed that father presence predicted subsequent parental autonomy support and basic psychological need satisfaction, that parental autonomy support and basic psychological need satisfaction were reciprocally associated over time, and that father presence exhibited a significant second-order stability path across the one-year period.

The RI-CLPM further showed that, after stable between-person differences were controlled for, the within-person cross-lagged paths involving father presence were no longer statistically significant, whereas the reciprocal paths between parental autonomy support and basic psychological need satisfaction remained significant. These findings suggest that the prospective paths involving father presence in the modified CLPM primarily reflected stable, long-term differences in family relational contexts between children. In contrast, the

association between parental autonomy support and basic psychological need satisfaction comprised both stable between-person covariation and dynamic within-person processes.

Discussion

Main Findings and Overall Contributions

The present study adopted a sequential analytical strategy by first estimating a modified cross-lagged panel model (CLPM) and subsequently estimating a random-intercept cross-lagged panel model (RI-CLPM). This approach allowed the overall longitudinal associations among father presence, parental autonomy support, and basic psychological need satisfaction to be distinguished from the analytical levels at which these associations occurred. The modified CLPM showed that father presence predicted subsequent parental autonomy support and basic psychological need satisfaction, that parental autonomy support and basic psychological need satisfaction were reciprocally associated over time, and that parental autonomy support also predicted subsequent father presence. In addition, the second-order autoregressive path from father presence at T1 to father presence at T3 was significant. The RI-CLPM further demonstrated that not all of these observed-level effects represented processes of change occurring within the same child. The role of father presence was primarily reflected in stable, long-term differences between children, whereas the reciprocal association between parental autonomy support and basic psychological need satisfaction remained significant after stable between-person differences had been controlled for.

Previous studies have generally focused on pairwise associations involving paternal involvement, paternal absence, parental autonomy support, or a single developmental outcome [8–10, 15, 16, 20, 24–28]. In contrast, the present study simultaneously incorporated a father-related relational resource, a proximal parenting process, and children's basic

psychological needs into a single longitudinal framework. By using three-wave data to distinguish between-person from within-person effects, the study extends the question of whether family factors matter to the more specific question of how different family factors operate across different timescales and analytical levels.

Father Presence as a Stable Family Relational Resource

The random-intercept results showed that children who consistently perceived greater father presence also persistently reported higher levels of parental autonomy support and basic psychological need satisfaction. This finding is consistent with the general direction of research on paternal involvement and father–child relationship quality. Longitudinal reviews, recent meta-analyses, and systematic reviews have consistently linked paternal involvement, paternal sensitivity, and high-quality father–child interactions with children's cognitive development, socioemotional functioning, emotion regulation, and psychological adjustment [8, 9, 32, 33, 38, 39]. A recent review of father–child relationships further proposed that paternal influence should be conceptualized in terms of relational processes such as warmth, sensitive responsiveness, shared play, guidance, and learning support rather than being reduced to the amount of time fathers spend with their children [11]. Reviews of paternal sensitive responsiveness have similarly emphasized that fathers' appropriate responses to children's signals represent a central interactional quality supporting positive development [12]. Research on nonresident fathers has also shown that father–child relationship quality is more consistently associated with child well-being than contact frequency alone [36]. Meuwissen and Carlson further demonstrated that the quality of paternal parenting has significance beyond whether or how frequently fathers are involved [24].

The present study extends this literature in two respects. First, father presence captures children's cumulative representation of their father's psychological availability, emotional

connection, and relational significance rather than coresidence status or the amount of time spent together [4, 5]. Second, this subjective relational resource was located primarily at the stable between-person level. This finding suggests that the effects of father presence may be embedded in a long-term family ecology rather than expressed as simple and immediate fluctuations over a six-month period.

The stable association between father presence and basic psychological need satisfaction also accords with previous research on fathers. A Japanese father–adolescent dyadic study found that fathers' intrinsic life goals, fathers' own need satisfaction, and adolescents' perceived paternal autonomy support were associated with adolescents' basic psychological need satisfaction [15]. Chinese longitudinal research has linked paternal love deprivation with lower need satisfaction and poorer adjustment [16]. More recent Chinese studies have also associated father presence with adolescents' interpersonal relationship quality, social responsibility, psychological security, ability to learn from failure, and psychological resilience [13, 14, 34, 35]. Together, these studies suggest that the quality of the father–child relationship may contribute to children's relational security, experiences of competence, and development of autonomy.

However, much of the existing evidence has been based on cross-sectional mediation models or longitudinal models estimated at the observed-score level. The RI-CLPM findings of the present study provide an important qualification: although father presence and basic psychological need satisfaction were strongly and consistently associated between children, father presence did not show a significant short-term prospective effect within the same child. Accordingly, previously reported associations between father-related relationships and need satisfaction may partly reflect long-term covariation involving family socioeconomic conditions, coparenting quality, parent–child attachment, and stable characteristics of the

child. Such associations should not automatically be interpreted as indicating that a short-term increase in father presence will immediately produce an increase in the same child's need satisfaction at the next wave.

The absence of significant within-person cross-lagged paths involving father presence does not imply that father–child relationships are unimportant. Rather, it suggests that their effects may operate over a different timescale. The significant second-order autoregressive path from father presence at T1 to father presence at T3 in the modified CLPM ($\beta = .201$) indicated that father presence contained a persistent long-term component that was not fully explained by stability across adjacent waves. This finding is consistent with the conceptualization of father presence as an internalized relational representation [4, 5]. It also accords with father–child activation relationship theory, which proposes that fathers facilitate children's development through sustained processes of exploration, challenge, and the regulation of safety and risk [37]. Meta-analytic evidence on paternal sensitivity and systematic reviews of paternal involvement have likewise emphasized that paternal influence depends on sustained interaction quality and the broader family context rather than exposure to isolated behaviors [38, 39]. The present findings therefore do not negate the role of fathers; instead, they reposition father presence from a short-term linear stimulus to a long-term relational foundation.

The Reciprocal Dynamic Association Between Parental Autonomy Support and Basic Psychological Need Satisfaction

At the within-person level, when children perceived parental autonomy support to be higher than their own usual level at one measurement occasion, their basic psychological need satisfaction was also higher at the subsequent occasion. This finding is consistent with the main propositions of self-determination theory and with the general direction of previous

empirical evidence. The motivational model of parenting identifies autonomy support, together with warmth and structure, as a central dimension of parenting that facilitates positive child development [40]. Importantly, autonomy support is not equivalent to permissiveness; rather, it involves understanding the child's perspective, explaining the rationale underlying expectations, and minimizing intrusive control [41]. Validation research on the Perceived Parental Autonomy Support Scale has supported the multidimensional assessment of autonomy-supportive parenting [42], and earlier longitudinal research showed that maternal autonomy support predicted children's subsequent school adjustment and academic performance [43].

Meta-analytic and cross-cultural studies have further demonstrated consistent associations between parental autonomy support and academic functioning, psychosocial adjustment, and child well-being [20, 45]. Basic psychological need satisfaction has been identified as a proximal psychological mechanism through which autonomy support may exert its effects [27, 28, 44]. Intensive longitudinal studies have additionally shown that autonomy support fluctuates meaningfully in everyday family life and is associated with children's well-being and positive affect within the same day or over intervals of several hours [30, 31]. The incremental contribution of the present study is that, after stable family differences had been controlled for, an increase in the same child's perceived autonomy support relative to their own usual level predicted a relative increase in need satisfaction six months later. The present findings therefore extend previous evidence from micro-timescale processes to medium-term developmental dynamics.

More notably, the reverse path was also significant: when children's basic psychological need satisfaction was higher than their own usual level, they subsequently perceived greater parental autonomy support. Most previous autonomy-support research has adopted a

unidirectional framework in which parental behavior influences child outcomes [17–21, 26–28, 40–44]. The present finding is more consistent with transactional models of development, which emphasize children's active role in shaping their developmental environments [29]. Daily diary and experience-sampling studies have already suggested that parents' and children's psychological states may form reciprocal feedback processes within families. For example, parents' need satisfaction and autonomy-supportive parenting may predict one another across days, while autonomy support and adolescents' positive affect may be reciprocally associated over intervals of several hours [30, 31].

Children whose needs are relatively well satisfied may be more willing to express their views, engage in negotiation, and respond to their parents with less defensiveness. Such behavior may create more favorable interactional conditions for parents to listen, provide explanations, and offer meaningful choices. A more positive psychological state may also enable children to recognize supportive elements in parental behavior more readily. This finding does not imply that children's need satisfaction unidirectionally causes changes in parenting. Rather, it suggests that parenting behavior and children's psychological experiences may be embedded in an ongoing reciprocal feedback process.

The reciprocal findings both correspond with recent research and provide a meaningful contrast with some previous RI-CLPM studies. In a four-wave RI-CLPM study of Chinese early adolescents, Bai et al. identified reciprocal within-person associations between parental autonomy support and internalizing problems, as well as reciprocal indirect pathways through self-compassion [47]. Their results support the view that children do not passively receive parenting but may influence subsequent family interactions through their own psychological functioning. Whereas Bai et al. focused on internalizing problems and self-compassion, the present study examined basic psychological need satisfaction, which is more proximal to the

theoretical mechanism of autonomy support. The transactional process was therefore located at the more immediate psychological level of parenting practices and need-related experiences.

In contrast, Vrolijk et al., using six-wave data from Dutch adolescents, found that associations between parental autonomy support and internalizing and externalizing problems were primarily explained by stable between-family differences, with no consistent prospective effects within families [25]. These results are not necessarily inconsistent with the present findings. Problem behaviors are relatively distal developmental outcomes influenced by multiple factors, whereas basic psychological need satisfaction represents a more direct psychological mechanism of autonomy support and may therefore be more likely to show within-person effects. Developmental stage may also matter. The present participants were children in the upper primary school years, for whom parents remain a central context of socialization, whereas the adolescents studied by Vrolijk et al. were entering a period of expanding autonomy in which parental influences increasingly interact with peers, schools, and individual choices. Taken together, the findings suggest that within-family effects of autonomy support may depend on the proximity of the outcome, the child's developmental stage, the interval between measurements, and the source of information.

From a cultural perspective, the present study also provides evidence against the concern that autonomy support is relevant only in cultures emphasizing individualism. A cross-cultural meta-analysis found that associations between autonomy support and child well-being did not disappear as a function of national individualism, cultural hierarchy, developmental stage, or gender [45]. A multi-informant study of children aged 8–12 years further suggested that children's subjective perceptions of autonomy support have independent developmental significance and cannot be fully replaced by parental self-reports

[46]. Autonomy support does not require parents to relinquish expectations or encourage children to detach from their families. Instead, it involves helping children understand expectations, express their views, and willingly internalize rules that they perceive as valuable [19, 21, 40–42].

Chinese families may place particular emphasis on responsibility, effort, and family obligations. Nevertheless, positive associations between parental autonomy support and children's psychological functioning, need satisfaction, and self-concept have already been documented in Chinese samples [28, 53]. The present study further indicates that these associations exist not only as differences between children but also as relative changes occurring within the same child over time. In a collectivistic cultural context, the critical issue may therefore be not whether parents establish expectations, but whether those expectations are communicated in a respectful, explanatory, and non-controlling manner.

Methodological Value of Comparing the CLPM and RI-CLPM

Reporting the modified CLPM before the RI-CLPM allowed the analysis to progress from determining whether overall longitudinal associations existed to identifying the analytical level at which those associations occurred. In the traditional CLPM, father presence significantly predicted subsequent parental autonomy support and basic psychological need satisfaction. However, these paths were no longer significant in the RI-CLPM. This pattern illustrates the methodological concern identified by Hamaker et al.: when stable between-person differences and within-person fluctuations are combined, observed-level cross-lagged coefficients may be misinterpreted as effects of change occurring within the same individual [48].

Berry and Willoughby similarly argued that the substantive interpretation of traditional CLPM coefficients depends on restrictive assumptions. When stable individual differences and timescale are ignored, lagged associations in the model may be overinterpreted as developmental processes [51]. The present findings correspond with Vrolijk et al.'s conclusion that parenting–adjustment associations may be largely attributable to stable differences between families [25]. However, the current results also show that not all pathways identified in the CLPM disappeared after the two levels were separated. The reciprocal association between parental autonomy support and basic psychological need satisfaction remained significant at the within-person level.

The theoretical value of comparing the two models therefore lies not simply in demonstrating that the RI-CLPM provides a better representation of the data. More importantly, the comparison identifies two distinct types of developmental mechanisms. Father presence primarily represents a relatively stable and slowly changing family relational context, whereas parental autonomy support and basic psychological need satisfaction involve both stable differences between families and dynamic coupling within individual children.

From a Unidirectional Mediation Model to a Multilevel Dynamic Mechanism

The theoretical pathway of father presence, parental autonomy support, and basic psychological need satisfaction remains plausible and is consistent with previous evidence linking father–child relationships, supportive parenting, and need satisfaction [15, 16, 26–28]. However, the present findings indicate that the overall correlations among these constructs and the pathways identified in the traditional CLPM should not be directly equated with within-person longitudinal mediation.

Peng et al. found that paternal love deprivation was associated with adolescent hypercompetitiveness through lower basic psychological need satisfaction [16], while Tanaka et al. provided evidence that autonomy support was associated with depressive symptoms through need satisfaction [26]. These findings establish the importance of need satisfaction as a mechanism through which family experiences may relate to adjustment. The present study extends this literature by examining the analytical level at which the proposed mechanism operates.

Because the within-person paths involving father presence were not significant, the current data do not support a strict longitudinal chain in which an increase in father presence within the same child leads to higher perceived autonomy support at the following wave, which in turn leads to greater need satisfaction at a later wave. A more informative interpretation is a distal stable relational context combined with a proximal reciprocal interaction process. Father presence constitutes a long-term family resource, whereas parental autonomy support and basic psychological need satisfaction may reinforce one another within the child over time. Future studies should assess paternal and maternal autonomy support separately and employ additional waves, latent-variable RI-CLPMs, or random-intercept longitudinal mediation models to distinguish between-person and within-person indirect effects more directly.

Theoretical and Practical Implications

Theoretically, the present study integrates three theoretical perspectives by assigning them to different analytical levels and timescales. Father presence theory explains why fathers may function as long-term internalized relational resources [4, 5]. Self-determination theory explains why autonomy-supportive parenting may directly nourish children's needs for autonomy, competence, and relatedness [1–3]. Transactional models of development

explain why children's need satisfaction may, in turn, shape subsequent parent–child interactions [29].

The resulting framework of a stable relational context and a proximal reciprocal process does not simply place the three theories alongside one another. Instead, it assigns each theory a distinctive temporal function. Father presence primarily accounts for stable differences between children and families across relatively long periods, whereas parental autonomy support and basic psychological need satisfaction primarily account for changeable processes occurring within the same child across adjacent periods. This framework also illustrates that significant pathways involving family variables in a CLPM do not necessarily indicate that all such variables are equally modifiable within individuals.

Practically, intervention priorities should correspond to the level at which each mechanism operates. Work involving fathers should not focus exclusively on increasing the frequency of contact or the amount of time spent together. Greater attention should be paid to relational stability, predictability, and emotional availability. Relevant practices may include responding consistently to the child, keeping promises, participating in important life events, and repairing the relationship after conflict.

Parental autonomy support may be more suitable as a short-term and trainable interactional target. Parents can be taught to listen to children's perspectives, acknowledge their emotions, provide limited but genuine choices, explain the reasons underlying rules, permit developmentally appropriate trial and error, and avoid using humiliation, threats, or conditional affection to obtain compliance. School-based family education programmes could therefore include two complementary components: a father–child relationship quality component aimed at establishing a long-term relational foundation and an autonomy-

supportive communication component aimed at practising concrete behaviors that can be repeatedly implemented in everyday family interactions.

Because basic psychological need satisfaction also predicted subsequent perceptions of support, interventions should additionally help children develop emotional expression, negotiation, and help-seeking skills. Strengthening these capacities may enable both parents and children to enter a more positive reciprocal feedback process.

Strengths and Limitations

The present study has four main strengths. First, the three-wave longitudinal design made it possible to examine temporal ordering and assess the stability of the principal pathways across two adjacent intervals. Second, the combined use of a modified CLPM and an RI-CLPM reduced the risk of interpreting observed-level prospective associations directly as within-person causal processes. Third, father presence, parental autonomy support, and basic psychological need satisfaction were incorporated into a single model, allowing a father-related relational resource, a parenting process, and a child psychological mechanism to be compared within a unified framework. Fourth, the study focused on Chinese children in the upper primary school years. It therefore extends a literature that has predominantly examined Western adolescents, maternal parenting, or relatively distal problem behaviors and demonstrates that within-person associations between autonomy support and need satisfaction can also be observed at an earlier developmental stage and within a Chinese cultural context.

Several limitations should nevertheless be acknowledged. First, all core variables were assessed through child self-report. The reciprocal within-person association between parental autonomy support and basic psychological need satisfaction may therefore have been partly

influenced by shared perceptions or concurrent emotional states. Future studies should incorporate parent reports, teacher reports, observations of parent–child interactions, and ecological momentary assessments.

Second, parental autonomy support was assessed as children's overall perception of their parents and therefore did not distinguish the specific contributions of fathers and mothers. The present design also could not determine whether coparenting explained the stable effects associated with father presence.

Third, the three-wave design with intervals of approximately six months was more suitable for capturing medium-term change. It may have missed short-term processes occurring during everyday interactions and was insufficient to characterize the long-term developmental trajectory through which father presence may be established over several years.

Fourth, the sample was drawn from a single city and predominantly consisted of children from two-parent families. The meaning and effects of father presence may differ in single-parent, migrant, left-behind, and reconstituted families.

Fifth, although the RI-CLPM improved the distinction between between-person and within-person effects, it could not eliminate the influence of unmeasured time-varying confounders. The findings should therefore be interpreted as prospective associations rather than definitive evidence of causality.

Conclusions

The present study demonstrated that father presence, parental autonomy support, and basic psychological need satisfaction were broadly and approximately stably associated over

time at the observed-score level, but that these associations operated at different developmental levels. Father presence exhibited persistent stability across the one-year study period, and its associations with parental autonomy support and basic psychological need satisfaction primarily reflected long-term stable differences between children and families. In contrast, parental autonomy support and basic psychological need satisfaction remained reciprocally associated over time after stable between-person differences had been controlled for.

Whereas previous research has often emphasized the unidirectional influence of parental behavior on child outcomes, the present study supports a more developmentally dynamic interpretation. A stable, available, and dependable father–child relationship may constitute a background family resource, whereas parental autonomy support and basic psychological need satisfaction form a proximal process through which parenting and children's psychological experiences reinforce one another over time.

These findings identify father presence as a stable family relational resource in child development and parental autonomy support and basic psychological need satisfaction as a more changeable proximal dynamic system. Promoting psychological adjustment among primary school students may therefore require both the long-term development of positive, accessible, and dependable father–child relationships and the continuous enhancement of autonomy-supportive practices in everyday parent–child interactions.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

W.Z. conceptualized the study, conducted the primary research and statistical analyses, and wrote the original manuscript. D.L. supervised the doctoral research and critically revised the manuscript for important intellectual content. Z.G. reviewed, edited, and polished the manuscript for language, clarity, and academic presentation. All authors read and approved the final manuscript.

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