



Heterogeneity in within-person relationships between parental support and adolescent meaning in life: a daily-diary study

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Abstract

Finding meaning in life is a developmental task for adolescents, which is essential for their mental health. Therefore, it is necessary to explore what promotes adolescents' meaning in life. Because supportive relationships play critical roles in the formation of meaning in life, and parental support is a fundamental source of support, this study investigated whether parental support fostered adolescents' meaning in life by using a daily diary design to obtain ecological valid data in natural contexts. To further understand the moderating mechanisms, we tested whether personal (i.e., adolescent gender) and contextual (i.e., family subjective socioeconomic status, FSSS) factors moderated this link. The sample were 278 adolescents (50.4% female; $M_{\text{age}} = 13.88$ years), who filled in daily assessments during one week. Results showed that adolescents reported higher level of presence of meaning and search for meaning than usual on days when they perceived more support from their parents. Moreover, the lagged association between parental support and search for meaning was moderated by FSSS. Specifically, parental support was positively associated with next-day search for meaning for adolescents with higher FSSS, but a reverse trend was observed for those with lower FSSS. These findings suggest that parental support is the key factor in the development of meaning in life and family context is a moderating mechanism. Overall, our findings provide theoretical guidance for developing meaning in life, maintaining mental health, and developing interventions in psychological disorders characterized by meaninglessness among adolescents.

Keywords Parental support · Adolescents' meaning in life · Heterogeneity · Daily diary study

Introduction

Adolescence is a critical developmental stage during which youth are undergoing rapid biological, psychological, and social changes (Dahl et al., 2018). How to effectively deal with these changes is a key issue. Research suggests that a considerable number of individuals not successfully adapt to developmental changes in adolescence and have experienced mental health problems. For example, nearly 1/5 adolescents have at least one psychiatric disorder (Costello

et al., 2011), and 1/10 adolescents have seriously thought about suicide (Nock et al., 2013). A key characteristic of severe health problems, such as depression and suicide, is that life lacks meaning (e.g., Heisel & Flett, 2004; Henry et al., 2014; Steger et al., 2006). Indeed, adolescence is not only a period of high prevalence of mental illness, but also a time of low level of meaning. Only about 25% adolescents report they have a high level of meaning in life (Bronk, 2014; Li & Kwok, 2024). And adolescents report significantly lower level of meaning in life than adults (Wang et al., 2016). In addition, adolescence is a critical stage for the development and formation of meaning in life. Individuals not develop sufficient cognitive abilities to seriously consider and explore the meaning in their lives until adolescence (Bronk, 2014).

Why adolescents have relative low level of meaningfulness and what are the key influencing factors? Finding answers to these questions will be beneficial for adolescents in terms of developing meaning in life, maintaining mental health, and designing interventions in psychological

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disorders characterized by meaninglessness. Considering that social support is theoretically regarded as the most influencing factor in meaning development (Bronk, 2014), it is necessary to investigate how supportive relationships link to meaning in life among adolescents. Supportive relationships typically include support from parents, friends, and others (such as teachers) (e.g., Garićpy et al., 2016). Given that prior studies have repeatedly shown the fundamental role of parental support for adolescents' health and well-being (e.g., Kjellström et al., 2017; Wang et al., 2021), and some studies even suggest that parental support is a better predictor than other sources of social support (e.g., Helsen et al., 2000; Pössel et al., 2018), we examined whether parental support promoted meaning in life among adolescents, using an ecological-valid daily diary design. The daily diary method was chosen because similar studies have used this method to investigate the impact of daily parental support on adolescents' developmental outcomes (e.g., Cheon & Chung, 2020; Janssen et al., 2021).

Parental support and meaning in life

The meaningful life integrates purposeful goals, existential significance, and comprehension perception of one's life and the world (King & Hicks, 2021). Meaning system includes the presence of and search for meaning in life (Steger et al., 2006, 2009). The presence of meaning in life is individuals' subjective sense of one's being and existence as purposeful, valuable, and significant, reflecting how meaningful people believe their lives are. The search for meaning in life refers to individuals' efforts aimed at establishing and increasing meaningfulness in their lives, reflecting how hard people try to make their lives more meaningful. The two dimensions are not only conceptually different, but also show distinctions in functions (e.g., Newman et al., 2018). Therefore, investigating how parent support foster both meaning dimensions may be helpful to gain a relative comprehensive understanding of meaning development.

Perceived support from parents is conceived to facilitate the development of adolescents' meaning in life. According to the ecological theory and developmental perspective of youth purpose (Bronk, 2014; Burrow & Hill, 2020), supportive relationships such as parental support are primary external assets within youth's ecosystem that have the potential to provide support for youth's purpose developmental processes. For one thing, parents can help youth explore life goals by engaging them in discussions and reflections on purpose in daily interactions, and providing resources (e.g., emotional support) for youth to try new things that confirming with personal interests, goals, and passions. Therefore, adolescents who perceived more parental support may reflect on and explore for meaning more. For another thing,

parental support may encourage adolescents to engage in meaningful activities such as helping at home, which then translate into a sense of meaningfulness. Perceived support from parents itself may also be a meaningful activity for adolescents as it satisfies human fundamental belonging need (Lambert et al., 2010). Thus, parental support may increase adolescent's feelings of meaningfulness by involving them in meaningful activities.

Empirical studies initially support these notions. Adolescents with more parental support are more likely to achieve adaptive purpose profiles characterized by high level of purpose exploration and commitment (Li & Cheng, 2020). Adolescents who perceive higher level of parental support and warmth also report a stronger sense of meaningfulness (Brassai et al., 2013; Sim et al., 2019).

While these cross-sectional studies are valuable in understanding the link between parental support and meaning in life, they are limited in important ways. Firstly, family issues using cross-sectional design focus on between-person differences but provide limited information about within-person processes (Bolger & Laurenceau, 2013; Laurenceau & Bolger, 2005). For example, when studies find adolescents who have perceived more parental support tend to report higher level of meaning in life, one cannot infer when a specific adolescent feels higher or lower level of meaningfulness than usual. Knowledge about this is important for understanding developmental mechanism, which operates at a within-, rather than between-person level (Voelkle et al., 2014). That is, daily parental support may co-occur with meaning in life within a specific adolescent, which might help to explain why this person have higher or lower meaning in life than other adolescents. Secondly, global questionnaires that require participants to recall past experiences over a long-time scale can be fraught with retrospective bias, which constitutes a threat to the validity of measures (Ohly et al., 2010). This is worth noting in well-being research (e.g., meaning in life) because global reports have larger recall bias than daily ones (e.g., Newman et al., 2021). Thirdly, it remains unknown whether the daily association is moderated by more stable individual or family-level characteristic, which is highlighted by some theoretical perspectives (e.g., Bronfenbrenner, 1995; Sameroff, 2010).

The daily diary method is beneficial for deepening our understanding of the association between parental support and meaning in life in several ways. Asking adolescents to report daily experiences repeatedly can obtain daily data nested in a person, enabling us to explore and examine within-person relationship (Cheon & Chung, 2020; Wang et al., 2021). It also enables us to examine interaction between individual differences and daily process (Janssen et al., 2021). For example, does daily association between parental support and meaning in life varied by FSSS? In

addition, recalling on what happened that day rather than much longer time (e.g., months) helps to gain more reliable and accurate data of youth purpose by reducing recall bias (Ohly et al., 2010). This method also allows researchers to capture “life as it is lived” within the natural context (Bolger et al., 2003), increasing the ecological validity. In sum, diary techniques can largely contribute to our understanding of meaning development in real world.

The moderating role of gender and FSSS

Though parental support may be protective to adolescents’ meaning in life, it would be premature to assume all adolescents would be benefited in a similar way. Indeed, theories have increasingly recognized susceptibility to positive parenting may vary from adolescent to adolescent (e.g., Sameroff, 2010). Researchers caution that families can deviate from the average effect to a large degree and thus it is necessary to explore and explain variations to avoid the fallacy of “one size fits all” (Boele et al., 2020). However, only few studies have empirically tested individual differences in the within-individual association (see a review, Boele et al., 2020). Perhaps partly because heterogeneity in the within-person link need repeatedly reported data within the same individual (e.g., daily reports of parental support), not just between-individual data (e.g., gender).

The daily diary method enables us to test individual differences in the within-person association between parental support and meaning in life. This study focused on individual differences of gender and FSSS, based on the process-person context-time (PPCT) model (Bronfenbrenner, 1995). According to this model, proximal process is the “engine” of development, which refers to everyday interaction between the person and others (e.g., parents) in the immediate environment (Bronfenbrenner, 1995). Typical proximal process in adolescents’ daily life is the interaction with their parents (Cheon & Chung, 2020), such as received support from parents. Adolescents’ proximal process of the experience of parental support was the focus of the current study. And this study investigated whether parental support would be the “engine” of adolescents’ development of meaning in life, based on the ecological theory and developmental perspective mentioned earlier. In addition, the PPCT model emphasizes that, information about person, context, and time should be considered because these factors might interact with the proximal processes and jointly influence development outcomes (Bronfenbrenner, 1995). According to this model and existing research reviewed later, the current research tested the moderating role of person-level factor of gender and context-level factor of FSSS in the proximal association between parental support and adolescents’ meaning in life.

Firstly, gender is one person-level characteristic in the PPCT model that might explain individual differences between parental support and meaning in life. There exists gender difference in how adolescents perceive support from their parents, with girls reporting more parental support than boys (Kristjánsson & Sigfúsdóttir, 2009). In addition, the associations between parental support and adolescents’ outcomes are differ in strength according to gender. In a study, parental support has a stronger association with girls’ health compared to boys’ (Kjellström et al., 2017). More relevant to this study, the between-person association between paternal support and adolescents’ meaningfulness is stronger for girls than boys (Brassai et al., 2013). Considering the reasoning above, the within-person relationship between parental support and adolescents’ meaning in life may be stronger among girls than boys.

The second factor is FSSS, a context-level characteristic in the PPCT model, which may also explain the variations in the link between parental support and meaning in life. FSSS is a core component of family context that has a widespread influence on youth development, and advantaged FSSS is associated with better health, cognitive, and socioemotional outcomes among adolescents (Bradley & Corwyn, 2002). Recent studies have also shown FSSS is positively associated with adolescents’ well-being (e.g., Yan et al., 2022). In addition to the direct relationship, FSSS may link to increased well-being by amplifying the effectiveness of positive parenting. This is theoretically supported, with higher FSSS regarded as an advantaged environmental context that could enhance the effectiveness of parenting (e.g., parental support) on developmental outcomes (Bronfenbrenner, 1995). Therefore, the role of positive parenting, such as parental support, may be more effective for adolescents’ meaning in life among adolescents living in high FSSS than their counterparts.

As for the role of time in PPCT model, this diary study is limited to test how historical time influences the short-term processes. Despite this limitation, exploring how parental support relates to meaning in life is still important, because the current study conducted in a challenging historical period of COVID-19 when parental support may be especially important to adolescent adjustment (Wang et al., 2021).

The current study

Following the theoretical perspectives of meaning development (i.e., the ecological theory and developmental perspective), the current study aimed to elucidate the within-person association between perceived parental support and adolescents’ meaning in life dimensions in daily settings. This study further examined how the association varied by personal

and contextual factors following the PPCT model. Based on theoretical and empirical studies, we hypothesized that, parental support on a given day would be positively associated with adolescent presence of and search for meaning in life on that day (i.e., same-day associations) and the next day (i.e., lagged associations). The reason why we tested the lagged associations was that previous studies found a lagged or “spillover” effect of parental warmth and support on developmental outcomes (Cheon & Chung, 2020; Wu et al., 2023). As for the moderating effect, we expected that perceived parental support would be more strongly related to adolescents’ meaning in life in girls than boys; that the association would be stronger for adolescents with higher FSSS than those with lower FSSS.

Methods

Participants and procedure

This study was conducted during COVID-19 (October 2021). We collected data when the area was at low-level risk and no event affected data collection. A total of 293 adolescents were recruited from a middle school using convenience cluster sampling. 15 participants were excluded from further analysis because unable to provide data that meet requirements (e.g., completed none diary entry). The final sample consisted of 278 students (4 participants not reported age, $M_{\text{age}} = 13.88$, $SD = 0.63$), with 140 students were identified as female and 136 as male. First, participants provided their written consent. Then, they were given paper questionnaires after school and instructed to complete before bed during 7 consecutive days, following previous daily diary studies (e.g., Cheon & Chung, 2020; Wu et al., 2023). Demographics and trait measures (e.g., FSSS) were measured on the first day. Among the possible 1,946 daily assessments (7 days, 278 adolescents), there were 2 missing and 5 incomplete daily entries from different participants. And 5 participants not or partially reported on sex and FSSS. Participants received a gift for taking part in this study and those who finished all 7 daily diaries were additionally rewarded. The study was approved by the ethics committee of the School of the Psychological and Cognitive Sciences at Peking University.

Measures

Daily meaning in life

Adolescents’ daily meaning in life was measured with four items that used in previous daily diary study, which has been demonstrated to have adequate validity (Newman et al.,

2021). Two items assessed the presence of meaning: “My life today was full of meaning” and “My life had a clear sense of purpose today”. Two items measured the search of meaning: “Today, I was searching for something that makes my life feel meaningful” and “I was looking to find purpose in my life today”. Each item was answered on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Multilevel alpha reliabilities were estimated using the method suggested by Geldhof et al. (2014). The reliabilities for the presence of meaning were 0.653 at the within-person level and 0.971 at the between-person level. And the reliabilities for the search for meaning were 0.598 at the within-person level and 0.951 at the between-person level.

Daily parental support

Daily parental support was assessed with two items that based on previous daily diary studies, which has been demonstrated to have adequate validity to measure parental support (Janssen et al., 2021; Wang et al., 2021). Items included “Today, I did something fun or relaxing with my parents” and “My parents were warm or supportive today”. These items were from two published daily-diary study that investigated adolescents perceived parental support. The first one was adapted from the Network of Relationship Inventory (Furman & Buhrmester, 2009) and used in the daily-diary research of Wang et al. (2021). The other item was from Janssen et al. (2021). Both items were answered on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scores of these items were averaged, with higher score indicated adolescents perceived more emotional support from parents on that day. The within- and between-person alpha reliabilities were 0.592 and 0.971, respectively.

FSSS

FSSS was measured with the MacArthur Scale of Subjective Social Status (Adler et al., 2000). Adolescents were showed an image of a 10-rung ladder representing the social class of a family in China, with higher rung representing higher income, education, and employment status of families. Adolescents subjectively assessed the social status of their families and marking the corresponding rung from 1 (lowest) to 10 (highest).

Data analysis

Considering that daily observations (Level 1) were nested within individuals (Level 2), multilevel models were analysed in Mplus 8.3. Daily parental support was Level 1 predictor and adolescent gender and FSSS were Level 2

predictors. Level 1 predictor was person-mean centered and Level 2 predictors were grand-mean centered to ensure the results were interpretable (Bolger & Laurenceau, 2013). Full-information maximum likelihood estimation was automatically used to analyze data with missing values, yielding unbiased and effective estimates under the missing at random pattern (Enders & Bandalos, 2001).

Several models were tested. In all models, the dependent variable was the presence of meaning in Model a and search for meaning in Model b. Firstly, unconditional models (Model 1a and 1b) were built to estimate the intraclass correlation coefficient (ICC) of meaning in life dimensions by splitting within- and between-person variances. Secondly, we estimated the same-day correlations and tested whether moderators could explain heterogeneity in these correlations. Random coefficient models (Model 2a and 2b) tested the within-person associations between parental support and two dimensions of meaning in life. If these links showed heterogeneity, Model 3 (Model 3a and 3b) would add the main effects of gender and FSSS and their interactions with parental support to explain random effects in level 1. These models included random slopes across individuals that allowing heterogeneity in within-person effects between persons. The grand-mean centered scores of the level 2 predictors (i.e., gender and FSSS) were used. Lastly, the lagged effect was estimated in Model 4 (Model 4a and 4b) and the moderating effects were tested in Model 5 (Model 5a and 5b). These models were similar to the same-day models built in step two, except the dependent variable was each next day (i.e., day $n+1$) meaning dimension, and the same meaning variable on day n was controlled.

Results

Descriptive statistics

Table 1 shows descriptive information and bivariate correlations of the study variables. The mean values for daily measures across days were calculated. Correlation analysis showed that FSSS was positively related to mean level of presence of meaning in adolescents ($r=.141$, $p<.019$),

indicating that higher subjective family social status was related to more presence of meaning in life. In addition, the mean level of daily parental support was positively correlated with 7-day mean of presence of meaning in life ($r=.729$, $p<.001$) and search of meaning in life ($r=.604$, $p<.001$), suggesting that adolescents who perceived more support from parents had stronger sense of meaning and search for meaning more.

Baseline model

Unconditional models (Model 1a and 1b) split the total variance in adolescent daily meaning in life into within-person variance and between-person variance. The ICC of presence of meaning was 0.546, indicating that 54.6% of the variance in adolescent daily presence of meaning was due to between-person variance. Similarly, the ICC of search for meaning was 0.563, indicating that 56.3% of the variance in adolescent search for meaning was due to between-person variance. These results suggested the necessity to perform multilevel analysis.

Same-day association between daily parental support and meaning in life

We first tested whether daily parental support related to the same day meaning in life in adolescence. Model 2a and Model 2b detected the effect of parental support on the presence of and search for meaning in life separately. As shown in Table 2, on days when adolescents perceived their parents to be more supportive, they reported higher level of presence of ($B=0.201$, $SE=0.028$, $p<.001$, 95% CI = [0.145, 0.256]) and search for ($B=0.180$, $SE=0.031$, $p<.001$, 95% CI = [0.118, 0.241]) meaning in life on that day. Moreover, the links between daily parental support and adolescent presence of (0.023) and search for meaning (0.049) on that day showed variance across individuals, supporting the heterogeneity hypothesis.

To explain heterogeneity in these within-person effects, Model 3 added the main and the interaction terms of gender and FSSS to above models and Table 2 showed the results. In contrary to the hypotheses, the relationships between

Table 1 Descriptive statistics and bivariate correlations for all study variables

Variables	Between Person Correlations						
	<i>M</i>	<i>SD</i>	1	2	3	4	5
1.Gender	0.49	0.501					
2.Age	13.88	0.630	0.115				
3.FSSS	5.18	1.40	0.070	0.019			
4.Mean parental support	3.83	0.92	0.031	−0.037	0.117		
5.Mean presence of meaning in life	3.55	0.85	0.066	−0.043	0.141 [*]	0.729 ^{***}	
6.Mean search for meaning in life	3.37	0.91	0.009	−0.037	0.092	0.604 ^{***}	0.793 ^{***}

Note. FSSS = Family subjective socioeconomic status. * $p<.05$; *** $p<.001$

Table 2 The relationship between parental support and adolescents' meaning in life at the same day

	Model 2a		Model 2b		Model 3a		Model 3b	
Fixed effects	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	3.552***	0.051	3.377***	0.055	3.551***	0.051	3.383***	0.055
PS _n	0.201***	0.028	0.180***	0.031	0.204***	0.028	0.181***	0.031
Gender					0.099	0.102	0.013	0.110
FSSS					0.082*	0.037	0.061	0.039
Gender × PS _n					−0.069	0.055	−0.002	0.023
FSSS × PS _n					−0.019	0.020	−0.014	0.061
Random effects								
Between-person variance	0.658		0.754		0.637		0.751	
Within-person variance	0.504		0.532		0.508		0.536	
Random effect variance	0.023		0.049		0.022		0.048	

Note. Dependent variable is presence of meaning (search for meaning) on day _n in model 2a and model 3a (model 2b and model 3b). PS_n = parental support on day _n; FSSS = family subjective socioeconomic status. * $p < .05$; *** $p < .001$

Table 3 The relationship between parental support and next-day adolescents' meaning in life

	Model 4a		Model 4b		Model 5a		Model 5b	
Fixed effects	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	3.528***	0.053	3.366	0.056	3.524***	0.053	3.368	0.056
DV _n	−0.041	0.027	−0.037	0.026	−0.041	0.027	−0.035	0.026
PS _n	−0.003	0.031	0.017	0.030	−0.001	0.031	0.018	0.029
Gender					0.095	0.106	0.000	0.113
FSSS					0.094*	0.038	0.063	0.041
Gender × PS _n					−0.064	0.059	−0.039	0.057
FSSS × PS _n					0.002	0.022	0.070***	0.021
Random effects								
Between-person variance	0.701		0.793		0.676		0.790	
Within-person variance	0.520		0.530		0.524		0.534	
Random effect variance	0.016		0.016		0.015		0.006	

Note. Dependent variable is presence of meaning (search for meaning) on day _{n+1} in model 4a and model 5a (model 4b and model 5b). DV_n = dependent variable on day _n; PS_n = parental support on day _n; FSSS = family subjective socioeconomic status. * $p < .05$; *** $p < .001$

parental support and meaning variables were not moderated by gender or FSSS ($ps > 0.05$). But FSSS had a main effect on daily presence of meaning in life ($B = 0.082$, $SE = 0.037$, $p = .024$, 95% CI = [0.011, 0.154]), indicating that adolescents who reported higher social status felt more meaningful in daily life. Besides, daily parental support still positively related to adolescent presence of ($B = 0.204$, $SE = 0.028$, $p < .001$, 95% CI = [0.148, 0.259]) and search for ($B = 0.181$, $SE = 0.031$, $p < .001$, 95% CI = [0.120, 0.242]) meaning in life after controlling for adolescents' gender and FSSS.

Lagged association between daily parental support and meaning in life

Table 3 showed the results of the lagged associations and moderating effects on these associations. Model 4 tested the lagged within-person associations between daily parental support and meaning variables. The dependent variable was next-day presence of and search for meaning in Model 4a and Model 4b, respectively. The results showed that, daily parental support not predicted presence of or search

for meaning in life on next day ($ps > 0.05$). But the slopes of both links showed variances (both were 0.016), suggesting the within-person effects were heterogeneous across adolescents.

Based on Model 4, Model 5 further tested the main effects and moderating effects of adolescents' gender and FSSS. FSSS had a significant moderating effect ($B = 0.070$, $SE = 0.021$, $p = .001$, 95% CI = [0.029, 0.111]) on the link between parental support and next-day search for meaning in life. And the random effect variance became smaller in Model 5b (0.006) compared to Model 4b (0.016), suggesting FSSS explained random variation in this lagged association. FSSS not moderated the lagged link between parental support and presence of meaning ($p > .05$). In addition, gender showed no main effect or interacting effect on the lagged within-person relationships between parental support and meaning dimensions ($ps > 0.05$).

Simple slope analysis was used to probe cross-level interactions between FSSS and parental support, shown in Fig. 1. Results indicated that daily parental support spilled over into more searching for meaning on the next

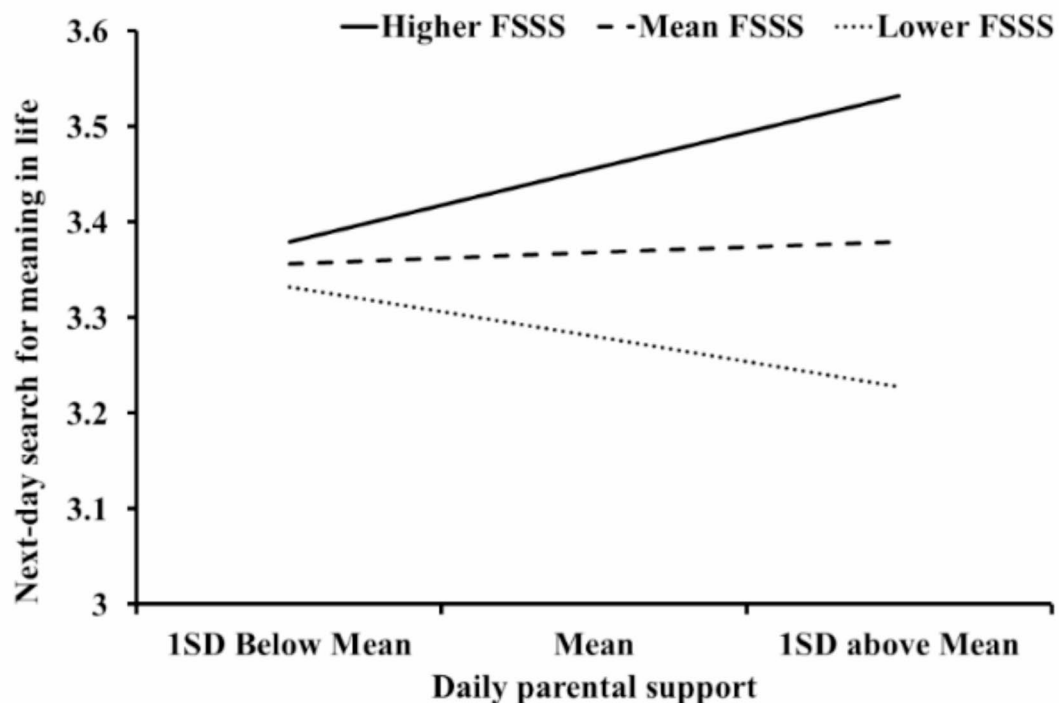


Fig. 1 FSSS moderates lagged association between parental support and adolescents' search for meaning

day only for adolescents who reported higher FSSS (1 *SD* above the mean; $B = 0.115$, $SE = 0.042$, $p = .006$, 95% CI = [0.033, 0.198]), but not for adolescents with medium FSSS ($p = .538$). As for adolescents with lower FSSS (1 *SD* below the mean), parental support marginally correlated with less searching for meaning on the next day ($B = -0.079$, $SE = 0.042$, $p = .059$, 95% CI = [-0.161, 0.003]).

Discussion

Meaning in life is an important developmental task for adolescents. Understanding what factor scaffolds the positive development of meaning among youth merits attention and study (Hill et al., 2013). This study therefore, following theoretical perspectives of meaning development, investigated the within-person relationship between parental support and adolescents' meaning in life. This study further examined whether this relationship varied by personal (i.e., adolescents' gender) and contextual (i.e., FSSS) factors, according to the PPCT model. The results showed that on days when adolescents perceived their parents to be more supportive, they reported more presence of and search for life meaning at the end of that day. Moreover, the lagged association between parental support and search for meaning was moderated by FSSS. Parental support was positively associated with next-day search for meaning among adolescents with

higher FSSS, but a reverse trend was observed for those with lower FSSS. These findings are valuable for adolescents' long-term adaptation by underscoring the underlying processes of meaning development.

Daily association between parental support and adolescents' meaning in life

The key finding was that adolescents reported stronger sense of meaningfulness and pursued meaning more than usual on days when they perceived higher level of parental support, supporting the ecological theory and developmental perspective of youth purpose (Bronk, 2014; Burrow & Hill, 2020). The possible explanations are as followings. For one thing, emotional support from parents provides youth' opportunity to meet the need of belonging (Lambert et al., 2010), which then may translate into an increased sense of meaning in life among adolescents (Goodman et al., 2019). For another, parental support entails parents' opinions and knowledge for meaning in life, which is likely to provide an opportunity for adolescents to reflect on their own life meaning. Parental support also conveys parents' love and affection for adolescents, which may serve as sources of courage during the process of pursuing meaning. As a result, adolescents search for meaning more on days when perceived more parental support. These findings are also consistent with previous cross-sectional results that adolescents

with more parental support are more likely to explore their meaning of life (Li & Cheng, 2020) and report a stronger sense of meaningfulness (Brassai et al., 2013; Sim et al., 2019). Our findings extend these to a within-person level, and highlight the role of supportive relationships, especially parental support, in positive youth development. This finding is consistent with the reports that positive parenting and high-quality family relationships are supportive for well-being and mental health in adolescence (Shek et al., 2021; Sim et al., 2019).

The moderating role of gender and FSSS

Rather than assuming supportive parenting would benefit to every adolescent equally, we considered individual differences to gain an even deeper understanding. Following the theoretical ideas of PPCT model (Bronfenbrenner, 1995), we tested the moderators of personal (i.e., gender) and contextual (i.e., FSSS) characteristics in the within-person link between parental support and meaning in life.

Gender, a person-level factor, unexpectedly not moderated the same-day or next-day associations between parental support and two components of meaning in life. This finding contradicts with the research result that the link between paternal support and adolescent meaningfulness is stronger for girls than boys (Brassai et al., 2013). One reason is that gender differences exist in the relationship between father's support, but not overall parental support, and adolescents' meaning in life. Future research is encouraged to explore whether the roles of father's and mother's support in son's and daughter's meaning in life are different. Another possibility is that our results and the results of Brassai et al. (2013) are based on two analytic levels. That is, Brassai et al. (2013) have examined whether gender moderates the between-person association, rather than within-person association that we did in the current study. The two analytic levels are statistically independent and moderating effects obtained in between-person models not help to predict what happened within a family unit (Keijsers et al., 2016).

FSSS, the second potential moderator, had a main effect on presence of meaning but not on search for meaning, with higher FSSS related to more presence of meaning in life. As for the moderating effects, FSSS not moderated the same-day or next-day association between parental support and presence of meaning. FSSS also not moderated the same-day association between parental support and search for meaning, suggesting that adolescents in various FSSS may search for meaning more on days when they perceived more parental support. However, FSSS did explain heterogeneity in the lagged association between parental support and search for meaning. That was, daily parental support spilled over to more search for life meaning on the next day for

adolescents with higher FSSS, not for those with medium FSSS, and an opposite trend was observed for those with lower FSSS.

The same day and lagged day positive associations between daily parental support and search for meaning were only found in adolescents reported higher FSSS, suggesting the benefit of parental support maybe longer for adolescents with favourable family economic condition. This positive spillover effect consistent with theoretical idea that the effectiveness of parenting is greater in advantaged environmental context (Bronfenbrenner, 1995). However, for adolescents who reported lower FSSS, the same-day association between parental support and search for meaning in life was positive, but the next-day association had a reverse trend. This opposite pattern is interesting, though the result is marginally significant and should be interpreted cautiously. One possibility for the opposite pattern is as follows. Support from parents might give youth courage and energy to search valuable, purposeful, and meaningful lives on that day. But search for meaning does not necessarily increase meaningfulness as the two dimensions are independent (Steger et al., 2006). Adolescents thus may be discouraged from keeping searching process on the following day, and this trend can be observed in adolescents with lower FSSS. By comparison, their counterparts with higher FSSS might continue to search for meaning more on the day after experienced more parental support, perhaps due to they possess more psychological and social resources that relieve such frustration and support their further exploration (Gallo & Matthews, 2003; Gottfried et al., 2003).

Methodological and practical implications

The current study has further methodological and practical implications for developmental psychology. Unlike previous cross-sectional studies, the present study assessed perceived parental support and adolescents' meaning in life repeatedly in ecologically valid contexts and investigated their relationships at the within person level. Investigating within-person relationship can help explain the underlying mechanisms that drive normative changes in meaning in life, as developmental mechanism operates at a within-person level (Keijsers et al., 2016; Voelkle et al., 2014). In addition, measuring psychological variables 10 times within a specific person is distinct from measuring once between 10 persons, as the homogeneity principle is violated. The distinction between different analytic level suggests that applying between-person level results (from cross-sectional design) to within-person level may be misleading (Nezlek, 2001). Thus, our results emphasize the importance of examining within-person association using intensive longitudinal design (e.g., daily diary design). Given that developmental

findings are predominantly built on between-person studies (e.g., Boele et al., 2020), further studies should examine the within-person processes underlying developmental changes.

Furthermore, the moderated effect found in this study suggests that the function of the same process may have individual differences. For example, the lagged correlation between parental support and search for meaning is varied by FSSS. This variation is not in the strength that proposed by many theoretical accounts (e.g., Gallo & Matthews, 2003) or empirical studies (Cheon & Chung, 2020), but in the direction. The other example is that, parental support is helpful for adolescent adaptation on the average sample, but can be counterproductive for a subset of families (e.g., those with high parental intrusiveness; Janssen et al., 2021). These empirical illustrations agree with the broader methodological concern that applying the average results to a specific person can be misleading (Bronfenbrenner, 1995; Keijsers et al., 2016). Then, taking individual differences into account may improve our understanding of unique processes that driven developmental changes within a specific adolescent.

Finally, our findings provide insight into the design of interventions. Parents could be informed that adolescents are sensitive to daily parenting experiences and be advised to provide emotional support to them, which is critical to adolescents' meaningful lives. The government and companies could also implement family-friendly policies that leave time for parents to interact with adolescents. In addition, given that our findings suggest that FSSS might enhance the effectiveness of daily parental support, parents with high FSSS are especially recommended to be aware of their roles in adolescent meaning development and be supportive to adolescents.

Limitations and future directions

This research has several limitations and provides possible directions for future research. First, we focused on daily association using a daily diary design. Future work could extend this study by determining long-term causality using longitudinal designs with longer time intervals. Second, future work could expand our study by examining the roles of other sources of support, such as support from peers, teachers, and schools, and further exploring the relative contribution of each source to adolescents' meaning in life. Third, the current study only focused on the role of perceived parental support in adolescents' meaning in life. Perceived parental support is not entirely the same as actual support given by parents (Kurock et al., 2024), and self-reported data from one source (i.e., adolescents) has potential common method variance. To overcome the limitations,

future research is advised to investigate the association between parental support and meaning in life by asking parents to report their actual support and adolescents to report meaning in life.

Conclusion

The presents study investigated the within-person relationship between daily perceived parental support and adolescents' meaning in life. Our finding suggests that supportive relationships within the ecosystem of adolescents can be beneficial for their meaning in life, which can even be observed at a daily, state level. That is, adolescents report more meaningfulness and search for meaning more on days when they perceived more parental support. The lagged associations are not found. As for the moderated effects, gender not moderated any association in this study. FSSS does explain heterogeneity in the lagged association between parental support and search for meaning, in an unexpected opposing direction. These findings highlight the value of parental support in meaning development, yielding insight into understanding long-term mental health and adaptations among adolescents. Furthermore, the moderated result challenges traditional idea that positive parenting acts on all adolescents in a similar way, shedding new light on person-centred practice and intervention.

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Authors' contribution All authors contributed to the study conception and design. Rong Yuan drafted the manuscript, analyzed data, helped to data collection. Yingshengnan Wu collected data, helped to draft the manuscript. Yanhong Wu provided resources, reviewed and edited manuscript, supervised the study, received the fund. All authors read and approved the final manuscript.

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Data, materials and code availability The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval This study was approved by the Committee for Protecting Human and Animal Subjects in the School of the Psychological and Cognitive Sciences, Peking University.

Consent statement All participants gave written informed consent before the study.

Competing interests There is no conflict of interest.

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