Transmission of Basic Psychological Need Satisfaction between Parents and Adolescents: The Critical Role of Parental Perceptions

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Abstract

While studies have documented the importance of basic psychological need satisfaction in parent-child relationships, a gap remains in understanding how parental and adolescent need satisfactions are associated. Using two longitudinal intergenerational datasets (200 parent-adolescent dyads and 408 mother-adolescent dyads; two waves), we examined whether (1) parents' need satisfaction predicts adolescents' need satisfaction (parental needs effect), (2) adolescents' need satisfaction predicts parents' need satisfaction (child's needs effect), and (3) parental perception of adolescent's need satisfaction, a possibly influential point of view, predicts adolescents' need satisfaction (parental perception effect). Findings from cross-lagged path models only supported parental perception effects: parents' T1 perception of their adolescent's need satisfaction predicted their adolescent's T2 self-reported need satisfaction, especially for autonomy and competence needs. Findings highlight the importance of parents' perceptions, which may benefit the design of new interventions for basic psychological needs.

Keywords: self-determination theory; basic psychological need satisfaction; parent-adolescent dyads

Introduction

Self-determination theory (SDT) is one of the most influential theories of human motivation and personality explaining how humans experience subjective wellbeing and develop optimally (Ryan & Deci, 2000, 2020). A mini-theory of SDT, the Basic Psychological Needs Theory, specifically introduces the notion that humans have the basic psychological needs of autonomy, competence, and relatedness (Ryan & Deci, 2000, 2017). The need for autonomy refers to the need to make decisions and act per our interests, beliefs, and values (Ryan & Deci, 2000, 2017). The need for competence is the need to have mastery over our lives and knowledge about how to attain our goals or avoid certain outcomes (Connell & Wellborn, 1991). Finally, the need for relatedness refers to the need to feel connected to and cared for by significant others (Connell & Wellborn, 1991; Ryan & Deci, 2000, 2017). The Basic Psychological Needs Theory posits that positive outcomes are associated with need satisfaction, while negative outcomes are linked to the absence of need satisfaction or presence of need frustration (Ryan & Deci, 2017). These hypotheses have been supported in many empirical studies showing that basic psychological need satisfaction (BPNS) is associated with greater emotional wellbeing (Stanley et al., 2021; Tang et al., 2020), motivation and engagement at school and work (Baard et al., 2004; Wang et al., 2019), as well as the development of high quality and more satisfying relationships (Deci et al., 2006; Patrick et al., 2007).

Research on BPNS has also explored how psychological needs are met in relationships, as SDT posits that basic psychological needs are satisfied or frustrated through social contexts. For example, studies on close friendships showed that receiving autonomy support from a friend predicted greater need satisfaction (Deci et al., 2006). One's BPNS also influences how need supportive they will be toward others in relationships, as another line of research showed that teachers' autonomy support toward students is associated with their autonomy need satisfaction (Marshik et al., 2017). These studies generally indicate that satisfaction or frustration of BPNS is considerably influenced by social and relational factors.

One of the most influential relationships is the parent-child relationship and previous studies showed that this relationship is important for BPNS. For example, studies (including interventions) have acknowledged parents' unique impact on children's BPNS and examined how they can optimally fulfill their children's needs with specific practices (e.g., Joussemet et al., 2014; Ratelle et al., 2021). However, a significant gap remains in the literature about one critical aspect of BPNS in the parent-child relationship: the interplay between parents' and young people's BPNS.

How is parental BPNS related to their children's BPNS? In the SDT literature, only a handful of studies addressed this question. An experimental study among Belgian mother-adolescent dyads showed that the self-reported BPNS of adolescents and mothers were positively and moderately correlated during a recorded conversation (Wuyts et al., 2018). Other cross-sectional studies among Italian (Costa et al., 2019; Lo Cricchio et al., 2021) and Japanese (Nishimura et al., 2021) parents and adolescents reported moderate positive associations between parents' and adolescents' overall BPNS. These studies provide a promising starting point to examine the potential intergenerational effects of BPNS, indicating a possible positive association between parent and child BPNS.

However, these studies have critical limitations. First, studies have not yet examined how parents and children influence each other over time, as study designs were all cross-sectional. Additionally, these studies generally assumed that parents' BPNS influenced children's BPNS (*parental needs effect*), but the opposite effect is also plausible: children's BPNS could influence parents' BPNS (*child's needs effect*). More informative study designs are imperative to determine the direction of the associations, accurately understand family dynamics, and even plan interventions targeting motivational or wellbeing outcomes in parents and children through BPNS. Longitudinal studies are thus an important next step for the Basic Psychological Needs Theory and to elucidate the intergenerational transmission and interplay of BPNS between parents and children.

Second, and critically, previous studies did not include the *perceptions* parents have of their children's BPNS as a factor that may play an important role in intergenerational effects. According to

the literature on parent-child and teacher-student relationships, adults' perceptions can impact both children and adults themselves. For example, a study showed that teacher behavior was influenced by their perception of their students' behavioral and emotional engagement in class (Skinner & Belmont, 1993). Similarly, parental expectations were also an important predictor of children's academic achievement and adjustment (e.g., Briley et al., 2014; Murayama et al., 2016). However, the possibility that parental perceptions of children's BPNS influence children's actual BPNS, referred to hereafter as the *parental perception effect*, has never been addressed in the literature.

Overall, there is a lack of research in SDT focusing on people's perceptions of someone else's BPNS. This could be because of the conceptualization of need satisfaction, which refers to an internal and subjective assessment that may be difficult to observe. However, studies examining other internal psychological concepts such as anxiety and depression and their clinical assessment show that parental perceptions of children can bring unique and valid insights. A study by Ohtani et al. (2021) demonstrated that parental perceptions of adolescent depressive symptoms impacted adolescents' self-reported symptoms over time: greater parental reports subsequently led to greater self-reported depressive symptoms in adolescents. Therefore, understanding parents' perceptions of their children's BPNS could provide insight into their child's need satisfaction. Bois et al. (2005) nicely illustrate this idea. Their study showed that mothers who perceived their child as highly competent in physical activity had children who subsequently reported greater physical activity competence. Extending upon these results, we examine the parental perception effect in relation to BPNS.

Overview of the Studies

The overarching aim of this paper is to explore the potential intergenerational interplay between parents' BPNS and their adolescents' BPNS. Importantly, we examine these associations by attending to the fundamental limitations in the existing literature discussed above. We adopted a longitudinal design in which parents and adolescents were assessed over two time points to gather information about the causal direction between parents' and adolescents' BPNS. This design allowed us to specify

both directions of lagged effects in a single model, although it still suffers from various confounders (time-varying confounders, stable traits; Usami et al., 2019). Finally, we included parents' perception of adolescents' need satisfaction to explore the potential role of parental perceptions in shaping adolescents' need satisfaction, providing a fuller picture of intergenerational dynamics.

The first study (Study 1) of this paper uses a longitudinal design to explore all associations between parents' BPNS, parents' perception of their adolescents' BPNS, and adolescents' BPNS. Although we expected to find some associations as speculated above (e.g., parental needs effect, child's needs effect, parental perception effect), we investigated them through open research questions (non-preregistered) given the lack of empirical literature directly addressing these research questions. Following the results from the first study, we formulated specific hypotheses and ran a preregistered second study (Study 2) to confirm our predictions in a larger sample. In our Supplementary Materials, we additionally examined if autonomy support and psychological control, two central and determining sets of parenting practices, mediated some of the associations hypothesized in Study 2.

Study 1

Methods

Participants and Procedure

This study was approved by the ethics committee of the last author's psychology department and is part of a larger project investigating parental effects on adolescents' motivation. Parent-adolescent dyads were randomly selected from a large nationwide database managed by a private Japanese research firm. The database includes participants who gave consent to be recruited for studies when they registered with the firm. Participants were selected from different parts of Japan, with no regional restrictions. Adolescents needed to be between 13 and 15 years of age at the time of the first assessment to participate. Participants then received their questionnaires by mail, first in February 2017 (T1) and then in March 2018 (T2; about 13 months interval). Parents and adolescents were asked to fill them out independently of each other and mail them back. We report all measures included in these

questionnaires in our online Supplementary Materials (along with datasets, codebooks, analysis codes, outputs, and supplementary analyses for this paper here:

https://osf.io/utr8s/?view_only=bdd2546afdc745248b4bab4c6cb7f2c1). Participants received monetary compensation for their participation. We recruited as many participants as allowed by the funding received to run the study. The sample consisted of 200 pairs of parents (78% mothers; $M_{age} = 46.53$, $SD = 4.57$) and adolescents (55% girls; $M_{age} = 14.31$, $SD = .86$) with a median annual family income of 6,000,000 to 6,999,999 yen. There was a 26% attrition rate from T1 to T2. A sensitivity power analysis was conducted in G*Power 3.1 (Faul et al., 2007) for the associations between our predictors and our outcomes, accounting for four control variables, with a two-tailed correlation test. Our sample after attrition (148 pairs) provided 80% power to detect a correlation of .23.

Measures

Basic Psychological Need Satisfaction. At T1 and T2, parents answered two versions of the basic psychological need satisfaction subscale from the Japanese version of the *Basic Psychological Need Satisfaction and Frustration Scale* (Nishimura & Suzuki, 2016) – one about themselves and one about their perception of their adolescent’s need satisfaction (“By imagining what your child thinks about, please rate the following items from 1 to 5 regarding which number is true of your child”). Adolescents reported their own BPNS by filling out the same subscale. Four items measure the satisfaction of each basic psychological need: autonomy (e.g., “I feel my choices express who I really am”), competence (e.g., “I feel confident that I can do things well”), and relatedness (e.g., “I feel connected with the people who care for me, and for whom I care”). The items were answered on a 5-point Likert scale, ranging from “1 – Completely disagree” to “5 – Completely agree”. Across both time points and the three versions of the subscales, Cronbach’s alphas ranged between .77 and .84 for autonomy, .84 and .90 for competence, and .78 and .87 for relatedness.

Sociodemographic characteristics. Annual family income was reported by parents at T1 using the following response scale: 1 – less than 2,000,000 yen; 2 – 2,000,000-2,999,999 yen; 3 – 3,000,000-

3,999,999 yen; 4 – 4,000,000-4,999,999 yen; 5 – 5,000,000-5,999,999 yen; 6 – 6,000,000-6,999,999 yen; 7 – 7,000,000-7,999,999 yen; 8 – 8,000,000-8,999,999 yen; 9 – 9,000,000-9,999,999 yen; 10 – 10,000,000-11,999,999 yen; 11 – 12,000,000-14,999,999 yen; and 12 – 15,000,000 yen or more. We also collected the information about the age and sex of parents and children.

Analytical Strategy

To explore the associations between parents' and adolescents' BPNS, we ran cross-lagged path models with latent variables, in which parents' self-reported BPNS, their perception of their adolescent's BPNS, and their adolescent's self-reported BPNS at T1 predicted the same variables at T2. We ran a separate model for autonomy, competence, and relatedness. In all our final cross-lagged models, we controlled for family income, as well as the age and sex of parents and adolescents, by regressing all T2 latent variables on the controlling variables. Models were run with full-information maximum likelihood to manage missing data in R (R Core Team, 2020) using the statistical package lavaan (version 0.6-9; Rosseel, 2012). Standardized betas and their associated *p* values are reported for regression coefficients.

Results

Descriptive Statistics and Correlations

Table 1 shows the sample size, mean, and standard deviation for each variable. Table 2 displays the correlations between all variables included in the cross-lagged models.

Measurement Models

Details about the tested measurement models can be found in our Supplementary Materials. All measurement models were built by progressively adding constraints. Models A through C all presented good fits for each need and supported measurement invariance. The last models, Models C, were used in our structural models.

Table 1*Descriptive Values for Both Study Samples*

Variables	Study 1			Study 2		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Parent autonomy SR T1	200	3.25	0.71	407	3.28	0.78
Ado. autonomy PR T1	200	3.37	0.64	408	3.48	0.63
Ado. autonomy SR T1	200	3.33	0.78	407	3.51	0.77
Parent competence SR T1	200	3.06	0.73	407	3.12	0.80
Ado. competence PR T1	200	3.25	0.74	406	3.27	0.73
Ado. competence SR T1	200	3.01	0.92	406	3.19	0.80
Parent relatedness SR T1	200	3.66	0.72	408	3.66	0.72
Ado. relatedness PR T1	200	3.72	0.57	407	3.71	0.59
Ado. relatedness SR T1	200	3.68	0.79	406	3.76	0.76
Parent autonomy SR T2	149	3.20	0.69	368	3.35	0.73
Ado. autonomy PR T2	149	3.31	0.59	369	3.57	0.61
Ado. autonomy SR T2	148	3.26	0.82	371	3.62	0.77
Parent competence SR T2	149	2.96	0.73	367	3.21	0.78
Ado. competence PR T2	149	3.15	0.73	364	3.34	0.72
Ado. competence SR T2	149	2.92	0.87	372	3.25	0.87
Parent relatedness SR T2	149	3.56	0.68	368	3.75	0.70
Ado. relatedness PR T2	149	3.64	0.54	369	3.81	0.57
Ado. relatedness SR T2	149	3.47	0.81	372	3.81	0.76

Note. Ado. = adolescent; SR = self-report; PR = parent report.

Table 2
Correlations Between All Variables Included in Study 1 Analyses

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Ado. age T1																						
2. Ado. sex	-.01																					
3. Parent age T1	.28***	-.14 [†]																				
4. Family income T1	-.02	.08	.18*																			
5. Relationship	-.02	.02	.25**	.06																		
6. Parent aut. SR T1	-.07	-.05	.10	.17*	-.05																	
7. Ado. aut. PR T1	-.04	.02	.18*	.08	-.03	.21**																
8. Ado. aut. SR T1	-.08	-.06	.16 [†]	.03	.04	.12 [†]	.42***															
9. Parent comp. T1	-.05	-.06	.08	.21**	.02	.69***	.22**	.16*														
10. Ado. comp. PR T1	.09	-.09	.17*	.10	-.05	.20**	.67***	.42***	.39***													
11. Ado. comp. SR T1	-.03	-.02	.20*	.02	.05	.08	.42***	.75***	.22**	.56***												
12. Parent rel. SR T1	.03	-.05	-.01	-.01	-.22**	.55***	.08	.13 [†]	.41***	.11	.04											
13. Ado. rel. PR T1	-.03	.06	.05	.06	-.18*	.24***	.61***	.31***	.27***	.46***	.33***	.23***										
14. Ado. rel. SR T1	-.09	.05	.14 [†]	-.06	.01	.09	.34***	.67***	.15*	.33***	.64***	.19**	.39***									
15. Parent aut. SR T2	-.10	-.10	.05	.19*	-.06	.67***	.16 [†]	.02	.63***	.19*	.10	.30***	.21*	.00								
16. Ado. aut. PR T2	.06	-.03	.09	.08	-.06	.25**	.49***	.29***	.27***	.47***	.23**	.06	.38***	.24**	.26**							
17. Ado. aut. SR T2	-.01	.03	.13	.13	-.09	.22**	.44***	.52***	.20*	.45***	.45***	.08	.36***	.45***	.22**	.43***						
18. Parent comp. SR T2	-.16 [†]	.02	.06	.21*	.04	.53***	.17*	.09	.75***	.29***	.18*	.19*	.22**	.02	.73***	.22**	.17*					
19. Ado. comp. PR T2	.11	-.07	.17*	.09	.05	.09	.45***	.33***	.31***	.74***	.42***	.04	.27**	.24**	.13	.61***	.35***	.28***				
20. Ado. comp. SR T2	.07	-.07	.18*	.13	.03	.08	.35***	.47***	.10	.48***	.58***	.03	.29***	.47***	.08	.27**	.73***	.09	.38***			
21. Parent rel. SR T2	-.04	-.09	-.01	.05	-.17*	.43***	.05	.04	.40***	.14 [†]	.09	.61***	.28***	.08	.54***	.16*	.18*	.47***	.14 [†]	.11		
22. Ado. rel. PR T2	-.04	.11	.07	.10	-.24**	.28***	.42***	.28***	.28***	.34***	.28***	.20*	.61***	.35***	.31***	.58***	.42***	.26**	.31***	.25**	.42***	
23. Ado. rel. SR T2	-.07	.21**	.02	.11	-.12	.22**	.36***	.32***	.25**	.22**	.29***	.13	.47***	.47***	.27***	.28***	.58***	.22**	.17*	.48***	.22**	.51***

Note. Ado. = adolescent; Aut. = autonomy; Comp. = competence; Rel. = relatedness; SR = self-report; PR = parent report.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Structural Models

Autonomy. The cross-lagged model was built on the last measurement model by adding cross-lagged and autoregressive paths to Model C, as well as regressing T2 latent variables onto covariates. This model showed a good fit for all indices: $\chi^2(351) = 395.83, p = .049$; CFI = .973; TLI = .969; RMSEA = .026; SRMR = .064 (see Figure 1). In terms of the parental needs effect, parents' autonomy need satisfaction was not significantly associated with adolescents' self-reported T2 autonomy need satisfaction. For the child's needs effect, adolescents' self-reported autonomy satisfaction at T1 did not significantly predict parents' self-reported need satisfaction at T2. However, findings showed a parental perception effect, where parents who perceived their adolescent as having more autonomy need satisfaction at T1 predicted greater autonomy satisfaction as reported by their adolescent at T2, $\beta = .30, p = .006, 95\% \text{ CI } [.09, .52]$. Results also showed that the more parents felt that their autonomy needs were satisfied at T1, the more they perceived their adolescent's autonomy needs to also be satisfied at T2, $\beta = .20, p = .021, 95\% \text{ CI } [.03, .37]$. Parents' perception of their adolescents' autonomy needs at T1 did not predict their own need satisfaction at T2 and adolescents' self-reported autonomy satisfaction at T1 did not significantly predict parental perception of adolescents' need satisfaction at T2.

Figure 1

Cross-Lagged Path Models for Autonomy Need Satisfaction in Studies 1 and 2

Note. Cross-lagged path models of parents' perception of their own autonomy need satisfaction, their perception of their adolescent's autonomy satisfaction, and their adolescent's perception of their own autonomy satisfaction in Study 1 ($n = 200$ dyads) / Study 2 ($n = 408$ dyads). Final models with equality constraints across time points and informants, and controlling for age, sex, and family income.

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

Competence. We built a final model, again adding our cross-lagged and autoregressive paths and covariables to the last measurement model for competence satisfaction (Model C). This model also demonstrated a good fit: $\chi^2 (351) = 440.92, p = .001$; CFI = .963; TLI = .958; RMSEA = .036; SRMR = .063 (see Figure 2). Parents' self-reported competence satisfaction at T1 did not significantly predict their adolescents' self-reported satisfaction at T2 through a parental needs effect. Similarly, adolescents' self-reported competence satisfaction at T1 did not significantly predict their parents' own T2 need satisfaction, therefore not supporting a child's needs effect. Findings did, however, show a parental perception effect, as greater parental perception of adolescents' need satisfaction at T1 predicted greater adolescent self-reported competence need satisfaction at T2, $\beta = .27, p = .040$, 95% CI [.01, .52]. None of the other effects were statistically significant.

Figure 2

Cross-Lagged Path Models for Competence Need Satisfaction in Studies 1 and 2

Note. Cross-lagged path models of parents' perception of their own competence need satisfaction, parent's perception of their adolescent's competence satisfaction, and their adolescent's perception of their own competence satisfaction in Study 1 ($n = 200$ dyads) / Study 2 ($n = 408$ dyads). Final models with all equality constraints across time points and informants, and controlling for age, sex, and family income.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Relatedness. The final model including the latest measurement model (Model C), cross-lagged and autoregressive paths, and control variables showed a good fit: $\chi^2 (351) = 477.74, p < .001$; CFI = .940; TLI = .932; RMSEA = .044; SRMR = .062 (see Figure 3). Results showed that parents' own need satisfaction at T1 did not significantly predict their adolescent's self-reported T2 relatedness need satisfaction through a parental needs effect. Adolescents' self-reported relatedness need satisfaction at T1 was also not significantly associated with parental need satisfaction at T2, thus not supporting a child's needs effect. Findings again indicated a parental perception effect, where the more parents perceived their adolescent as feeling connected to others at T1, the more adolescents then reported their relatedness needs as satisfied at T2, $\beta = .30, p = .004, 95\% \text{ CI } [.10, .50]$. Parents' perception of their adolescents' relatedness needs at T1 positively predicted their own relatedness needs at T2, $\beta = .23, p = .011, 95\% \text{ CI } [.05, .40]$. None of the other paths were statistically significant.

Figure 3

Cross-Lagged Path Models for Relatedness Need Satisfaction in Studies 1 and 2

Note. Cross-lagged path models of parents' perception of their own relatedness need satisfaction, parent's perception of their adolescent's relatedness satisfaction, and their adolescent's perception of their own relatedness satisfaction in Study 1 ($n = 200$ dyads) / Study 2 ($n = 408$ dyads). Final models with all equality constraints across time points and informants, and controlling for age, sex, and family income.

$^{\dagger} p < .10$. $^{*} p < .05$. $^{**} p < .01$. $^{***} p < .001$.

Study 2

Objectives and Hypotheses

In this preregistered study (see here <https://osf.io/ba6kg>), we aimed to extend findings from the literature (hypothesis 1) and replicate our main findings from Study 1 in a larger sample (hypothesis 2). To further explain these associations, we explored their mediation by autonomy support and psychological control in our Supplementary Materials (hypothesis 3).

Following the analyses of the first sample and before the obtention and analysis of the second sample of mother-adolescent dyads, we formulated and preregistered the following hypotheses:

1. Parents' BPNS at T1 will positively predict their adolescent's self-reported BPNS at T2, at least for autonomy need satisfaction (parental needs effect).
2. Parents' perceptions of their adolescent's BPNS at T1 will positively predict their adolescent's self-reported BPNS at T2 (parental perception effect).

Methods

Participants and Procedure

Participants were recruited with the same procedure used in the first study. They received their questionnaires in October 2019 (T1) and February-March 2020 (T2; five-month interval). This study was also part of a larger study examining parental effects on adolescents' motivation and a list of all scales included in the questionnaires is available in our online Supplementary Materials (https://osf.io/utr8s/?view_only=bdd2546afdc745248b4bab4c6cb7f2c1). The dataset used in this study is also used in another study by Tanaka et al. (2021) to investigate adolescents' depressive symptoms. The questionnaires included in this study are the same as in Study 1, with the addition of scales about autonomy-supportive and controlling parenting practices (used to test the mediation hypotheses in our Supplementary Materials). The sample included 408 mother ($M_{age} = 44.84$, $SD = 4.49$) and adolescent dyads (52% girls; $M_{age} = 13.73$, $SD = .90$) with a median annual family income of 5,000,000 to 5,999,999 yen. Note that this study focused only on mothers' reports, unlike Study 1, to avoid potential

confounding effects of parents' sex. There was a 9% attrition rate between time points. A sensitivity power analysis for the associations between our predictors and our outcomes with a two-tailed correlation test conducted in G*Power 3.1 (Faul et al., 2007) showed that our sample after attrition (371 pairs) provided 80% power to detect a correlation of .14.

Measures

Basic Psychological Need Satisfaction. As for Study 1, mothers answered two versions of the 12-item satisfaction subscale from the Japanese version of the *Basic Psychological Need Satisfaction and Frustration Scale* (Nishimura & Suzuki, 2016) at T1 and T2 – one about themselves and one about their perception of their adolescent's need satisfaction. Adolescents reported their BPNS using the same scale. Cronbach's alphas for the three versions of the subscales at each time point ranged between .79 and .87 for autonomy, .83 and .89 for competence, and .81 and .88 for relatedness.

Sociodemographic characteristics. Using the same scales as in Study 1, mothers reported their family's annual income and their age and adolescents reported their age and sex.

Analytical Strategy

All preregistered statistical analyses have been conducted and are reported in this paper or in the Supplementary Materials. To answer our preregistered hypotheses, we first replicated the same cross-lagged models from Study 1. We then tested the mediation effects of autonomy-supportive and controlling practices as reported by mothers and adolescents on the parental needs effect and the parental perception effect in cross-lagged models (hypothesis 3 in our Supplementary Materials).

Table 3*Correlations Between All Variables Included in Study 2 to Test Hypotheses 1 and 2*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Ado. age T1																					
2. Ado. sex	0.07																				
3. Parent age T1	0.12*	0.06																			
4. Family income T1	-0.04	0.00	-0.11*																		
5. Parent aut. SR T1	0.03	0.00	0.03	-0.30***																	
6. Ado. aut. PR T1	-0.04	0.03	0.03	-0.15**	0.37***																
7. Ado. aut. SR T1	0.07	0.00	0.02	-0.14**	0.17***	0.33***															
8. Parent comp. SR T1	0.02	-0.02	0.04	-0.29***	0.70***	0.28***	0.08														
9. Ado. comp. PR T1	0.06	0.03	0.06	-0.16***	0.32***	0.65***	0.31***	0.36***													
10. Ado. comp. SR T1	0.01	0.02	0.04	-0.18***	0.13**	0.27***	0.72***	0.11*	0.40***												
11. Parent rel. SR T1	0.00	0.01	0.09†	-0.20***	0.63***	0.32***	0.15**	0.55***	0.31***	0.14**											
12. Ado. rel. PR T1	0.04	0.03	0.12*	-0.08	0.33***	0.64***	0.20***	0.31***	0.58***	0.20***	0.46***										
13. Ado. rel. SR T1	0.06	0.17***	0.02	-0.13**	0.08	0.24***	0.65***	0.08	0.26***	0.60***	0.18***	0.31***									
14. Parent aut. SR T2	0.03	0.02	0.05	-0.28***	0.75***	0.23***	0.09†	0.62***	0.20***	0.09†	0.55***	0.24***	0.07								
15. Ado. aut. PR T2	0.08	0.03	0.14**	-0.11*	0.32***	0.59***	0.32***	0.28***	0.47***	0.30***	0.27***	0.42***	0.25***	0.35***							
16. Ado. aut. SR T2	0.11*	0.05	0.03	-0.13*	0.17**	0.38***	0.64***	0.16**	0.35***	0.59***	0.19***	0.28***	0.46***	0.15**	0.45***						
17. Parent comp. SR T2	0.06	0.02	0.01	-0.29***	0.56***	0.18***	-0.02	0.76***	0.24***	0.05	0.52***	0.21***	0.02	0.70***	0.27***	0.12*					
18. Ado. comp. PR T2	0.14**	0.02	0.13*	-0.11*	0.26***	0.45***	0.39***	0.26***	0.67***	0.46***	0.27***	0.36***	0.27***	0.29***	0.68***	0.46***	0.31***				
19. Ado. comp. SR T2	0.04	-0.03	0.05	-0.15**	0.15**	0.32***	0.57***	0.09†	0.41***	0.71***	0.16**	0.27***	0.45***	0.14**	0.43***	0.75***	0.09†	0.51***			
20. Parent rel. SR T2	0.06	0.00	0.02	-0.23***	0.53***	0.24***	0.12*	0.47***	0.22***	0.14**	0.76***	0.37***	0.17**	0.62***	0.32***	0.22***	0.57***	0.32***	0.20***		
21. Ado. rel. PR T2	0.02	0.03	0.13*	-0.15**	0.29***	0.44***	0.34***	0.24***	0.40***	0.34***	0.43***	0.56***	0.40***	0.31***	0.63***	0.43***	0.31***	0.56***	0.46***	0.55***	
22. Ado. rel. SR T2	0.04	0.12*	-0.05	-0.11*	0.19***	0.27***	0.48***	0.15**	0.25***	0.48***	0.24***	0.31***	0.58***	0.18***	0.37***	0.71***	0.11*	0.33***	0.62***	0.26***	0.44***

Note. Ado. = adolescent; Aut. = autonomy; Comp. = competence; Rel. = relatedness; SR = self-report; PR = parent report.

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

Results

Descriptive Statistics and Correlations

The sample size, mean, and standard deviation for all variables can be found in Table 1. Correlations between all variables of interest are reported in Table 3; their overall pattern is similar to the associations found in Study 1 and indicates positive associations between parents' and adolescents' BPNS.

Measurement models

Following the same analysis plan as in Study 1, we started by creating measurement models for each basic psychological need. As shown in our Supplementary Materials, Models A to C for autonomy, competence, and relatedness all presented good fit indices and supported measurement invariance.

Structural Models

Autonomy. In order to test hypotheses 1 and 2, a structural model was created by adding to the latest measurement model (Model C) cross-lagged and autoregressive paths and regressing T2 latent variables onto control variables. This final model indicated a good fit: $\chi^2(330) = 582.63, p < .001$; CFI = .942; TLI = .935; RMSEA = .045; SRMR = .057 (see Figure 1). Results for autonomy need satisfaction did not support the parental needs effect predicted by hypothesis 1, as parents' autonomy satisfaction at T1 did not significantly predict adolescents' self-reported autonomy satisfaction at T2. However, findings supported the parental perception effect from hypothesis 2. The more parents perceived their adolescents as having their autonomy needs met at T1, the more adolescents subsequently reported need satisfaction at T2, $\beta = .24, p < .001, 95\% \text{ CI } [.12, .37]$.

Aside from hypothesized associations, results showed that parents' need satisfaction at T1 was marginally positively associated with their perception of their adolescent's need satisfaction at T2, $\beta = .12, p = .052, 95\% \text{ CI } [-.00, .23]$. Parents' perception of their adolescent's need satisfaction marginally and negatively predicted their own level of need satisfaction at T2, $\beta = -.09, p = .072, 95\% \text{ CI } [-.19,$

.01]. Adolescents' self-reported need satisfaction at T1 positively predicted parents' perception of their adolescent's autonomy satisfaction at T2, $\beta = .16, p = .021, 95\% \text{ CI } [.02, .30]$. Finally, adolescents' self-reported autonomy need satisfaction at T1 did not significantly predict parents' satisfaction at T2, therefore not supporting a child's needs effect.

Competence. The final cross-lagged model showed a good fit: $\chi^2 (330) = 605.22, p < .001$; CFI = .948; TLI = .941; RMSEA = .047; SRMR = .055 (see Figure 2). Results did not support the parental needs effects predicted in hypothesis 1, but supported the parental perception effect from hypothesis 2 by showing that parents' perceptions of their adolescent's competence satisfaction at T1 positively predicted adolescents' satisfaction at T2, $\beta = .17, p = .003, 95\% \text{ CI } [.06, .28]$.

Other associations showed that parents' perception of their adolescent's need satisfaction at T1 negatively predicted their own need satisfaction at T2, $\beta = -.11, p = .027, 95\% \text{ CI } [-.21, -.01]$. Adolescents' self-reported competence satisfaction at T1 positively predicted their parents' perception of their needs at T2, $\beta = .26, p < .001, 95\% \text{ CI } [.12, .39]$, while parents' own need satisfaction at T1 did not predict their perceptions. Finally, the results did not support a child's needs effect.

Relatedness. The final model containing the cross-lagged and autoregressive paths and control variables also demonstrated a good fit: $\chi^2 (330) = 500.67, p < .001$; CFI = .962; TLI = .957; RMSEA = .038; SRMR = .052 (see Figure 3). Results did not support the parental needs effect from hypothesis 1, as parents' self-report at T1 did not significantly predict adolescents' self-reported relatedness satisfaction at T2. For the second hypothesis about the parental perception effect, results showed that parents' perception of adolescents' need satisfaction at T1 only marginally predicted adolescents' relatedness satisfaction at T2, $\beta = .12, p = .097, 95\% \text{ CI } [-.02, .26]$.

Findings also indicated that parents' own need satisfaction at T1 positively predicted their perception of their adolescents' relatedness need satisfaction at T2, $\beta = .21, p = .002, 95\% \text{ CI } [.08, .33]$, but the reverse association was not significant. Adolescents' self-reported relatedness satisfaction at T1

positively predicted parents' perception of their adolescent's satisfaction at T2, $\beta = .26, p < .001$, 95% CI [.14, .37]. Again, the results did not support a child's needs effect.

General Discussion

Our first exploratory study and our second preregistered confirmatory study aimed to address a gap in the literature by developing a better understanding of the interplay of basic psychological needs between parents and adolescents over time. Our studies provided overall support for the parental perception effect, in which parents' perception of their adolescent's BPNS positively predicted their adolescent's BPNS, especially for the need satisfaction of autonomy and competence. On the other hand, we did not find a reliable parental needs effect (parental BPNS predicting adolescent BPNS) or child's needs effect (adolescent BPNS predicting parental BPNS) across the two studies.

Associations between Parents' and Adolescents' Needs

Based on previous study findings (Costa et al., 2019; Lo Cricchio et al., 2021; Nishimura et al., 2021), we expected to find associations between some of the BPNS of parents and adolescents. However, while our correlational analysis basically replicated the significant positive correlations between parents' and adolescents' BPNS (see Tables 2 and 3) found in the literature (e.g., Lo Cricchio et al., 2021; Nishimura et al., 2021), the results from our two longitudinal analyses did not detect such influence over time. More specifically, parents' need satisfaction did not reliably predict adolescents' need satisfaction (no parental need effect) and adolescents' need satisfaction did not predict parents' need satisfaction (no child's needs effect).

These somewhat surprising results could be explained in several ways. For example, they could be explained by the possibly stronger influence parents exert in children's than adolescents' lives. While previous studies either used a sample of children (van der Kaap-Deeder et al., 2015) or only observed cross-sectional associations in parent-adolescent dyads (Costa et al., 2019; Lo Cricchio et al., 2021; Nishimura et al., 2021), this paper examined the changes in BPNS between parents and adolescents. By adolescence, parents' influence on their children may have stabilized. Furthermore,

during adolescence, both parents and children may have less influence over each other's need satisfaction as adolescents become more independent (Smetana et al., 2015) and find increasingly more global need fulfillment in other relationships, such as friendships. Another explanation relates to our examination of the parental and child's needs effect within a specific time frame in adolescence (i.e., 13 months and 5 months). The cross-lagged model that we used has a critical assumption that the effect emerges at the time of the second assessment, but it is possible that the parental and child's needs effects take place in a shorter time frame (such as the correlations observed in cross-sectional studies) and then dissipate over time (Voelkle et al., 2012). Despite the non-significant effects observed in the current data, future studies should still test these effects more comprehensively.

The Parental Perception Effect

This study was the first to examine parents' perception of their adolescent's need satisfaction (parental perception effect). Our findings showed that parents' perceptions of their adolescent's need satisfaction, especially autonomy and competence needs, predicted their adolescents' need satisfaction over time. In other words, the more a parent thought their adolescent's needs were satisfied, the more their adolescent reported increased need satisfaction months later. This finding is similar to the studies by Bois et al. (2005), where mothers' views of their child's physical activity competence predicted the child's view of their own competence a year later, and by Ohtani et al. (2021), where parental perception of adolescents' depressive symptoms predicted adolescent-reported symptoms months later.

This pattern of findings could be explained by a Pygmalion effect (Rosenthal & Jacobson, 1968), where parents who perceive their adolescents to have their needs met have adolescents who subsequently report need satisfaction. While studies investigating both parental perceptions and children or adolescent perceptions are rare, similar effects appear in literatures on adults' expectations of children and adolescents. For example, students whose teachers have higher expectations of their future success are more likely to have higher academic achievement and graduate from college (Boser et al., 2014; Szumski & Karwowski, 2019). Another small study investigating the development of

children's anxious cognitions found similar results: mothers' expectations of their child's anxious cognitions predicted the changes in children's anxious cognition over time (Creswell et al., 2006). This transmission of perceptions could happen through a self-fulfilling prophecy or the adolescents' internalization of their parent's view of their need satisfaction. This process could also happen as part of normal developmental discrepancies, with parents leading their adolescents to develop more autonomy, competence, and relatedness.

An alternative explanation could be that parents have a more accurate perception of their adolescent's true need satisfaction, which adolescents only recognize later (see Ohtani et al., 2021). For example, parents could perceive their adolescents as having high autonomy satisfaction, being able to make developmentally appropriate choices in line with what they perceive as their values and beliefs, while adolescents, not yet fully aware of their own identity, values, and beliefs, only realize later that they are acting in accordance to their own volition. In this scenario, parents would recognize their adolescents' autonomy need satisfaction earlier than adolescents and reflect that perception to adolescents, influencing their perceptions over time. However, this explanation would not reflect a pure parental perception effect, as parental perception is a consequence, rather than an antecedent, of adolescents' need satisfaction. Still, need satisfaction is highly subjective and it can be difficult to conceive that parents can better assess adolescents' internal lives than adolescents themselves.

Limitations and Future Directions

We should note some limitations of the current work. First, we improved on the literature by looking at the interplay of BPNS longitudinally with two time points. However, extending our research to three or more time points would be important to examine how the development of BPNS happens over longer periods. Recent studies have shown that models with more than two time points can potentially control for various types of confounders (Lüdtke & Robitzsch, 2021; Usami et al., 2019). Testing the models at different ages could also be highly informative to make better causal inferences.

Second, both studies used samples of Japanese parents and adolescents, which could limit the generalizability of our findings. Although SDT positions BPNS as universal, some cultural differences have been found in the ways these needs are fulfilled. While research generally shows great overlaps between relationship descriptions across different cultures, relationship differences have been suggested in the literature (Laursen & Collins, 2009; Smetana et al., 2015). For example, research suggests that the parent-child relationship undergoes a lower decrease in closeness in Japanese adolescents than in United States adolescents (Rothbaum et al., 2000; Smetana et al., 2015).

Finally, findings from both studies highlight the importance of parents' perception of their adolescents and have key implications for future interventions targeting adolescents' emotional, social, and academic adaptation. Assessing parents' perceptions of adolescents could provide important information to guide interventions and explain the maintenance of certain perceptions of autonomy, competence, and relatedness, which underpin various negative outcomes in adolescents.

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