


Transactional Links Between Social Anxiety Symptoms and Parenting Across Adolescence: Between- and Within-Person Associations

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This 4-year longitudinal multi-informant study examined between- and within-person associations between adolescent social anxiety symptoms and parenting (parental psychological control and autonomy support). A community sample of 819 adolescents (46.1% girls; $M_{ageT_1} = 13.4$ years) reported annually on social anxiety symptoms and both adolescents and mothers reported on parenting. Between-person associations suggested that adolescent social anxiety symptoms were associated with higher adolescent- and mother-reported psychological control and lower mother-reported autonomy support. At the within-person level, however, mothers reported *lower* psychological control and *higher* autonomy support after periods with higher adolescent social anxiety symptoms. Our findings illustrate the importance of distinguishing among between-person and within-person associations and including perceptions of both dyad members in longitudinal research concerning parenting and adolescent mental health.

Adolescence is a critical phase for the development of social anxiety symptoms, which involve a marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others (American Psychiatric Association, 2013). Not only are social anxiety symptoms among the most prevalent psychopathological symptoms in the general population during adolescence, but these symptoms also appear to be quite persistent over time and are associated with a wide range of psychosocial difficulties, such as difficulties in relationships with parents, peers, and problems in the school context (Blöte, Miers, Heyne, & Westenberg, 2015; Kessler et al., 2012; Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010). Consequently, research that focuses on the development of social anxiety symptoms in adolescence and identifies factors that affect this development is of crucial importance.

In contemporary theoretical models, low facilitative or high constraining parenting, that is, parenting behavior characterized by low autonomy support or high overprotection or overcontrol (e.g., psychological control), is assumed to play a prominent role in the development of social anxiety symptoms (Spence & Rapee, 2016; Wong & Rapee, 2015, 2016). Even though these processes through which parents affect their youth take place at the level of the individual family, empirical support for this association between youth anxiety symptoms and parenting is largely based on cross-sectional studies and between-family, or between-person analyses such as regression analyses or structural equation models at the group level (for meta-analytic reviews, see McLeod, Wood, & Weisz, 2007; Van der Bruggen, Stams, & Bögels, 2008; Yap, Pilkington, Ryan, & Jorm, 2014). These between-person findings have illuminated that adolescents with higher levels of social anxiety experience different

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parenting compared to peers with lower levels of social anxiety, here called between-family estimates.

However, recent methodological advances have raised concerns that between-family estimates need not be related to the within-family process under examination, that is, the dynamic process over time occurring at the level of a parent and his or her own child (Hamaker, 2012; Keijsers, 2016; Kievit, Frankenhuis, Waldorp, & Borsboom, 2013). These concerns build on a much older issue of debate on the distinction between between-person and within-person estimates, which has traditionally been examined using multilevel modeling (for discussions, see Molenaar, 2004; Papp, 2004). Consequently, in light of this renewed methodological debate on how parenting dynamics need to be studied, it is at this moment still unclear whether facilitative or constraining parenting may affect adolescent social anxiety symptoms *within* families across time. In other words: Do adolescents really display a change in symptoms following changes in the parenting behaviors of their own parents? In the present study, we therefore aimed to examine how within-family fluctuations in parental psychological control and parental autonomy support (Joussemet, Landry, & Koestner, 2008) were associated with within-family fluctuations in adolescent social anxiety symptoms across time, and vice versa. For this purpose, we applied random-intercept cross-lagged panel models (RI-CLPMs) to disentangle within- and between-person associations (Hamaker, Kuiper, & Grasman, 2015; Keijsers, 2016).

Longitudinal Associations Between Parenting and Adolescent Social Anxiety Symptoms

Adolescents in families with more overcontrolling and less autonomy supporting parents are expected to experience more social anxiety symptoms than adolescents in families with less overcontrolling and more autonomy supporting parents (Spence & Rapee, 2016; Wong & Rapee, 2015). There are several mechanisms through which high parental psychological control and low parental autonomy support may be associated with increased levels of adolescent (social) anxiety symptoms (Van der Bruggen et al., 2008). For example, psychologically controlling and nonautonomy supporting parents tend to be directive and overmanage situations for their adolescents, control and restrict their adolescents' behaviors and activities, and discourage independence and autonomy. By doing so, such parents do not provide adolescents with occasions to explore their environment

and develop new and constructive coping and problem-solving strategies for dealing with novel or challenging (social) situations (Barlow, 2002). In this way, they increase adolescents' perception of (social) threat (Rapee, 2001) and reduce their perceived control over (social) threat (Chorpita & Barlow, 1998). As such, in families with higher parental psychological control and lower parental autonomy support, adolescents' may experience higher levels of adolescent social anxiety symptoms than in families with lower parental psychological control and higher parental autonomy support.

Similar mechanisms may be expected to operate *within* families. Specifically, when a parent increases his/her psychological control or decreases his/her autonomy support, these changes in parenting behaviors likely go together with greater restriction of the adolescent's behavior and activities, and diminished opportunities for the adolescent in that family to explore the environment and develop new and constructive coping and problem-solving strategies for dealing with novel or challenging (social) situations. Subsequently, the adolescent in that family may perceive increased (social) threat and reduced control over (social) threat, which is associated with increases in social anxiety symptoms. An increase in parental psychological control or decrease in parental autonomy support within a family may therefore be associated with an increase in adolescent social anxiety symptoms in that particular family.

Importantly, however, adolescents are not passive recipients of parenting but rather play an active role in their development by eliciting, evoking, reinforcing, and shaping their environment, including their parents, through continuous interactions (Kerr & Stattin, 2003; Lollis & Kuczynski, 1997). Child-driven or reciprocal influences may be particularly important to consider during adolescence, when there is a realignment of the parent-child relationship that forces this relationship to become more egalitarian and reciprocal (Laursen & Collins, 2009). In fact, over time reciprocal effects may be expected in which adolescent social anxiety symptoms elicit psychologically controlling and nonautonomy supporting parenting, as parents may be trying to adequately deal with their adolescent's symptomatology by increasing their parental control and decreasing their autonomy support. This may in turn increase adolescent social anxiety symptoms because of the aforementioned mechanisms that deprive adolescents of opportunities for personal growth, adequate threat assessment, and adequate coping.

Unfortunately, most research on the association between adolescent social anxiety symptoms and

parenting has been cross-sectional in nature (McLeod et al., 2007; Spence & Rapee, 2016; Van der Bruggen et al., 2008; Wong & Rapee, 2015; Yap et al., 2014), which precludes conclusions about the direction of these effects over time. The few longitudinal studies that have been conducted typically rely on between-family estimates, and the validity of inferences that can be drawn from such between-family estimated concerning within-family processes is an ongoing issue of debate (Hamaker, 2012; Hamaker et al., 2015; Keijsers, 2016; Kievit et al., 2013; Molenaar, 2004).

Within-Family Hypotheses Versus Between-Family Analyses

In order to draw accurate inferences from statistical models on parenting dynamics, it is important to carefully match the analysis to the level of the hypothesis under examination (for a taxonomy, see Keijsers & Van Roekel, in press). For instance, when it comes to parenting of adolescents, it may be interesting to know in which families adolescents experience more social anxiety problems. When this is the question, a between-family analytical comparison would be most suitable. Such analyses typically indicate that adolescents with more overcontrolling and less autonomy supporting parents (compared to their peers) experience more social anxiety symptoms. However, when it comes to tapping into the transactional dynamics within families, that is, the processes through which parents and adolescents affect each other over time, the research question is completely different. In that case, researchers want to find out whether the same adolescent behaves, feels, or acts differentially in periods when his or her parents act differentially, and vice versa. This is a within-family question (see Keijsers, 2016, for a conceptual introduction of this distinction). Both types of questions have theoretical importance, but because they are different in nature, they need to be tested with different analytical models that adequately tap into the different levels of analysis. Even though it is (still) common practice to test a within-family hypothesis at the between-family level, this comes at the risk of ecological fallacies in the inferences that we draw (Kievit et al., 2013).

For instance, in one study (Aunola, Tolvanen, Viljaranta, & Nurmi, 2013), youths' negative emotions were associated with *increased* levels of parental psychological control when comparing youths at the between-family level. At the within-family level, however, youths' negative emotions preceded a *decrease* in their parent's psychological control

over time. Moreover, in a recent study (Dietvorst, Hiemstra, Hillegers, & Keijsers, 2017), adolescents' secrecy was associated with *increased* levels of adolescent perceived privacy invasion when comparing adolescents at the between-family level. At the within-family level, however, higher levels of adolescents' secrecy preceded *decreased* perceptions of privacy invasion by their parents. Finally, in another recent study (Rekker, Keijsers, Branje, Koot, & Meeus, 2017), parental control was not associated with levels of minor delinquency when comparing adolescents at the between-family level. At the within-family level, however, adolescents offended more in periods with increased parental control. These three studies illustrate that associations that tap into differences between persons may be different from the dynamic processes linking the same concepts within persons over time. In fact, estimates at the between-family and the within-family level can be reverse in sign and direction (e.g., Aunola et al., 2013; Dietvorst et al., 2017; Rekker et al., 2017; see also simulation studies by Hamaker et al., 2015), leading to a situation called a Simpson's paradox.

In a longitudinal analytical approach that is widely used to test direction of effects over time, that is, the CLPM, no distinction is made between variance at the between-family level and variance at the within-family level. This has recently led methodologists to criticize this approach when the study aim is to test for within-family effects (Berry & Willoughby, 2017; Hamaker et al., 2015), and RI-CLPMs have been proposed as a suitable alternative that allows researchers to differentiate between the within-family and the between-family level. In general terms, it has been argued that although most developmental theories formulate ideas about within-person change, the traditional analytical models used to test these ideas may not be entirely suited to get at the accurate level of inference, because they cannot disentangle within- and between-person associations. Thus, even though CLPMs are extremely suitable for testing directions of effects over time, they fall short when it comes to differentiating between within-family processes and between-family estimates.

The Present Study

In the present 4-year longitudinal study on associations between adolescent social anxiety symptoms and parenting, we applied one of the recently proposed novel models, that is, a RI-CLPM, to disentangle within- and between-family effects.

Specifically, we examined at the within-family level how fluctuations in both constraining and facilitative parenting (i.e., parental psychological control and autonomy support) were longitudinally associated with fluctuations in adolescent social anxiety symptoms, and vice versa. This approach implies that we examined these relationships with regard to state-like fluctuations over time at the within-family level, above and beyond trait-like associations among these constructs at the between-family level (Hamaker et al., 2015). Based on theoretical expectations (Spence & Rapee, 2016; Wong & Rapee, 2015, 2016) and past between-family estimates (for meta-analytic reviews, see McLeod et al., 2007; Van der Bruggen et al., 2008; Yap et al., 2014), we expected to find that adolescents with higher levels of social anxiety experienced higher parental psychological control and lower parental autonomy support compared to peers with lower levels of social anxiety at the between-family level. In addition, we examined at the within-family level whether similar associations were found. Moreover, we examined these associations between adolescent social anxiety symptoms and parental psychological control and autonomy support relying on multi-informant reports of parenting by the adolescent as well as by the mother.

Method

Participants

Participants were 819 adolescents (46.1% girls; $M_{\text{age } T_1} = 13.38$ years, $SD_{\text{age } T_1} = 0.68$) and their mothers ($N = 619$; $M_{\text{age } T_1} = 43.30$ years, $SD_{\text{age } T_1} = 4.49$) who took part in the longitudinal “Studying Transactions in Adolescence: Testing Genes in Interaction with Environments” (STRATEGIES) study in Flanders, the Dutch-speaking part of Belgium. All participants attended Grade 7 (49.2%) or Grade 8 (50.8%) at the start of the study. Most participants were born in Belgium (94.7%) and lived in intact two-parent families (79.1%). Participants were asked to complete questionnaires at four annual assessments.

Sample attrition was on average 14.6% per year for adolescents and 12.4% per year for mothers from the first to the fourth measurement occasion. There were no significant differences between adolescents who were still participating at the fourth measurement occasion and those dropping out of the study on social anxiety symptoms at the start of the study, $F(1, 734) = 0.04$, $p = .84$, adolescent-reported autonomy support at the start of the study, $F(1,$

769) = 0.03, $p = .87$, sex, $\chi^2(1) = 2.66$, $p = .10$, age, $F(1, 809) = 0.23$, $p = .63$, or grade level, $\chi^2(1) = 3.18$, $p = .08$. However, adolescents who were still participating at the fourth measurement occasion reported lower levels of adolescent-reported parental psychological control at the start of the study, $F(1, 753) = 7.83$, $p = .01$, partial $\eta^2 = .01$, than those dropping out of the study. Furthermore, there were no significant differences between mothers who were still participating at the fourth measurement occasion and those dropping out of the study regarding age, $F(1, 602) = 0.00$, $p = .99$, mother-reported parental psychological control at the start of the study, $F(1, 586) = 3.34$, $p = .07$, and mother-reported parental autonomy support at the start of the study, $F(1, 591) = 1.41$, $p = .24$.

Procedure

Data collection for the STRATEGIES study started in February–March 2012 in nine secondary schools in Flanders. A randomized multistage sampling approach was used to select participants. Several secondary schools from different provinces were invited to take part in the research project, stratified by educational track in order to include participants from the academic, technical, and vocational tracks. From the nine schools that were willing to participate, classes from Grades 7 ($M_{\text{age } T_1} = 12.89$ years) and 8 ($M_{\text{age } T_1} = 13.85$ years) were randomly selected to participate. Within these classes, all adolescents were invited to participate. Active written informed consent was obtained from both parents and adolescents before the start of the study. At each measurement occasion, participants completed questionnaires in a 50-min session in their classroom during regular school time. Research assistants supervised these sessions and provided instructions, ensured confidentiality, and answered questions when necessary. Mothers were invited to complete their questionnaires at home either online or on paper by themselves at a moment that suited them best. This study received ethical approval from the Biomedical Institutional Review Board at the KU Leuven, Belgium.

Measures

Social Anxiety Symptoms

We used a 12-item short version of the Social Anxiety Scale for Adolescents (SAS-A; Nelemans et al., 2017) to assess adolescents’ social anxiety symptoms. The original 18-item version of the SAS-A (La Greca & Lopez, 1998) consists of the three

subscales, Fear of Negative Evaluation, Social Avoidance and Distress to New Situations, and Generalized Social Avoidance and Distress, which can be combined into a total SAS-A score. The 12-item short version of the SAS-A consists of the four highest loading items for each subscale that have been consistently found to load substantially on their designated factor in previous studies. Sample items include “I worry about what others say about me,” “I feel shy around people I don’t know,” and “I am quiet when I’m with a group of people.” All items were rated on a 5-point Likert-type scale, ranging from 1 (*not at all*) to 5 (*all the time*). We found good internal consistency for the total SAS-A scale across all 4 years (Cronbach’s $\alpha = .91-.92$). Higher scores reflect higher mean levels of social anxiety and means were computed for all participants without missing values as only few participants had missing data.

Parental Psychological Control and Autonomy Support

We used the 9-item psychological control and 8-item autonomy support subscales described in Janssens et al. (2015). These subscales are Dutch adaptations of the well-established Psychological Control Scale—Youth Self-Report (Barber, 2002) and the Perceptions of Parents Scale (Grolnick, Ryan, & Deci, 1991), respectively. Adolescents reported on their perception of parental psychological control and autonomy support and mothers reported on their perception of their own parental psychological control and autonomy support across 4 successive years. Sample items include “My parents will avoid looking at me when I have disappointed them” for adolescent-reported parental psychological control and “I help my son/daughter to choose his/her own direction” for mother-reported parental autonomy support. All items were rated on a 5-point Likert-type scale, ranging from 1 (*completely disagree*) to 5 (*completely agree*). We found good internal consistency for both the psychological control subscale (Cronbach’s $\alpha = .71-.83$) and the autonomy support subscale (Cronbach’s $\alpha = .80-.88$) for both informants across all 4 years. Higher scores reflect higher mean levels of parental psychological control and autonomy support and means were computed for all participants without missing values as only few participants had missing data.

Statistical Analyses

For the purposes of the present study, we constructed four RI-CLPMs (for a graphical

representation, see Figure 1) in *Mplus* Version 7.4 (Muthén & Muthén, 1998–2015), as well as four traditional CLPMs (see Supporting Information). Specifically, separate models were estimated for adolescent-reports of parental psychological control, adolescent-reports of parental autonomy support, mother-reports of parental psychological control, and mother-reports of parental autonomy support. All syntaxes are available from the first author upon request.

We used maximum likelihood (ML) estimation with robust standard errors (computed using a sandwich estimator) and chi-square robust to non-normality (i.e., MLR estimator; Muthén & Muthén, 1998–2015). Model fit was assessed with the comparative fit index (CFI), the root-mean-squared error of approximation (RMSEA) and its 90% confidence interval (CI), and the standardized root mean square residual (SRMR), using conventional standards (see Hu & Bentler, 1999; Kline, 2005). For reasons of parsimony—and given that we had no specific hypotheses regarding nonstationarity of the underlying within-person processes—all longitudinal parameters were constrained to be time invariant in our baseline RI-CLPMs (Kline, 2005). To examine potential changes in the within-person correlated change and cross-lagged estimates over time, we tested whether freeing these longitudinal parameters of interest in our baseline RI-CLPMs in a stepwise manner resulted in a significantly better model fit. The comparative fit of models was tested using Satorra–Bentler scaled chi-square difference tests ($\Delta\chi^2_{SB}$; Satorra & Bentler, 2001). Little’s MCAR test showed a normed $\chi^2(\chi^2/df)$ of 1.05, suggesting that the data were likely missing at random (Bollen, 1989). Missing data were handled with full information maximum likelihood (Muthén & Muthén, 1998–2015). We reported on STDYX standardized estimates (Muthén & Muthén, 1998–2015), which standardizes each association on its own respective level of variation (Schuurman, Ferrer, De Boer-Sonnenschein, & Hamaker, 2016).

Results

Descriptive Statistics

Table 1 provides an overview of the means and standard deviations of all study variables across all 4 years. Concurrent associations were weak to moderate (Cohen, 1992) between social anxiety symptoms and adolescent-reported psychological control, $r = .18$ to $.24$; adolescent-reported autonomy support, $r = -.07$ to $-.11$; mother-reported

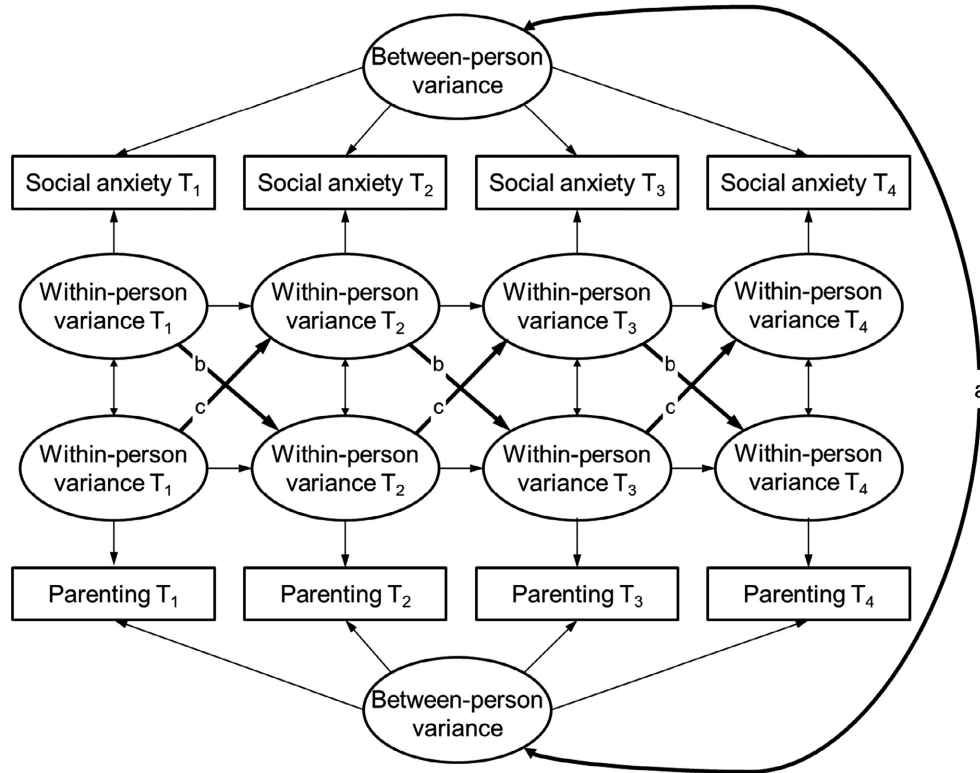


Figure 1. Graphical representation of our four-wave random-intercept cross-lagged panel models on associations between adolescent social anxiety symptoms and parental psychological control/autonomy support. In bold are the main associations of interest: between-person level associations (a), within-person level prediction of within-person variation in parenting by within-person variation in social anxiety symptoms (b), and within-person level prediction of within-person variation in social anxiety symptoms by within-person variation in parenting (c).

psychological control, $r = -.02$ to $.17$; and mother-reported autonomy support, $r = .03$ to $-.09$, across 4 years. Furthermore, moderate positive concurrent associations were found between reports of different informants on parental psychological control, $r = .24$ to $.37$, and parental autonomy support, $r = .18$ to $.27$, across 4 years. Intraclass correlation coefficients (ICCs) suggested that a substantial part of the variance in all study variables was located at the within-person level. In other words, a substantial part of the variation observed was due to fluctuations over time in the study variables and not to stable between-person differences. The exact estimates were: 29.8% for social anxiety symptoms, 33.2% for adolescent-reported psychological control, 34.4% for adolescent-reported autonomy support, 29.5% for mother-reported psychological control, and 33.6% for mother-reported autonomy support. In addition, ICCs in a three-level structure, in which between-person variance was further differentiated from between-classroom variance, suggested that a negligible part of the variance in all study variables was located at the classroom-level (i.e., ICCs ranged

between .005 and .053). We have therefore continued with our planned two-level RI-CLPMs.

Table 2 provides an overview of all parameter estimates in our four RI-CLPMs, which are described next in greater detail.

RI-CLPM Adolescent Social Anxiety Symptoms and Adolescent-Reported Parenting

Our fully constrained baseline RI-CLPMs showed good-to-excellent fit concerning both adolescent-reported parental psychological control, $\chi^2(19) = 42.10$, CFI = .98, RMSEA = .04 [.02, .06], SRMR = .05, and adolescent-reported parental autonomy support, $\chi^2(19) = 45.98$, CFI = .98, RMSEA = .04 [.03, .06], SRMR = .07. Stepwise freeing the within-person correlated change, $\Delta\chi^2_{SB}(2) = 3.92$, $p = .14$, and the cross-lagged paths, $\Delta\chi^2_{SB}(4) = 8.14$, $p = .09$, over time did not significantly improve model fit for adolescent-reported psychological control. For reasons of parsimony, we therefore kept all longitudinal structural parameters constrained in our final RI-CLPM concerning adolescent-reported psychological

Table 1
Means and Standard Deviations of all Study Variables Across All 4 Years

Variable	M	SD
Social anxiety symptoms T ₁	2.38	.80
Social anxiety symptoms T ₂	2.53	.82
Social anxiety symptoms T ₃	2.50	.79
Social anxiety symptoms T ₄	2.50	.80
Adolescent-reported psychological control T ₁	1.95	.65
Adolescent-reported psychological control T ₂	1.98	.66
Adolescent-reported psychological control T ₃	1.95	.64
Adolescent-reported psychological control T ₄	1.92	.60
Mother-reported psychological control T ₁	1.77	.50
Mother-reported psychological control T ₂	1.75	.47
Mother-reported psychological control T ₃	1.77	.51
Mother-reported psychological control T ₄	1.71	.49
Adolescent-reported autonomy support T ₁	3.90	.64
Adolescent-reported autonomy support T ₂	3.84	.62
Adolescent-reported autonomy support T ₃	3.87	.61
Adolescent-reported autonomy support T ₄	3.94	.57
Mother-reported autonomy support T ₁	4.18	.45
Mother-reported autonomy support T ₂	4.18	.46
Mother-reported autonomy support T ₃	4.21	.44
Mother-reported autonomy support T ₄	4.21	.45

Note. All variables ranged from 1 to 5.

control. For adolescent-reported autonomy support, freeing the within-person correlated change over time did not significantly improve model fit, $\Delta\chi^2_{SB}(2) = 0.72$, $p = .70$, but freeing the cross-lagged paths did, $\Delta\chi^2_{SB}(4) = 11.25$, $p = .02$. Specifically, freeing the cross-lagged paths from adolescent-reported autonomy support to later social anxiety symptoms significantly improved model fit, $\Delta\chi^2_{SB}(2) = 9.18$, $p = .01$, whereas freeing the cross-lagged paths from social anxiety symptoms to later adolescent-reported autonomy did not, $\Delta\chi^2_{SB}(2) = 4.57$, $p = .10$. In our final RI-CLPM concerning adolescent-reported parental autonomy support, we therefore freely estimated the cross-lagged paths from adolescent-reported autonomy support to later social anxiety symptoms, $\chi^2(17) = 36.63$, CFI = .99, RMSEA = .04 [.02, .06], SRMR = .07.

At the between-person level, adolescents with more social anxiety symptoms reported higher levels of psychological control compared to adolescents with lower social anxiety symptoms, $\psi = .27$, $p < .001$, but did not report a distinct level of adolescent-reported parental autonomy support, $\psi = -.08$, $p = .30$. At the within-person level, concurrent associations suggested that adolescents reported higher social anxiety symptoms at times when they experienced higher levels of levels of parental

psychological control, $\psi_s = .10$ to $.20$, $p_s = .003-.08$, but there were no significant associations between adolescent social anxiety symptoms and adolescent-reported parental autonomy support, $\psi_s = -.04$ to $-.08$, $p_s = .14-.44$. Importantly, after a temporary increase in social anxiety symptoms, adolescents' own perceptions of both parental psychological control, $p = .39$, and autonomy support, $p = .24$, did not change, nor were there any reverse effects from adolescents' own perceptions of both parental psychological control, $p = .76$, and autonomy support, $p_s = .07-.43$, to adolescent social anxiety symptoms.

In sum, when comparing families to each other at the between-person level, adolescent-reported parental psychological control was the highest for adolescents with high social anxiety symptoms, but no associations were found between social anxiety symptoms and adolescent-reported parental autonomy support. At the within-family level, similar concurrent associations were found, with adolescents reporting higher social anxiety symptoms at times when they experienced higher levels of parental psychological control. However, a temporary increase in adolescent social anxiety symptoms did not precede or follow increased levels of adolescent-reported psychological control or decreased levels of adolescent-reported autonomy support.

RI-CLPM Adolescent Social Anxiety Symptoms and Mother-Reported Parenting

Our fully constrained baseline RI-CLPMs showed good-to-excellent fit concerning both mother-reported parental psychological control, $\chi^2(19) = 45.41$, CFI = .98, RMSEA = .04 [.03, .06], SRMR = .06, and mother-reported parental autonomy support, $\chi^2(19) = 29.53$, CFI = .99, RMSEA = .03 [.00, .04], SRMR = .09. Stepwise freeing the within-person correlated change, $\Delta\chi^2_{SB}(2) = 5.23$, $p = .07$ and $\Delta\chi^2_{SB}(2) = 0.51$, $p = .78$, respectively, and the cross-lagged paths, $\Delta\chi^2_{SB}(4) = 4.78$, $p = .31$ and $\Delta\chi^2_{SB}(4) = 4.82$, $p = .31$, respectively, over time did not significantly improve model fit for both mother-reported parental psychological control and autonomy support. For reasons of parsimony, we therefore kept all longitudinal structural parameters constrained in our final RI-CLPMs concerning mother-reported parenting.

At the between-person level, mothers of adolescents with more social anxiety symptoms reported higher levels of psychological control, $\psi = .14$, $p = .03$, and lower levels of autonomy support compared to mothers of adolescents with lower social anxiety symptoms, $\psi = -.19$, $p = .02$. At the within-

Table 2
Overview of All Parameter Estimates in Our Four Final RI-CLPMs

Model	Psychological control		Autonomy support	
	<i>b</i> (SE)	<i>r</i> / β	<i>b</i> (SE)	<i>r</i> / β
Adolescent report				
Between-level association	.07 (.02)***	.28	-.02 (.02)	-.08
Social anxiety → parenting	.05 (.06)	.05 to .06	-.06 (.05)	-.07 to -.08
Parenting → social anxiety	.02 (.07)	.02	-.17 (.09) to .12 (.07)	-.15 to .10
T ₁ within-person correlations	.06 (.02)***	.20	-.02 (.02)	-.08
T ₂ -T ₄ within-person correlations	.03 (.02)	.10 to .14	-.01 (.01)	-.04 to -.05
Autoregressive paths social anxiety	.23 (.11)*	.23 to .26	.27 (.10)***	.26 to .30
Autoregressive paths parenting	.34 (.08)***	.33 to .38	.19 (.07)***	.20 to .21
Mother report				
Between-level association	.03 (.01)*	.14	-.04 (.01)*	-.19
Social anxiety → parenting	-.07 (.04)*	-.11 to -.14	.08 (.04)*	.14 to .16
Parenting → social anxiety	-.06 (.09)	-.03 to -.04	.10 (.10)	.06
T ₁ within-person correlations	.01 (.01)	.06	-.01 (.01)	-.05
T ₂ -T ₄ within-person correlations	-.01 (.01)	-.07 to -.08	.03 (.01)**	.14 to .19
Autoregressive paths social anxiety	.24 (.10)*	.24 to .27	.24 (.09)**	.23 to .27
Autoregressive paths parenting	.09 (.09)	.08 to .09	.19 (.09)*	.19 to .21

Note. RI-CLPM = random-intercept cross-lagged panel model.
* $p < .05$. ** $p \leq .01$. *** $p \leq .001$.

person level, concurrent associations from T₂ to T₄ suggested that mothers reported higher levels of autonomy support at times when their adolescent reported higher social anxiety symptoms, $\psi_s = .14$ to $.19$, $p_s = .01$, but there were no significant associations between mother-reported parental psychological control and adolescent social anxiety symptoms, $\psi_s = -.08$ to $.06$, $p_s = .22$ – $.39$. Importantly, after a temporary increase in an adolescent's social anxiety symptoms mothers reported lower levels of psychological control, $b = -.07$, $\beta_s = -.11$ to $-.14$, $p = .03$, and higher levels of autonomy support 1 year later, $b = .08$, $\beta_s = .14$ to $.16$, $p = .03$. This indicates the potential existence of a Simpson's paradox, where the signs of the association at the between-person level and the within-person level, both concerning the within-person correlated change and the longitudinal cross-lagged paths, are in opposite directions. No reverse effects were found from mother-reported psychological control and autonomy support to adolescent social anxiety symptoms 1 year later, $p = .51$ and $p = .36$, respectively.

In sum, when comparing families to each other at the between-person level, mother-reported psychological control was higher and mother-reported autonomy support was lower for adolescents with higher social anxiety symptoms. At the within-family level, in contrast, significant concurrent associations suggested that mothers reported higher levels of

parental autonomy support at times when adolescents reported higher social anxiety symptoms. In addition, a temporary increase in adolescent social anxiety symptoms preceded, but did not follow, decreased levels of mother-reported psychological control, and increased levels of mother-reported autonomy support over time.

Auxiliary Analyses: CLPMs

In addition to our main RI-CLPMs, we constructed four separate CLPMs for adolescent reports of parental psychological control, adolescent reports of parental autonomy support, mother reports of parental psychological control, and mother reports of parental autonomy support. In addition, to examine the robustness of our CLPM findings, we also conducted CLPMs controlling for adolescent age and sex as time-invariant covariates (see Supporting Information). The findings showed that when using standard CLPMs, in which between-person and within-person variance is blended, higher levels of adolescent social anxiety symptoms were significantly associated with higher levels of adolescent-reported parental psychological control and lower levels of adolescent-reported parental autonomy support 1 year later, but not vice versa, whereas adolescent social anxiety symptoms and both mother-reported parental psychological control

and autonomy support were not significantly related to one another over a 1-year period. Results were similar controlling for adolescent age and sex as time-invariant covariates, which attests to the robustness of the CLPM findings.

Discussion

This 4-year longitudinal multi-informant study examined between- and within-family associations between adolescent social anxiety symptoms and both parental psychological control and autonomy support, as reported by both adolescents and mothers. We applied a RI-CLPM to disentangle within- and between-family associations and examine at the within-family level how fluctuations in parental psychological control and parental autonomy support were longitudinally associated with fluctuations in adolescent social anxiety symptoms and vice versa. As auxiliary analyses, we applied a CLPM, which is a common longitudinal analytical approach that is used to test direction of effects over time in which between-person and within-person variances are blended. Between-family associations in RI-CLPMs suggested that adolescents who reported more social anxiety symptoms compared to peers reported higher parental psychological control, and their mothers reported both higher psychological control and lower autonomy support, compared to (mothers of) peers. Concurrent associations at the within-family level suggested also that adolescents reported higher levels of parental psychological control at times when they experienced higher levels of social anxiety symptoms, whereas mothers, in contrast, reported lower psychological control and higher autonomy support at times when their adolescent experienced higher levels of social anxiety symptoms. In addition, longitudinal associations at the within-family level suggested that after periods with higher adolescent social anxiety symptoms, mothers reported lower psychological control and higher autonomy support across adolescence, whereas no longitudinal associations were found between adolescent social anxiety symptoms and adolescent-reported psychological control or autonomy support. Findings from RI-CLPMs and CLPMs also differed on important aspects, including the significance of associations and the sign (i.e., positive or negative) of estimates. In sum, our study suggests that important differences may exist in between-family and within-family associations, as well as between findings from RI-CLPMs and CLPMs, concerning associations between parenting and adolescent mental health.

In contemporary theoretical models on the developmental psychopathology of social anxiety, parenting behavior characterized by low autonomy support or high psychological control is assumed to play a prominent role in the development of social anxiety symptoms (Spence & Rapee, 2016; Wong & Rapee, 2015, 2016). At this moment, most empirical support for this association comes from cross-sectional studies and between-family analyses (for meta-analytic reviews, see McLeod et al., 2007; Van der Bruggen et al., 2008; Yap et al., 2014), which suggest that adolescents with higher levels of social anxiety indeed experience different parenting compared to other adolescents with lower levels of social anxiety. In line with these theoretical models and past studies, our findings concerning between-family associations in RI-CLPMs suggested that adolescent social anxiety symptoms go together with higher adolescent- and mother-reported parental psychological control and lower mother-reported parental autonomy support across adolescence (captured with associations between random intercepts). In addition, concurrent findings at the within-family level were consistent in showing that adolescents reported higher levels of parental psychological control at times when they experienced higher levels of social anxiety symptoms. However, these findings do not inform us whether adolescents really display a change in symptoms following changes in the parenting behaviors of their own parents, that is, the parenting dynamics, or vice versa.

Our within-family longitudinal RI-CLPMs findings suggested that (a) mothers appear to change their parenting behavior in response to changes in adolescent social anxiety symptoms (i.e., child-driven effects), and (b) mothers report responding with *lower* psychological control and *higher* autonomy support to increases in adolescent social anxiety symptoms across adolescence. Concerning the former, this finding contrasts with notions that parenting affects adolescent mental health (i.e., parent-driven effects), including social anxiety symptoms. Our finding adds to a growing body of literature that has found evidence for child-driven rather than parent-driven effects (for a review, see Meeus, 2016). Importantly, although past research has typically not distinguished among between-family and within-family longitudinal estimates, our findings suggest that child-driven effects appear to specifically occur within families. In light of this finding, theoretical models on the etiology of social anxiety symptoms may need to be reconsidered to reflect that (changes in) adolescent symptomatology appears to more strongly affect parenting and the parent-adolescent relationship than vice versa.

Concerning the latter, our finding that mothers reported responding with lower psychological control and higher autonomy support to increases in adolescent social anxiety symptoms across adolescence not only contrasts with theoretical models on the developmental psychopathology of social anxiety and the findings of past studies (that typically did not specifically distinguish among between-family and within-family estimates) but also contrasts with our between-family associations. Specifically for the mother-reported parenting, our findings appeared to indicate the potential existence of a Simpson's paradox (Kievit et al., 2013), where the signs of the association at the between-person level and the within-person level are in opposite directions (see also Aunola et al., 2013; Dietvorst et al., 2017; Rekker et al., 2017). So we found that, rather than relying on more constraining parenting behaviors after being confronted with increases in adolescents' social anxiety symptoms, mothers report resorting to more facilitative parenting behaviors. This might suggest that in response to increases in adolescents' social anxiety symptoms, mothers want to support their adolescents in exploring their environment and developing new and constructive coping and problem-solving strategies for dealing with novel or challenging (social) situations (Barlow, 2002). In this way, they may strive to decrease adolescents' perception of (social) threat (Rapee, 2001) and induce perceived control over (social) threat (Chorpita & Barlow, 1998). Our findings may also fit with Coyne's (1976) interactional theory of depression and a relationship erosion perspective (Branje, Hale, Frijns, & Meeus, 2010; Joiner & Coyne, 1999), which suggest that high symptoms of anxiety or depression in adolescents may initially elicit more supportive parental behaviors. Eventually, however, adolescents high in anxiety or depression are assumed to set into motion a process of support erosion in which the initially supportive parent-adolescent interaction becomes increasingly rejecting and constraining (e.g., Branje et al., 2010; Nelemans, Hale, Branje, Hawk, & Meeus, 2014). High symptoms of anxiety or depression may thereby eventually erode the parent-adolescent relationship over time.

Interestingly, although mothers reported responding with lower psychological control and higher autonomy support to increases in adolescent social anxiety symptoms across adolescence, this increase in facilitative parenting and decrease in constraining parenting was not perceived by adolescents (i.e., adolescent reports of increases or decreases in psychological control and autonomy support were unrelated to increases or decreases in adolescents' social

anxiety symptoms). However, adolescents perceived higher levels of parental psychological control at times when they experienced higher levels of social anxiety symptoms. From one perspective, our findings may be in line with suggestions that high levels of youth (social) anxiety are associated with a wide range of negative cognitive biases (Clark & Wells, 1995; Creswell & O'Connor, 2011; Spence & Rapee, 2016; Wong & Rapee, 2015, 2016), which may prevent adolescents with increases in social anxiety symptoms from perceiving the increase in facilitative parenting and decrease in constraining parenting by their mothers.

It might also be that the well-meant increase in autonomy support reported by mothers is perceived as controlling by adolescents at times when they experience higher levels of social anxiety symptoms, because mothers' autonomy support encourages adolescents to face the (social) situations they fear. Thereby, adolescents might feel pressured to face the situations they want to avoid because of their heightened levels of social anxiety and may feel psychologically controlled, because in their experience this increased maternal autonomy support does not fit with their current developmental needs. Although by increasing their autonomy support mothers may in the long term strive to facilitate the development of new and constructive coping and problem-solving strategies in their adolescents (Barlow, 2002) and thereby decrease adolescents' perception of (social) threat (Rapee, 2001) and their social anxiety symptoms, this may be perceived by adolescents as psychologically controlling at times when they experience heightened levels of social anxiety.

Importantly, this discrepancy between mothers' and adolescents' perception may yield meaningful information in and of itself in the context of informant discrepancies and agreement (De Los Reyes & Ohannessian, 2016). It would be interesting for future research to further examine associations between parenting and adolescent mental health, including social anxiety symptoms, from the perspective of different informants, the potential causes or consequences of informant discrepancies in these associations, and the processes underlying discrepant views between parents' and adolescents' concerning parenting (or adolescent mental health). Similarly, it would be interesting for future research, for example, to further examine how informant agreement functions within parent-adolescent dyads over time and whether associations between parenting and adolescent mental health, including social anxiety symptoms, vary as a

function of informant agreement within families. Specifically, in order to assess how the associations of interest may vary as a function of informant (dis) agreement, a multilevel design with cross-level interactions may be used, which would require larger samples and/or more repeated assessments.

Strengths, Limitations, and Directions for Future Research

The present study has several important strengths. First, our longitudinal study was based on a large community sample ($N = 819$) followed across 4 successive years in which we applied one of the recently proposed novel models, that is, a RI-CLPM (Hamaker et al., 2015; Keijsers, 2016), to disentangle within- and between-family effects and examine at the within-family level how fluctuations in facilitative and constraining parenting were longitudinally associated with fluctuations in adolescent social anxiety symptoms, and vice versa. Thereby, we examined these relationships with regard to state-like fluctuations over time at the within-family level, above and beyond trait-like associations among these constructs at the between-family level. Second, we not only examined both positive and negative parental behaviors in relation to adolescent social anxiety symptoms, but we also relied on multi-informant reports of parenting from both adolescents and mothers. Third, we were able to compare findings from RI-CLPM to findings from traditional CLPM to shed light on the validity of inferences that can be drawn from findings from past longitudinal research on directions of effects concerning parenting and adolescent social anxiety symptoms using CLPM. One specific new finding in this respect is that when the between-person and the within-person associations show opposite signs of directions (see our RI-CLPMs concerning mother-reported parenting), it is plausible that a CLPM does not indicate any significant linkages among the two constructs (see Supporting Information concerning mother-reported parenting). These findings suggest that not just significant but also null findings in CLPMs may need to be reconsidered with novel methods such as RI-CLPMs. Because of the importance of trait factors in the development of social anxiety symptoms, which can include both genetics and temperamental or personality factors (Spence & Rapee, 2016; Wong & Rapee, 2015), it is important to distinguish between-person (i.e., trait-level) associations and within-person dynamics.

At the same time, our study should be considered in light of some limitations, which may

provide directions for future research. First, although our study provides information on associations across a relatively large age span in adolescence, the question remains whether the annual assessments in our study represent the optimal timing of assessments to capture transactional within-family processes. This study was set up to test for (in)consistencies among between-family and within-family estimates concerning associations between adolescent social anxiety symptoms and aspects of parenting (i.e., the ecological fallacy; Keijsers & Van Roekel, in press). However, it might also be that opposing or different processes operate across longer and shorter time intervals (i.e., the galloping horse fallacy; Keijsers & Van Roekel, in press). For example, although adolescents with high levels of internalizing symptoms may initially elicit more supportive parenting, they are assumed to set into motion a process of support erosion on the longer term in which the initially supportive parent-adolescent interaction becomes increasingly rejecting and constraining (Branje et al., 2010; Coyne, 1976; Joiner & Coyne, 1999; Nelemans et al., 2014). The current study design was not optimally tailored to address whether different processes may operate across longer and shorter time intervals. For intervention efforts, for example, it would be important to know whether increases in facilitative parenting may be associated with decreases in adolescent social anxiety symptoms across a shorter time interval than assessed in the current study. Guided by novel theoretical formulations regarding the direction and sign of effects on different time scales, in future studies it may thus be important to look at potential within-family associations across a shorter time interval (e.g., using diaries), because these processes likely also operate across shorter time intervals, and/or link shorter and longer term mechanisms as well as within- and between-person processes to each other in one integrated design (e.g., Voelkle, Brose, Schmiedek, & Lindenberger, 2014).

Second, in this study we have employed RI-CLPMs to distinguish among between- and within-person associations to specifically examine within-family dynamics between adolescent social anxiety symptoms and aspects of parenting. However, RI-CLPMs represent just one, and not the only, analytical approach that can be taken. For example, a specific limitation of RI-CLPMs is that between-person variance in systematic growth is not captured in the models. In other words, although the within-person latent structure captures variation around each individual's expected score, the model assumes similar systematic growth for each

individual. When this is not realistic, however, and growth rates of the constructs of interest are correlated, *SEs* around the structural parameters may be slightly larger (although we have freely estimated the within-person residual variances in our RI-CLPMs to take some of this into account). Also, although ICCs suggested that a negligible part of the variance in all study variables was located at the classroom-level in a three-level design, the between-person variance may be slightly inflated with between-classroom variance. Moreover, in studies with longitudinal designs other than our design with relatively long time intervals of 1 year between assessments, for example, studies with measurement burst designs, there may be a need to differentiate between the within-person processes under study and the longer term developmental changes, as well as interindividual differences in the rate of change. In such cases, more complicated models, such as autoregressive latent trajectory models, may be a more appropriate analytical approach (see Bollen & Curran, 2004; Bollen & Zimmer, 2010; Mund & Nestler, 2018). In future studies, it may also be interesting to employ growth models to examine whether in families with stronger changes in parenting there are also stronger changes in adolescents mental health over time (e.g., do adolescents who show stronger increases in social anxiety symptoms tend to have parents who show stronger increases in psychological control over time?).

Third, care should be taken not to overgeneralize our findings. The data were collected in a particular region of Western Europe in a relatively well-functioning community sample of adolescents with a relatively homogeneous ethnic background. It is unclear whether our results can be extended to adolescents who live in other regions of the world, who have a more diverse socioeconomic and ethnic background, and who are more diverse in psychosocial functioning. Future research should strive to include more diverse samples to examine how the processes under scrutiny operate normatively within such samples. Fourth, other aspects of the parenting environment than the ones we examined, and parental overprotection in particular (Spence & Rapee, 2016; Wong & Rapee, 2015, 2016), have also been found relevant in association with adolescent social anxiety symptoms. In addition, future studies with larger sample sizes are needed to examine how different aspects of parenting operate together, in the same statistical model, in association with indicators of adolescent mental health, including social anxiety symptoms. Fifth and finally, our

findings seemed to suggest that for adolescent reports, psychological control was more strongly associated with adolescent social anxiety symptoms, whereas for mother reports autonomy support was more strongly associated with adolescent social anxiety symptoms. Future studies are needed to further examine and explain this potential differential association between adolescent social anxiety symptoms and adolescent-reported constraining parenting and mother-reported facilitative parenting.

Concerning directions for future research, methodological advances, such as the recent availability of RI-CLPMs, set the stage for an important discussion in our research field in general regarding the key question whether we are typically testing what we are trying to test. Theory should be a driving force in determining the desired level of analysis, but often there appears to be a mismatch between developmental theories and the statistical analyses we employ to test hypotheses derived from those theories (Berry & Willoughby, 2017; Hamaker et al., 2015; Keijsers, 2016; Keijsers & Van Roekel, in press). Researchers may be interested in characteristics of families (e.g., in which families do adolescents experience more social anxiety problems?) or rank order changes in characteristics of families across time, and for such topics a between-family analytical comparison is needed. However, most developmental theories on parenting describe transactional dynamics within families or intraindividual change, for example, the processes through which parents and adolescents affect each other over time and for those topics within-family transactional analyses are needed. Also, different fields of study may pose questions at differ levels of analysis. For instance, researchers in the field of personality research may be primarily interested in interindividual differences, reflected in between-person variance, whereas researchers on parenting in the field of developmental psychology may be strongly interested in intraindividual changes across time reflected in within-person variance. In light of this issue, we would like to emphasize the importance for researchers to carefully match their analytical strategy to the level of the hypothesis under examination in order to draw accurate inferences from statistical models. Future research is needed, and strong collaborations between statisticians and theoretical researchers for that matter, to test different novel methods against each other and against established analytical methods. Thus, this study provides only a first impression of how associations at the within-person level may differ from

established findings at the between-person level in earlier work. Parallel to the application of novel analytical strategies, it is also urgent time to step back and integrate our findings by reframing our theories to be more specific regarding the ecological level of analysis, the timing of developmental processes, and the possible heterogeneity in how developmental mechanisms operate (for a conceptual analysis, see Keijsers & Van Roekel, in press).

Conclusion

In conclusion, this 4-year longitudinal community study illustrates the importance of distinguishing between between-family and within-family associations in longitudinal research concerning parenting and adolescent mental health. In line with some recent longitudinal studies (e.g., Aunola et al., 2013; Dietvorst et al., 2017; Rekker et al., 2017), we found that the estimates at the between-family and the within-family level can be reversed, leading to a situation called a Simpson's paradox (Kievit et al., 2013), and that results from RI-CLPM and CLPM may differ on important aspects. Specifically, concerning between-family associations in our RI-CLPMs, we found that adolescents who reported more social anxiety symptoms, compared to peers, reported higher parental psychological control and their mothers reported higher psychological control and lower parental autonomy support, compared to (mothers of) peers. At the within-family level, however, after periods with higher adolescent social anxiety symptoms, mothers reported lower psychological control and higher autonomy support across adolescence.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Results of our four traditional CPLM models.