

The Interaction between Child Behavioral Inhibition and Parenting Behaviors across
Development: Effects on Adolescent Psychopathology

Sarah Ryan Radtke

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Psychology

Thomas H. Ollendick, Chair

Martha Ann Bell

Lee D. Cooper

Jungmeen Kim-Spoon

Angela Scarpa-Friedman

May 13, 2020

Blacksburg, VA

Keywords: behavioral inhibition, parenting, childhood, psychopathology

The Interaction between Child Behavioral Inhibition and Parenting Behaviors across
Development: Effects on Adolescent Psychopathology

Sarah Ryan Radtke

Abstract

Psychopathology is highly prevalent during childhood and adolescence and contributes to a variety of negative outcomes. Attempts to identify etiological factors which contribute to the development of psychopathology in youth have considered the Goodness of Fit between children's temperaments and the behaviors exhibited by their parents (Chess & Thomas, 1999; Zuckerman, 1999). Many studies have demonstrated that the interaction of children's behavioral inhibition and certain parenting behaviors influences children's psychological outcomes. However, the ability to draw firm conclusions from these studies is severely limited by methodological weaknesses.

In the current study, data were analyzed from 253 youth (46% male) who completed assessments at 2-years ($N=167$), 3-years ($N=144$), 4-years ($N=134$), 6-years ($N=110$), and 9-years of age ($N=192$), and during adolescence ($N=78$; mean age=14.08 years). Measures of child behavioral inhibition, maternal warmth and control, and child psychopathology were gathered at each time point. Cross-sectional and longitudinal analyses were conducted to explore the moderating effect of maternal warmth and control on the relationship between child shyness and child/adolescent internalizing and externalizing symptoms.

With a few exceptions, child shyness significantly predicted child internalizing symptoms at each time point, while maternal warmth and control, and their interaction with child shyness, did not predict child internalizing or externalizing outcomes. Longitudinally, the slope of shyness across childhood significantly predicted adolescent internalizing symptoms. The moderating

effect of maternal parenting on this relationship could not be explored due to sample size and missing data restrictions. Hierarchical regression analyses indicated that the interaction between child shyness (at each time point) and maternal warmth and control did not predict adolescent psychopathology. Cross-lagged structural equation models analyzed the longitudinal, bidirectional relationships between child shyness and maternal warmth and control. However, youth shyness and maternal warmth/control were not correlated at any time point, youth shyness did not predict future displays of maternal warmth/control, and maternal warmth/control did not impact future levels of youth shyness.

Compared to previous studies, the current study's design and methodology had many strengths. However, the findings were largely inconsistent with hypotheses and previous work. Possible explanations for these findings, study limitations, and directions for future research are summarized.

The Interaction between Child Behavioral Inhibition and Parenting Behaviors across
Development: Effects on Adolescent Psychopathology

Sarah Ryan Radtke

General Audience Abstract

The presence of psychological disorders is common during childhood and adolescence and contributes to a variety of negative outcomes. Attempts to determine what is causing these disorders to develop in youth have considered how children's temperaments and the behaviors exhibited by their parents may or may not fit well together. Past research has demonstrated that the interaction of children's fearfulness or shyness and certain parenting behaviors influences children's psychological outcomes. However, the ability to draw firm conclusions from this past research is limited by weaknesses within studies and inconsistencies between them.

The current study attempted to address some of these weaknesses and inconsistencies by exploring the relationships among child shyness, maternal displays of warmth and control, and psychological symptoms. A total of 253 children had already participated in one or more assessment sessions when they were 2, 3, 4, 6, and 9-years-old, and, for the current study, 78 of those children completed an assessment as adolescents (average age = 14-years-old).

Similar to previous research, at most of the ages, child shyness predicted the likelihood that the children would experience internalizing symptoms (i.e., symptoms of anxiety and mood disorders). Additionally, the way children's shyness scores changed over time also predicted which adolescents would experience internalizing symptoms. However, contrary to previous research, maternal warmth and control did not predict child psychological symptoms. Furthermore, the results did not indicate that certain parenting behaviors were better or worse for children with differing levels of shyness.

This study also explored whether child shyness and maternal parenting behaviors were related to one another over time. Results indicated that shyness levels predicted future levels of shyness, and maternal warmth/control predicted future levels of warmth/control. However, again contrary to the findings of previous studies, child shyness and maternal parenting did not predict one another.

Because the study findings were largely inconsistent with what was expected, possible explanations for these findings, study limitations, and directions for future research are discussed.

Acknowledgements

There are many people who deserve to be acknowledged for their role in this dissertation, my graduate school experience, and my life.

My advisor – Dr. Tom Ollendick. I sincerely appreciate the support and guidance you have given me over the many years we have worked together. In addition to being an advisor, you are truly a mentor and a friend. You have played a central role in my development as a clinical scientist and that will never be forgotten.

My dissertation committee – Dr. Martha Ann Bell, Dr. Lee Cooper, Dr. Jungmeen Kim-Spoon, and Dr. Angela Scarpa. I thank you for your time, but more importantly for your valuable feedback and guidance. I have been fortunate to work with or be taught by each of you in various contexts throughout my time at Virginia Tech and I am better for it. Dr. Martha Ann Bell and her lab members deserve special thanks for allowing me to recruit from their research sample, for fully supporting this project, and for tolerating my innumerable questions and requests. This project would not exist without their generosity.

My loving parents – Barbara and Stephen Ryan. Words could never fully capture all you have done for me. You have been my constant cheerleaders for every goal I have ever sought and I would not be where I am in my career, nor who I am as a person, without you.

My brothers – Luke and Michael Ryan. Since we were kids, you have always been fully supportive of my dreams while never failing to remind me that there is more to life than school and books. Thank you for the balance.

My extended family and many friends – Whether you knew it or not, your love, friendship, and encouragement has meant the world to me. I am so lucky to have so many wonderful people in my corner.

My cohort family – Carlos Salinas, Lauren Delk, Marlene Strege, Ransom Campbell, and Reina Factor. Your friendship brings so much joy to my life. I will be forever grateful that graduate school brought us together; this process was infinitely more enjoyable than it would have been without you.

And finally, my husband – Connor Radtke. Your unconditional and unwavering love, support, and patience have given me the strength to persevere. You make me a better person and I am blessed to have you in my life.

Thank you all.

Table of Contents

Abstract	ii
General Audience Abstract	iv
Acknowledgements	vi
Table of Contents	vii
List of Tables	viii
List of Figures	ix
Chapter 1 – Introduction	1
Behavioral Inhibition	1
Parenting.....	3
The Interaction between Behavioral Inhibition and Parenting Behaviors	4
Bidirectional Relationships between Behavioral Inhibition and Parenting Behaviors	5
The Current Study.....	6
Chapter 2 – Method	8
Participants	8
Procedures	9
Measures.....	9
Data Analyses	13
Chapter 3 – Results	17
Aim 1.1 Cross-Sectional Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology.....	17
Aim 1.2 Longitudinal Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology.....	17
Aim 2 Analysis of the Bidirectional Relationship between Child Shyness and Maternal Parenting.....	18
Supplemental Descriptive Statistics of the Time 6 Subsample and Exploratory Analyses ..	19
Chapter 4 – Discussion	21
Aim 1.1 Cross-Sectional Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology.....	21
Aim 1.2 Longitudinal Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology.....	23
Aim 2 Analysis of the Bidirectional Relationship between Child Shyness and Maternal Parenting.....	25
Additional Limitations	26
Conclusions	28
References	30
Tables	43
Figures	51

List of Tables

Table 1.....	43
<i>Variable Means and Standard Deviations across Time</i>	
Table 2.....	44
<i>Cross-Sectional Regression Results with Internalizing Symptoms as the Dependent Variable</i>	
Table 3.....	45
<i>Cross-Sectional Regression Results with Externalizing Symptoms as the Dependent Variable</i>	
Table 4.....	46
<i>Model Fit Statistics for the Unconditional Growth Curve Models of Shyness and the Conditional Growth Curve Model including Shyness and Adolescent Psychopathology</i>	
Table 5.....	47
<i>Longitudinal Regression Results with Adolescent Internalizing Symptoms as the Dependent Variable</i>	
Table 6.....	48
<i>Model Fit Indices of Cross-lagged Models including Child Shyness and Maternal Warmth</i>	
Table 7.....	48
<i>Model Fit Indices of Cross-lagged Models including Child Shyness and Maternal Control</i>	
Table 8.....	48
<i>Number of Adolescents Meeting Diagnostic Criteria for DSM-5 Disorders (N = 22)</i>	
Table 9.....	49
<i>Descriptive Statistics of Mother and Adolescent-Report of Maternal Parenting Behaviors and Bivariate Correlations between Mother and Adolescent-Report of Maternal Parenting Behaviors and Observational Measurement of Maternal Warmth and Control</i>	
Table 10.....	50
<i>Cross-Sectional Regression Results at Time 6 Including CRPBI subscales (N = 22)</i>	

List of Figures

Figure 1.....	51
<i>Hypothesized conditional model</i>	
Figure 2.....	52
<i>Hypothesized cross-lagged panel model</i>	
Figure 3.....	52
<i>Reciprocal time-lagged effects between shyness and maternal warmth</i>	
Figure 4.....	53
<i>Reciprocal time-lagged effects between shyness and maternal control</i>	
Figure 5.....	54
<i>Illustration of the moderating effect of maternal firm control on the relationship between adolescent shyness and internalizing symptoms</i>	

Chapter 1 - Introduction

With the worldwide point-prevalence rate of psychological disorders in childhood and adolescence estimated at 13.4%, and with up to 40% of youth meeting criteria for a psychological disorder throughout their development (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Kessler et al., 2012; Merikangas et al., 2010; Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015), researchers have sought to identify etiological factors which contribute to this high rate of psychopathology in youth. These factors include characteristics of the children (e.g., temperament) and characteristics of the environment (e.g., parenting behaviors), among several others. Furthermore, researchers have suggested that the interaction between a child's temperament and the parenting behaviors he or she is exposed to may have a greater impact on the development of psychopathology than either factor alone (Gallagher, 2002; Ryan & Ollendick, 2018). This suggestion is theoretically consistent with the diathesis-stress model and the concept of Goodness of Fit which together imply that poor parenting behaviors could contribute to the development of psychopathology in temperamentally at-risk children while parenting behaviors that are adapted to best fit a child's unique temperament may foster healthy psychological development (Chess & Thomas, 1999; Thomas, Chess, Birch, Hertzog, & Korn, 1963; Zuckerman, 1999).

Behavioral Inhibition

Behavioral inhibition is one component of temperament which has been consistently found to be associated with psychopathology in children (Clauss & Blackford, 2012; Klingzell et al., 2016; Panayiotou, Fanti, & Lazarou, 2015). Unlike other temperament traits (e.g., irritability, effortful control), both ends of the continuum of behavioral inhibition are associated with psychopathology and the majority of research finds high levels of behavioral inhibition to predict

internalizing symptoms and low levels of behavioral inhibition (i.e., behavioral disinhibition) to predict externalizing symptoms. Although all studies do not support those precise findings (e.g., Colder, Lochman, & Wells, 1997; Lahey et al., 2008), there is substantial support for both extremes of behavioral inhibition predicting negative outcomes in children. Unfortunately, various research teams use different terminology to capture this temperamental characteristic: behavioral inhibition/disinhibition, fearfulness/fearlessness, shyness, approach/withdrawal, and harm avoidance. However, regardless of the term used, behavioral inhibition generally refers to a biologically based disposition that is exhibited as avoidance or wariness in the presence of novel people, places, objects, or situations. Behavioral disinhibition is commonly used to refer to the converse: the lack of appropriate avoidance or wariness in the presence of novel people, places, objects, or situations.

Regarding internalizing symptomology, behavioral inhibition's strongest association is with social anxiety (Ollendick & Benoit, 2012); however, high levels of behavioral inhibition have also been found to predict symptoms of other anxiety disorders as well as depression, across both longitudinal and cross-sectional studies (e.g., Clauss & Blackford, 2012; Muris, van Brakel, Arntz, & Schouten, 2011; Oldehinkel, Veenstra, Ormel, de Winter, & Verhulst, 2006; Sportel, Nauta, de Hullu, de Jong, & Hartman, 2011). As noted above, externalizing symptomology – including aggression, oppositional behavior, and callous-unemotional traits – is commonly predicted by behavioral disinhibition or fearlessness (e.g., Raine, Reynolds, & Venables, 1998; Sentse, Veenstra, Lindenberg, Verhulst, & Ormel, 2009; Waller et al., 2016). However, behavioral inhibition has also been found to predict externalizing symptomology as well, indicating less specificity in the association between inhibition/disinhibition and externalizing psychopathology (Colder et al., 1997; Lahey et al., 2008).

Parenting

A wide variety of parenting behaviors have been explored in relation to the development of child psychopathology. These behaviors include psychological and behavioral control, inconsistent discipline, rejection, responsiveness, and warmth, among others. Of these, parental overprotection is strongly associated with the development of anxiety (McLeod, Wood, & Weisz, 2007; Ollendick & Benoit, 2012; van der Bruggen, Stams, & Bögels, 2008), while parental rejection and lack of warmth are associated with child depression (Hipwell, Keenan, Kasza, Loeber, & Bean, 2008; McLeod, Weisz, & Wood, 2007). In contrast, parenting behaviors related to involvement in the child's life (e.g., lack of involvement, poor monitoring/supervision) and discipline strategies (e.g., harsh parenting, inconsistent discipline) are most commonly associated with externalizing symptoms and behaviors (Gryczkowski, Jordan, & Mercer, 2010; McKee et al., 2007; Scaramella, Neppl, Ontai, & Conger, 2008).

Despite the relatively consistent support for the association between various parenting behaviors and child psychopathology, meta-analyses have demonstrated that parenting behaviors account for only a small proportion of the variance in child psychopathology. For example, McLeod, Weisz, and Wood (2007) and McLeod, Wood, and Weisz (2007) found that parenting behaviors accounted for only 4% of the variance in child anxiety and 8% in child depression. When the authors considered sub-dimensions of general parenting behaviors, they found that the variance accounted for by some behaviors increased to 18% (i.e., autonomy-granting) but others decreased as low as 1% (i.e., warmth). Meta-analyses exploring the association with externalizing symptoms are similar. Hoeve and colleagues (2009) found parenting to account for 11% of the variance in adolescent delinquency and Kawabata, Alink, Tseng, van Ijzendoorn, and Crick (2011) found the mean effect sizes (r) for the association between clusters of parenting

behaviors and child aggression to range from .04 to .12. Although these studies indicate that parenting behaviors play only a relatively small role in the development of psychopathology, other studies have supported the notion that these behaviors have a more significant impact when they are experienced by temperamentally vulnerable individuals.

The Interaction between Behavioral Inhibition and Parenting Behaviors

Studies which support this interaction between child temperament and parenting behaviors have been conducted in children from toddlerhood through adolescence and across both genders. They have also used differing constructs of behavioral inhibition (i.e., fear, shyness, inhibition) and have explored a variety of parenting behaviors. Similarly, a variety of psychological outcomes have been explored, although the most common are broad measures of internalizing and externalizing symptoms. With some exceptions, the results of these studies have consistently demonstrated that parenting behaviors moderate the relationship between child temperament and outcomes (see Ryan & Ollendick, 2018, for a review).

For example, Lewis-Morrarty and colleagues (2012) found that behavioral inhibition during early childhood (ages one to seven-years) predicted social anxiety symptoms during adolescence but only for the youth who experienced high levels of maternal over-control as young children. Another study found that high levels of fearfulness during adolescence predicted internalizing symptoms two years later regardless of parenting behaviors; however, this relationship was stronger for adolescents who reported experiencing high levels of parental rejection (Sentse et al., 2009). This same study demonstrated that low levels of fearfulness (i.e., a fearless temperament) predicted externalizing symptoms two years later but only when parental emotional warmth was low (Sentse et al., 2009). Additionally, two studies have demonstrated that fearless temperament only predicted later callous-unemotional traits, which commonly co-

occur with conduct problems, when parents had exhibited low levels of positive parenting during early childhood (Waller, Shaw, & Hyde, 2016; Waller, Trentacosta, et al., 2016).

Notably, however, this body of literature is quite inconsistent in its findings and rife with methodological variation and limitations which contribute to inconsistency of findings (i.e., lack of replication of results). A subsample of these limitations include the lack of standardized measures and the variability of measures used for defining behavioral inhibition, parenting variables, and child outcomes; variability in study design and timing of assessment sessions; variation in age ranges; and lack of exploration of parent sex differences.

Bidirectional Relationships between Behavioral Inhibition and Parenting Behaviors

In addition to the moderating roles behavioral inhibition and parenting behaviors play on their respective relationships with psychopathology, these variables directly influence each other as well. Studies have demonstrated that temperamental characteristics can elicit specific parenting behaviors in as little as a few minutes (Belsky, Rha, & Park, 2000) and across multiple years as well (Rubin, Nelson, Hastings, & Asendorpf, 1999). However, whether behavioral inhibition elicits more positive parenting behaviors (e.g., increases in acceptance, decreases in inconsistency) or more negative behaviors (e.g., increases in rejection, increases in intrusive over-control) is unclear as both have been found.

Conflicting evidence as to whether parenting behaviors directly influence child temperament also exists. Belsky and colleagues (2000) and Rubin and colleagues (1999) did not find parenting behaviors to be related to child temperament when measured a few minutes or two years later. However, other studies have found higher parental rejection and inconsistent discipline to predict increases in child fear across a one year period, maternal negativity when the children were four-years-old to predict shyness at seven years of age, and parental intrusive

control at age 15 to predict shyness at age 16 (Degnan, Henderson, Fox, & Rubin, 2008; Lengua, 2006; Lengua & Kovacs, 2005; Van Zalk & Kerr, 2011). Therefore, more research is clearly needed to explore these relationships.

The Current Study

The current study explored the relationships among child behavioral inhibition, maternal parenting behaviors, and child/adolescent psychopathology in a sample of youth who have completed assessments while 2-years-old, 3-years-old, 4-years-old, 6-years-old, 9-years-old, and during adolescence (Broomell, Smith, Calkins, & Bell, 2020; Helm et al., 2020; Liu, Calkins, & Bell, 2018). Because of the inconsistencies of previous research, the following two aims are exploratory in nature.

Aim 1. The moderating role of maternal parenting behaviors on the relationship between child behavioral inhibition and psychopathology will be explored cross-sectionally (Aim 1.1) and longitudinally (Aim 1.2). The ability to explore these relationships across various designs is a significant strength of the current study. As noted above, the designs of previous research have varied widely which increases the difficulty of explaining inconsistencies in findings. The current sample will include data gathered at multiple time points from when the youth were 2-years-old into mid-adolescence. This extensive dataset includes more assessment time points than any previously conducted work in this area. Furthermore, measuring the same constructs using similar (and often identical) methods across time points will control for other methodological and sample variance and allow for the detailed exploration of these relationships at distinct ages and across time.

Aim 2. To add to the literature regarding the bidirectional relationship between child temperament and parenting, the causal relationships between these variables will be modeled across time.

Additionally, a subsample of adolescents will complete additional assessment measures providing a more detailed picture of their psychological profile and allowing the correlation between parent/child-report of parenting behaviors and observational measures to be explored.

Chapter 2 - Method

Participants

The sample is comprised of 253 adolescents (47% male) who previously completed assessments through the Cognition, Affect, and Psychophysiology (CAP) Lab at Virginia Tech under the supervision of Dr. Martha Ann Bell. The children in this study represent Cohort 1 and Cohort 2 (50%) of a two-site longitudinal study designed to examine the interaction of cognition and emotion across early development (funded by R01 HD049878 and R03 HD043057; Martha Ann Bell, PI). The children in these two cohorts were recruited from a rural university town in southwest Virginia and the children in Cohort 3 (not included in the current study) were recruited from a mid-size city in North Carolina.

Cohort 1 children were three years older than Cohort 2 children. All children had research visits at 5, 10, 24, 36, and 48 months, as well as 6 and 9 years, with the following exceptions. Due to the timing of the grant renewal, Cohort 1 did not have a visit at age 6 but Cohort 2 did. Additionally, because of attrition, the research team re-recruited for Cohort 2 at the age 6 visit. Of the 110 children from Cohort 2 who contributed data at age 6, 47 were new recruits. The research team also re-recruited for Cohort 1 at the age 9 visit, adding 24 new participants to the study. For the current adolescent visit (Time 6), participants include Cohort 1 "old" and "new" (as of the age 9 visit) and Cohort 2 "old" and "new" (as of the age 6 visit) participants. These adolescents currently range in age from 12 to 18-years-old ($M = 14.25$, $SD = 1.93$) and are predominantly Caucasian (95%). The majority of mothers (76%) and fathers (71%) have completed a 4-year university or graduate degree program.

As noted above, the youth attended assessment sessions across their childhood. At the time points being included in the current study, the children were 2-years-old (Time 1; $N = 167$),

3-years-old (Time 2; $N = 144$), 4-years-old (Time 3; $N = 134$), 6-years-old (Time 4; $N = 110$), and 9-years-old (Time 5; $N = 192$). Additionally, 78 participants, to date, have completed an assessment session during adolescence (Time 6; mean age = 14.08, $SD = 1.84$; 44% Male).

Procedures

At each of the time points, the children attended the session with their mother. During these sessions, the children completed a variety of cognitive and emotion regulation tasks, mothers completed questionnaires, and both completed maternal-child interaction tasks. Additionally, at certain time points the children completed standardized measures of academic achievement and receptive language ability as well.

Following their completion of the Time 6 session at the CAP lab, the 78 families were invited to participate in a session at the Child Study Center. Twenty-two adolescents (mean age = 13.3, $SD = 1.66$; 40% male) and their mothers attended this session and completed questionnaires, a diagnostic interview, and an interaction task. This study remains underway.

Measures

Temperament. Child temperament was measured at each time point using developmentally appropriate, parallel, parent-report questionnaires: Early Childhood Behavior Questionnaire (Time 1; Putnam, Gartstein, & Rothbart, 2006), Child Behavior Questionnaire (Time 2-4; Putnam & Rothbart, 2006), and the Early Adolescent Temperament Questionnaire-Revised (Time 5-6; Ellis & Rothbart, 2001). At each time point mothers answered questions about their child's behavior on a 7-point Likert scale (1 = Never to 7 = Always). The items of each measure create 11-18 temperament scales. The temperament scale of Shyness was used in the current study as a measure of behavioral inhibition at each time point. This subscale measures inhibition to novelty, uncertainty, and challenge.

Parenting.

Observation. At time points 1 through 5, each mother-child dyad completed one, two, or three interaction tasks depending on the child's age and the timing of his/her recruitment. Activities included collaborating to solve puzzles, draw shapes on an etch-a-sketch, and solve a marble maze. These interaction tasks were audio and video recorded. Mothers' *positive affect*, *negative affect*, *intrusiveness*, *permissiveness*,¹ *directiveness*, and the degree to which they *facilitated the child's attention* were coded on four-point scales (1 = behavior/affect was not exhibited; 2 = minimal; 3 = moderate; 4 = high/strong/intense) for each task. Mothers' scores for each variable were averaged across tasks.

The five variables (excluding *permissiveness*) were standardized and combined to create composite scores measuring warmth and control. The warmth composite was comprised of *positive affect*, *negative affect* (reverse scored), and *facilitates attention*. The control composite was comprised of *intrusiveness* and *directiveness*. To create the composite scores, the standardized variables for each composite were averaged together and then the composite score was standardized again. Winsorization was applied to composite Z scores that were greater than three standard deviations from the mean; across the sessions, nine outliers on the warmth composite and eight on the control composite were replaced by the next closest score. With only a few exceptions, the subscales of each composite score significantly correlated with one another at each time point.

At Time 6, the 22 mother-adolescent dyads who completed the session at the Child Study Center completed a conflict task during which they were asked to discuss two previously-

¹ Permissiveness measures a mothers' lack of intent to redirect the child when he/she is off task. Because it is only coded when a child is off task, overall N's at each time point were low and permissiveness was not included in either composite parenting score.

identified issues over the course of 12-minutes. Prior to beginning the task, each adolescent and mother viewed a list of common issues between adolescents and their parents (e.g., doing homework; how to spend free time; cleaning up room) and rated the frequency and intensity of discussion of the issues over the last two weeks. This conflict task was videotaped and maternal behaviors were coded using the Family Interaction Macro-coding System (FIMS; Holmbeck, Zebracki, Johnson, Belvedere, & Hommeyer, 2013). Families were rated on codes assessing interaction style, conflict, affect, control, and collaborative problem solving. Each item is rated on a five-point Likert-scale scale (1 = Not at All to 5 = Very Often). The coding manual includes descriptors for each anchor. Undergraduate research assistants were trained to code the video-recordings for a separate project. For the current project, each interaction was independently coded by two, three, or four coders. Interclass correlation coefficients for the six scales being used in the current study ranged from acceptable to good (.591-.869).

The *positive affect*, *negative affect*, *warmth*, *supportiveness*, *dominance*, and *pressure* scales were used in the current study. Similar to the procedure for the earlier time points, the six variables were standardized and combined to create composite scores measuring warmth and control. The warmth composite was comprised of *positive affect*, *negative affect* (reverse scored), *warmth*, and *supportiveness*. The control composite was comprised of *dominance* and *pressure*. To create the composite scores, the standardized variables for each composite were averaged together and then the composite score was standardized again. Following this procedure there were no outliers.

Alabama Parenting Questionnaire. The Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996) is 42-item measure of parenting behaviors with corresponding child and parent-report versions. All items are rated on a five-point Likert scale (1 = Never, 3 =

Sometimes, 5 = Always) and are summed to create five subscales: positive involvement, supervision/monitoring, positive discipline, consistency of discipline, and corporal punishment. Acceptable reliability and validity has been established for all subscales except corporal punishment (Dadds, Maujean, & Fraser, 2003; Gryczkowski et al., 2010; Hawes & Dadds, 2005; Shelton et al., 1996). Although the APQ was originally designed for children ages 6 to 13, acceptable psychometric properties have also been found in adolescent populations (Essau, Sasagawa, & Frick, 2006; Frick, Christian, & Wootton, 1999). Mothers and adolescents who attended the Time 6 appointment at the Child Study Center independently completed the APQ.

Child Report of Parenting Behavior Inventory. The original Child Report of Parenting Behavior Inventory (CRPBI; Schaefer, 1965) included 260 items but it has been subsequently shortened several times. The most recent version (Schludermann & Schludermann, 1988) contains 30 items which comprise three dimensions: acceptance/rejection, firm control/lax control, psychological control/psychological autonomy. Youth rate the extent to which each item represents their mother/father on a three-point scale (1 = Not Like, 2 = Somewhat Like, 3 = A Lot Like). Although a published reference for the 30-item version is not available, numerous studies have found it to have acceptable reliability and applicability to adolescent samples (Bebes, Samarova, Shilo, & Diamond, 2015; Oudekerk, Allen, Hessel, & Molloy, 2015; Peisch et al., 2016). The CRPBI was completed by the 22 adolescents who attended the Time 6 appointment at the Child Study Center.

Psychopathology.

Child Behavior Checklist. Child psychopathology was measured at time points 2-6 using the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). The CBCL is a 118-item parent-report measure for children ages 18 months to 18 years. Across the CBCL each item is

rated on a 3-point Likert scale (0 = Not True to 2 = Very/Often True) and eight syndrome scale scores are calculated based on age and gender norms. These syndrome scales are combined to form an Internalizing Problems score, Externalizing Problems score, and an overall Total Problems score. The Internalizing Problems and Externalizing Problems composite scores are utilized in the current study. Raw scores are used for Time 2 and Time 3, and T-scores are used for Time 4, Time 5, and Time 6.

Anxiety Disorders Interview Schedule. The Anxiety Disorders Interview Schedule (ADIS; Silverman & Albano, 1996) is a semi-structured diagnostic interview which facilitates the diagnosis of anxiety and related disorders. Clinician Severity Ratings (CSRs) are assigned on a 9-point scale (0 to 8, ratings of 4 or greater suggest clinical level of interference) for each disorder. In the current study, mothers and adolescents who attended the Time 6 appointment at the Child Study Center were interviewed simultaneously and one CSR was provided for each disorder based on the collective information both individuals contributed.

Data Analyses

The primary independent variable is shyness (as measured by the ECBQ, CBQ, and EATQ) and the primary dependent variables are the internalizing problems score and externalizing problems score (as measured by the CBCL). The primary moderating variables (i.e., parenting) are the warmth and control composite parenting scores.

To explore the cross-sectional influence of behavioral inhibition, parenting, and their interaction on child psychopathology (Aim 1.1) a separate hierarchical regression model was run for each time point at which psychopathology was assessed (i.e., Time 2 – Time 6). The overall R^2 values for each model, and the coefficients for each variable and the interaction, are reported

in order to evaluate the relative impact of these variables on psychopathology across development. Shyness and the parenting composite scores were mean centered in all models.

Structural Equation Modeling (SEM) was used to address study aims 1.2 and 2. The Mplus Version 8.4 statistical software program was used and missing data was accounted for using full information maximum likelihood estimation (Muthén & Muthén, 1998-2017). This allowed all data at each time point to be utilized without excluding participants who did not complete all measures or attend every time point. Root Mean Square Error of Approximation (less than .06), Confirmatory Fit Index (greater than or equal to .95), Standardized Root Mean Square Residual (less than .08), and χ^2 value and corresponding *p*-value were utilized as model fit indices (Hooper, Coughlan, & Mullen, 2008; Hu & Bentler, 1999).

The unconditional latent growth curve model for shyness included all 253 participants and shyness at Time 1 through 5. The fit of three models was compared using chi-square difference tests. The first model included the fixed linear slope of shyness, the second model included the linear slope of shyness with freed factor loadings, and the third model included the quadratic slope. After the best fitting unconditional model was identified, the conditional model, including the internalizing and externalizing problems scores, was fit to the 78 participants who completed the Time 6 session (See Figure 1).

Grouping variables were created, based on maternal warmth and control composite scores in order to utilize multi-group models to assess the moderating role of parenting behavior. At each time point, mothers' warmth and control scores were categorized as "average" if they fell within half a standard deviation from the mean (i.e., mean \pm .5 SD). Scores more than half a standard deviation below the mean were labeled "below average" and scores more than half a standard deviation above the mean were labeled "above average." Each mothers' final warmth

and control group status was based on the earliest time point for which their parenting behavior scores were available.

The multi-group models were attempted in Mplus but could not be conducted because the models failed to converge. This is likely due to the small sample sizes in each group and missing data across time points. Alternative analyses allowing the moderating role of parenting to be explored in longitudinal models were conducted using hierarchical regression analyses. In separate models, adolescent internalizing symptoms were regressed on shyness at Time 1 through Time 5, maternal warmth and control (as a continuous variable), and the interaction between shyness and warmth/control. Each mothers' warmth and control score was based on the earliest time point for which their parenting behavior scores were available. Shyness and the parenting composite scores were mean centered in all models.

Cross-lagged panel analyses were used to address Aim 2 (See Figure 2). Time 6 was excluded from the hypothesized model because of the limited number of participants for which parenting scores were available at that time point ($N = 21$)². First, a baseline autoregressive model with child shyness predicting child shyness at the next time point and maternal parenting predicting parenting at the next time point was tested. In the next model, the effect of shyness was estimated by regressing maternal warmth/control on shyness from the preceding time point. Next, the effect of parenting was estimated by regressing child shyness on maternal warmth/control from the preceding time point. Finally, the full cross-lagged model was tested in which both shyness and maternal parenting were regressed on the variables from the preceding time point. In each model, correlations among shyness and parenting at nonsequential time

² A video-recording malfunction prohibited the coding of one mother-adolescent dyad.

points (e.g., Time 1 and Time 3) were included to help account for shared method variance. The fit of the three subsequent models was compared to the autoregressive model (i.e., the most parsimonious) using chi-square difference tests.

Lastly, supplemental descriptive statistics are provided for the subsample ($N = 22$) who completed the session at the Child Study Center. T-tests and chi-square analyses were used to compare this subsample to the larger sample of children who completed the Time 6 session ($N = 78$). An exploratory cross-sectional hierarchical regression analysis was used to assess the moderating role of adolescent-reported parenting behavior (i.e., CRPBI subscales) on the relationship between adolescent shyness and psychopathology. Additionally, bivariate correlations between parent and adolescent-report of maternal parenting behaviors and the warmth and control composite scores are provided.

Chapter 3 - Results

Descriptive statistics for each primary variable at each time point are presented in Table 1

Aim 1.1 Cross-Sectional Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology

Cross-sectional, hierarchical multiple regression analyses were conducted to examine the influence of child shyness, maternal warmth and control, and the interaction between shyness and parenting on child psychopathology at each time point. In the first step of the regression models, shyness significantly predicted internalizing symptoms at Time 4, $b = 2.18$, $t(95) = 3.26$, $p = .002$, Time 5, $b = 4.43$, $t(155) = 6.36$, $p = .026$, and Time 6, $b = 3.40$, $t(17) = 3.27$, $p = .002$, but not at Time 2 or Time 3. Additionally, control significantly predicted internalizing symptoms at Time 5, $b = 1.66$, $t(153) = 2.24$, $p = .026$, but neither control nor warmth significantly predicted internalizing symptoms at any other time point. Regarding moderation, the relationship between shyness and internalizing symptoms was not significantly moderated by warmth or control at any time point. See Table 2.

Shyness did not significantly predict externalizing symptoms at any time point. Additionally, no parenting variables significantly predicted externalizing symptoms with the exception of warmth at Time 5, $b = -1.96$, $t(153) = -2.05$, $p = .040$. Regarding moderation, the relationship between shyness and externalizing symptoms was not significantly moderated by warmth or control at any time point. See Table 3.

Aim 1.2 Longitudinal Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology

The model fit statistics of the unconditional growth curve models including shyness at Time 1 through Time 5 can be found in Table 4. The inclusion of the quadratic slope fit the data

well and was a significant improvement over the fixed linear model $\Delta\chi^2(7) = 177.77, p < .001$, and the linear model with freed slope factor loadings, $\Delta\chi^2(4) = 35.17, p < .001$. When adolescent internalizing and externalizing symptoms were included in the model the overall fit remained good (Table 4). The slope of shyness significantly predicted adolescent internalizing symptoms, $\beta = 0.19, p = 0.038$, but the intercept did not. Neither the intercept, nor the slope, of shyness significantly predicted adolescent externalizing symptoms.

Hierarchical regression analyses were used to further explore the main effect and moderating effect of maternal behaviors over time. As can be seen in Table 5, child shyness did not significantly predict adolescent internalizing symptoms. Additionally, early measurements of maternal warmth and control also did not significantly predict adolescent internalizing symptoms or moderate the relationship between shyness and internalizing symptoms.

Aim 2 Analysis of the Bidirectional Relationship between Child Shyness and Maternal Parenting

The results of the cross-lagged model including warmth are presented in Figure 3. The fit of the autoregressive model was acceptable (Table 6). The second and third models, which included the effects of shyness on parenting, $\Delta\chi^2(4) = 1.74, p = .783$, and parenting on shyness, $\Delta\chi^2(4) = 4.51, p = .341$, respectively, did not significantly improve the model fit. The final model, which included both sets of cross-lagged effects, also fit the data well while not significantly improving the fit when compared to the autoregressive model, $\Delta\chi^2(11) = 7.83, p = .728$. Each autoregressive path between shyness at the various time points was significant, and each autoregressive path between warmth at the various time points was significant, indicating that both shyness and warmth were significantly associated over time. However, none of synchronous correlations or cross-lagged effects were significant, indicating that youth shyness

and maternal warmth were not correlated at any time point, youth shyness did not predict future displays of maternal warmth, and maternal warmth did not impact future levels of youth shyness. These findings were consistent across the four models.

The results of the cross-lagged model including control are presented in Figure 4. Results were similar to the warmth model; the fit of the autoregressive model was acceptable (Table 7). The second and third models, which included the effects of shyness on parenting, $\Delta \chi^2 (4) = 6.36, p = .174$, and parenting on shyness, $\Delta \chi^2 (4) = 1.64, p = .802$, respectively, did not significantly improve the model fit. The final model, which included both sets of cross-lagged effects, also fit the data well while not significantly improving the fit when compared to the autoregressive model, $\Delta \chi^2 (11) = 14.5, p = .207$. Consistent with the warmth models, each autoregressive path between shyness at the various time points was significant. However, the autoregressive paths between control at Time 1 and Time 2, and Time 4 and Time 5 were significant, while the paths between Time 2 and Time 3, and Time 3 and Time 4, were not. Only one of synchronous correlations (Time 2) and none of the cross-lagged effects were significant, indicating that youth shyness and maternal warmth were not correlated at four of the five time points, youth shyness did not predict future displays of maternal control, and maternal control did not impact future levels of youth shyness. These findings were consistent across the four models.

Supplemental Descriptive Statistics of the Time 6 Subsample and Exploratory Analyses

The subsample of adolescents who completed the additional assessment session at the Child Study Center did not significantly differ from the remainder of the adolescents who completed the Time 6 session on sex, $\chi^2(1, N = 78) = 0.55, p = .457$, age, $t(75) = 1.51, p = .253$, race, $\chi^2(1, N = 78) = 0.55, p = .457$, maternal education level, $\chi^2(1, N = 78) = 0.13, p = .716$,

paternal education level, $\chi^2(1, N = 78) = 1.54, p = .215$, shyness, $t(75) = 0.88, p = .383$, internalizing symptoms, $t(75) = -1.37, p = .175$, or externalizing symptoms $t(75) = -0.90, p = .369$.

Of the 22 adolescents in the subsample, 16 (73%) met criteria for at least one DSM-V diagnosis per the ADIS-5. Of those, 14 (64%) met criteria for an internalizing disorder and 6 (27%) met criteria for an externalizing disorder (See Table 8). The number of diagnoses for each adolescent ranged from zero to five, indicating considerable comorbidity for many of the youth.

In this sample, observed maternal warmth and control did not significantly correlate with maternal- or child-report of parental behavior (See Table 9).

The moderating role of adolescent reported maternal behavior (acceptance/rejection, firm control/lax control, psychological control/psychological autonomy) was explored in this subsample. The results of these models can be viewed in Table 10. Maternal acceptance/rejection and psychological control/psychological autonomy did not significantly predict adolescent internalizing or externalizing symptoms, and they did not significantly moderate the relationship between shyness and internalizing symptoms or shyness and externalizing symptoms. However, maternal firm control did significantly predict adolescent internalizing symptoms, $b = 1.34, t(17) = 2.80, p = .012$, and significantly moderated the relationship between shyness and internalizing symptoms, $\Delta R^2 = .18, F(1,17) = 10.0, p = .006$. As can be seen in Figure 5, when mothers utilize low, $b = 10.84, t(17) = 5.88, p < .001$, or mean levels, $b = 6.42, t(17) = 4.87, p < .001$, of firm control there is a significant positive relationship between adolescent shyness and internalizing symptoms. However, when mothers exhibit high levels of firm control the relationship between shyness and internalizing symptoms is nonsignificant, $b = 1.99, t(17) = 1.00, p = .333$.

Chapter 4 - Discussion

Aim 1.1 Cross-Sectional Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology

The current study aimed to extend the research surrounding the effects of child behavioral inhibition, parenting, and their interaction on the development of psychopathology. Consistent with previous research, youth shyness, a measure of behavioral inhibition, significantly predicted internalizing symptoms at Time 4 (6-years-old), Time 5 (9-years-old), and Time 6 (adolescence). However, shyness did not significantly predict externalizing symptoms at any point in time. Although high levels of behavioral inhibition have been found to predict externalizing symptoms in some studies (Colder et al., 1997; Lahey et al., 2008), these symptoms are more commonly associated with behavioral disinhibition (i.e., fearlessness). Unfortunately, lower scores on the shyness subscales of the temperament measures used in the current study did not clearly capture fearlessness. Although fearless children would score low on the shyness scale, a low score is not indicative of disinhibition per se.

With only two exceptions, maternal warmth and control did not significantly predict youth psychopathology across the time points. Previous literature exploring the relationship between these parenting behaviors and child psychopathology is mixed; however, numerous studies have supported the impact of both warmth (Asselmann, Wittchen, Lieb, Hofler, & Beesdo-Baum, 2015; Hipwell et al., 2008; Sentse et al., 2009; Suchman, Rounsaville, DeCoste, & Luthar, 2007) and behavioral control (Barber, Maughan, & Olsen, 1994; Gilliom & Shaw, 2004; Lewis-Morrarty et al., 2012; van der Bruggen et al., 2008). Nevertheless, these findings must be considered in light of meta-analyses indicating that parenting behaviors account for

small portions of the variance in child psychopathology (Hoeve et al., 2009; Kawabata et al., 2011; McLeod, Weisz, et al., 2007; McLeod, Wood, et al., 2007).

Importantly, in the majority of studies, parental behaviors are measured with parent- or child-report measures. These measures typically capture parenting behavior broadly. It is possible that the observed behavior which was coded in this study did not fully capture maternal behavior outside of the session. This conjecture is supported by the lack of significant correlations between observed parental behavior and questionnaire reports of behavior in the subsample of adolescents. While other studies have found significant relationships between self-reported and observed parental behavior, the observation periods in those studies was significantly longer which may have allowed the observers to view a more representative sample of the parents' behaviors (Hawes & Dadds, 2006; Kochanska, Kuczynski, & Radke-Yarrow, 1989).

The exploratory regression analyses including adolescent-report of their mother's behavior identified a significant main effect of the firm control subscale on internalizing symptoms and a significant moderating effect on the relationship between shyness and internalizing symptoms. The current findings indicated that there is a significant positive association between adolescent shyness and internalizing symptoms when their mothers exhibit low or moderate levels of firm control. On average, the adolescents who had low levels of shyness and who experienced low levels of firm control exhibited fewer internalizing symptoms. This is in contrast to findings by Lewis-Morrarty and colleagues (2012) who found that the simultaneous experience of low levels of behavioral inhibition and low levels of maternal control predicted higher levels of social anxiety symptoms during adolescence. The authors also noted that high behavioral inhibition only predicted social anxiety symptoms in the presence of high

levels of maternal control, another discrepancy from the current study. These discrepant findings could be due to the longitudinal design of that study or other confounding variables. For example, Van Brakel, Muris, Bögels, and Thomassen (2006) found that the moderating role of parental control on the relationship between behavioral inhibition and broad anxiety symptoms varied depending on whether the adolescent was securely or insecurely attached.

Additionally, the discrepant findings were likely influenced by the *type* of parental control that was measured. While the firm control subscale used in the current study captured maternal behavioral control, the measure of control used by Lewis-Morrarty and colleagues captured psychological control. Although both types of control are related to child psychopathology, high levels of parental psychological control has been consistently found to predict child internalizing symptoms while low levels of parental behavioral control has been found to predict child externalizing symptoms (Ballash, Leyfer, Buckley, & Woodruff-borden, 2006; Barber et al., 1994; Ollendick & Grills, 2016). The relationship between parental behavioral control and child internalizing symptoms is currently unclear and needs further exploration: the relationship has been found to be negative (Barber et al., 1994; Özdemir, 2012), positive (Mills & Rubin, 1998; Wijsbroek & Hale, 2011), and non-significant (Gaertner, Fite, & Colder, 2010; Symeou & Georgiou, 2017).

Aim 1.2 Longitudinal Analysis of the Moderating Role of Maternal Parenting on the Relationship between Child Shyness and Psychopathology

Because multi-group models could not be run, conclusions regarding the longitudinal role of shyness and parenting on the development of psychopathology are limited. Most importantly, the hierarchical regression analyses could not capture the variation in child shyness over time. This change over time significantly predicted adolescent internalizing symptoms per the

conditional growth curve model while baseline levels of shyness did not. Therefore, findings indicating that child shyness at each individual time point did not significantly predict adolescent outcomes were unsurprising. Gathering additional data at the adolescent time point would allow the more sophisticated, planned analyses to be completed. These may provide important information regarding how the trajectory of youth inhibition interacts with parenting behaviors over childhood.

However, it is important to note that the lack of a significant relationship between child shyness and adolescent psychopathology could have been influenced by the length of time between measurement points. In a larger sample that included children from the current study's sample and another cohort of subjects, Liu and colleagues (2018) found that fearful inhibition (a composite measure of fear and shyness) measured at age two significantly predicted child internalizing symptoms at age six. Although the duration between time points in that study (i.e., four years) is only slightly shorter than that between Time 5 and Time 6 in the current study, it may have partially contributed to the discrepant findings. Although two studies have found behavioral inhibition to significantly predict child outcomes over extended time periods (i.e., greater than six years; Lewis-Morrarty et al., 2012; Prinzie, van Harten, Deković, van den Akker, & Shiner, 2014) these relationships are most often studied cross-sectionally and in longitudinal studies of short duration.

Furthermore, Liu and colleagues (2018) found maternal negativity (a composite measure of maternal intrusiveness and negative affect) measured at age 3 neither independently predicted child internalizing symptoms nor interacted with fearful inhibition to predict internalizing symptoms. Although a different composite of maternal behaviors was used, these findings are similar to those of the current study. The authors' results did indicate, however, that the three-

way interaction between child fearful inhibition, child inhibitory control, and maternal negativity significantly predicted internalizing symptoms when the children were six-years-old. Similar to the findings of Van Brakel and colleagues (2006), this provides additional evidence that role of the interaction between child behavioral inhibition and parenting behaviors may vary depending on other characteristics of the child or family.

Aim 2 Analysis of the Bidirectional Relationship between Child Shyness and Maternal Parenting

Previous studies have consistently demonstrated that both child temperament and parenting behaviors are moderately stable across time (Baker, Baibazarova, Ktistaki, & Shelton, 2012; Barber et al., 1994; Burke, Pardini, & Loeber, 2008; McNally, Eisenberg, & Harris, 1991; Neppl et al., 2010; Pedlow, Sanson, Prior, & Oberklaid, 1993; van den Akker, Dekovi, Prinzie, & Asscher, 2010) and these findings were replicated in the current study for shyness, warmth, and control (to a lesser degree). However, the lack of significant cross-lagged effects between shyness and parenting is inconsistent with previous findings. Previous studies have found significant cross-lagged effects between multiple measures of behavioral inhibition (e.g., shyness, fearfulness, inhibition) and multiple parenting behaviors (e.g., acceptance/rejection, inconsistent discipline, intrusive control) across childhood and adolescence (Belsky et al., 2000; Degnan et al., 2008; Lengua, 2006; Lengua & Kovacs, 2005; Rubin et al., 1999; Van Zalk & Kerr, 2011). Notably, however, with one exception, these studies measured child temperament and parenting behaviors via questionnaires (Belsky et al., 2000). It is possible that the findings of those studies were influenced by single-informant bias which was not present during the current study.

Additionally, as noted above, the observational measures of parenting behavior in the current study may not accurately capture maternal behavior outside of the lab, contributing to the current findings. Although Belsky and colleagues (2000) measured parental behaviors via observational coding during a lab task, their study design explored the association between child inhibition and parental behaviors during short behavioral tasks that immediately followed one another. While certainly influenced by parents overall parenting styles, observational coding of parental behavior during short epochs (e.g., 30 seconds in the current study) may better capture parents' reactions to their child's present behavior. Future studies should utilize multi-method assessment of parental behaviors to be able to ascertain whether these posited effects are at play.

Furthermore, although child behavioral inhibition during the maternal-child interaction tasks in the current study was not recorded, at time points one through five, the tasks the children were engaged in were not likely to elicit significant levels of inhibition (i.e., completing puzzles and mazes, drawing with an Etch-a-sketch). If the maternal behavior codes were indeed capturing mothers' reaction to their child's present behavior, each mother's score is likely not representative of how she responds to her child's day-to-day displays of inhibition.

Additional Limitations

In addition to the possible impact of the observational measure of maternal behaviors, the selected measure of behavioral inhibition could have influenced the study outcomes in two ways. First, as noted above, this measure does not capture fearlessness, negating our ability to explore the relationships between that end of the continuum of behavioral inhibition and the other study variables. Second, although intending to capture inhibition broadly, the majority of items that comprise the shyness subscale of the measures used in the current study capture inhibition in social situations and interactions. Thus, this measure does not fully represent the general

wariness of novel places, situations, and objects outside of social situations that comprise the accepted construct of behavioral inhibition. It is possible that this measure captured a unique component of behavioral inhibition that is predictive of unique psychological symptoms (e.g., social anxiety) rather than internalizing or externalizing symptoms broadly. Although shyness has been found to predict broad anxiety symptoms in both kindergarteners (Coplan, Arbeau, & Armer, 2008) and adolescents (Prinz et al., 2014) it is infrequently used as a measure of behavioral inhibition and thus conclusions are hard to draw. A wide range of terminology and an even wider range of measures are used to capture youth behavioral inhibition. The field could benefit from research exploring the correlations among these measures and their relative effects on child psychopathology.

Characteristics of the study sample also limit potential conclusions and generalizability. The sample is predominantly comprised of Caucasian youth whose parents are highly educated which limits generalizability to other more diverse samples. The study sample also includes only mothers and it will be important for future studies to also consider the impact of paternal parenting behaviors on the development of child psychopathology. In two parent families, in addition to independently influencing child outcomes, the interaction between maternal and paternal parenting also likely plays an important role as these behaviors cannot be extricated from the family system as a whole. This study also did not consider whether the relationships between child shyness, maternal parenting, and child psychopathology varied by child sex. To date, few studies have explored potential sex differences and those that have reached different conclusions (Gryczkowski et al., 2010; McKee et al., 2007). This is another important direction for future research and may be particularly fruitful when both child and parent sex are considered in the same sample.

Finally, although there was notable range in internalizing and externalizing symptoms scores across youth, the majority of youth exhibited “average” levels of symptoms for their age and gender. The study findings may differ if tested in a clinical sample. However, in this regard, it is important to note that the majority (73%) of the subsample of youth who completed the diagnostic interview met criteria for at least one psychological disorder. This rate is higher than expected in community samples and is incongruent with the mean CBCL T-scores falling near 50 at the various time points. While it is possible that an unmeasured confounding variable predicted both higher levels of psychopathology and willingness to participate in the additional assessment session, informant differences could also at least partially account for these discrepancies. While mothers completed the CBCL about their adolescent’s symptoms, the adolescents themselves contributed to the diagnostic interview and might have reported problems that their mothers were either unaware of or did not view as particularly important or troublesome to their sons or daughters. Discrepancies between the reports of mothers and their adolescent children are not at all uncommon (Grills & Ollendick, 2003; Reyes & Kazdin, 2005).

Conclusions

Despite the limitations and qualifications discussed above, the current study is one of only two that explore the relationships among child behavioral inhibition, parental behaviors, and child psychopathology both cross-sectionally and longitudinally using the same sample (Vreeke, Muris, Mayer, Huijding, & Rapee, 2013). The six time points included in the current study provide more assessment points, spaced over a larger period of development than any other studies of these variables to date. This complex design, and the fact that measures of temperament, parenting, and psychopathology were consistent over time, controls for the sample and methodological variance that has contributed to discrepancies between previous studies.

Further examining the longitudinal relationships among these variables with a larger sample size at Time 6 will allow these strengths to be capitalized on. This is particularly relevant to the multi-group SEM analyses. The current study is the first to note that the variation in child behavioral inhibition over time may impact their psychological outcomes (i.e., internalizing symptoms). It will be important for future research to identify which temperament trajectories increase the risk of the development of an internalizing disorder and whether that risk is influenced by parental behaviors.

The results of the current study highlight the necessity of future research in this area to be extended in multiple ways: with the controlled comparison of the various labels for behavioral inhibition (e.g., fearfulness, approach/avoidance, shyness) to determine whether they are capturing the same construct and predicting the same outcomes; with the comparison of observational and questionnaire measures of parenting behaviors to assess their ability to capture “state” versus “trait” parenting and whether these different measurement methods differentially relate to child temperament; and to identify what other components of the child or the family system (e.g., inhibitory control, attachment, child sex) may influence the variable relationships discussed herein.

References

- Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA School-Age Forms & Profiles*. Burlington, VT: Research Center for Children, Youth, & Families.
- Asselmann, E., Wittchen, H. U., Lieb, R., Hofler, M., & Beesdo-Baum, K. (2015). The role of behavioral inhibition and parenting for an unfavorable emotional trauma response and PTSD. *Acta Psychiatrica Scandinavica*, *131*(4), 279–289.
<https://doi.org/10.1111/acps.12316>
- Baker, E., Baibazarova, E., Ktistaki, G., & Shelton, K. H. (2012). Development of fear and guilt in young children: Stability over time and relations with psychopathology, *24*, 833–845.
<https://doi.org/10.1017/S0954579412000399>
- Ballash, N., Leyfer, O., Buckley, A. F., & Woodruff-borden, J. (2006). Parental control in the etiology of anxiety. *Clinical Child and Family Psychology Review*, *9*(2).
<https://doi.org/10.1007/s10567-006-0007-z>
- Barber, B. K., Maughan, S. L., & Olsen, J. A. (1994). Associations between parental psychological and behavioral control and youth internalized and externalized behaviors. *Child Development*, *65*(4), 1120–1136.
- Bebes, A., Samarova, V., Shilo, G., & Diamond, G. M. (2015). Parental acceptance, parental psychological control and psychological symptoms among sexual minority adolescents. *Journal of Child and Family Studies*, *24*(4), 882–890. <https://doi.org/10.1007/s10826-013-9897-9>
- Belsky, J., Rha, J., & Park, S. (2000). Exploring reciprocal parent and child effects in the case of child inhibition in US and Korean samples. *International Journal of Behavioral Development*, *24*(3), 338–347. <https://doi.org/10.1080/01650250050118321>

- Broomell, A. P. R., Smith, C. L., Calkins, S. D., & Bell, M. A. (2020). Context of maternal intrusiveness during infancy and associations with preschool executive function. *Infant and Child Development, 29*(1), 1–16. <https://doi.org/10.1002/icd.2162>
- Burke, J. D., Pardini, D. A., & Loeber, R. (2008). Reciprocal relationships between parenting behavior and disruptive psychopathology from childhood through adolescence. *Journal of Abnormal Child Psychology, 36*, 679–692. <https://doi.org/10.1007/s10802-008-9219-7>
- Chess, S., & Thomas, A. (1999). *Goodness of fit: Clinical applications from infancy through adult life*. Psychology Press.
- Clauss, J. A., & Blackford, J. U. (2012). Behavioral inhibition and risk for developing social anxiety disorder: A meta-analytic study. *Journal of the American Academy of Child and Adolescent Psychiatry, 51*(10), 1066–1075.
<https://doi.org/10.1016/j.jaac.2012.08.002>. Behavioral
- Colder, C. R., Lochman, J. E., & Wells, K. C. (1997). The moderating effects of children's fear and activity level on relations between parenting practices and childhood symptomatology. *Journal of Abnormal Child Psychology, 25*(3), 251–263.
<https://doi.org/10.1023/A:1025704217619>
- Coplan, R. J., Arbeau, K. A., & Armer, M. (2008). Don't fret, be supportive! Maternal characteristics linking child shyness to psychosocial and school adjustment in kindergarten. *Journal of Abnormal Child Psychology, 36*(3), 359–371. <https://doi.org/10.1007/s10802-007-9183-7>
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry, 60*, 837–844. <https://doi.org/10.1001/archpsyc.60.8.837>

- Dadds, M. R., Maujean, A., & Fraser, J. A. (2003). Parenting and conduct problems in children: Australian data and psychometric properties of the Alabama Parenting Questionnaire. *Australian Psychologist, 38*(3), 238–241. <https://doi.org/10.1080/00050060310001707267>
- Degnan, K. A., Henderson, H. A., Fox, N. A., & Rubin, K. H. (2008). Predicting social wariness in middle childhood: The moderating roles of childcare history, maternal personality and maternal behavior. *Social Development, 17*(3), 471–487. <https://doi.org/10.1111/j.1467-9507.2007.00437.x>
- Ellis, L. K., & Rothbart, M. K. (2001). Revision of the Early Adolescent Temperament Questionnaire. *Poster Presented at the Biennial Meeting of the Society for Research in Child Development. Minneapolis, Minnesota.*
- Essau, C. A., Sasagawa, S., & Frick, P. J. (2006). Psychometric properties of the Alabama Parenting Questionnaire. *Journal of Child and Family Studies, 15*(5), 595–614. <https://doi.org/10.1007/s10826-006-9036-y>
- Frick, P. J., Christian, R. E., & Wootton, J. M. (1999). Age trends in the association between parenting practices and conduct problems. *Behavior Modification, 23*(1), 106–128. <https://doi.org/10.1177/0145445599231005>
- Gaertner, A. E., Fite, P. J., & Colder, C. R. (2010). Parenting and friendship quality as predictors of internalizing and externalizing symptoms in early adolescence. *Journal of Child and Family Studies, 19*, 101–108. <https://doi.org/10.1007/s10826-009-9289-3>
- Gallagher, K. C. (2002). Does child temperament moderate the influence of parenting on adjustment? *Developmental Review, 22*(4), 623–643. [https://doi.org/10.1016/S0273-2297\(02\)00503-8](https://doi.org/10.1016/S0273-2297(02)00503-8)
- Gilliom, M., & Shaw, D. S. (2004). Codevelopment of externalizing and internalizing problems

in early childhood. *Development and Psychopathology*, 16(2), 313–333.

<https://doi.org/10.1017/S0954579404044530>

- Grills, A. E., & Ollendick, T. H. (2003). Multiple informant agreement and the Anxiety Disorders Interview Schedule for Parents and Children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(1), 30–40. <https://doi.org/10.1097/00004583-200301000-00008>
- Gryczkowski, M. R., Jordan, S. S., & Mercer, S. H. (2010). Differential relations between mothers' and fathers' parenting practices and child externalizing behavior. *Journal of Child and Family Studies*, 19(5), 539–546. <https://doi.org/10.1007/s10826-009-9326-2>
- Hawes, D. J., & Dadds, M. R. (2005). The treatment of conduct problems in children with callous-unemotional traits. *Journal of Consulting and Clinical Psychology*, 73(4), 737–741. <https://doi.org/10.1037/0022-006X.73.4.737>
- Hawes, D. J., & Dadds, M. R. (2006). Assessing parenting practices through parent-report and direct observation during parent-training. *Journal of Child and Family Studies*, 15(5), 555–568. <https://doi.org/10.1007/s10826-006-9029-x>
- Helm, A. F., McCormick, S. A., Deater-Deckard, K., Smith, C. L., Calkins, S. D., & Bell, M. A. (2020). Parenting and children's executive function stability across the transition to school. *Infant and Child Development*, 29, 1–19. <https://doi.org/10.1002/icd.2171>
- Hipwell, A., Keenan, K., Kasza, K., Loeber, R., & Bean, T. (2008). Reciprocal influences between girls' conduct problems and depression, and parental punishment and warmth: A six year prospective analysis. *Journal of Abnormal Child Psychology*, 36(5), 663–677. <https://doi.org/10.1007/s10802-007-9206-4>. Reciprocal
- Hoeve, M. H., Dubas, J. S., Eichelsheim, V. I., Van Der Laan, P. H., Smeenk, W., & Gerris, J. R.

- M. (2009). The relationship between parenting and delinquency: A meta-analysis. *Journal of Abnormal Child Psychology*, 37(6), 749–775. <https://doi.org/10.1007/s10802-009-9310-8>
- Holmbeck, G. N., Zebracki, K., Johnson, S. Z., Belvedere, M., & Hommeyer, J. S. (2013). *Parent-Child Interaction Macro-Coding Manual: Unpublished Manual*. Chicago, IL.
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods*, 6(1), 53–60. <https://doi.org/10.1037/1082-989X.12.1.58>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Kawabata, Y., Alink, L. R. A., Tseng, W. L., van Ijzendoorn, M. H., & Crick, N. R. (2011). Maternal and paternal parenting styles associated with relational aggression in children and adolescents: A conceptual analysis and meta-analytic review. *Developmental Review*, 31(4), 240–278. <https://doi.org/10.1016/j.dr.2011.08.001>
- Kessler, R. C., Avenevoli, S., Costello, E. J., Georgiades, K., Green, J. G., Gruber, M. J., ... Merikangas, K. (2012). Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Archives of General Psychiatry*, 69(4), 372–380. <https://doi.org/10.1001/archgenpsychiatry.2011.160>
- Klingzell, I., Fanti, K. A., Colins, O. F., Frogner, L., Andershed, A. K., & Andershed, H. (2016). Early childhood trajectories of conduct problems and callous-unemotional traits: The role of fearlessness and psychopathic personality dimensions. *Child Psychiatry and Human Development*, 47(2), 236–247. <https://doi.org/10.1007/s10578-015-0560-0>

- Kochanska, G., Kuczynski, L., & Radke-Yarrow, M. (1989). Correspondence between Mothers' Self-Reported and Observed Child-Rearing Practices. *Child Development, 60*(1), 56–63.
- Lahey, B. B., Van Hulle, C. A., Keenan, K., Rathouz, P. J., D'Onofrio, B. M., Rodgers, J. L., & Waldman, I. D. (2008). Temperament and parenting during the first year of life predict future child conduct problems. *Journal of Abnormal Child Psychology, 36*(8), 1139–1158. <https://doi.org/10.1007/s10802-008-9247-3>
- Lengua, L. J. (2006). Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. *Developmental Psychology, 42*(5), 819–832. <https://doi.org/10.1037/0012-1649.42.5.819>
- Lengua, L. J., & Kovacs, E. A. (2005). Bidirectional associations between temperament and parenting and the prediction of adjustment problems in middle childhood. *Journal of Applied Developmental Psychology, 26*(1), 21–38. <https://doi.org/10.1016/j.appdev.2004.10.001>
- Lewis-Morrarty, E., Degnan, K. A., Chronis-Tuscano, A., Rubin, K. H., Cheah, C. S. L., Pine, D. S., ... Fox, N. A. (2012). Maternal over-control moderates the association between early childhood behavioral inhibition and adolescent social anxiety symptoms. *Journal of Abnormal Child Psychology, 40*(8), 1363–1373. <https://doi.org/10.1007/s10802-012-9663-2>
- Liu, R., Calkins, S. D., & Bell, M. A. (2018). Fearful inhibition, inhibitory control, and maternal negative behaviors during toddlerhood predict internalizing problems at age 6. *Journal of Abnormal Child Psychology, 46*, 1665–1675.
- McKee, L., Roland, E., Coffelt, N., Olson, A. L., Forehand, R., Massari, C., ... Zens, M. S. (2007). Harsh discipline and child problem behaviors: The roles of positive parenting and gender. *Journal of Family Violence, 22*(4), 187–196. <https://doi.org/10.1007/s10896-007->

- McLeod, B. D., Weisz, J. R., & Wood, J. J. (2007). Examining the association between parenting and childhood depression: A meta-analysis. *Clinical Psychology Review, 27*(8), 986–1003. <https://doi.org/10.1016/j.cpr.2007.03.001>
- McLeod, B. D., Wood, J. J., & Weisz, J. R. (2007). Examining the association between parenting and childhood anxiety: A meta-analysis. *Clinical Psychology Review, 27*(8), 155–172. <https://doi.org/10.1016/j.cpr.2007.03.001>
- McNally, S., Eisenberg, N., & Harris, J. D. (1991). Consistency and change in maternal child-rearing practices and values: A longitudinal study. *Child Development, 62*(1), 190–198.
- Merikangas, K., He, J., Burstein, M., Swanson, S., Avenevoli, S., Cui, L., ... Swendsen, J. (2010). Lifetime prevalence of mental disorders in US adolescents: Results from the National Comorbidity Study-Adolescent Supplement. *Journal of the American Academy of Child and Adolescent Psychiatry, 49*(10), 980–989. <https://doi.org/10.1016/j.jaac.2010.05.017>
- Mills, R. S. L., & Rubin, K. H. (1998). Short report: Are behavioural and psychological control both differentially associated with childhood aggression and social withdrawal? *Canadian Journal of Behavioural Science, 30*(2), 132–136.
- Muris, P., van Brakel, A. M. L., Arntz, A., & Schouten, E. (2011). Behavioral inhibition as a risk factor for the development of childhood anxiety disorders: A longitudinal study. *Journal of Child and Family Studies, 20*, 157–170. <https://doi.org/10.1007/s10826-010-9365-8>
- Muthén, L. K., & Muthén, B. O. (2017). *Mplus User's Guide: Eight Edition*. Los Angeles, CA: Muthén & Muthén.
- Neppl, T. K., Donnellan, M. B., Scaramella, L. V, Widaman, K. F., Spilman, S. K., Ontai, L. L.,

- & Conger, R. D. (2010). Differential stability of temperament and personality from toddlerhood to middle childhood. *Journal of Research in Personality, 44*(3), 386–396.
<https://doi.org/10.1016/j.jrp.2010.04.004>
- Oldehinkel, A. J., Veenstra, R., Ormel, J., de Winter, A. F., & Verhulst, F. C. (2006). Temperament, parenting, and depressive symptoms in a population sample of preadolescents. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 47*(7), 684–695. <https://doi.org/10.1111/j.1469-7610.2005.01535.x>
- Ollendick, T. H., & Benoit, K. E. (2012). A parent-child interactional model of social anxiety disorder in youth. *Clinical Child and Family Psychology Review, 15*(1), 81–91.
<https://doi.org/10.1007/s10567-011-0108-1>
- Ollendick, T. H., & Grills, A. E. (2016). Perceived control, family environment, and the etiology of child anxiety—revisited. *Behavior Therapy, 47*(5), 633–642.
<https://doi.org/10.1016/j.beth.2016.01.007>
- Oudekerk, B. A., Allen, J. P., Hessel, E. T., & Molloy, L. E. (2015). The cascading development of autonomy and relatedness from adolescence to adulthood. *Child Development, 86*(2), 472–485. <https://doi.org/10.1111/cdev.12313>
- Özdemir, Y. (2012). Parental behavioral and psychological control relationships to self-esteem, life satisfaction, depression, and antisocial behaviors. *International Journal of Human Sciences, 9*(2), 1581–1590.
- Panayiotou, G., Fanti, K. A., & Lazarou, C. (2015). Fearful victims and fearless bullies? Subjective reactions to emotional imagery scenes of children involved in school aggression. *Personality and Individual Differences, 78*, 29–33.
<https://doi.org/10.1016/j.paid.2015.01.011>

- Pedlow, R., Sanson, A., Prior, M., & Oberklaid, F. (1993). Stability of maternally reported temperament from infancy to 8 years. *Developmental Psychology, 29*(6), 998–1007.
- Peisch, V., Parent, J., Forehand, R., Golub, A., Reid, M., & Price, M. (2016). Intimate partner violence in cohabiting families: Reports by multiple informants and associations with adolescent outcomes. *Journal of Family Violence, 31*(6), 747–757.
<https://doi.org/10.1007/s10896-016-9808-0>
- Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 56*(3), 345–365. <https://doi.org/10.1111/jcpp.12381>
- Prinzle, P., van Harten, L. V., Deković, M., van den Akker, A. L., & Shiner, R. L. (2014). Developmental trajectories of anxious and depressive problems during the transition from childhood to adolescence: Personality × parenting interactions. *Development and Psychopathology, 26*, 1–16. <https://doi.org/10.1017/S0954579414000510>
- Putnam, S. P., Gartstein, M. A., & Rothbart, M. K. (2006). Measurement of fine-grained aspects of toddler temperament: The Early Childhood Behavior Questionnaire. *Infant Behavior and Development, 29*(3), 386–401. <https://doi.org/10.1016/j.infbeh.2006.01.004>
- Putnam, S., & Rothbart, M. (2006). Development of short and very short forms of the Children’s Behavior Questionnaire. *Journal of Personality Assessment, 87*(1), 103–113.
<https://doi.org/10.1207/s15327752jpa8701>
- Raine, A., Reynolds, C., & Venables, P. H. (1998). Fearlessness, stimulation-seeking, and large body size at age 3 years as early predispositions to childhood aggression at age 11 years. *Archives of General Psychiatry, 55*, 745–751.

- Reyes, A. D. L., & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin*, *131*(4), 483–509. <https://doi.org/10.1037/0033-2909.131.4.483>
- Rubin, K. H., Nelson, L. J., Hastings, P., & Asendorpf, J. (1999). The transaction between parents' perceptions of their children's shyness and their parenting styles. *International Journal of Behavioral Development*, *23*(4), 937–957. <https://doi.org/10.1080/016502599383612>
- Ryan, S. M., & Ollendick, T. H. (2018). The interaction between child behavioral inhibition and parenting behaviors: Effects on internalizing and externalizing symptomology. *Clinical Child and Family Psychology Review*. <https://doi.org/10.1007/s10567-018-0254-9>
- Scaramella, L. V., Neppl, T. K., Ontai, L. L., & Conger, R. D. (2008). Consequences of socioeconomic disadvantage across three generations: Parenting behavior and child externalizing problems. *Journal of Family Psychology*, *22*(5), 725–733. <https://doi.org/10.1037/a0013190>
- Schaefer, E. S. . (1965). Children's Reports of Parental Behavior: An Inventory. *Child Development*, *36*(2), 413–424.
- Schludermann, S., & Schludermann, E. (1988). Questionnaire for children and youth (CRPBI-30). *Unpublished Manuscript, University of Manitoba, Winnipeg.*
- Sentse, M., Veenstra, R., Lindenberg, S., Verhulst, F. C., & Ormel, J. (2009). Buffers and risks in temperament and family for early adolescent psychopathology: Generic, conditional, or domain-specific effects? The trails study. *Developmental Psychology*, *45*(2), 419–430. <https://doi.org/10.1037/a0014072>

- Shelton, K. K., Frick, P. J., & Wootton, J. (1996). Assessment of parenting practices in families of elementary school-age children. *Journal of Clinical Child Psychology, 25*(3), 317–329. https://doi.org/10.1207/s15374424jccp2503_8
- Silverman, W. K., & Albano, A. M. (1996). *Anxiety Disorders Interview Schedule for DSM-IV (Child and Parent Versions)*. San Antonio, TX: Psychological Corporation.
- Sportel, B. E., Nauta, M. H., de Hullu, E., de Jong, P. J., & Hartman, C. A. (2011). Behavioral inhibition and attentional control in adolescents: Robust relationships with anxiety and depression. *Journal of Child and Family Studies, 20*, 149–156. <https://doi.org/10.1007/s10826-010-9435-y>
- Suchman, N. E., Rounsaville, B., DeCoste, C., & Luthar, S. (2007). Parental control, parental warmth, and psychosocial adjustment in a sample of substance-abusing mothers and their school-aged and adolescent children. *Journal of Substance Abuse Treatment, 32*(1), 1–10. <https://doi.org/10.1016/j.jsat.2006.07.002>
- Symeou, M., & Georgiou, S. (2017). Externalizing and internalizing behaviours in adolescence , and the importance of parental behavioural and psychological control practices. *Journal of Adolescence, 60*, 104–113. <https://doi.org/10.1016/j.adolescence.2017.07.007>
- Thomas, A., Chess, S., Birch, H. G., Hertzog, M. E., & Korn, S. (1963). *Behavioral Individuality in Early Childhood*. New York: New York University Press.
- Van Brakel, A. M. L., Muris, P., Bögels, S. M., & Thomassen, C. (2006). A multifactorial model for the etiology of anxiety in non-clinical adolescents: Main and interactive effects of behavioral inhibition, attachment and parental rearing. *Journal of Child and Family Studies, 15*(5), 568–578. <https://doi.org/10.1007/s10826-006-9061-x>
- van den Akker, A. L., Dekovi, M., Prinzie, P., & Asscher, J. J. (2010). Toddlers' temperament

profiles: Stability and relations to negative and positive parenting, 38, 485–495.

<https://doi.org/10.1007/s10802-009-9379-0>

van der Bruggen, C. O., Stams, G. J., & Bögels, S. M. (2008). Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 49, 1257–1269.

<https://doi.org/10.1111/j.1469-7610.2008.01898.x>

Van Zalk, N., & Kerr, M. (2011). Shy adolescents' perceptions of parents' psychological control and emotional warmth: Examining bidirectional links. *Merrill-Palmer Quarterly*, 57(4), 375–401. <https://doi.org/10.1353/mpq.2011.0021>

Vreeke, L. J., Muris, P., Mayer, B., Huijding, J., & Rapee, R. M. (2013). Skittish, shielded, and scared: Relations among behavioral inhibition, overprotective parenting, and anxiety in native and non-native Dutch preschool children. *Journal of Anxiety Disorders*, 27(7), 703–710. <https://doi.org/10.1016/j.janxdis.2013.09.006>

Waller, R., Shaw, D. S., & Hyde, L. W. (2016). Observed fearlessness and positive parenting interact to predict childhood callous-unemotional behaviors among low-income boys. *Journal of Child Psychology and Psychiatry*. <https://doi.org/10.1111/jcpp.12666>

Waller, R., Trentacosta, C. J., Shaw, D. S., Neiderhiser, J. M., Ganiban, J. M., Reiss, D., ... Hyde, L. W. (2016). Heritable temperament pathways to early callous–unemotional behaviour. *The British Journal of Psychiatry*, 475–482.

<https://doi.org/10.1192/bjp.bp.116.181503>

Wijsbroek, S. A. M., & Hale, W. W. (2011). The direction of effects between perceived parental behavioral control and psychological control and adolescents' self-reported GAD and SAD symptoms. *European Child and Adolescent Psychiatry*, 20, 361–371.

<https://doi.org/10.1007/s00787-011-0183-3>

Zuckerman, M. (1999). Diathesis-Stress Models. In *Vulnerability to psychopathology: A biosocial model* (pp. 3–23). American Psychological Association.

Tables

Table 1.
Variable Means and Standard Deviations across Time

	2 Years (N = 167)	3 Years (N = 144)	4 Years (N = 134)	6 Years (N = 110)	9 Years (N = 192)	Adolescence (N = 78)
Shyness	3.33(0.97)	3.87(1.36)	3.57(1.37)	3.84(1.35)	2.48(0.96)	2.55(1.04)
Internalizing Symptoms	-	7.27(5.62)	6.94(4.85)	50.06(9.77)	51.42(10.11)	52.15(10.07)
Externalizing Symptoms	-	10.96(8.27)	11.55(7.91)	49.92(9.58)	47.88(9.99)	45.82(8.97)
Warmth Composite (Z Score)	0.03(0.90)	0.02(0.93)	0.00(1.00)	0.01(0.96)	0.04(0.85)	0.00(1.00)
Control Composite (Z Score)	-0.01(0.98)	-0.00(0.99)	-0.01(0.96)	-0.03(0.83)	-0.03(0.90)	0.00(1.00)

Note. Internalizing and Externalizing Symptoms not measured at Time 1; Internalizing and Externalizing Symptom scores at 3 and 4 years are raw scores, Internalizing and Externalizing Symptom scores at 6 years, 9 years, and adolescence are T scores; Means and standard deviations of Warmth Composite and Control Composite were computed after accounting for outliers via winsorization

Table 2

Cross-Sectional Regression Results with Internalizing Symptoms as the Dependent Variable

	<u>Warmth</u>				<u>Control</u>			
	b	T	R ² /ΔR ²	F	b	T	R ² /ΔR ²	F
Time 2 (N = 44)			0.01	0.12			0.07	0.96
Shyness	0.36	0.65			0.36	0.65		
Parenting	0.01	0.01			0.96	0.80		
Interaction	0.32	0.38	0.00	0.15	-1.14	-1.49	0.05	2.22
Time 3 (N = 45)			0.01	0.15			0.01	0.12
Shyness	0.32	0.65			0.32	0.65		
Parenting	-0.26	-0.36			-0.21	-0.24		
Interaction	-0.14	-0.27	0.00	0.07	-0.16	-0.29	0.00	0.08
Time 4 (N = 97)			0.10	3.51*			0.11	3.66*
Shyness	2.18	3.26**			2.18	3.26**		
Parenting	-0.59	-0.60			-0.92	-0.81		
Interaction	0.13	0.19	0.00	0.04	-0.28	0.38	0.00	0.01
Time 5 (N = 157)			0.20	12.50***			0.21	13.40***
Shyness	4.43	6.36***			4.43	6.36***		
Parenting	-1.54	-1.76 [†]			1.71	2.04*		
Interaction	-0.05	-0.06	0.00	0.00	-0.60	-0.66	0.00	0.61
Time 6 (N = 21)			0.43	3.77*			0.39	3.25 [†]
Shyness	3.40	3.27**			3.40	3.27**		
Parenting	0.96	0.51			-1.38	-0.60		
Interaction	-1.85	-1.04	0.04	1.08	.76	0.35	0.00	0.12

Note. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$; Time 1 = 2 years, Time 2 = 3 years, Time 3 = 4 years, Time 5 = 6 years, Time 6 = Adolescence; Overall model R² and F values located next to each time point label, ΔR² and corresponding F value for the addition of the interaction term located on the interaction lines

Table 3

Cross-Sectional Regression Results with Externalizing Symptoms as the Dependent Variable

	<u>Warmth</u>				<u>Control</u>			
	b	T	R ² /ΔR ²	F	b	T	R ² /ΔR ²	F
Time 2 (N = 44)			0.09	1.28			0.03	0.38
Shyness	-0.70	-0.85			-0.70	-0.85		
Parenting	2.89	1.68 [†]			-0.60	-0.36		
Interaction	1.34	0.92	0.02	0.84	-0.62	-0.52	0.01	0.28
Time 3 (N = 45)			0.01	0.18			0.03	0.43
Shyness	-0.01	-0.01			-0.01	-0.01		
Parenting	0.85	0.73			1.62	1.09		
Interaction	-0.10	-0.11	0.00	0.01	0.55	0.54	0.01	0.29
Time 4 (N = 97)			0.04	1.38			0.00	0.08
Shyness	-0.16	-0.24			-0.16	-0.24		
Parenting	0.75	0.76			0.53	0.45		
Interaction	-1.23	-1.87 [†]	0.04	3.49 [†]	-0.07	-0.10	0.00	0.01
Time 5 (N = 157)			0.05	2.69*			0.02	1.00
Shyness	1.08	1.43			1.08	1.43		
Parenting	-1.96	-2.05*			0.37	0.40		
Interaction	-0.84	-0.84	0.00	0.71	0.07	0.07	0.00	0.00
Time 6 (N = 21)			0.13	0.78			0.11	0.60
Shyness	-0.66	-0.67			-0.66	-0.67		
Parenting	-0.11	-0.06			-1.49	-0.64		
Interaction	-2.72	-1.50	0.13	2.26	2.88	1.32	0.10	1.74

Note. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$; Time 1 = 2 years, Time 2 = 3 years, Time 3 = 4 years, Time 5 = 6 years, Time 6 = Adolescence; Overall model R² and F values located next to each time point label, ΔR² and corresponding F value for the addition of the interaction term located on the interaction lines

Table 4

Model Fit Statistics for the Unconditional Growth Curve Models of Shyness and the Conditional Growth Curve Model including Shyness and Adolescent Psychopathology

	χ^2	Df	CFI	RMSEA	SRMR
<i>Unconditional Growth Curve Models of Shyness (N = 253)</i>					
Linear Model	54.35***	7	0.770	0.164	0.137
Freed Linear Model	18.14**	4	0.931	0.118	0.065
Quadratic Model	3.32	3	0.998	0.020	0.049
<i>Conditional Growth Curve Model with Adolescent Outcomes (N = 78)</i>					
	11.68	9	0.975	0.062	0.066

Note. ** $p < .01$, *** $p < .001$. Df = Degrees of Freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual

Table 5
Longitudinal Regression Results with Adolescent Internalizing Symptoms as the Dependent Variable

	<u>Warmth</u>				<u>Control</u>			
	b	T	R ² /ΔR ²	F	b	T	R ² /ΔR ²	F
Time 1 (N = 35)			0.02	0.18			0.01	0.10
Shyness	0.23	0.11			0.23	0.11		
Parenting	-1.67	-0.66			-0.98	-0.47		
Interaction	0.97	0.23	0.00	0.05	0.72	0.28	0.00	0.08
Time 2 (N = 38)			0.05	0.54			0.04	0.42
Shyness	-1.23	-1.09			-1.23	-1.09		
Parenting	-1.60	-0.68			-0.40	-0.20		
Interaction	0.58	0.41	0.00	0.17	-0.58	-0.45	0.00	0.12
Time 3 (N = 36)			0.05	0.54			0.08	0.92
Shyness	-0.98	-0.88			-0.98	-0.88		
Parenting	-0.75	-0.34			0.57	0.32		
Interaction	1.60	0.89	0.02	0.79	-2.42	-1.39	0.06	1.93
Time 4 (N = 45)			0.07	0.98			0.09	1.29
Shyness	1.82	1.65			1.82	1.65		
Parenting	-0.46	-0.30			0.69	0.41		
Interaction	0.48	0.42	0.00	0.18	-1.47	-1.00	0.02	1.00
Time 5 (N = 78)			0.05	1.24			0.09	2.56 [†]
Shyness	2.32	1.93 [†]			2.32	1.93 [†]		
Parenting	-0.32	-0.24			0.44	0.33		
Interaction	0.24	0.16	0.00	0.02	-2.65	-1.91 [†]	0.05	3.67 [†]
Earliest Timepoint (N = 78)			0.03	0.74				
Shyness	1.00	1.22			1.00	1.22		
Parenting	-0.73	-0.52			0.36	0.26		
Interaction	0.71	0.72	0.01	0.52	-0.17	-0.14	0.00	0.02

Note. [†] $p < .07$, * $p < .05$, ** $p < .01$, *** $p < .001$; Time 1 = 2 years, Time 2 = 3 years, Time 3 = 4 years, Time 5 = 6 years; The “earliest timepoint” models include the shyness variable for each adolescent from the earliest time point they had data available; warmth and control scores are based on the earliest time point for which parenting behavior scores were available for each subject; Overall model R² and F values located next to each time point label, ΔR² and corresponding F value for the addition of the interaction term located on the interaction lines

Table 6

Model Fit Indices of Cross-lagged Models including Child Shyness and Maternal Warmth

	χ^2	Df	CFI	RMSEA	SRMR
Autoregressive	18.14	23	1.000	0.000	0.052
Shyness Effects	16.40	19	1.000	0.000	0.056
Parenting Effects	13.63	19	1.000	0.000	0.041
Cross-Lagged	10.31	12	1.000	0.000	0.043

Note. Df = Degrees of Freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; The chi-square values for each model were nonsignificant, $p > .05$

Table 7

Model Fit Indices of Cross-lagged Models including Child Shyness and Maternal Control

	χ^2	Df	CFI	RMSEA	SRMR
Autoregressive	23.82	23	0.997	0.012	0.072
Shyness Effects	17.46	19	1.000	0.000	0.054
Parenting Effects	22.18	19	0.989	0.026	0.071
Cross-Lagged	9.32	12	1.000	0.000	0.046

Note. Df = Degrees of Freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; The chi-square values for each model were nonsignificant, $p > .05$

Table 8

Number of Adolescents Meeting Diagnostic Criteria for DSM-5 Disorders (N = 22)

<i>Internalizing Disorders</i>		<i>N</i>	<i>Externalizing Disorders</i>		<i>N</i>
Generalized Anxiety Disorder		10	Attention Deficit/Hyperactivity Disorder – Inattentive Presentation		4
Social Anxiety Disorder		8	Attention Deficit/Hyperactivity Disorder – Combined Presentation		2
Specific Phobia		3	Oppositional Defiant Disorder		2
Panic Disorder		2			
Separation Anxiety Disorder		1			
Agoraphobia		1			
Major Depressive Disorder		2			
Persistent Depressive Disorder		1			

Table 9

Descriptive Statistics of Mother and Adolescent-Report of Maternal Parenting Behaviors and Bivariate Correlations between Mother and Adolescent-Report of Maternal Parenting Behaviors and Observational Measurement of Maternal Warmth and Control

Measure and Subscale	Range	M (SD) (N = 22)	Skewness	Warmth	Control
				Correlation (N = 21)	
APQ-M Involvement	32-49	38.91(4.79)	0.56	-0.27	0.18
APQ-M Positive Parenting	14-29	22.55(3.50)	-0.48	0.50	0.33
APQ-M Poor Monitoring	12-23	16.86(3.54)	0.34	-0.20	0.29
APQ-M Inconsistent Discipline	8-21	13.18(3.36)	0.55	0.26	0.10
APQ-M Corporal Punishment	3-6	3.50(1.01)	1.82	0.08	0.04
APQ-A Involvement	37-77	60.64(10.67)	-0.53	0.14	0.24
APQ-A Positive Parenting	9-27	20.05(4.36)	-0.84	-0.13	0.30
APQ-A Poor Monitoring	12-23	17.45(3.35)	0.06	-0.10	0.18
APQ-A Inconsistent Discipline	6-19	13.00(3.59)	0.58	-0.23	0.17
APQ-A Corporal Punishment	3-6	3.50(1.01)	1.82	0.12	0.16
CRPBI Acceptance	15-30	24.27(4.05)	-0.73	-0.14	0.17
CRPBI Psychological Control	10-20	14.68(2.51)	0.34	0.16	0.17
CRPBI Firm Control	15-25	20.55(2.79)	-0.29	-0.38	-0.12

Note. APQ-M – Alabama Parenting Questionnaire, Mother Report; APQ-A – Alabama Parenting Questionnaire, Adolescent Report; CRPBI – Children’s Report of Parent Behavior Inventory; No correlations between questionnaire measures of maternal behavior and observational coding were significant

Table 10

Cross-Sectional Regression Results at Time 6 Including CRPBI subscales (N = 22)

	<u>Internalizing Symptoms</u>				<u>Externalizing Symptoms</u>			
	b	T	R ² /ΔR ²	F	b	T	R ² /ΔR ²	F
Acceptance			0.42	4.07*			0.18	1.28
Shyness	6.08	3.48**			0.12	0.07		
Parenting	-0.20	-0.46			-0.78	-1.77 [†]		
Interaction	0.03	0.08	0.03	0.08	-0.17	-0.46	0.01	0.21
Psychological Control			0.42	4.11*			0.15	1.02
Shyness	5.95	3.38**			0.37	0.21		
Parenting	-0.18	-0.25			0.16	0.21		
Interaction	0.32	0.45	0.01	0.20	-1.27	-1.72	0.15	2.96
Firm Control			0.69	12.52***			0.07	0.45
Shyness	6.42	4.87***			0.51	0.27		
Parenting	1.34	2.8*			0.71	1.02		
Interaction	-1.55	-3.16**	0.18	10.0**	0.26	0.37	0.01	0.14

Note. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$; CRPBI – Children’s Report of Parent Behavior Inventory; Overall model R² and F values located next to each subscale label, ΔR² and corresponding F value for the addition of the interaction term located on the interaction lines

Figures

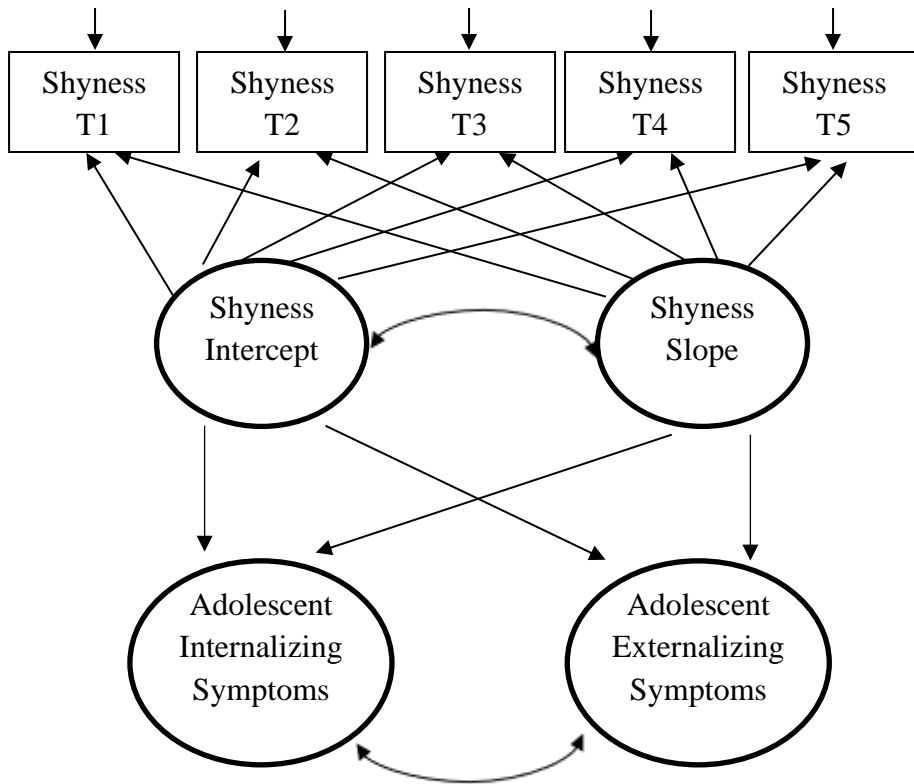


Figure 1. Hypothesized conditional model.

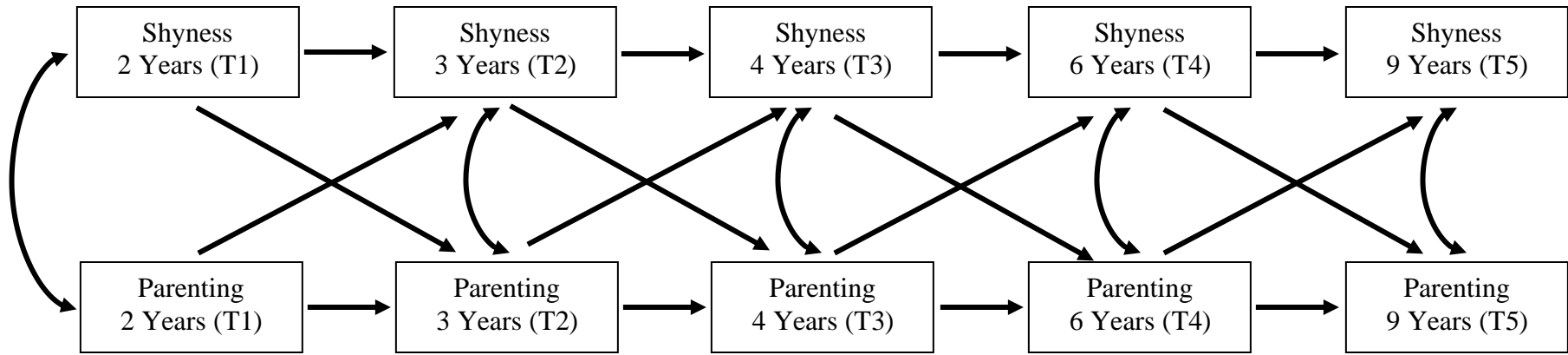


Figure 2. Hypothesized cross-lagged panel model.

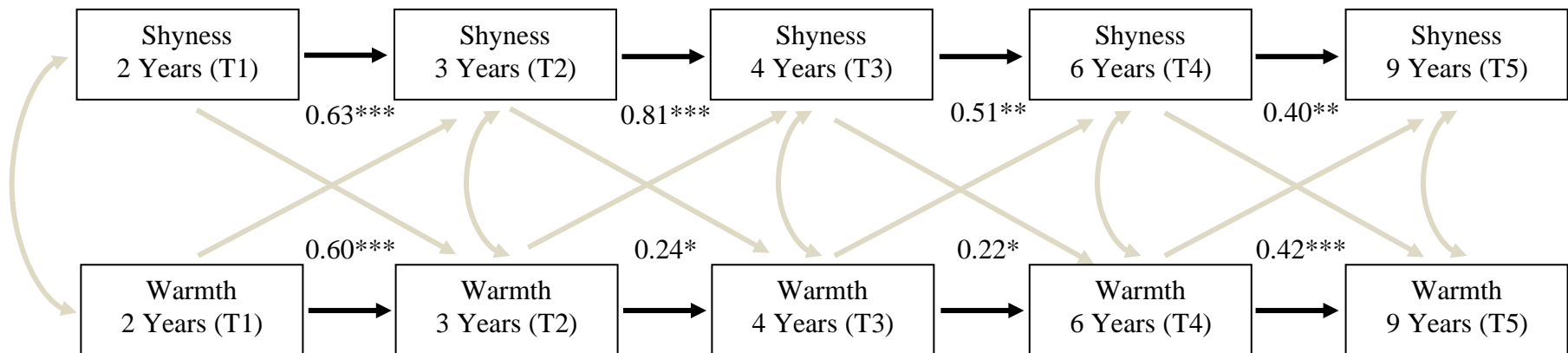


Figure 3. Reciprocal time-lagged effects between shyness and maternal warmth.

Note. Statistically significant paths are in black and standardized effects are presented. * $p < .05$, ** $p < .01$, *** $p < .001$

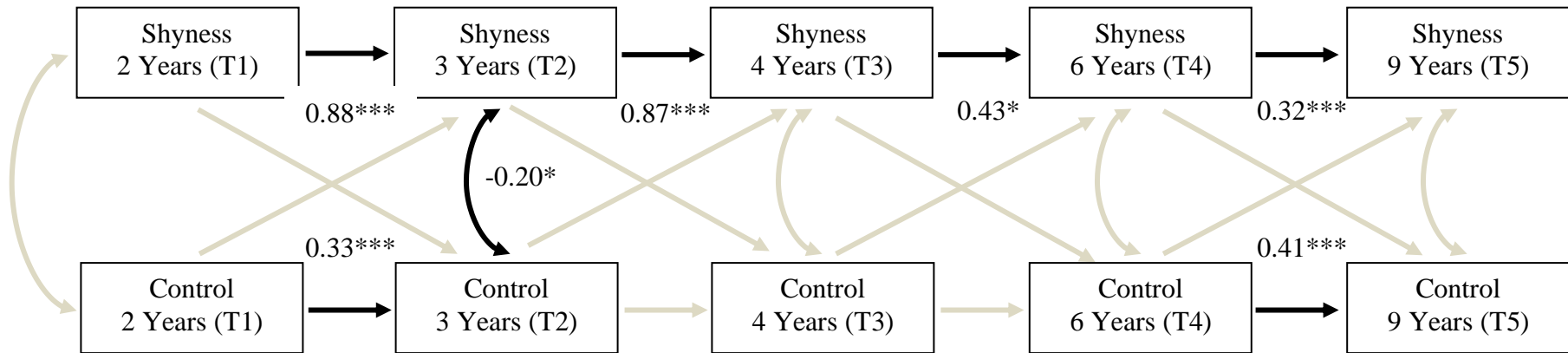


Figure 4. Reciprocal time-lagged effects between shyness and maternal control.

Note. Statistically significant paths are in black and standardized effects are presented. * $p < .05$, ** $p < .01$, *** $p < .001$

CHILD BEHAVIORAL INHIBITION AND PARENTING BEHAVIORS

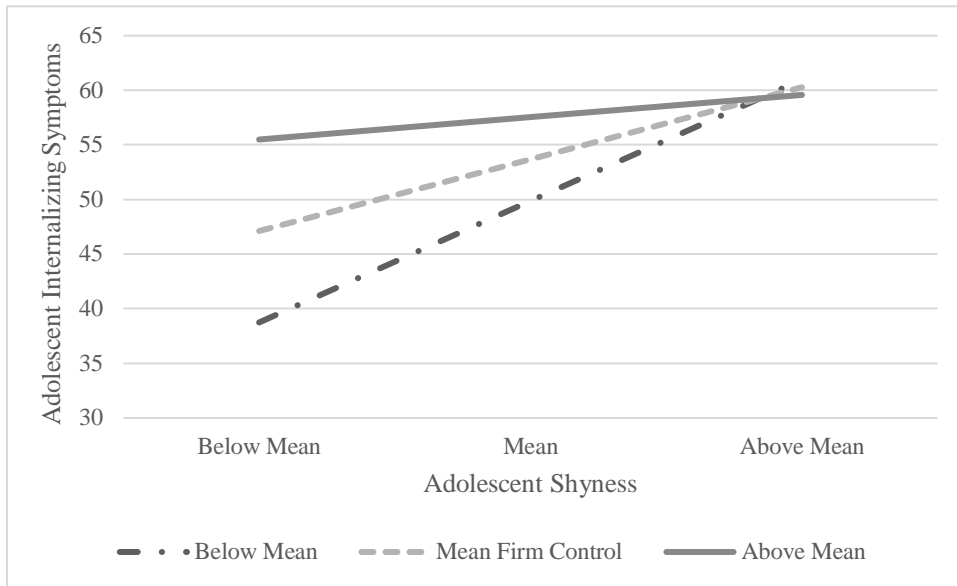


Figure 5. Illustration of the moderating effect of maternal firm control on the relationship between adolescent shyness and internalizing symptoms