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**Differentiation Between Low Positive Affectivity and Behavioral Inhibition in
Preschool-Age Children: An Examination Across Domains of Temperament, Social
Behavior, Parenting, and Psychological Symptomatology**

A Dissertation Presented

by

Rebecca Sonia Laptook

To

The Graduate School

in Partial Fulfillment of the

Requirements

for the Degree of

Doctor of Philosophy

in

Clinical Psychology

Stony Brook University

August 2009

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Abstract of the Dissertation

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The temperament constructs of low positive affectivity (PA) and high behavioral inhibition (BI) overlap and are often not differentiated in the research literature. Both constructs are characterized by low approach and engagement. However, while low PA should be present across most contexts, BI should only be evident in novel situations. Additionally, research has shown that low PA and high BI may be differentially associated with other variables across a variety of domains. The present study used a laboratory assessment of child temperament and behavior to distinguish low PA from high BI in a sample of 559 preschool-age children. The two traits were also examined across the domains of temperament, social behavior, parenting, and psychological symptomatology, and the moderating effect of parenting on the temperament – symptom relationship was explored. Results indicated that these two traits can be differentiated in a laboratory setting, with children with low PA and children with high BI exhibiting similar

levels of approach/engagement in novel situations, and both groups exhibiting lower approach than children with neither low PA nor high BI. In contrast, children with low PA exhibited significantly lower levels of approach/engagement in non-novel situations than children with high BI and children with neither high BI nor low PA. The study also provides some evidence for the validation of these traits across other domains but raises the possibilities that raters may have difficulty distinguishing the constructs and that low PA may be more associated with anxiety than previously conceptualized. Finally, this study provides support for the moderating effect of parenting on the relationship between low PA and high BI and psychological symptoms. Child low PA was associated with elevated affective problems regardless of level of parental hostility, whereas high PA was associated with fewer affective problems when hostility was low. Child low PA was also associated with fewer internalizing symptoms at higher levels of parental support. Additionally, the interaction of high hostility, low connection, and low PA predicted more internalizing problems, suggesting that a sense of connection may be an important protective factor. For children with high BI, lower autonomy-granting and higher overprotectiveness predicted more anxiety symptoms.

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Introduction

Temperament has been defined as largely biologically-based individual differences in behavioral and emotional reactivity and regulation. These differences are considered to be relatively stable over time and are thought to shape the way individuals adapt to environmental circumstances (Clark & Watson, 1999; Rothbart, Ahadi, & Evans, 2000). Research has explored the role of temperament in the development of personality as well as the emergence of psychopathology. However, further progress in the field requires sharpening the distinctions between several key, but overlapping, temperament constructs.

Temperament Traits

Two of the main dimensions on which major models of temperament have focused include positive affectivity (PA) and negative affectivity (NA) (Rothbart & Bates, 2006; Watson & Tellegen, 1985). In addition, Kagan (1997) and others (e.g., Fox et al., 2005) have developed an influential line of research examining the origins and developmental course of the construct of behavioral inhibition (BI). Although these constructs have distinct features, they also share some common behavioral traits that can create difficulties in distinguishing among them. Specifically, low PA and high BI share the common feature of low behavioral approach/engagement (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Pfeifer, Goldsmith, Davidson, & Rickman, 2002). Other researchers have distinguished between sets of constructs similar to the temperament constructs of low PA and high BI. Putnam and Stifter (2005) drew on Gray's (1982) motivational systems theory to hypothesize that low approach in infants and toddlers could be due to either an underactive behavioral approach system (BAS), which is linked

to low PA, or an overactive behavioral inhibition system (BIS), which is associated with NA, especially fear/anxiety.

The construct of PA includes positive mood states, sociability, and engagement with the environment (Clark & Watson, 1991). For the purposes of this proposal, we use PA to refer to the temperament construct of positive affectivity, and we use the term “positive affect” to refer specifically to the affective component of the broader PA construct. Thus, children with low PA tend to exhibit low levels of positive affect, social interactions, and appetitive behavior when interacting with stimuli and people in their environment. The construct of BI includes high negative affect (especially fear), low approach, and high constraint (Kagan, 1997). Children with high BI tend to be wary, hesitant, and fearful in unfamiliar contexts and with unfamiliar adults and peers. Although both constructs share low approach as a core feature, the underlying motivation and eliciting contexts are presumed to differ. In low PA, approach deficits should be exhibited across contexts in that the low approach reflects chronically low levels of motivation to engage the environment. In contrast, the low approach that characterizes BI should be limited to unfamiliar situations as BI is hypothesized to emerge from a system responsible for generating responses to novelty and threat.

Two recent studies have examined this distinction. Putnam and Stifter (2005) conducted a longitudinal study in which motivations to approach or inhibit approach were studied in a sample of 126 children, assessed at ages 6 months, 12 months, and 2 years. In contrast to previous studies, laboratory observations of positive and negative affect were measured independently of laboratory observations of approach-inhibition responses. Confirmatory factor analysis supported the conceptualization of positivity, negativity,

and approach-inhibition as separate dimensions, such that children who exhibited negative affect in conjunction with failure to approach (i.e., indicative of inhibition) were differentiated from those who failed to approach but lacked negative affect (i.e., indicative of low PA). In a sample of 100 preschool-age children, Laptook et al. (2008) used laboratory measures to differentiate low PA and high BI. The zero-order correlation between positive affect and BI was small-moderate ($r = -.27, p = .008$), suggesting that these constructs are distinct. Results indicated that both temperament traits were associated with low behavioral approach in novel contexts but that only PA was distinguished by low approach behavior in non-novel situations. The present study aims to replicate and extend these last findings in a larger sample of 559 preschool-age children by differentiating low PA and high BI in a laboratory setting and comparing them across other domains including parent/teacher-reported temperament, social behavior, parenting, and psychological symptomatology.

Relationship between Temperament and Social Behavior

A number of investigators have distinguished between two groups of socially withdrawn children: a shy-conflicted, reticent group that wishes to engage in peer interactions but withdraws due to fear and anxiety, consistent with high BI; and a passive-solitary, disinterested group that withdraws due to a lack of desire for social interactions, consistent with low PA (Asendorpf, 1990; Coplan, Rubin, Fox, Calkins, & Stewart, 1994; Coplan, Prakash, O'Neil, & Armer, 2004; Harrist, Zaia, Bates, Dodge, & Pettit, 1997). In a study aiming to distinguish types of social withdrawal in preschoolers using both parent/teacher report and observational measures, Coplan et al. (2004) found a number of differences between children classified as exhibiting conflicted shyness and

those displaying social disinterest. Mother-report of social behavior indicated only a modest correlation ($r = .29$) between conflicted shyness and social disinterest. Moreover, shyness, but not disinterest, was related to elevated teacher ratings of anxiety, low perceived competence, observational ratings of reticent behavior and parallel play, the temperamental trait of fearful shyness (i.e., BI), and maternal overprotectiveness. Results also indicated a significant positive association between shyness and NE and a negative association between disinterest and NE. Similarly, in a study of social behavior during a laboratory observation of peer play in a sample of four-year-olds, children classified as reticent differed from those classified as solitary-passive on measures of fearful temperament, EEG alpha power, and respiratory sinus arrhythmia (Henderson, Marshall, Fox, & Rubin, 2004).

Relationship between Temperament and Parenting

Research on the relationship between child temperament and parenting is inconsistent. Moreover, research suggests that parenting might differ for the temperament traits of low PA and high BI; however, there is a paucity of research focusing on the specific relationship between low PA and parenting. Some studies have shown that low PA in children is associated with lower maternal warmth (Lengua & Kovacs, 2005) and that parental involvement is positively related to exploration and mastery of the environment in children who are low in PA-related behaviors such as engagement and activity (Gandour, 1989).

In contrast to the literature on low PA and parenting, there is more direct research in the area of BI and parenting, with studies more consistently showing that parenting behaviors consisting of high intrusiveness and high support are associated with high BI in

children. In one study, 108 toddlers and their mothers were observed during a series of paradigms involving novel situations, adults, and peers. Results showed a positive association between toddlers who were consistently inhibited and mothers who were oversolicitous (i.e., inappropriately warm and controlling) (Rubin et al., 1997). In a longitudinal study aiming to assess the relationship between parenting, temperament and adjustment in a sample of 92 children, child fearful temperament was found to predict greater maternal acceptance (Lengua & Kovacs, 2005). Similarly, in a study examining the antecedents of inhibition at age three in a sample of 125 boys, supportive parenting was associated with greater child inhibition (Park, Belsky, Putnam, & Crnic, 1997). Furthermore, in an observational study of 108 toddlers and their mothers, over-controlling parenting behaviors comprised of warmth, high intrusiveness, and hostility moderated the relationship between BI and preschool social behavior such that toddler inhibition significantly predicted later social inhibition only when over-controlling parenting and/or hostility was present (Rubin, Burgess, & Hastings, 2002). Moreover, maternal overprotectiveness in a sample of highly reactive infants has been associated with child inhibition, suggesting that parenting behavior may interfere with the child's development of coping strategies (Arcus et al., 1992).

Relationship between Temperament and Child Psychological Symptomatology

There is not much direct research exploring the relationship between low PA and child symptomatology (Durbin et al., 2005; Shankman & Klein, 2003); however, there is data to suggest that PA may distinguish depression from anxiety. Anhedonia, which is characterized by low PA-related characteristics of low interest and lack of enjoyment, has been shown to be related to preschool depression (Luby et al., 2006). Additionally,

laboratory-assessed low PA at age three has been shown to predict maternal reports of child depression at age ten (Dougherty, Klein, Durbin, Hayden, & Olino, submitted). In a study of 233 inpatients ranging in age from six to seventeen-years-old, self-reported symptoms of low interest and motivation, indicative of low PA, was found to distinguish children with a depressive disorder from those with an anxiety disorder (Lonigan, Carey, & Finch, 1994). Joiner and Lonigan (2000) reported findings from a study of 74 child and adolescent psychiatric inpatients in which the combination of low PA and high NA was found to be significantly associated with the development and maintenance of depressive symptoms but not anxiety symptoms. Additionally, results from a large longitudinal study have shown that low PA at age 18 is associated with affective disorders at age 21 (Krueger, 1999). Using data from the same sample, Moffitt et al. (2007) found that low PA at age 18 predicted pure MDD but not pure GAD at the adult follow-up, suggesting some specificity between the temperament trait of low PA and depression. Furthermore, low PA-related behaviors, such as behavioral apathy, have also been associated with the development of early-onset and persistent affective disorders (van Os, Jones, Lewis, Wadsworth, & Murray, 1997).

Research focusing on BI has shown early inhibition to be related to later anxiety disorders, and possibly internalizing problems in general (Rothbart & Bates, 2006). A study of BI in a sample of four- to seven-year-old children of parents with panic disorder and agoraphobia found that inhibited children had higher rates of multiple anxiety disorders in middle childhood as compared to healthy controls (Biederman et al., 1990). Results from a study of 79 adolescents who were classified as inhibited during a laboratory observation at age two indicate a significant positive association between early

inhibition and later generalized social anxiety (Schwartz, Snidman, & Kagan, 1999). Moreover, a recent five-year follow-up study of laboratory-observed behavioral inhibition in a sample of 284 children, ages 21 months to six years old, found that early BI specifically predicted social anxiety in middle childhood (Hirshfeld-Becker et al., 2007). In contrast, Caspi, Moffitt, Newman, and Silva (1996) found that children classified as inhibited during an observational assessment at age three were significantly more likely to have higher rates of anxiety disorders but also be diagnosed with depression at age 21 as compared to children classified as undercontrolled and well-adjusted; however, the measure of inhibition used in this study appeared to include items that also tapped PA.

Parenting as a Moderator of the Temperament – Symptom Relation

Research exploring parenting as a moderator of the relationship between temperament and symptomatology focuses on the potential for parenting behaviors to be risk or protective factors in child development. Consistent with a diathesis-stress model, certain parenting behaviors may act as stressors and interact with child temperament to result in psychological symptoms. Many studies have examined the role of parenting in the relationship between negative affectivity and externalizing behaviors, showing that high parental intrusiveness leads to aggression and related symptoms in children high in general negative affectivity (Putnam, Sanson, & Rothbart, 2002). Less research has focused on the interaction of parenting and specific temperament traits such as low PA and high BI with regard to child outcome. One study examined child adjustment problems in a sample of 231 recently divorced mothers and their nine- to twelve-year-old children (Lengua, Wolchik, Sandler, & West, 2000). The investigators found that low PA

and parental rejection interacted to predict both depression and conduct problems. Studies have also shown that parenting interacts with BI to predict later BI (e.g. Rubin et al., 2002), which, based on evidence cited above, may be a precursor of later anxiety disorders.

Differentiation of Temperament Traits

Although the temperament traits of high BI and low PA have been differentially associated with other variables across a variety of domains, studies often fail to distinguish between high BI and low PA. Laboratory observational measures of BI frequently include markers of PA, such as smiling and laughter (e.g., Gest, 1997; Kagan, Snidman, & Arcus, 1998). In addition, many studies have conceptualized BI and PA as the opposite ends of a single dimension, defined by high BI at one end and high PA/exuberance at the other (Polak-Toste & Gunnar, 2006). However, studies using laboratory observations of temperament in young children indicate that BI and PA are empirically distinct and, indeed, almost orthogonal dimensions, with correlations between the two constructs ranging from $-.09$ (Pfeifer et al., 2002) to $-.28$ (Durbin et al., 2005). Failure to distinguish these traits both conceptually and methodologically may make it difficult to integrate findings from studies as well as understand the possible differential trajectories of these temperament constructs. Moreover, as described earlier, temperament traits of BI and PA may have important roles in the development of later psychopathology, such that low PA may be a specific precursor/predisposing factor for depression (Clark & Watson, 1991), whereas BI has been proposed to be an early temperamental precursor of later anxiety disorders (Fox et al., 2005; Kagan, 1997).

The present study seeks to extend the literature on the relationship between PA and BI by testing the core proposition that these constructs reflect distinct patterns of motivation as indicated by differences in their eliciting contexts. Similar to previous findings in a preliminary study of 100 preschool-age children (Laptook et al., 2008), it is hypothesized that higher levels of BI and lower levels of PA would both predict low approach behavior in novel situations, but only lower levels of PA would predict low approach in non-novel contexts. These hypotheses are tested in a new community sample of 559 preschool-age children using a comprehensive battery of laboratory measures of temperament and behavior.

Furthermore, this study aims to validate the laboratory-assessed temperament traits of low PA and high BI by examining them across four additional domains: 1) parent and teacher reports of PA, BI, and closely related temperament traits; 2) social disinterest and tentative play; 3) supportive, overprotective, and hostile parenting; and 4) depressive and anxiety symptoms. For the first domain, it is hypothesized that laboratory-defined PA will predict PA variables from external temperament measures, and laboratory-defined BI will predict externally-rated BI variables. For the second domain, it is hypothesized that laboratory low PA will predict social variables consistent with the social disinterest literature, and laboratory high BI will predict social variables consistent with the shyness literature. For the third domain, it is hypothesized that low PA will predict greater parent hostility and lower parent warmth/support, while high BI will predict greater overprotectiveness and intrusiveness. For the fourth domain, it is hypothesized that low PA will predict internalizing symptoms that are related to depression, while high BI will predict internalizing symptoms that are more reflective of anxiety. Finally, we will

examine the moderating effect of parenting on the relationship between temperament and symptoms. It is hypothesized that parenting will have a moderating effect on the relationship between child low PA and child depressive symptoms, with low PA predicting depressive symptoms when hostile parenting and low maternal support is present. It is also hypothesized that parenting will moderate the relationship between BI and child anxiety symptoms, with BI predicting anxiety symptoms when intrusiveness and overprotectiveness are present.

Method

Participants

Participants included 559 children (54% male and 46% female) from a suburban community. The mean age of the children was 42.2 months ($SD = 3.1$). The mean age of parents was 36 years ($SD = 4.4$) for mothers and 38.3 years ($SD = 5.3$) for fathers.

Participants were recruited via a commercial mailing list and were initially contacted by the Stony Brook University Center for Survey Research. Eligible families had a child between three and four years of age, with no significant medical conditions or developmental disabilities, and at least one English-speaking biological parent.

Participants were 87.1% Caucasian and came from mainly middle-class families, as measured by the Hollingshead's Four Factor Index of Social Status (Hollingshead, 1975; $M=54.2$; $SD=11$). The vast majority (94.2%) of the children came from two-parent homes, and 51.4% of the mothers worked outside the home part- or full-time. Children's mean scores on the Peabody Picture Vocabulary Test ($M = 102.8$, $SD = 14$) (PPVT; Dunn & Dunn, 1997) and the Expressive One-Word Picture Vocabulary Test ($M = 100.5$, $SD = 13$) (EOWPVT; Brownell, 2000) were in the average range.

Procedure

The study consisted of two laboratory visits and a phone interview. During the initial visit, participant families were given a complete description of the study, after which written informed consent was obtained. The initial visit lasted approximately two and a half hours and consisted of the child's participation in a structured laboratory observation of temperament and behavior. The primary caregiver who accompanied the child to the visit was given a set of questionnaires to fill out about her/himself and the child. The majority of the respondents were mothers (N of fathers = 25). The parent was instructed to work on the questionnaire packet during the laboratory visit but was allowed to finish uncompleted forms at home and mail them back if needed. If the child was in daycare or preschool, consent was also obtained in order to contact teachers and send them questionnaires to complete and return by mail (N of teachers = 230). The second laboratory visit included a structured parent-child interaction, which lasted approximately 30 minutes, and a psychophysiological assessment, which will not be discussed here. The majority of parents who participated in the parent-child interaction were mothers (N of fathers = 34). Finally, a semi-structured diagnostic interview assessing the child's temperament, behavior, and development was conducted over the phone with the primary caregiver. Families were compensated monetarily for their participation in the study.

Assessment Procedures

Laboratory Temperament Assessment. The first laboratory visit consisted of the child's participation in a standardized set of twelve episodes from the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995), lasting approximately two hours. The twelve episodes were designed to elicit different

behaviors and emotions. The episodes in the Lab-TAB were drawn from previous studies that examine a number of research questions related to child development and emotionality (e.g., Kochanska & Knaack, 2003; Pfeifer et al., 2002). The child returned to a neutral state in between each episode by taking a short play break. Each episode was videotaped through a one-way mirror and later coded. A parent remained in the room for all episodes except for Stranger Approach and Box Empty. Below is a description of each episode and what each was designed to elicit:

Risk Room (BI, activity). The child explored a set of novel and ambiguous stimuli (e.g. cloth tunnel, balance beam, Halloween mask, etc.).

Tower of Patience (inhibitory control, interest). The child and experimenter alternated turns building a tower together with large blocks. During each of her turns, the experimenter increased delays in placing her block on the tower, thus making the child wait.

Arc of Toys (positive affect, interest, negative affect). The child was allowed to play with toys for a few minutes, after which the experimenter asked the child to clean up the toys.

Stranger Approach (BI). While the experimenter went to get more toys, a male research assistant entered the room where the child waited alone and spoke to the child in a neutral tone while gradually walking closer (Afterwards, the experimenter re-entered and asked the child if there was a man in the room and what he was like. The experimenter told the child it was her friend who was looking for some papers and then proceeded to open the door and greet the stranger).

Car Go (positive affect, interest). The child and experimenter raced remote controlled cars.

Transparent Box (persistence, interest, negative affect). The child selected a toy, which was then locked in a transparent box. The child was then left alone in the room with a set of incorrect keys to use to open the box. After a few minutes, the experimenter returned, gave the child the correct key, and encouraged the child to use the new key to open the box and play with the toy.

Exploring New Objects (BI). The child explored a set of novel and ambiguous stimuli, including a mechanical spider, a mechanical bird, and sticky water-filled soft gel balls.

Pop-up Snakes (positive affect). The child and experimenter surprised the child's mother with a can of potato chips that actually contained coiled toy snakes.

Impossibly Perfect Green Circles (negative affect, persistence). The child was instructed to repeatedly draw a circle on a large piece of paper. After each drawing, the circle was mildly criticized.

Popping Bubbles (positive affect, interest). The child and experimenter played with a bubble-shooting toy.

Snack Delay (inhibitory control). The child was instructed to wait for the experimenter to ring a bell before eating a snack. The experimenter systematically delayed ringing the bell.

Box Empty (negative affect). The child was given a present to unwrap, in which nothing was inside. After the child discovered the box was empty, the experimenter returned with several small toys for the child to keep.

Although all episodes were somewhat novel to children in that they took place in an unfamiliar laboratory setting, only three (i.e., Risk Room, Stranger Approach, and Exploring New Objects) were explicitly designed to elicit wariness, hesitancy, and fear. These episodes, which are similar to the episodes used in most laboratory studies of BI (Kagan, 1997; Pfeifer et al., 2002), were included as novel situations for this study. The remaining 9 episodes, which were similar to play situations that young children frequently participate in, were characterized as non-novel.

Tape Coding Procedures. Coding procedures followed those in previous studies (Durbin et al., 2005, Olino, Klein, Durbin, Hayden, & Buckley, 2005). Different coding methods were employed for behavioral inhibition, positive affect, and behavior variables. The scoring developed for these assessments have been related to independent home observations and have shown moderate stability over time (Durbin, Hayden, Klein, & Olino, 2007).

Most previous studies of BI have employed a micro-coding approach, using a small number of episodes specifically designed to elicit BI (Kagan, 1997; Pfeifer et al., 2002). Thus, in order to compare the present findings to those in the BI literature, the present analyses used micro-coding of BI that incorporates variables from the three novel situations. The micro-level coding, based on Goldsmith et al. (1995), consisted of coding highly specific behaviors and emotions at 20-30 second intervals for each episode. A summary variable was computed for each variable coded in each episode by computing average ratings over the entire episode. Aggregate variables were then computed as averages across all episodes that coded that variable.

Because, by definition, BI should only be evident in novel contexts, variables used to measure BI were only assessed and coded during the three novel episodes. From Risk Room and Exploring New Objects, these variables included latency to touch objects, total number of objects touched, tentative play, references and proximity to parent, references to experimenter, time spent playing, and latency to verbalize. From Exploring New Objects, a startle variable was also included. From Stranger Approach, variables included gaze aversion, latency to vocalize, approach to and avoidance of stranger, and verbal/nonverbal interaction with stranger. Variables included from all novel episodes consisted of fearful facial, vocal, bodily affect, and latency to first fear response. The micro BI scale was comprised of an average of z-scored codes ($\alpha = .80$; ICC = .88, $N = 28$) from Risk Room, Exploring New Objects, and Stranger Approach.

The ratings of positive affect considered qualitative and quantitative aspects of displays of joy and enthusiasm. Each instance of positive affect was rated on a four-point scale and then summed across the episode. Positive affect was coded during all 12 episodes, regardless of whether that episode was specifically designed to elicit it. This decision was based on the rationale that children may display positive affect in many contexts and not just those intended to elicit high positive affect. Thus, ratings of bodily, facial, and vocal positive affect were each averaged across the 12 episodes. Next, averaged ratings of bodily, facial, and vocal positive affect were combined to yield a composite score of positive affect ($\alpha = .87$). Interrater ICC for global coded positive affect was .92 ($N = 35$).

For the behavior ratings, only a single rating was made per episode. This single rating was based on all behaviors thought to be relevant to each dimension during that

episode. Variables on which the constructs of PA and BI were hypothesized to overlap include activity, interest/engagement, and sociability. Global activity ratings ($\alpha = .73$) were based on the quantity and quality of movement during each episode as well as the amount of vigor exhibited in the manipulation of stimuli. Global interest ratings ($\alpha = .68$) were based on how engaged the child appeared in play. Global sociability ratings ($\alpha = .83$) were based on the quality and quantity of the child's attempts to engage and interact with the experimenter and the parent. Interrater ICCs ($N = 35$) for activity, interest, and sociability were .84, .75, and .83, respectively. Ratings of each variable were summed to form a composite behavioral approach scale for novel episodes ($\alpha = .71$) and non-novel episodes ($\alpha = .80$).

Children's Behavior Questionnaire (CBQ). The CBQ (Rothbart, Ahadi, Hersey, & Fisher, 2001) is a widely used 194-item caregiver report measure of temperament for three to seven-year-old children. The primary caregiver is asked to rate the child's reaction/behavior within the past six months on a seven-point scale ranging from 1 (extremely untrue of your child) to 7 (extremely true of your child). Scales used in the present analyses included fear (N of items = 12, $\alpha = .74$), shyness (N of items = 13, $\alpha = .92$), and smiling/laughter (N of items = 13, $\alpha = .73$).

Behavioral Inhibition Questionnaire (BIQ). The BIQ (Bishop, Spence, & McDonald, 2003) assesses the frequency of children's behavioral inhibition across three domains: social novelty, situational novelty, and physical activities with possible risk of injury. Items are rated on a seven-point scale ranging from 1 (hardly ever) to 7 (almost always). A parent form, consisting of 30 items, and a teacher form, consisting of 28 items, were completed by the primary caregiver and teacher, respectively. The BIQ has been shown

to have acceptable internal consistency, moderate stability over one year, and strong concurrent and construct validity (Bishop et al., 2003). In this study, the coefficient alpha for the total score from both the parent and teacher forms was .96.

Children's Reaction Scale (CRS). The CRS (Eisenberg et al., 1996) is a 19-item measure that assesses the way children respond to events and the ways in which they express emotion. Each item is rated on a seven-point scale ranging from 1 (never) to 7 (always). The CRS was completed by both the primary caregiver and the teacher. The coefficient alphas from the positive (N of items = 6) and negative (N of items = 5) scales of the parent form were .80 and .70, respectively. From the teacher form, coefficient alphas were .84 for the positive scale and .75 for the negative scale.

Child Social Preference Scale (CSPS). The CSPS (Coplan et al., 2004) consists of 11 items that were designed to assess children's conflicted shyness and social disinterest. Both the primary parent and teacher completed this measure by indicating the degree to which each item reflects the child's general social behavior. Items are rated on a five-point scale ranging from 1 (not at all) to 5 (a lot). The CSPS has been shown to have satisfactory psychometric properties (Coplan et al., 2004). In this study, coefficient alphas for the parent-rated shyness (N of items = 7) and disinterest scales (N of items = 4) were .90 and .73, respectively. From the teacher form, alphas were .88 and .86, respectively.

Teaching Tasks. In the second laboratory visit, the child and parent participated in a parent-child interaction (PCI), lasting approximately 30 minutes, which consisted of a modified version of the Teaching Tasks battery: a series of six standardized tasks designed to elicit different parenting and child behaviors and interaction styles (Teaching

Tasks; Egeland et al., 1995). The interaction was videotaped and later coded. Below is a description of each task:

Book Reading. The parent read a short book with the child and then took a few minutes to talk about the book together.

Wheels. The parent tried to get the child to name as many things with wheels as possible.

Blocks. The parent tried to get the child to build larger square blocks using the smaller blocks.

Matching. The parent worked with the child to match pieces on a board so that pieces of the same shape were in columns and pieces of the same color were in rows (If the child was younger than 3 ½ years old, a different matching task was used in which the child matched color only).

Maze. The parent worked with the child to complete a maze by using the knobs on an etch-a-sketch.

Gift. The parent presented the child with a small gift and then spent a few minutes looking at the toys together.

Tape Coding Procedures. The parent-child interaction was coded using a global approach, where a single rating was made for each variable per episode based on all relevant behaviors in that episode. For the present analyses, parenting-related ratings of parent supportive presence, hostility, and intrusiveness were coded for each episode. Additionally, ratings of child positive affect were coded for each episode. Ratings of parent supportive presence ($\alpha = .88$) were based on the parent's expression of positive regard and emotional support to the child. Ratings of hostility ($\alpha = .76$) were based on the

parent's expression of anger, frustration, annoyance, discounting or rejecting of the child. Ratings of intrusiveness ($\alpha = .61$) were based on the degree to which the parent interferes with the child's needs, interests, or actual behaviors and fails to recognize the child's effort to gain autonomy. Ratings of child positive affect ($\alpha = .82$) were based on the frequency and intensity of the child's expression of facial, vocal, and bodily positive affect. Each variable in the PCI was coded during all six tasks and then averaged across tasks. Interrater ICCs for parent supportive presence, hostility, intrusiveness, and child positive affect were .85, .83, .70, and .87 ($N = 55$), respectively.

Parenting Styles and Dimensions Questionnaire (PSDQ). The PSDQ (Robinson, Madleco, Olsen, & Hart, 2001) is a 37-item measure, completed by the primary caregiver, that assesses authoritarian, authoritative, permissive, and overprotective parenting behaviors. Parents rated how often they exhibit each behavior with their child on a 5-point scale ranging from 1 (never) to 5 (always). The scales used in the present analyses included overprotectiveness (N of items = 5), hostility (N of items = 12), autonomy (N of items = 5), and connection (N of items = 5). The hostility scale ($\alpha = .61$) was created by combining the verbal hostility (N of items = 4), physical coercion (N of items = 4), and non-reasoning/punitive (N of items = 4) scales. Coefficient alphas for overprotectiveness, autonomy, and connection were .69, .65, and .66, respectively.

Preschool Age Psychiatric Assessment (PAPA). The PAPA (Egger, Ascher, Angold, 1999) is a semi-structured interview designed to assess psychopathology in preschoolers between two- and five-years-old. The PAPA covers a comprehensive set of symptoms from the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision* (DSM-IV-TR; American Psychiatric Association, 2000) as well as

developmentally relevant items, such as eating, sleeping, and playing behaviors, that are absent from the current nosology. Adequate test-retest reliability has been found for the PAPA (Egger et al., 2006). Interviews were conducted by graduate students in clinical psychology who were trained on the administration by a member of the PAPA development team. Interviews typically lasted between one and two hours and were conducted over the telephone with the primary caregiver. For the purposes of the present study, items relating to behavioral inhibition, anxiety, depression, anhedonic symptoms, as well as social behavior were included in the analyses. Coefficient alphas for the major symptom scales of depression (N of items = 39) and anxiety (N of items = 79) were .71 and .80, respectively. The interrater ICCs for the depression and anxiety scales were .98 and .99 ($N = 21$).

Child Behavior Checklist Ages 1 ½ - 5 (CBCL). The CBCL (Achenbach & Rescorla, 2000) is a widely used parent-report checklist that consists of 99 items assessing a range of behavioral/emotional problems in children between the ages of 1 ½ and 5 years. Parents rated each item as 0 (not true), 1 (somewhat or sometimes true), or 2 (very or often true). For children in daycare or preschool, their caregiver or teacher completed the Caregiver/Teacher Report Form (C-TRF/1 ½-5; Achenbach & Rescorla, 2000). There are well-established norms for the CBCL with young children, and a number of studies have documented its reliability and validity (e.g. Achenbach & Rescorla, 2000; Achenbach, Edlbrock, & Howell, 1987). From both the parent and teacher forms, the DSM affective problems (N of items = 10) and DSM anxiety problems (N of items = 10) scales were used. From the parent version, coefficient alphas were .62 and .67, respectively. From the teacher version, alphas were .71 and .77.

Data analysis

The first set of analyses in this study was designed to replicate the analyses in our previous study discussed earlier (Laptook et al., 2008) and use variables assessed in the Lab-TAB. In order to eliminate overlap between variables, the PA variable was defined solely by positive affect; the BI variable was defined using specific behaviors derived from previous research; and the behavioral approach variable was defined using variables on which the constructs of PA and BI are hypothesized to overlap, with the exception of the affective component. While PA has generally been conceptualized as a dimensional variable in the literature (Clark & Watson, 1999), BI is often conceptualized as a categorical variable (Kagan, 1997). Hence, PA and BI were examined using both dimensional and categorical approaches. Multiple linear regressions were used for the dimensional analysis. Positive affect and BI were entered simultaneously into models predicting behavioral approach in novel and non-novel contexts, and any nonlinear effects were examined. Interactions are reported only when significant. Due to the large sample size, relatively small associations could be statistically significant. Thus, in cases where positive affect and BI both predicted the dependent variable, the magnitude of the correlations was compared using Meng's procedure (Meng, Rosenthal, & Rubin, 1992). For the categorical analyses, a one-way analysis of variance (ANOVA) was used to compare three groups (low PA, high BI, comparison) on levels of behavioral approach, and subsequent planned comparisons were conducted.

The second set of analyses aimed to extend the findings from the preliminary study and validate the laboratory temperament groups of low PA and high BI by comparing them across four areas: temperament (i.e., parent/teacher reports of

temperament and other laboratory assessments); social/peer behavior; parenting; and psychological symptomatology. Primary analyses were conducted using a dimensional approach, and secondary analyses were conducted using a categorical approach.

Results

Laboratory differentiation of PA and BI using dimensional definitions

The zero-order correlation between positive affect and BI was not significant ($r = -.08, p > .05$). Data from the regression analyses are presented in Table 1. As expected, in the novel situations, both the coefficients for positive affect and BI were significant but in opposite directions, with more BI and lower positive affect associated with lower approach. Because both coefficients were significant, correlation coefficients between both predictor variables with the criterion variable were compared using the method described in Meng, Rosenthal, and Rubin (1992). During the $r - Z$ transformation, the sign for positive affect was reversed so that both positive affect and BI were scored in the same direction, although the original non-reversed correlations are reported below. There was no significant difference between the correlation coefficients, $Z = -.21, p > .05$.

In the non-novel situations, both coefficients for positive affect and BI were significant and followed a similar pattern to the results in the novel situations. However, the correlation between positive affect and behavioral approach ($r = .67$) was significantly larger than the correlation between BI and behavioral approach ($r = -.19$), $Z = 10.10, p \leq .001$. There was also a significant interaction between positive affect and BI, as indicated by the product term having a significant unique effect, effect size (partial r) = .16. There was a simple main effect for low PA, [$b = -.58, SE_b = .09, t[552] = -6.07, p \leq .05$]. For low PA, levels of behavioral approach decreased as BI increased. Low and high

PA differed at both lower [$b = 1.41, SE_b = .10, t[552] = 13.47, p \leq .05$] and higher [$b = 1.92, SE_b = .10, t[552] = 18.29, p \leq .05$] levels of BI, with low PA associated with overall lower approach. Figure 1 illustrates this pattern by showing the regression lines at the mean and one SD above and below for positive affect predicting behavioral approach at the mean and one SD above and below on BI.

Laboratory differentiation of PA and BI using categorical definitions

As described earlier, to eliminate overlap between the independent and dependent variables, the PA group was defined solely by positive affect, and the BI group was defined using specific behaviors derived from previous research. Using the positive affect ratings, children who scored in the lowest 25% of the sample ($N = 98$) were included in the low PA group. Children who scored in the highest 25% on BI ($N = 98$) were included in the high BI group. A comparison group ($N = 93$) was created consisting of those children who fell within both the middle 40% of positive affect and the middle 40% of BI, in order to minimize overlap with the target groups as well as exclude extreme groups at the opposite ends of the constructs. In creating distinct groups of children with high BI and low positive affect, children who met criteria for both groups ($N = 42$) were not included in the analyses. The three groups were compared on the composite behavior approach variable (activity, interest, and sociability).

A one-way ANOVA was conducted to compare the three groups on levels of behavioral approach. Analyses yielded significant results for the overall ANOVA in both the novel ($F[2, 284] = 4.31, p \leq .01$) and non-novel situations ($F[2, 285] = 36.77, p \leq .001$). Group differences as well as means and standard deviations are presented in Table 2. Planned comparisons between each pair of groups were then conducted. For novel

situations, there was a significant difference between the comparison and high BI groups ($t[284] = -2.62, p \leq .01$), reflecting a small effect size ($ES = .18$) with the high BI group exhibiting lower levels of behavioral approach, and a significant difference between the comparison and low PA groups ($t[284] = -2.48, p \leq .01$), reflecting a small effect size ($ES = .19$) with the low PA group exhibiting lower levels of approach. There was no significant difference between the low PA and high BI groups ($t[284] = -.12, p > .05$). Results for the non-novel situations revealed no significant difference between the comparison and high BI groups ($t[285] = 1.75, p > .05$). However, there was a significant difference between the comparison and low PA group ($t[285] = -6.32, p \leq .001$), reflecting a small-medium effect size ($ES = .42$), and a significant difference between the low PA and high BI groups ($t[285] = 8.17, p \leq .001$), reflecting a medium effect size ($ES = .49$), with the low PA group exhibiting lower levels of approach compared to both the comparison and high BI groups.

Temperament domain

Dimensional analyses. To examine the relationship between laboratory ratings of low positive affect and high BI with external measures of temperament, simultaneous multiple regressions were conducted in which laboratory dimensional scores of positive affect and BI were entered as predictor variables and relevant PA and BI variables from other measures of temperament were entered as criterion variables. Data from the regression analyses are presented in Table 3.

Parent-Child Interaction (PCI). With PCI child positive affect as the criterion variable, both the coefficients for positive affect and BI were significant but in opposite directions, with higher positive affect and lower BI associated with higher PCI child

positive affect. However, the correlation between positive affect and PCI child positive affect ($r = .31$) was significantly larger than the correlation between BI and PCI child positive affect ($r = -.11$), $Z = 3.50$, $p \leq .001$.

Children's Behavior Questionnaire (CBQ). With fear as the criterion variable, only the coefficient for BI was significant, with BI particularly associated with fear. With shyness as the criterion variable, both the coefficients for positive affect and BI were significant but in opposite directions, with higher BI and lower positive affect associated with higher shyness. The correlation between BI and shyness ($r = .23$) was significantly larger than the correlation between positive affect and shyness ($r = -.13$), $Z = 1.72$, $p \leq .05$. With smiling/laughter as the criterion variable, both of the coefficients were significant, but in opposite directions, with higher positive affect and lower BI associated with more smiling/laughter. However, there was no significant difference between the correlation coefficients, $Z = -.33$, $p > .05$.

Behavioral Inhibition Questionnaire (BIQ). With parent total score as the criterion variable, both the coefficients for positive affect and BI were significant. Lower positive affect and higher BI were indicative of more inhibition. There was a trend toward a significant difference between the correlation of BI ($r = .25$) and positive affect ($r = -.16$), $Z = 1.52$, $p = .06$, with parent total BIQ. With teacher total score as the criterion variable, findings were similar; however, there was no significant difference between the correlation coefficients, $Z = 1.02$, $p < .05$.

Children's Reaction Scale (CRS). With parent positive scale as the criterion variable, contrary to expectations, only the coefficient for BI was significant, with more BI associated with less positive reactions. With parent negative scale as the criterion

variable, results were similar, but more BI was associated with more negative reactions. With teacher positive scale as the criterion variable, both the coefficients for positive affect and BI were significant but in opposite directions, with more positive affect and less BI associated with more positive reactions. There was no significant difference between the correlation coefficients, $Z = 1.38, p > .05$. With teacher negative scale as the criterion variable, neither of the coefficients were significant.

Preschool Age Psychiatric Assessment (PAPA). With the item “preference to play alone” as the criterion variable, neither of the coefficients were significant. With “difficulty with friends due to withdrawal” as the criterion variable, only the coefficient for positive affect was significantly associated, in a negative direction, with the criterion variable. With the PAPA BI scale as the criterion variable, both of the coefficients for positive affect and BI were significant. Lower positive affect and greater BI were associated with higher BI scale scores. The difference between the correlation coefficients was not significant, $Z = .34, p > .05$.

Categorical analyses. One-way ANOVAs were conducted to compare the previously defined low PA, high BI, and comparison groups on levels of variables from other measures of temperament. Analyses yielded significant overall ANOVAs with PCI child positive affect ($F[2, 270] = 3.56, p \leq .05$), CBQ fear ($F[2, 270] = 5.57, p \leq .01$), CRS teacher positive scale ($F[2, 112] = 3.95, p \leq .05$), and CRS teacher negative ($F[2, 111] = 6.28, p \leq .01$). Group differences as well as means and standard deviations are presented in Table 4. For PCI child positive affect, there was a significant difference between the high BI and low PA groups ($t[270] = 2.63, p \leq .01$), reflecting a small effect size ($ES = .18$), with the low PA group exhibiting lower levels of positive affect. There was no

significant difference between the high BI and comparison groups ($t[270] = 1.67, p > .05$) or the low PA and comparison groups ($t[270] = -.90, p > .05$). For CBQ fear, there was a significant difference between the high BI and comparison groups ($t[270] = 2.55, p \leq .01$), reflecting a small effect size ($ES = .20$), and a significant difference between the high BI and low PA groups ($t[270] = 3.14, p \leq .01$), reflecting a small effect size ($ES = .22$), with the high BI group exhibiting more fear than both the comparison and low PA groups. There was no significant difference between the low PA and comparison groups ($t[270] = -.54, p > .05$). For CRS teacher positive scale, there was a significant difference between the high BI and low PA groups ($t[112] = 2.78, p \leq .01$), reflecting a small effect size ($ES = .32$), with the low PA group exhibiting less positive reactions. There was no significant difference between the high BI and comparison groups ($t[112] = 1.77, p > .05$) or the low PA and comparison groups ($t[112] = -1.03, p > .05$). For the CRS teacher negative scale, there was a significant difference between the high BI and comparison groups ($t[111] = 2.80, p \leq .01$), reflecting a small effect size ($ES = .29$), and a significant difference between the high BI and low PA groups ($t[111] = 3.30, p \leq .001$), reflecting a small-medium effect size ($ES = .37$), with the high BI group exhibiting more negative reactions than both the comparison and low PA groups. There was no significant difference between the low PA and comparison groups ($t[111] = -.53, p > .05$).

Social domain

Dimensional analyses. Data from the regression analyses are presented in Table 5.

Child Social Preference Scale (CSPS). With parent-rated shyness as the criterion variable, both the coefficients for positive affect and BI were significant but in opposite directions, with more BI and less positive affect associated with more shyness. There was

no significant difference between the correlation coefficients, $Z = .65, p > .05$. With parent-rated disinterest as the criterion variable, neither of the coefficients were significant. With teacher-rated shyness as the criterion variable, contrary to expectations, only the coefficient for positive affect was significant and was negatively associated with shyness. With teacher-rated disinterest as the criterion variable, the coefficient for positive affect was significant and negatively associated with disinterest.

Categorical analyses. One-way ANOVAs were conducted to compare the previously defined low PA, high BI, and comparison groups on levels of variables from the social domain. Results from all analyses were not significant.

Parenting domain

Dimensional analyses. Data from the regression analyses are presented in Table 6.

Parent-Child Interaction (PCI). With supportive presence, intrusiveness, and hostility as criterion variables, the coefficients for positive affect and BI were not significant.

Parenting Styles and Dimensions Questionnaire (PSDQ). With overprotectiveness and hostility as criterion variables, both coefficients were not significant. With connection and autonomy as criterion variables, the coefficient for BI was significant and negatively associated with both dependent variables.

Categorical analyses. One-way ANOVAs were conducted to compare the previously defined low PA, high BI, and comparison groups on levels of variables from the parenting domain. Results from all analyses were not significant.

Psychological symptomatology domain

Dimensional analyses. Data from the regression analyses are presented in Table 7.

Child Behavior Checklist (CBCL). With parent-rated DSM affective problems as the criterion variable, contrary to expectations, only the coefficient for BI was significant, with more BI associated with more affective problems; however, the overall F was not significant. With parent-rated DSM anxiety problems as the criterion variable, both of the coefficients for positive affect and BI were significant but in opposite directions, with more BI and less positive affect associated with more anxiety. There was no significant difference between the correlation coefficients, $Z = 1.41, p > .05$. With teacher-rated DSM affective problems as the criterion variable, both coefficients were not significant. With teacher-rated DSM anxiety problems, the coefficient for BI was significant and positively associated with anxiety.

Preschool Age Psychiatric Assessment (PAPA). With depression scale as the criterion variable, contrary to expectations, only the coefficient for BI was significant, with more BI related to more depressive symptoms. With anxiety scale as the criterion variable, both the coefficients for positive affect and BI were significant but in opposite directions, with more BI and less positive affect related to more anxiety. There was no significant difference between the correlation coefficients, $Z = .17, p > .05$. With social phobia scale as the criterion variable, results were similar, with no significant difference between the correlation coefficients, $Z = .17, p > .05$. With specific phobia scale as the criterion variable, the coefficient for BI was significant and positively associated with specific phobia.

Categorical analyses. One-way ANOVAs were conducted to compare the previously defined low PA, high BI, and comparison groups on levels of variables from the symptom domain. Analyses yielded significant results for the overall ANOVA with

CBCL parent-rated anxiety problems ($F[2, 283] = 4.48, p \leq .01$), CBCL teacher-rated anxiety problems ($F[2, 113] = 4.16, p \leq .05$), and PAPA depression scale ($F[2, 276] = 5.76, p \leq .01$). Group differences as well as means and standard deviations are presented in Table 8. For CBCL parent-rated anxiety problems, there was a significant difference between the high BI and comparison groups ($t[283] = 2.98, p \leq .01$), reflecting a small effect size ($ES = .22$), with the high BI group exhibiting more anxiety. There was no significant difference between the low PA and comparison groups ($t[283] = 1.74, p > .05$) or the low PA and high BI groups ($t[283] = 1.27, p > .05$). For CBCL teacher-rated anxiety problems, there was a significant difference between the high BI and comparison groups ($t[59.30] = 2.59, p \leq .01$), reflecting a small effect size ($ES = .28$), and a significant difference between the high BI and low PA groups ($t[74.46] = 2.24, p \leq .05$), reflecting a small effect size ($ES = .25$), with the high BI group exhibiting more anxiety than both the comparison and low PA groups. There was no significant difference between the low PA and comparison groups ($t[63.44] = -.06, p > .05$). For PAPA depression scale, there was a significant difference between the high BI and comparison groups ($t[159.05] = 3.42, p \leq .001$), reflecting a small effect size ($ES = .24$), and a significant difference between the low PA and comparison groups ($t[176.68] = 2.24, p \leq .05$), reflecting a small effect size ($ES = .16$), with both the high BI and low PA groups exhibiting more depression than the comparison group. There was no significant difference between the high BI and low PA groups ($t[180.92] = 1.30, p > .05$).

Interaction of temperament and parenting on symptoms

To examine the moderating effect of parenting on the relationship between temperament and psychological symptoms, simultaneous multiple regressions were

conducted in which laboratory dimensional scores of temperament, laboratory (i.e., PCI) and self-report (i.e. PSDQ) scores of parenting behaviors, and interaction terms were entered as predictor variables and symptom variables (i.e., CBCL and PAPA) were entered as criterion variables. Analyses were first conducted with the 3-way interaction term entered in the model (i.e., PA x hostility x support for PA-related analyses and BI x intrusiveness x support for BI-related analyses). If the 3-way term was not significant, only the two 2-way interaction terms were retained in the model. If one or neither of those terms were significant, the non-significant cross-product term(s) were dropped from the model. Only significant parenting by temperament interactions and parenting main effects are reported. Parenting main effects are reported only in the absence of a significant interaction. Main effects for temperament were reported in Table 7. Simple main effects are also reported to probe significant interactions.

Interaction of positive affect and parenting on symptoms. These analyses examined the interaction of positive affect and hostility as well as positive affect and support in predicting depressive and anxiety symptoms. From the PCI, hostility and supportive presence variables were used to create the interaction terms. From the PSDQ, hostility and connection variables were used to create the interaction terms. Data from the regression analyses are presented in Table 9.

Interactions of positive affect with PCI variables. With CBCL affective problems as the criterion variable, both the coefficients for the interaction terms of positive affect x hostility and positive affect x support were significant. For the first interaction, there was only a simple main effect for high PA, [$b = .42, SE_b = .18, t[519] = 2.30, p \leq .05$]. When hostility was high, higher positive affect was associated with more affective problems.

Low and high PA differed at lower levels of hostility [$b = -.39, SE_b = .17, t[519] = -2.31, p \leq .05$], with low PA associated with more affective problems (see Figure 2). For the second interaction, only the simple main effect for low PA was significant, [$b = -.45, SE_b = .17, t[519] = -2.58, p \leq .05$]. When support was low, lower positive affect was associated with more affective problems. Low and high PA differed at lower levels of support, [$b = -.39, SE_b = .16, t[519] = -2.36, p \leq .05$], with low PA associated with more affective problems (see Figure 3).

With CBCL anxiety problems as the criterion variable, both of the 2-way interaction terms were significant. For the first interaction, there was a significant simple main effect for low [$b = -.61, SE_b = .23, t[519] = -2.59, p \leq .05$] and high [$b = .53, SE_b = .22, t[519] = 2.43, p \leq .05$] PA. Low PA was associated with fewer anxiety problems as hostility increased, and high PA was associated with more anxiety as hostility increased. However, low and high PA differed only at lower levels of hostility [$b = -1.00, SE_b = .19, t[519] = -5.15, p \leq .05$], with low PA associated with more anxiety (see Figure 4). For the second, there was a simple main effect for low PA, [$b = -.54, SE_b = .20, t[519] = -2.67, p \leq .05$], with low PA associated with more anxiety when support was low. Low and high PA differed at lower levels of support [$b = -.81, SE_b = .20, t[519] = -4.12, p \leq .05$], with low PA associated with higher anxiety (see Figure 5).

With PAPA depression scale as the criterion variable, the interaction of positive affect and hostility was not significant, although there was a significant main effect for hostility, $t(521) = 4.54, p \leq .001$, indicating an association between higher hostility and more depressive symptoms. In contrast, the interaction for positive affect and support was significant, and there was a simple main effect for low PA, [$b = -1.02, SE_b = .24, t[521] =$

-4.31, $p \leq .05$]. For low PA, depression levels were higher when support was low. Low and high PA differed at lower levels of support [$b = -.52$, $SE_b = .25$, $t[521] = -2.07$, $p \leq .05$], with low PA associated with higher depression (see Figure 6).

With PAPA anxiety scale as the criterion variable, both of the 2-way interaction terms were significant. For the first, there was a simple main effect for low PA, [$b = -2.19$, $SE_b = .76$, $t[519] = -2.86$, $p \leq .05$], indicating that anxiety levels were higher when hostility was low. Low and high PA differed at lower levels of hostility [$b = -3.23$, $SE_b = .64$, $t[519] = -5.03$, $p \leq .05$], with low PA associated with more anxiety (see Figure 7). For the second, there was also a simple main effect for low PA, [$b = -1.64$, $SE_b = .65$, $t[519] = -2.52$, $p \leq .05$], with more anxiety when support was low. Low and high PA differed at lower levels of support [$b = -2.66$, $SE_b = .63$, $t[519] = -4.21$, $p \leq .05$], with low PA associated with more anxiety (see Figure 8).

With PAPA social phobia scale as the criterion variable, the interaction term for positive affect and hostility was significant, and there were no significant simple main effects for PA. However, low and high PA differed at lower levels of hostility [$b = -.39$, $SE_b = .12$, $t[522] = -3.18$, $p \leq .05$], with low PA associated with more social phobia (see Figure 9).

With PAPA specific phobia scale as the criterion variable, analyses did not yield significant results.

Interaction of positive affect with PSDQ variables. With CBCL affective problems as the criterion variable, the 3-way interaction term was significant. When hostility was low, there was a simple main effect for high PA, [$b = -.69$, $SE_b = .23$, $t[246] = -2.97$, $p \leq .05$], with less affective problems associated with higher connection. Low

and high PA differed at higher levels of connection [$b = -.40$, $SE_b = .20$, $t[246] = -2.05$, $p \leq .05$], with low PA associated with more affective problems (see Figure 10). When hostility was high, neither the simple main effect for low PA nor high PA was significant. Levels of PA also did not differ at lower or higher levels of connection (see Figure 11).

With CBCL anxiety problems as the criterion variable, the interaction of positive affect and hostility was not significant, although there was a significant main effect for hostility [$t(499) = 2.98$, $p \leq .01$], indicating that higher hostility was associated with higher anxiety. The interaction of positive affect and support was also not significant; however, there was a significant main effect for connection [$t(499) = -1.99$, $p \leq .05$], indicating that higher connection was associated with lower anxiety.

With PAPA depression scale as the criterion variable, the 3-way interaction term was significant. When hostility was low, neither simple main effect for PA was significant, and levels of PA did not differ at low or high levels of connection (see Figure 12). When hostility was high, neither simple main effect for PA was significant. However, low and high PA differed at lower levels of connection [$b = -.86$, $SE_b = .40$, $t[245] = -2.17$, $p \leq .05$], with low PA related to more depression (see Figure 13).

With PAPA anxiety scale and social phobia scale as the criterion variables, both interaction terms were not significant.

With PAPA specific phobia scale as the criterion variable, the interaction of positive affect and hostility was not significant; however, there was a significant main effect for hostility, $t(499) = 2.07$, $p \leq .05$, indicating an association between higher hostility and higher levels of social phobia. The interaction of positive affect and support was not significant, and there were no significant main effects.

Interaction of positive affect with a combination of parenting variables. In light of the findings for the interactions of positive affect with PSDQ hostility and connection, it was hypothesized that similar interactions may exist between positive affect, PCI hostility, and PSDQ connection, especially with respect to affective problems. The relationship between these variables may be influenced by parent-child connection, with children of hostile parents possibly feeling more connected. To test this, the 3-way interaction term of positive affect, PCI hostility, and PSDQ connection was entered into the model with PAPA depression as the criterion variable. The 3-way interaction term was significant, $\beta = .12$, $t(477) = .2.60$, $p \leq .01$. When PCI hostility was low, neither simple main effect for PA was significant. Levels of PA also did not differ at low or high levels of connection (see Figure 14). When PCI hostility was high, there were no simple main effects for PA. However, levels of PA differed at lower levels of connection [$b = -1.16$, $SE_b = .49$, $t[221] = -2.35$, $p \leq .05$], with low PA related to more depression (see Figure 15). The 3-way interaction term was also entered into models with CBCL affective and anxiety problems and PAPA anxiety and social phobia scales as criterion variables; however, the interaction terms were not significant.

Interaction of BI and parenting on symptoms. These analyses examined the interaction of BI and intrusiveness as well as BI and support in predicting depressive and anxiety symptoms. From the PCI, the intrusiveness variable was used to create the interaction term. There was no interaction term for BI and support using the PCI variables because the PCI support variable does not capture the overprotective quality of support theorized to be relevant to BI. From the PSDQ, autonomy and overprotectiveness variables were

used to create the interaction terms. Data from the regression analyses are presented in Table 10.

Interactions of BI with PCI variables. With CBCL affective problems as the criterion variable, the interaction of BI and intrusiveness was not significant, although there was a significant main effect for intrusiveness, $t(521) = 2.62, p \leq .01$, indicating an association between higher intrusiveness and higher levels of affective problems.

With CBCL anxiety problems, PAPA depression scale, anxiety scale, specific phobia scale, and social phobia scales entered as criterion variables, the interaction terms were not significant.

Interaction of BI with PSDQ variables. With CBCL affective problems as the criterion variable, the interaction of BI and intrusiveness was not significant. The interaction of BI and support was also not significant. . However, there was a significant main effect for overprotectiveness [$t(495) = 4.78, p \leq .001$], indicating an association between higher overprotectiveness and higher affective problems.

With CBCL anxiety problems as the criterion variable, the coefficients for the interaction of BI and intrusiveness and the interaction of BI and support were significant. For the first interaction, there was a simple main effect for high BI, [$b = -.34, SE_b = .18, t[493] = -1.92, p \leq .05$], indicating that anxiety decreased as parental autonomy-granting increased. Levels of BI differed at both low [$b = .95, SE_b = .17, t[493] = 5.46, p \leq .05$] and high [$b = .44, SE_b = .18, t[493] = 2.37, p \leq .05$] levels of autonomy, with high BI associated with more anxiety overall (see Figure 16). For the second, there was a simple main effect for high BI [$b = .82, SE_b = .15, t[493] = 5.38, p \leq .05$], indicating that anxiety levels were higher when overprotectiveness was high. Levels of BI differed at both lower

[$b = .50$, $SE_b = .14$, $t[493] = 3.47$, $p \leq .05$] and higher [$b = .88$, $SE_b = .16$, $t[493] = 5.56$, $p \leq .05$] levels of overprotectiveness, with high BI associated with more overall anxiety (see Figure 17).

With PAPA depression scale as the criterion variable, the interaction of BI and intrusiveness was not significant. The interaction of BI and support was also not significant; however, there was a significant main effect for overprotectiveness, $t(495) = 2.38$, $p \leq .05$, indicating an association between higher overprotectiveness and more depressive symptoms.

With PAPA anxiety scale as the criterion variable, the interaction of BI and intrusiveness was not significant. The interaction of BI and support was also not significant; however, there was a significant main effect for overprotectiveness [$t(495) = 2.27$, $p \leq .05$], indicating an association between higher overprotectiveness and higher anxiety.

With PAPA social phobia scale as the criterion variable, none of the interaction terms were significant.

With PAPA specific phobia scale as the criterion variable, both interaction terms were significant. For the first, there were no simple main effects for BI. However, levels of BI differed at lower levels of autonomy [$b = .72$, $SE_b = .19$, $t[493] = 3.69$, $p \leq .05$], with high BI associated with more symptoms of specific phobia (see Figure 18). For the second, there was a simple main effect for high BI, [$b = .43$, $SE_b = .17$, $t[493] = 2.59$, $p \leq .05$], with high levels of specific phobia associated with more overprotectiveness. Levels of BI differed at higher levels of overprotectiveness [$b = .70$, $SE_b = .18$, $t[493] = 3.84$, $p \leq .05$], with high BI related to more specific phobia (see Figure 19).

Discussion

The temperament traits of low PA and high BI share the common characteristic of low behavioral approach/engagement with the environment (Durbin et al., 2005; Pfeifer et al., 2002); however, research has indicated that there may be different motivational tendencies underlying this phenotypic similarity (Henderson et al., 2004; Putnam & Stifter, 2005). Specifically, in the BI literature, the lack of approach is hypothesized to reflect the presence of fearful inhibition (Kagan, 1997; Kagan et al., 1998). Children who are high in BI are thought to possess the motivation to approach other people and novel stimuli but have anxiety/fear about doing so. Research on child shyness and social withdrawal has shown that lack of approach may also emerge from social disinterest or the lack of desire to engage (Asendorpf, 1990). This latter motivation is consistent with the pattern we observed in children who exhibit low positive affect. However, past research on BI has generally not distinguished BI from low PA or has assumed that high PA and BI were the two poles of a single dimension, making it difficult to discern whether these two traits are associated with different patterns of approach behavior. Nevertheless, studies have shown distinctions between the theoretically similar constructs of shyness/reticence and disinterest/passive-solitary play in the social literature (Asendorpf, 1990; Coplan et al., 1994; Coplan et al., 2004; Harrist et al., 1997). Moreover, there are data that suggest that low PA and high BI may be differentially associated with parenting behavior (Lengua & Kovacs, 2005; Rubin et al., 2002) and psychological symptoms (Joiner and Lonigan, 2000; Lonigan et al., 2000).

The present study consisted of two main aims. First, it sought to replicate findings from a previous study of laboratory differentiation of temperament (Laptook et al., 2008)

and demonstrate that although low approach is common to both BI and low PA, specific contextual factors determine whether children low in PA or high in BI engage in approach behaviors with their surroundings. Second, this study focused on validating the laboratory-assessed temperament traits of low PA and high BI by examining them across the domains of temperament, social behavior, parenting behavior, and psychological symptomatology as well as exploring the moderating effect of parenting on child temperament in predicting internalizing symptoms.

Laboratory differentiation of PA and BI

Similar to findings from Laptook et al. (2008), we found that low PA and high BI can be differentiated in a laboratory setting. BI and low PA both appear to dampen approach behavior in novel situations. In non-novel situations, children with low PA continue to exhibit low approach, whereas children with high BI exhibit approach behavior that is similar to comparison children who are neither low on PA nor high on BI.

Using a categorical approach, in novel situations, both the high BI and low PA groups exhibited a significantly lower level of behavioral approach than the comparison group. Importantly, the high BI and low PA groups did not differ on approach behavior in novel situations. This confirms the predicted overlap between these two temperament constructs in novel contexts and highlights the difficulty of distinguishing them when examined in an unfamiliar environment. In contrast, in non-novel situations, the high BI and comparison groups did not differ, whereas the low PA group exhibited significantly lower levels of approach behavior than both of these groups. Thus, children with high BI

and children with low PA can be distinguished with respect to approach behavior when examined using tasks that employ more familiar stimuli and situations.

Similar results were obtained using a dimensional approach. Results indicated that in novel situations, both positive affect and BI were similarly associated with behavioral approach. In non-novel situations, positive affect was significantly more associated with approach. Additionally, there was a significant interaction between positive affect and BI, which showed that lower levels of positive affect predicted lower levels of approach as BI increased. Levels of positive affect differed at both low and high levels of BI, with lower positive affect associated with overall lower levels of approach. Thus, in more familiar contexts, although lower positive affect predicted lower approach, the presence of high BI magnified this relationship.

Examining PA and BI across different domains

To extend laboratory findings of the differentiation of low PA and high BI, these traits were compared with theoretically relevant variables from other laboratory observations as well as parent/teacher-reports across the domains of temperament, social behavior, parenting behavior, and psychological symptomatology. Overall, findings for BI were more consistent with hypotheses, whereas findings for PA were less consistent. A summary of hypotheses and outcomes are presented in Table 11. Because the dimensional analyses have greater power, only data from these analyses are included in the table.

Temperament domain. In general, results indicated that laboratory-rated BI was associated with BI-related variables from parent/teacher reports of temperament. Higher levels of BI were related to higher levels of parent-reported fear, shyness, negative

reactions, overall behavioral inhibition, PAPA behavioral inhibition symptoms, and teacher-reported inhibition. While we didn't have a strong hypothesis for the relationship between BI and smiling/laughter, it was not unexpected that BI was associated with lower levels of parent-reported smiling/laughter. However, one would expect this association to be influenced by contextual situations, with BI more strongly related to lower levels of smiling/laughter in novel or potentially threatening situations. BI was also associated with lower levels of teacher-reported positive reactions. Contrary to hypotheses, BI was uniquely related to lower levels of parent-reported positive reactions.

For PA, results were not as consistent. Lower positive affect in the Lab-TAB was significantly more closely associated than BI with lower positive affect in the parent-child interaction. Lower positive affect was also related to less parent-reported smiling/laughter, less teacher-reported positive reactions, and more difficulty with friends due to withdrawal on the PAPA, all of which are consistent with the construct of PA. Although laboratory-rated PA was associated with these PA-related variables, it was also related to several BI-related variables. Positive affect was negatively related to parent-reported shyness, PAPA behavioral inhibition symptoms, and both parent and teacher-reported overall inhibition. Surprisingly, positive affect was not related to parent-reports of children's positive reactions, although it was related to teacher reports.

Categorical analyses supported and clarified some of the findings for BI and PA. Children with high BI exhibited significantly higher levels of parent-reported fear compared to children with low PA and the comparison group of children. Additionally, although BI was not significantly related to teacher-reported negative reactions in the dimensional analyses, categorical analyses revealed that children with high BI scored

significantly higher on teacher-rated negative reactions as compared to both children with low PA and controls.

Furthermore, although the low PA and comparison groups did not differ on levels of positive affect in the PCI, analyses indicated that children with low PA exhibited significantly lower levels of positive affect in the PCI as compared to children with high BI, thus highlighting the distinction between these two temperament traits.

Results from the temperament domain suggest that, overall, laboratory-rated BI more consistently predicts BI- relevant variables, whereas PA less consistently predicts related variables. This may suggest that these two constructs are not as distinct as hypothesized. For example, low positive affect may reflect a defensive style of shutting down to cope with anxiety. However, it may also be indicative of the difficulties different raters, such as parents and teachers, have in distinguishing PA from anxiety-related traits, such as shyness.

Social domain. Findings for both BI and PA were mixed. BI was hypothesized to be related to the theoretically relevant construct of shyness, as shyness reflects a desire to interact but an anxiety in doing so. Higher levels of BI were associated with higher levels of parent-reported shyness, consistent with Coplan (2004), but were unrelated to teacher-reported shyness. Positive affect was hypothesized to be associated with the related construct of disinterest, as disinterest reflects a lack of motivation to engage socially; however, this association was significant for teachers alone. Additionally, less positive affect was related to more shyness as reported by both parents and teachers, again suggesting the possibilities that parents and teachers may not always discriminate the motivational tendencies underlying PA and BI or that the construct of PA is different than

previously thought and may be more associated with anxiety-related constructs such as shyness.

Parenting domain. Overall, results yielded few significant findings. Higher levels of BI were associated with lower levels of parent autonomy-granting, consistent with the notion that BI and parental intrusiveness are related (Rubin et al., 1997; Rubin et al., 2002). Higher BI was also associated with less connection, suggesting that children with BI have parents who are less comforting and responsive to their needs. There were no significant results regarding the relationship between positive affect and parenting; however, later in the discussion, significant findings pertaining to the interaction of temperament and parenting variables in the prediction of psychological symptomatology will be discussed.

Psychological symptomatology domain. Similar to findings from the temperament domain, results generally indicated that laboratory-rated BI was associated with internalizing symptoms related to anxiety. Higher levels of BI were associated with both parent- and teacher-reported anxiety as well as symptoms of social phobia, specific phobia, and total anxiety on the PAPA interview. Although BI was related to all measures of anxiety, it was also positively related to parent-reported affective problems and PAPA depression symptoms. This, however, is not unexpected given the overlap in symptoms of depression and anxiety. Additionally, results are consistent with findings from previous studies that show an association between BI and anxiety disorders (Biederman et al., 1990; Schwartz et al., 1999) as well as internalizing symptoms in general (Rothbart & Bates, 2006).

Results for PA were not as clear. Positive affect was unrelated to both parent and teacher reports of affective problems as well as PAPA depression symptoms. Positive affect was, however, negatively associated with PAPA symptoms of anxiety and social phobia in addition to parent-reported anxiety problems. This may be suggestive of the possible difficulty parents experience in discriminating low PA from high BI as well as the possibility that the construct of PA also taps into features of anxiety. Moreover, there is research that suggests that social anxiety may be the one anxiety disorder with a significant component of low PA (Chorpita, Plummer, & Moffitt, 2000; Kashdan, 2004).

Categorical analyses provided support and some clarification for several findings for PA and BI. For teacher-reported anxiety, the high BI group exhibited significantly higher levels of anxiety as compared to both the low PA and comparison groups, while the low PA group did not differ from the comparison group. This is consistent with previous research that showed specificity in the association of BI and anxiety. However, for parent-reported anxiety, the high BI group differed only from the comparison group. This finding supports the specific relationship between BI and anxiety, but it also highlights the difficulty of distinguishing low PA and high BI. For PAPA depression, both the high BI and low PA groups exhibited significantly higher levels of depression than the comparison group. Thus, this finding provides support for the association of low positive affect and depression and is consistent with findings from other studies (i.e., Dougherty et al., submitted); however, it also underscores the challenge of discriminating the two temperament traits.

Interaction of positive affect and parenting in predicting symptomatology

A summary of outcomes for significant temperament x parenting interactions are presented in Table 12. To explore the moderating effect of hostility and support on the relationship between positive affect and internalizing symptoms, we examined the interactions of laboratory positive affect and relevant variables from the parent-child interaction (PCI) and the PSDQ measure of parenting behavior.

Using PCI variables, levels of affective problems differed only as a function of low parent hostility, with children with low positive affect experiencing more affective problems. When hostility was high, children with low and high positive affect experienced similar levels of affective problems. This may reflect the overall greater association between low positive affect and depression. While children both low and high in positive affect appear to be negatively affected by parental hostility, these results suggest the possibility that children with low positive affect may be at risk for depression even when parental hostility is low.

For CBCL anxiety and PAPA anxiety, results were somewhat unexpected, such that low child positive affect was associated with higher child anxiety when parent hostility was low. In contrast, high child positive affect was associated with lower parent-reported CBCL anxiety when hostility was low. Similar to the analyses with CBCL affective problems, levels of positive affect differed only at lower levels of hostility, with lower positive affect related to more CBCL and PAPA anxiety and PAPA social phobia. Taken together with the findings for affective problems in the previous paragraph, these results may reflect a subgroup of children with low positive affect who may tend to exhibit elevated symptoms of depression and anxiety when parental hostility is low but a decrease in anxiety symptoms only when hostility is high. It is possible that parental

hostility may lead to a state of sadness and dejection that is not accompanied by apprehension.

Findings for parent support were consistent with hypotheses for PA. Lower child positive affect was associated with more child CBCL affective problems and PAPA depression symptoms when parent support was low as compared to when it was high. Additionally, children with low and high positive affect differed only at lower levels of support, with low positive affect related to more depression. Similar results were found for CBCL and PAPA anxiety. These findings suggest that parental support may be a protective factor for children low in positive affect with regard to internalizing symptoms in general.

Analyses using the PSDQ variables of parent hostility and connection yielded no significant interactions for child anxiety; however, there was a 3-way interaction between child positive affect, parent hostility, and parent connection for both CBCL affective problems and PAPA depression. For parents low in hostility, higher positive affect was associated with more affective problems when connection was low. Levels of child positive affect differed at higher levels of connection, with lower positive affect associated with more affective problems. Findings suggest that children with both low and high positive affect are negatively affected when parents exhibit low hostility and low connection; however, only those with high positive affect improve as connection increases, whereas those with low positive affect remain symptomatic.

For PAPA depression results varied slightly. For parents high in hostility, levels of positive affect differed at lower levels of connection, with lower positive affect related to more depression. This interaction of child low positive affect and parenting behavior

comprised of less connection and more hostility appears to support a diathesis-stress model for the expression of depressive symptoms.

Because of the significant interaction between child positive affect and PSDQ hostility and connection, we also examined the interaction between positive affect, PSDQ connection, and PCI hostility. The 3-way interaction term was, in fact, significant, but only for PAPA depressive symptoms. Results were consistent with findings from the PSDQ analysis examining the interaction between positive affect, PSDQ hostility, and PSDQ connection in predicting PAPA depression. A sense of connection between parent and child appears to be an important protective factor that may influence the interaction of hostility and positive affect in predicting depression, specifically.

Interaction of BI and parenting in predicting symptomatology

In contrast to findings with positive affect, analyses yielded fewer significant interactions for BI and parenting; however, results were generally consistent with hypotheses for BI. For CBCL anxiety, high BI was associated with less anxiety when parent autonomy-granting was high. High BI was also associated with more anxiety when parent overprotectiveness was high. For PAPA specific phobia, levels of BI differed at lower levels of autonomy, with high BI related to more overall specific phobia symptoms. Finally, higher BI was related to higher levels of specific phobia when overprotectiveness was high. Results were consistent with data showing the moderating effect of over-controlling parenting on child behavior (Rubin et al., 2002). These findings suggest that parenting behavior may interfere with children's development of coping strategies, thus placing them at risk for anxiety. Parents who are overprotective and intrusive may limit children's experience of novelty or other potential anxiety-producing

situations and may, therefore, hinder their acquirement of adaptive coping skills. Without effective coping abilities, children may not be able to appropriately respond to future novel or threatening situations and may exhibit anxious tendencies.

Summary and conclusion

This study adds to the small literature examining the relationship between PA and BI, and it extends that literature by demonstrating that the overlap between the two constructs depends on the context in which they are observed. It further adds to the literature by examining the internal construct validity of PA and BI in a large laboratory sample as well as comparing these constructs to theoretically relevant external variables. The study, however, had several limitations. First, the sample was not diverse, thus limiting the population to whom findings may be generalized. Second, as this paper involved cross-sectional data, we were not able to examine the stability or predictive validity of the differences in PA and BI or the temporal relations between temperament and the other domains. Third, this study relied on laboratory measures of temperament traits and reports by only the primary caregivers. Also, although teacher reports were included in the analyses, they were limited in sample size in comparison to parent reports. By including other measures, such as co-parent reports of temperament, or other observational contexts, such as the home or school, findings may be more generalizable. Finally, this study would be strengthened by examining the potential differences in the neurobiological correlates of BI and low PA. Incorporating physiological and biological measures, such as EEG or cortisol, may further clarify the distinction of these two traits.

In conclusion, this study indicates that the temperament traits of low PA and high BI can be distinguished in a laboratory setting. Low approach/engagement in BI is

context-dependent and limited to novel situations, whereas it appears to be more generalized in low PA in that it is evident regardless of the familiarity of the context. Moreover, this study shows some validation for laboratory-assessed PA and BI across domains of temperament, social behavior, parenting behavior, and symptomatology as well as support for the moderating effect of parenting on the relationship between temperament and symptoms. However, this study raises the possibility that the construct of PA may be slightly different than previously conceptualized in that low PA may be more typically accompanied by anxiety than is generally acknowledged. For example, it is possible that low PA reflects a defensive coping style of shutting down in the presence of anxiety. Additionally, this study raises the possibility that parents and teachers may not always discriminate between these temperament traits, although they may have a more coherent conception of BI and anxiety than low PA. It is possible that observers have difficulty distinguishing these traits in three-year-olds, in particular, and discrimination may improve as children develop and opportunities to observe them in varying contexts increase. It is also possible that the external measures employed in this study to validate BI and low PA across domains may not be well-suited to distinguish these two constructs. Furthermore, another possibility is that laboratory designs that specifically elicit BI and PA may allow for distinctions that may not be as clear in everyday situations.

Overall, results suggest that low PA and high BI reflect different motivational systems and that future research should treat them as independent dimensions that likely have different developmental trajectories and are associated with different patterns of adjustment and functioning. Moreover, by not considering the different motivations

underlying a child's low approach, it may prove difficult to effectively address this behavior. By understanding the reasons behind a child's lack of approach, parents and teachers may be able to tailor their interaction styles appropriately to the individual needs of each child.

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Table 1

Simultaneous multiple regressions with positive affect and BI as the predictor variables and behavioral approach as the criterion variable

Behavioral approach	β	t	R^2	F
<i>Novel situations (N = 556)</i>				
Positive affect	.43	12.88***	.40	182.41***
BI	-.43	-13.07***		
<i>Non-novel situations (N = 556)</i>				
Positive affect	.66	21.39***	.49	173.86***
BI	-.13	-4.13***		
Positive affect x BI	.12	3.73***		

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 2

Planned comparisons of the high BI, low PA, and comparison groups on behavioral approach in novel and non-novel situations

Behavioral approach	BI	Low PA	Control
Novel situations <i>M(SD)</i>	-.74(2.37) ^a	-.71(2.06) ^a	.06(1.93) ^b
Non-novel situations <i>M(SD)</i>	.54(2.08) ^a	-1.84(2.16) ^b	.03(1.85) ^a

Note. Superscripts indicate differences at $p \leq .05$.

Table 3

Simultaneous multiple regressions with positive affect and BI as the predictor variables and variables from other temperament measures as the criterion variables

	β	t	R^2	F
<i>PCI Child Positive Affect (N = 525)</i>				
Positive affect	.30	7.20***	.10	29.67***
BI	-.08	-2.01*		
<i>CBQ Fear (N = 524)</i>				
Positive affect	.07	1.73	.08	21.03***
BI	.27	6.37***		
<i>CBQ Shyness (N = 527)</i>				
Positive affect	-.11	-2.55**	.06	17.50***
BI	.22	5.12***		
<i>CBQ Smiling/Laughter (N = 516)</i>				
Positive affect	.11	2.54**	.03	8.66***
BI	-.14	-3.09**		
<i>BIQ Total score – Parent (N = 495)</i>				
Positive affect	-.14	-3.26**	.08	22.47***
BI	.24	5.59***		
<i>BIQ Total score – Teacher (N = 226)</i>				
Positive affect	-.23	-3.52***	.07	8.76***
BI	.13	1.99*		
<i>CRS Positive – Parent (N = 478)</i>				
Positive affect	.05	1.13	.01	3.36*
BI	-.10	-2.24*		
<i>CRS Negative – Parent (N = 478)</i>				

Positive affect	-.06	-1.35	.03	7.99***
BI	.17	3.65***		
<i>CRS Positive – Teacher (N = 228)</i>				
Positive affect	.27	4.26***	.10	12.39***
BI	-.14	-2.24*		
<i>CRS Negative – Teacher (N = 227)</i>				
Positive affect	.06	.96	.00	.46
BI	.01	.08		
<i>PAPA Preference to play alone (N = 541)</i>				
Positive affect	.01	.12	.01	1.34
BI	.07	1.64		
<i>PAPA Difficulty with friends (N = 540)</i>				
Positive affect	-.16	-3.65***	.03	7.75***
BI	.05	1.18		
<i>PAPA BI scale (N = 541)</i>				
Positive affect	-.15	-3.61***	.06	16.44***
BI	.18	4.17***		

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 4

Planned comparisons of the high BI, low PA, and comparison groups on variables from the temperament domain

	BI	Low PA	Control
PCI Child positive affect <i>M(SD)</i>	2.68(.75) ^a	2.39(.80) ^b	2.49(.76) ^{ab}
CBQ Fear <i>M(SD)</i>	4.29(.87) ^a	3.85(1.07) ^b	3.93(.90) ^b
CRS Positive – teacher <i>M(SD)</i>	27.62(6.36) ^a	23.13(6.80) ^b	24.77(7.81) ^{ab}
CRS Negative – teacher <i>M(SD)</i>	20.30(5.77) ^a	15.95(5.00) ^b	16.64(6.27) ^b

Note. Superscripts indicate differences at $p \leq .05$.

Table 5

Simultaneous multiple regressions with positive affect and BI as the predictor variables and variables from the social domain as the criterion variables

	β	t	R^2	F
<i>CSPS Shyness – Parent (N = 493)</i>				
Positive affect	-.09	-2.08*	.03	6.94***
BI	.13	2.92**		
<i>CSPS Disinterest – Parent (N = 493)</i>				
Positive affect	-.02	-.45	.00	.49
BI	.04	.85		
<i>CSPS Shyness – Teacher (N = 230)</i>				
Positive affect	-.15	-2.30*	.03	2.96*
BI	.04	.62		
<i>CSPS Disinterest – Teacher (N = 230)</i>				
Positive affect	-.13	-1.98*	.02	2.29
BI	.04	.66		

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 6

Simultaneous multiple regressions with positive affect and BI as the predictor variables and variables from the parenting domain as the criterion variables

	β	t	R^2	F
<i>PCI Supportive presence (N = 525)</i>				
Positive affect	.07	1.58	.01	1.25
BI	.00	.03		
<i>PCI Intrusiveness (N = 525)</i>				
Positive affect	-.01	-.21	.00	.42
BI	.04	.87		
<i>PCI Hostility (N = 525)</i>				
Positive affect	.02	.40	.00	.38
BI	.04	.80		
<i>PSDQ Overprotective (N = 499)</i>				
Positive affect	.00	.05	.00	.04
BI	.01	.26		
<i>PSDQ Connection (N = 502)</i>				
Positive affect	.00	.10	.02	3.70*
BI	-.12	-2.70**		
<i>PSDQ Hostility (N = 499)</i>				
Positive affect	.01	.30	.00	.56
BI	.05	1.04		
<i>PSDQ Autonomy (N = 500)</i>				
Positive affect	-.02	-.53	.02	4.03*
BI	-.13	-2.82**		

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 7

Simultaneous multiple regressions with positive affect and BI as the predictor variables and variables from the psychological symptomatology domain as the criterion variables

	β	t	R^2	F
<i>CBCL Affective problems – parent (N = 552)</i>				
Positive affect	-.04	-1.02	.01	2.63
BI	.08	1.97*		
<i>CBCL Anxiety problems – parent (N = 552)</i>				
Positive affect	-.15	-3.58***	.08	25.25***
BI	.24	5.84***		
<i>CBCL Affective problems – teacher (N = 230)</i>				
Positive affect	.02	.28	.00	.07
BI	.02	.30		
<i>CBCL Anxiety problems – teacher (N = 230)</i>				
Positive affect	-.05	-.77	.03	3.89*
BI	.17	2.61**		
<i>PAPA Depression scale (N = 541)</i>				
Positive affect	-.03	-.72	.01	2.47
BI	.09	2.04*		
<i>PAPA Anxiety scale (N = 541)</i>				
Positive affect	-.16	-3.86***	.06	17.03***
BI	.17	4.07***		
<i>PAPA Social phobia scale (N = 541)</i>				
Positive affect	-.10	-2.39*	.02	5.78**
BI	.10	2.23*		
<i>PAPA Specific phobia scale (N = 541)</i>				

Positive affect	-0.04	-0.97	.02	5.62**
BI	.13	3.12**		

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 8

Planned comparisons of the high BI, low PA, and comparison groups on variables from the psychological symptomatology domain

	BI	Low PA	Control
CBCL Anxiety problems - parent <i>M(SD)</i>	4.65(2.59) ^a	4.16(2.77) ^{ab}	3.49(2.62) ^b
CBCL Anxiety problems – teacher <i>M(SD)</i>	1.92(2.16) ^a	.85(2.03) ^b	.87(1.26) ^b
PAPA Depression scale <i>M(SD)</i>	5.48(5.24) ^a	4.56(4.50) ^a	3.26(3.42) ^b

Note. Superscripts indicate differences at $p \leq .05$.

Table 9

Simultaneous multiple regressions with the interaction of positive affect and parenting as predictor variables and psychological symptoms as criterion variables

	β	t	R^2	F
<i>CBCL Affective problems^b (N = 525)</i>				
Positive affect x PCI hostility	.14	2.20*	.03	3.16**
Positive affect x PCI support	.14	2.14*		
<i>CBCL Anxiety problems^b (N = 525)</i>				
Positive affect x PCI hostility	.22	3.49***	.06	6.06***
Positive affect x PCI support	.15	2.30*		
<i>PAPA Depression scale^c (N = 525)</i>				
Positive affect x PCI hostility	-.05	-1.16	.04	7.23***
Positive affect x PCI support	.11	2.45*	.04	6.36***
<i>PAPA Anxiety scale^b (N = 525)</i>				
Positive affect x PCI hostility	.21	3.32***	.05	5.87***
Positive affect x PCI support	.14	2.21*		
<i>PAPA Social phobia scale^c (N = 525)</i>				
Positive affect x PCI hostility	.09	1.95*	.01	3.39*
Positive affect x PCI support	-.03	-.74	.01	2.31
<i>PAPA Specific phobia scale^c (N = 525)</i>				
Positive affect x PCI hostility	.04	.79	.01	1.04
Positive affect x PCI support	-.00	-.09	.01	1.24
<i>CBCL Affective problems^a (N = 499)</i>				
Positive affect x PSDQ hostility x PSDQ support	.09	1.99*	.08	5.77***
<i>CBCL Anxiety problems^c (N = 499)</i>				
Positive affect x PSDQ hostility	.04	1.00	.05	7.87***

Positive affect x PSDQ support	-0.02	-0.40	.04	6.03***
<i>PAPA Depression scale^a (N = 499)</i>				
Positive affect x PSDQ hostility x PSDQ support	.10	2.25*	.05	4.89***
<i>PAPA Anxiety scale^c (N = 499)</i>				
Positive affect x PSDQ hostility	.08	1.83	.04	6.48***
Positive affect x PSDQ support	.01	.10	.03	5.27***
<i>PAPA Social phobia scale^c (N = 499)</i>				
Positive affect x PSDQ hostility	.04	.88	.02	2.48
Positive affect x PSDQ support	-.01	-.10	.01	2.27
<i>PAPA Specific phobia scale^c (N = 499)</i>				
Positive affect x PSDQ hostility	-.04	-.90	.01	2.25
Positive affect x PSDQ support	-.06	-1.38	.01	1.42

Note. Superscripts indicate differences in models. ^a = model with 3-way interaction term; ^b = model with two 2-way interaction terms retained; ^c = separate models with one 2-way interaction term each

* = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 10

Simultaneous multiple regressions with the interaction of BI and parenting as predictor variables and psychological symptoms as criterion variables

	β	t	R^2	F
<i>CBCL Affective problems^c (N = 525)</i>				
BI x PCI intrusiveness	.03	.68	.02	3.82**
<i>CBCL Anxiety problems^c (N = 525)</i>				
BI x PCI intrusiveness	-.01	-.27	.07	12.16***
<i>PAPA Depression scale^c (N = 525)</i>				
BI x PCI intrusiveness	.00	.03	.01	1.88
<i>PAPA Anxiety scale^c (N = 525)</i>				
BI x PCI intrusiveness	-.02	-.41	.03	6.08***
<i>PAPA Social phobia scale^c (N = 525)</i>				
BI x PCI intrusiveness	-.04	-1.00	.01	2.33
<i>PAPA Specific phobia scale^c (N = 525)</i>				
BI x PCI intrusiveness	-.00	-.02	.02	3.32*
<i>CBCL Affective problems^c (N = 499)</i>				
BI x PSDQ intrusiveness	.02	.51	.01	1.41
BI x PSDQ support	.06	1.31	.05	9.45***
<i>CBCL Anxiety problems^b (N = 499)</i>				
BI x PSDQ intrusiveness	-.09	-1.92*	.13	14.08***
BI x PSDQ support	.09	2.00*		
<i>PAPA Depression scale^c (N = 499)</i>				
BI x PSDQ intrusiveness	-.03	-.56	.01	1.48
BI x PSDQ support	-.05	-1.18	.02	3.74**

PAPA Anxiety scale^c (N = 499)

BI x PSDQ intrusiveness	-.03	-.72	.04	6.25***
BI x PSDQ support	.02	.48	.04	7.50***

PAPA Social phobia scale^c (N = 499)

BI x PSDQ intrusiveness	-.03	-.62	.02	2.14
BI x PSDQ support	.01	.11	.01	1.83

PAPA Specific phobia scale^b (N = 499)

BI x PSDQ intrusiveness	-.10	-1.93*	.04	3.80**
BI x PSDQ support	.12	2.50**		

Note. Superscripts indicate differences in models. ^a = model with 3-way interaction term; ^b = model with two 2-way interaction terms retained; ^c = separate models with one 2-way interaction term each

* = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$.

Table 11

Summary of hypotheses and outcomes for positive affect and BI across temperament, social, parenting, and symptomatology domains

Dependent variable	Positive affect		Behavioral inhibition	
	Expected association	Actual association	Expected association	Actual association
<i>Temperament domain</i>				
PCI Child Positive Affect	Yes	Yes	No	Yes ^a
CBQ Fear	No	No	Yes	Yes
CBQ Shyness	No	Yes ^a	Yes	Yes
CBQ Smiling/Laughter	Yes	Yes	No	Yes ^b
BIQ Total score – Parent	No	Yes	Yes	Yes
BIQ Total score – Teacher	No	Yes	Yes	Yes
CRS Positive – Parent	Yes	No	No	Yes ^b
CRS Negative – Parent	No	No	Yes	Yes
CRS Positive – Teacher	Yes	Yes	No	Yes ^b
CRS Negative – Teacher	No	No	Yes	No
PAPA Preference to play alone	Yes	No	No	No
Difficulty with friends	Yes	Yes	No	No
PAPA BI scale	No	Yes	Yes	Yes

Dependent variable	Positive affect		Behavioral inhibition	
	Expected association	Actual association	Expected association	Actual association
<i>Social domain</i>				
CSPS Shyness – Parent	No	Yes	Yes	Yes
CSPS Disinterest – Parent	Yes	No	No	No
CSPS Shyness – Teacher	No	Yes	Yes	No
CSPS Disinterest – Teacher	Yes	Yes	No	No
<i>Parenting domain</i>				
PCI Supportive Presence	Yes	No	No	No
PCI Intrusiveness	No	No	Yes	No
PCI Hostility	Yes	No	No	No
PSDQ Overprotective	No	No	Yes	No
PSDQ Connection	Yes	No	No	Yes ^b
PSDQ Hostility	Yes	No	No	No
PSDQ Autonomy	No	No	Yes	Yes

Dependent variable	Positive affect		Behavioral inhibition	
	Expected association / Actual association		Expected association / Actual association?	
<i>Symptom domain</i>				
CBCL Affective problems – Parent	Yes	No	No	Yes ^b
CBCL Anxiety problems – Parent	No	Yes ^b	Yes	Yes
CBCL Affective problems – Teacher	Yes	No	No	No ^b
CBCL Anxiety problems – Teacher	No	No ^b	Yes	Yes
PAPA Depression scale	Yes	No	No	Yes ^b
PAPA Anxiety scale	No	Yes ^b	Yes	Yes
PAPA Social phobia scale	Yes	Yes	Yes	Yes
PAPA Specific phobia scale	No	No	Yes	Yes

Note. ^a indicates significant differences in the magnitude of correlations between predictor and criterion variables.

^b indicates associations that are not completely unexpected given previous research

Table 12

Summary of outcomes for significant temperament by parenting interactions in predicting symptomatology

Interactions with PA

- (1) PA x PCI Hostility → CBCL Affective problems (Figure 2)
 - a) For high PA, high hostility → More depression
 - b) Low & high PA differed at lower levels of hostility, with low PA related to more depression

- (2) PA x PCI Hostility → CBCL Anxiety problems (Figure 4); PAPA Anxiety scale (Figure 7)
 - a) For low PA, low hostility → More anxiety
For high PA, low hostility → Less anxiety (only for CBCL Anxiety problems)
 - b) Low & high PA differed at lower levels of hostility, with low PA related to more anxiety

- (3) PA x PCI Hostility → PAPA Social phobia scale (Figure 9)
 - a) Neither low nor high PA → Anxiety
 - b) Low & high PA differed at lower levels of hostility, with low PA related to more anxiety

- (4) PA x PCI Support → CBCL Affective problems (Figure 3); PAPA Depression scale (Figure 6)*
 - a) For low PA, low support → More depression
 - b) Low & high PA differed at lower levels of support, with low PA related to more depression

- (5) PA x PCI Support → CBCL Anxiety problems (Figure 5); PAPA Anxiety scale (Figure 8)*
 - a) For low PA, low support → More anxiety
 - b) Low & high PA differed at lower levels of support, with low PA related to more anxiety

- (6) PA x PSDQ Connection x PSDQ Hostility → CBCL Affective problems (Figure 10)*
 - a) When parent hostility was low, for high PA, low connection → More depression
 - b) When parent hostility was low, high & low PA differed at higher levels of connection, with low PA related to more affective problems

- (7) PA x PSDQ Hostility x PSDQ Connection → PAPA Depression scale (Figure 13)*

- PA x PCI Hostility x PSDQ Connection → PAPA Depression scale (Figure 15)*
- a) When parent hostility was high, neither high nor low PA → Depression
 - b) When parent hostility was high, high & low PA differed at lower levels of connection, with low PA related to more depression

Interactions with BI

- (1) BI x PSDQ Autonomy → CBCL Anxiety problems (Figure 16)*
 - a) For high BI, high autonomy → Less anxiety
 - b) High and low BI differed at both higher and lower levels of autonomy, with high BI related to more anxiety overall
- (2) BI x PSDQ Overprotective → CBCL Anxiety problems (Figure 17)*
 - a) For high BI, high overprotectiveness → More anxiety
 - b) High & low BI differed at higher and lower levels of overprotectiveness, with high BI related to more overall anxiety
- (3) BI x PSDQ Autonomy → PAPA Specific phobia scale (Figure 18)*
 - a) Neither high nor low BI → Specific phobia
 - b) High & low BI differed at lower levels of autonomy, with high BI related to more specific phobia
- (4) BI x PSDQ Overprotective → PAPA Specific phobia scale (Figure 19)*
 - a) For high BI, high overprotectiveness → More specific phobia
 - b) High & low BI differed at higher levels of overprotectiveness, with high BI related to more specific phobia

Note. * = consistent with hypotheses.

Figure 1

Interaction of positive affect and BI on behavioral approach in non-novel situations

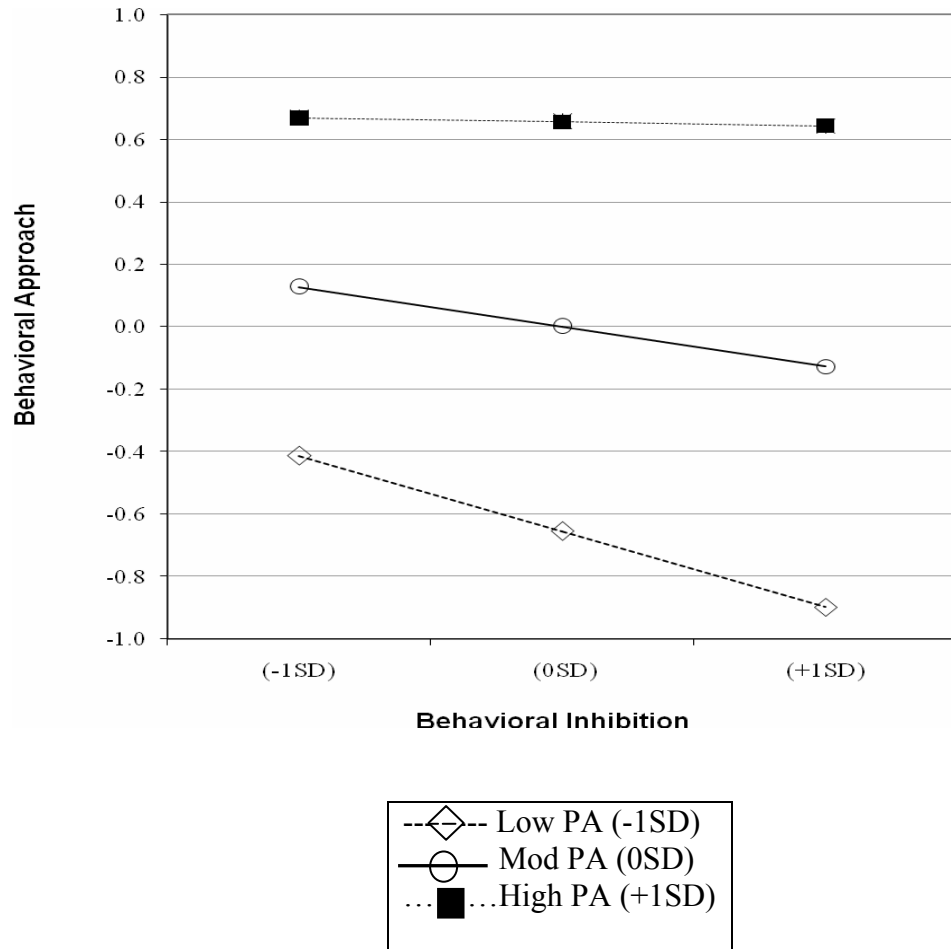


Figure 2

Interaction of positive affect and PCI hostility in predicting CBCL affective problems

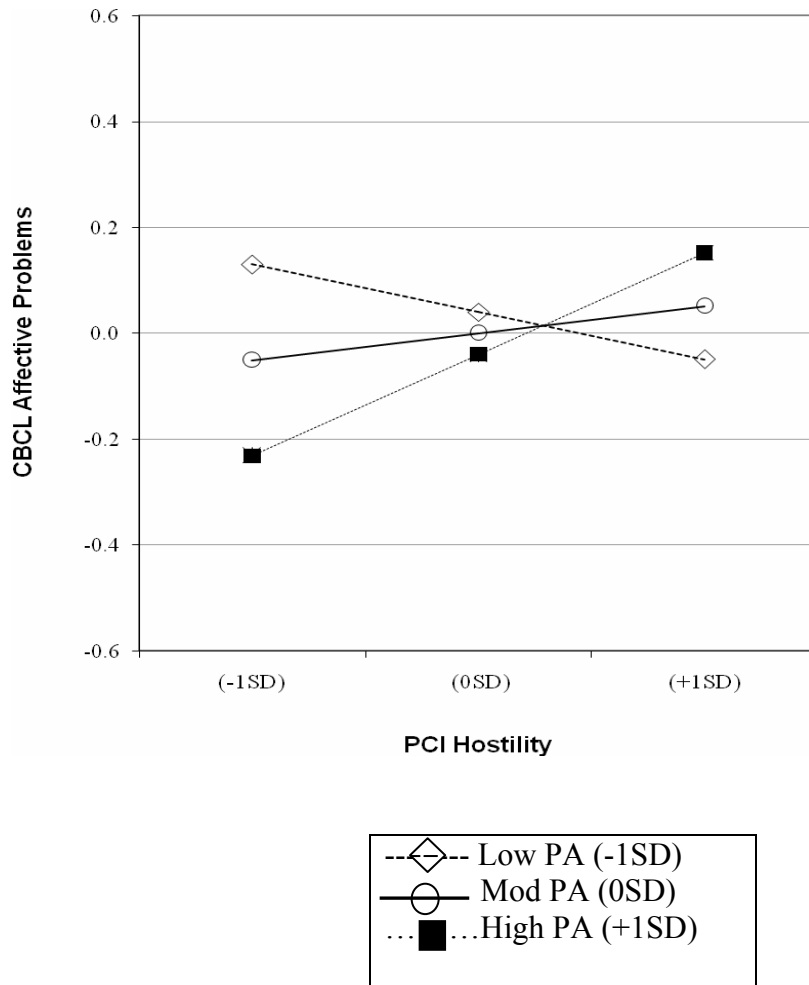


Figure 3

Interaction of positive affect and PCI support in predicting CBCL affective problems

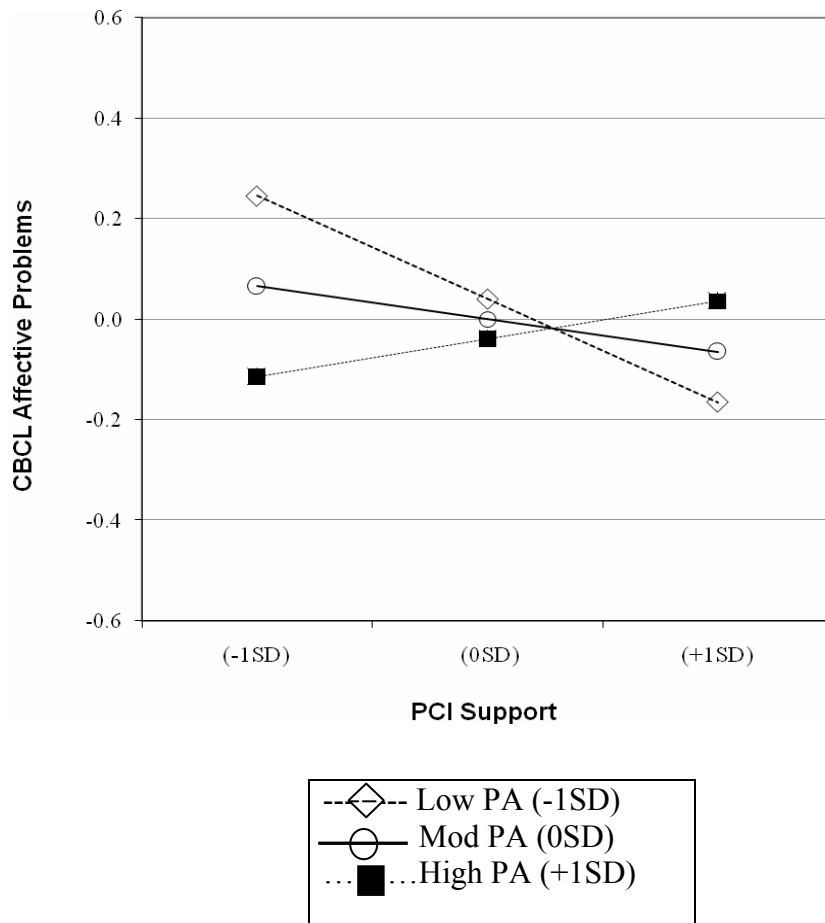


Figure 4

Interaction of positive affect and PCI hostility in predicting CBCL anxiety problems

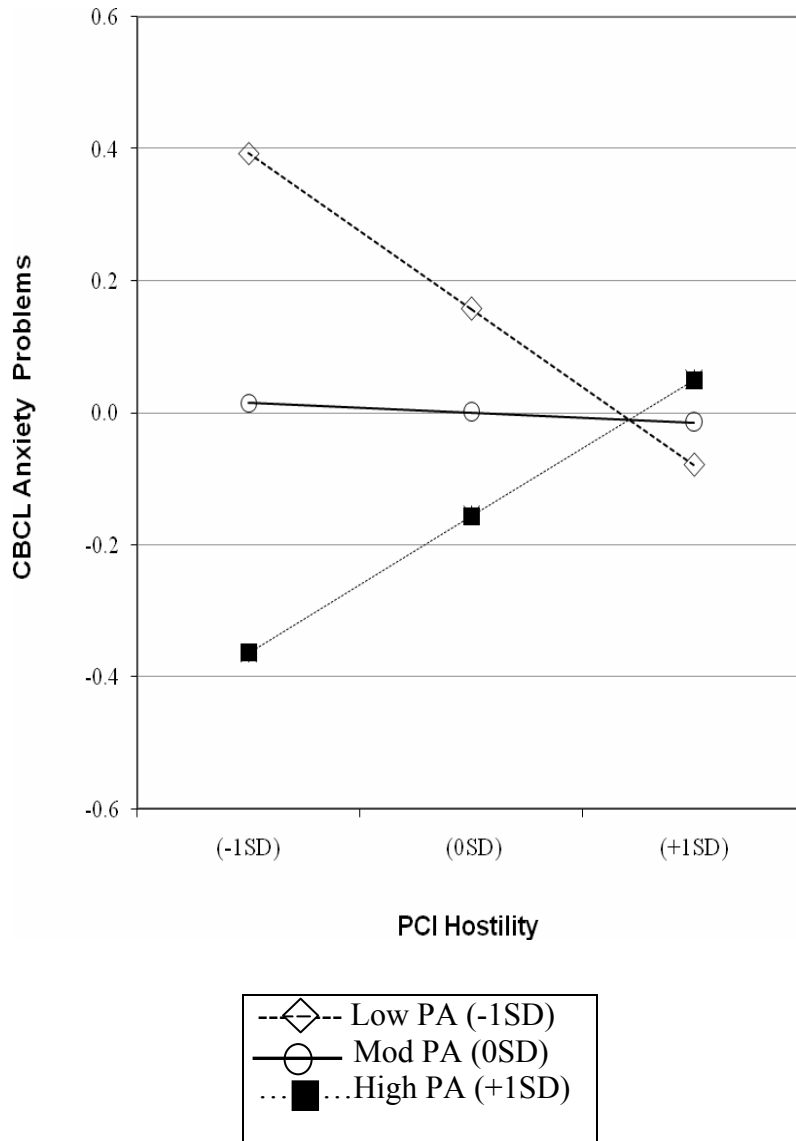


Figure 5

Interaction of positive affect and PCI support in predicting CBCL anxiety problems

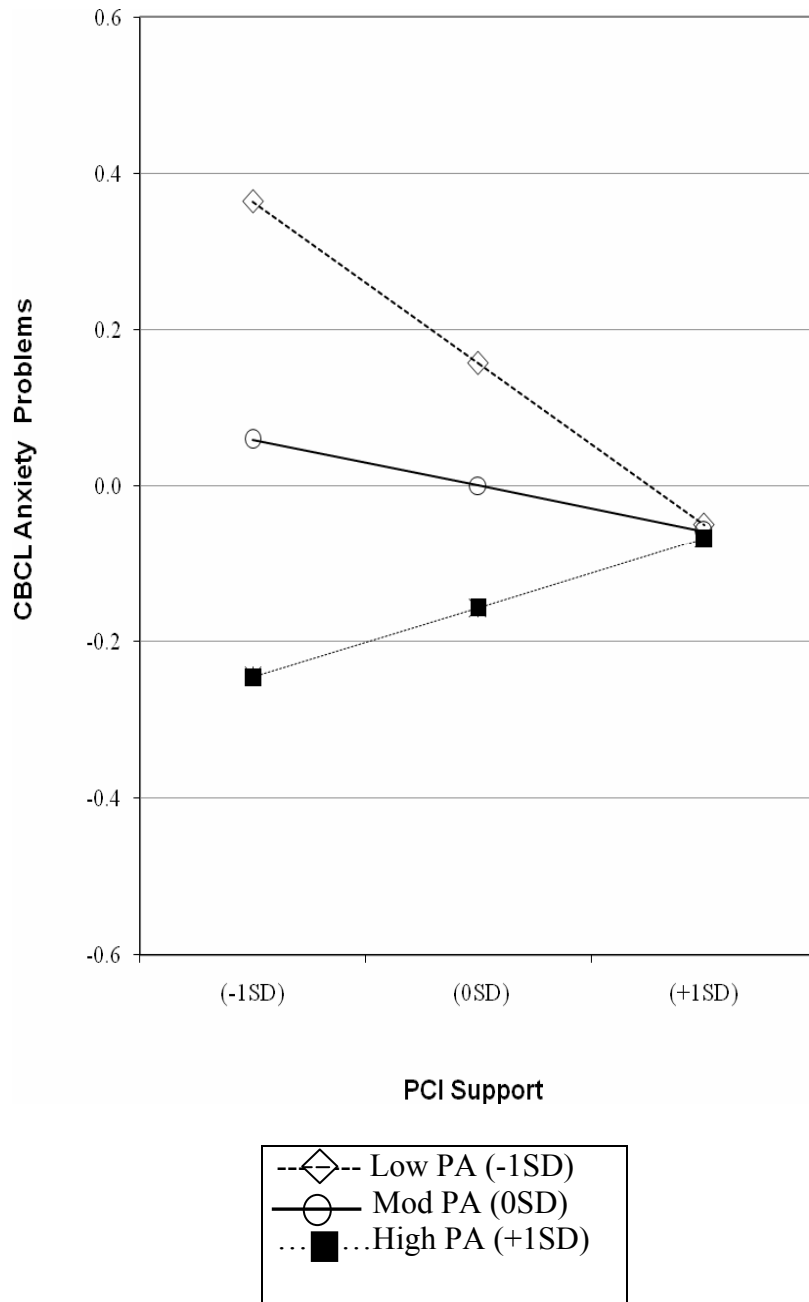


Figure 6

Interaction of positive affect and PCI support in predicting PAPA depression scale

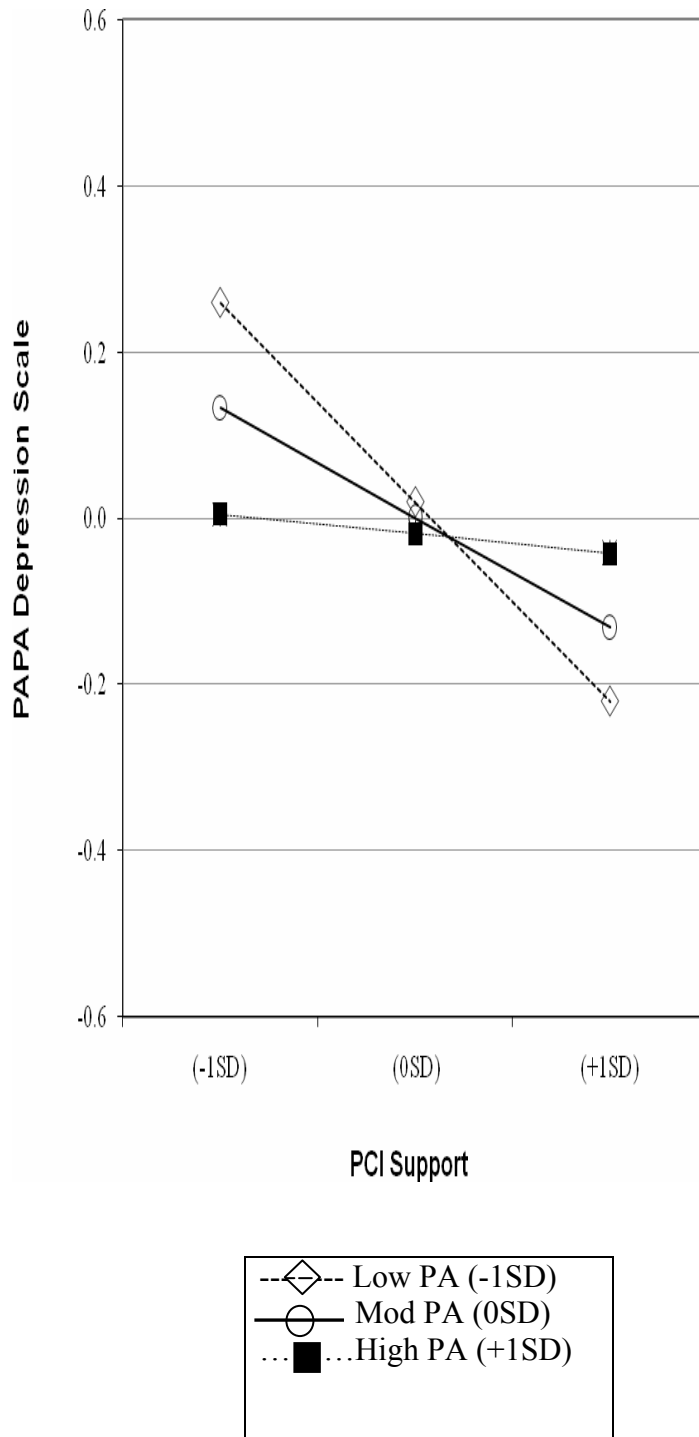


Figure 7

Interaction of positive affect and PCI hostility in predicting PAPA anxiety scale

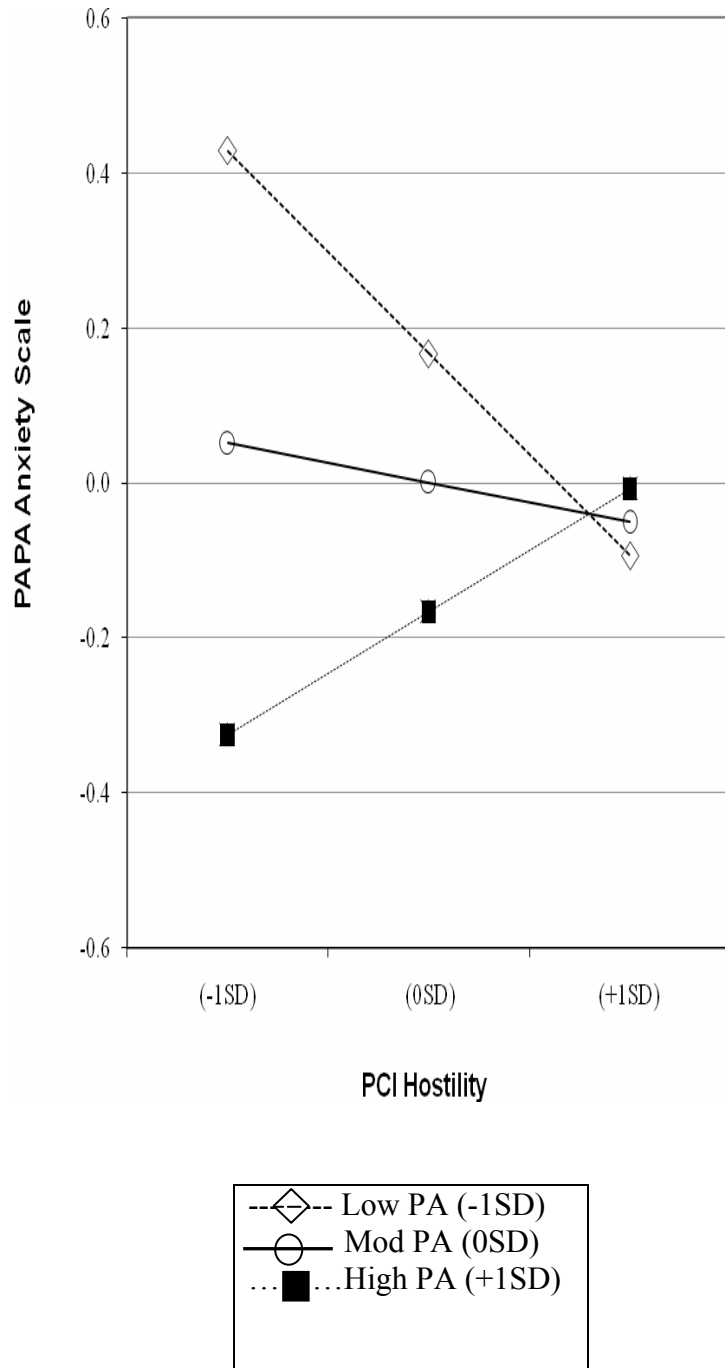


Figure 8

Interaction of positive affect and PCI support in predicting PAPA anxiety scale

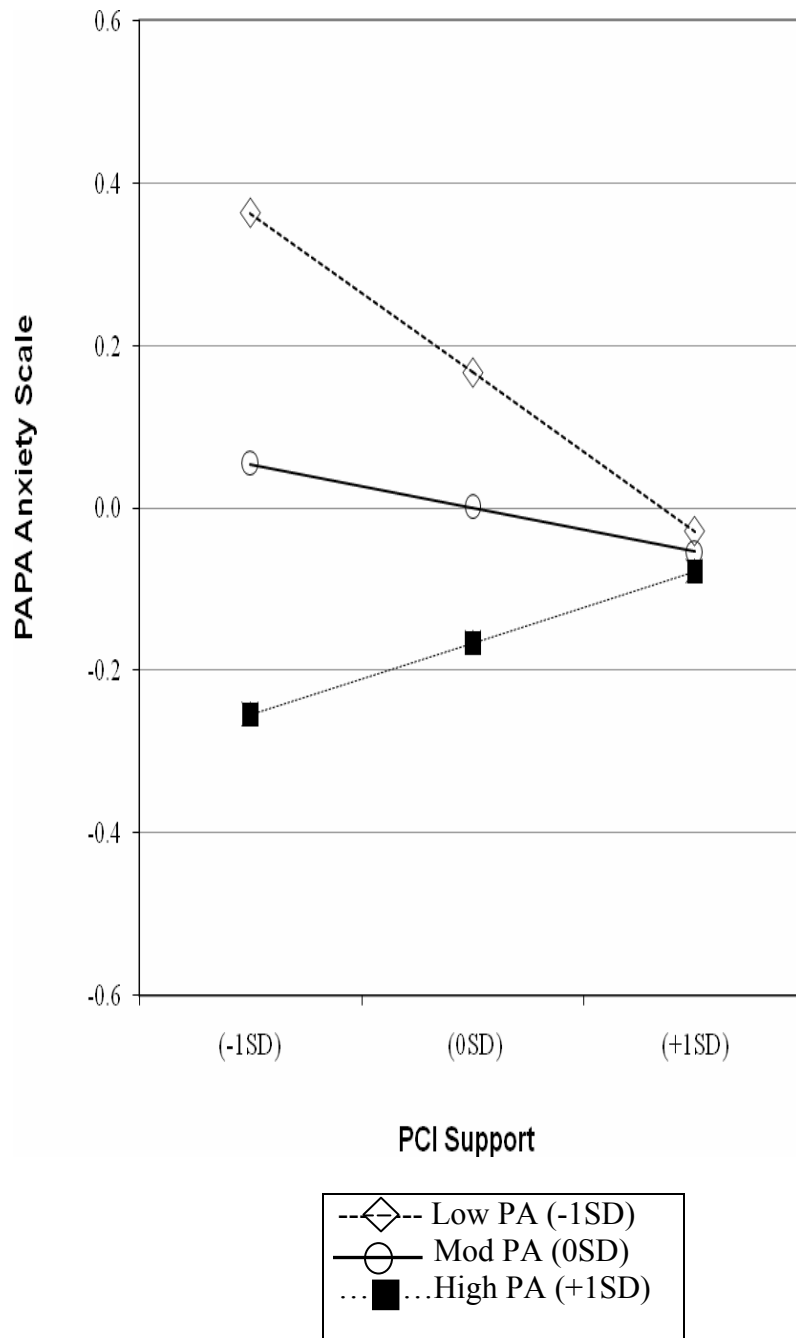


Figure 9

Interaction of positive affect and PCI hostility in predicting PAPA social phobia scale

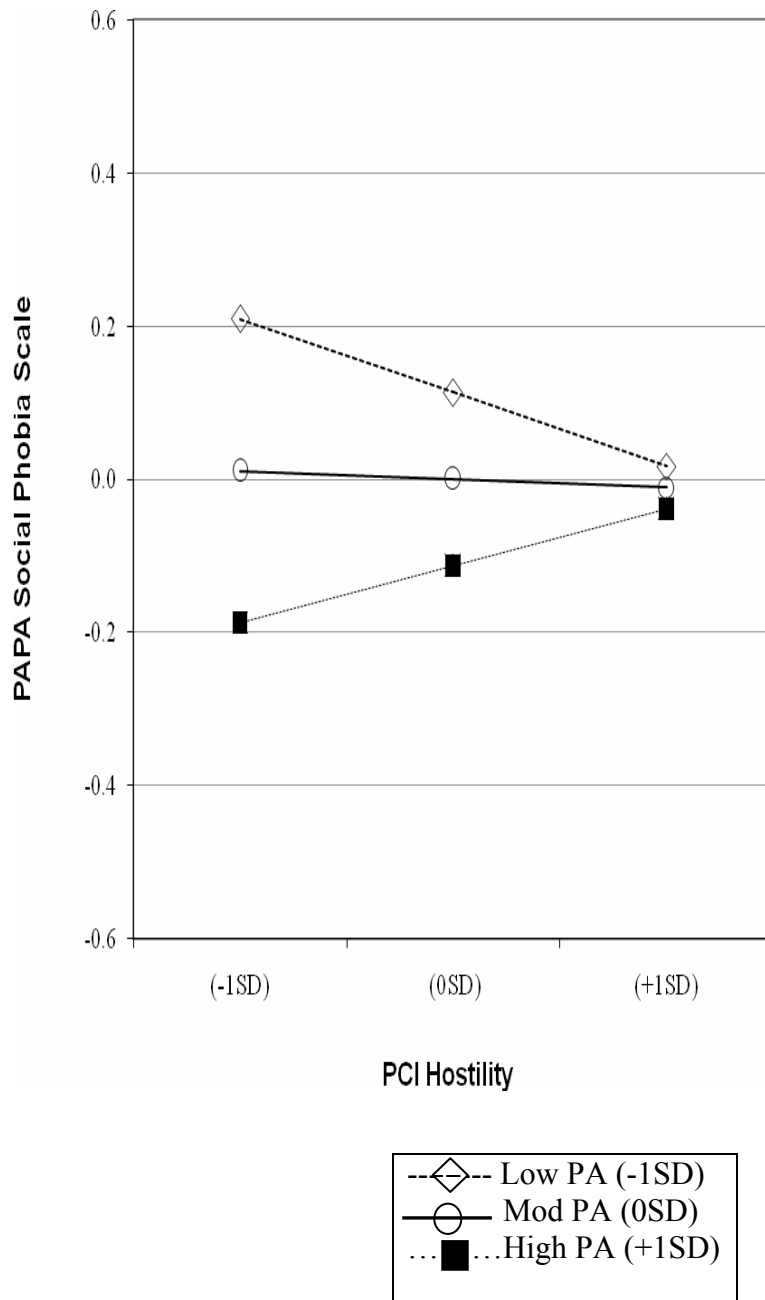


Figure 10

Interaction of positive affect and PSDQ connection in predicting CBCL affective problems when PSDQ hostility is low

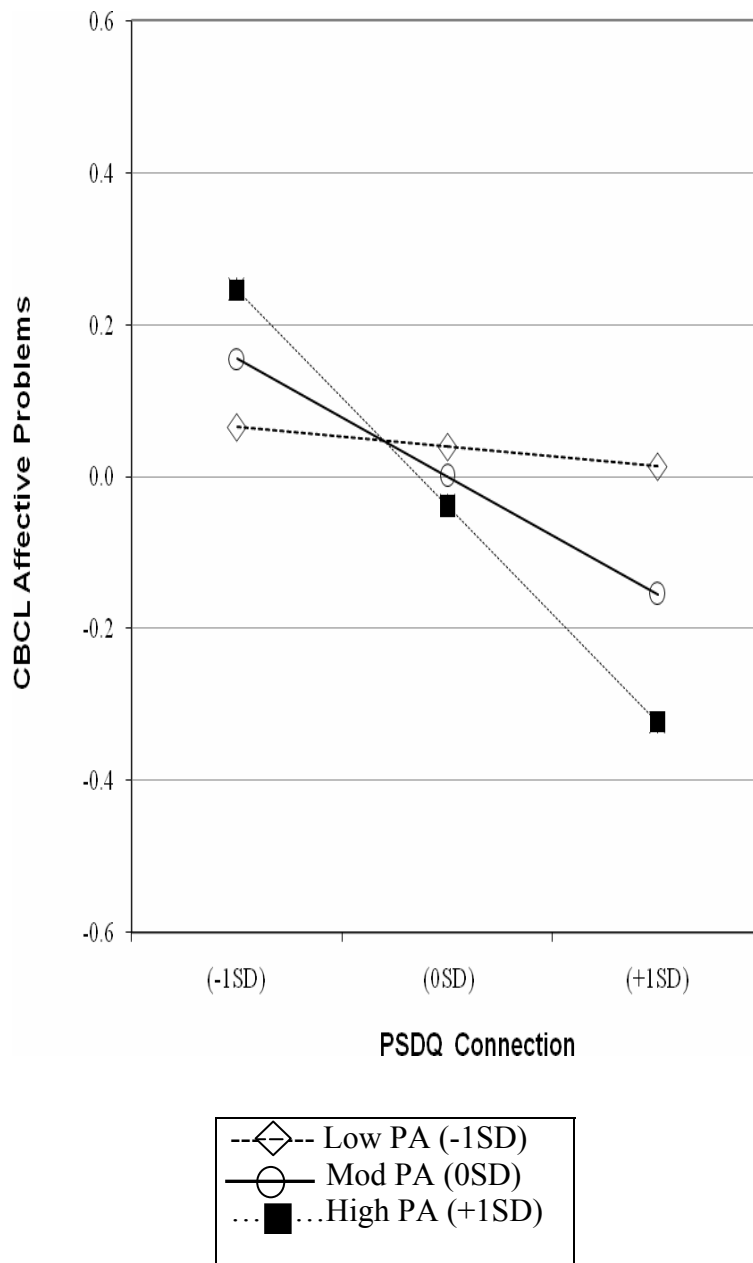


Figure 11

Interaction of positive affect and PSDQ connection in predicting CBCL affective problems when PSDQ hostility is high

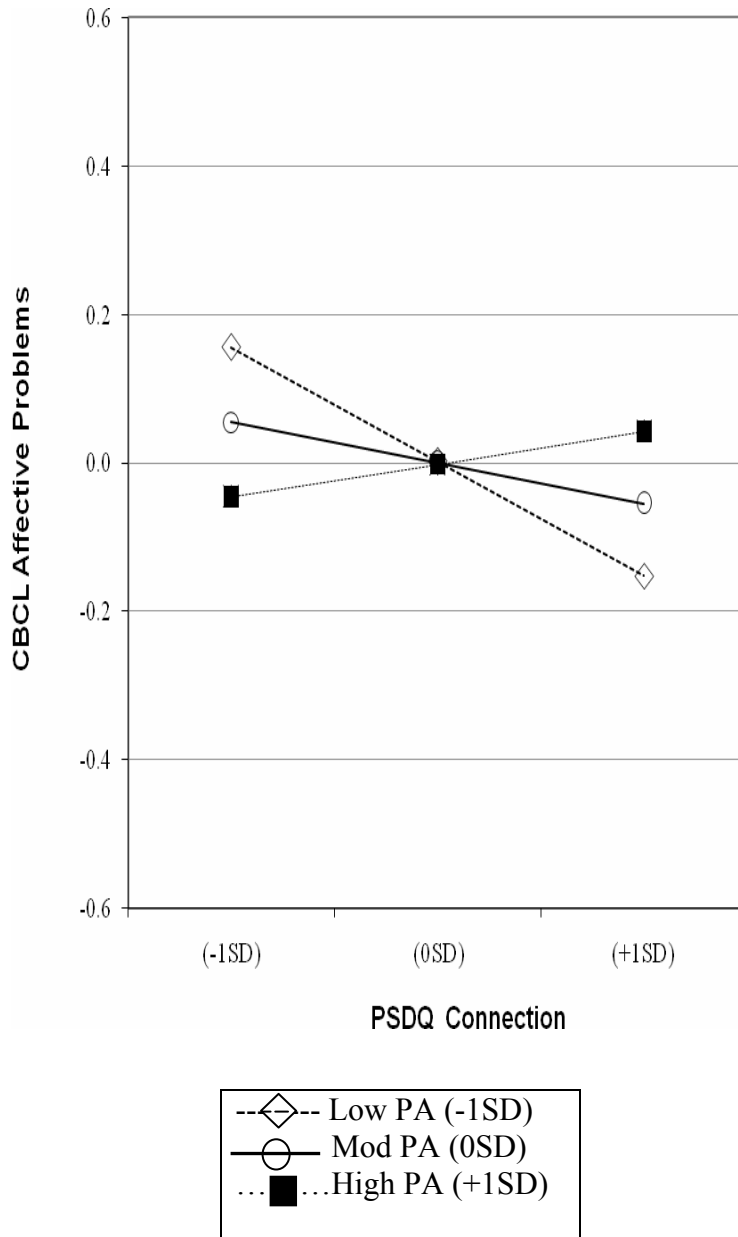


Figure 12

Interaction of positive affect and PSDQ connection in predicting PAPA depression scale when PSDQ hostility is low

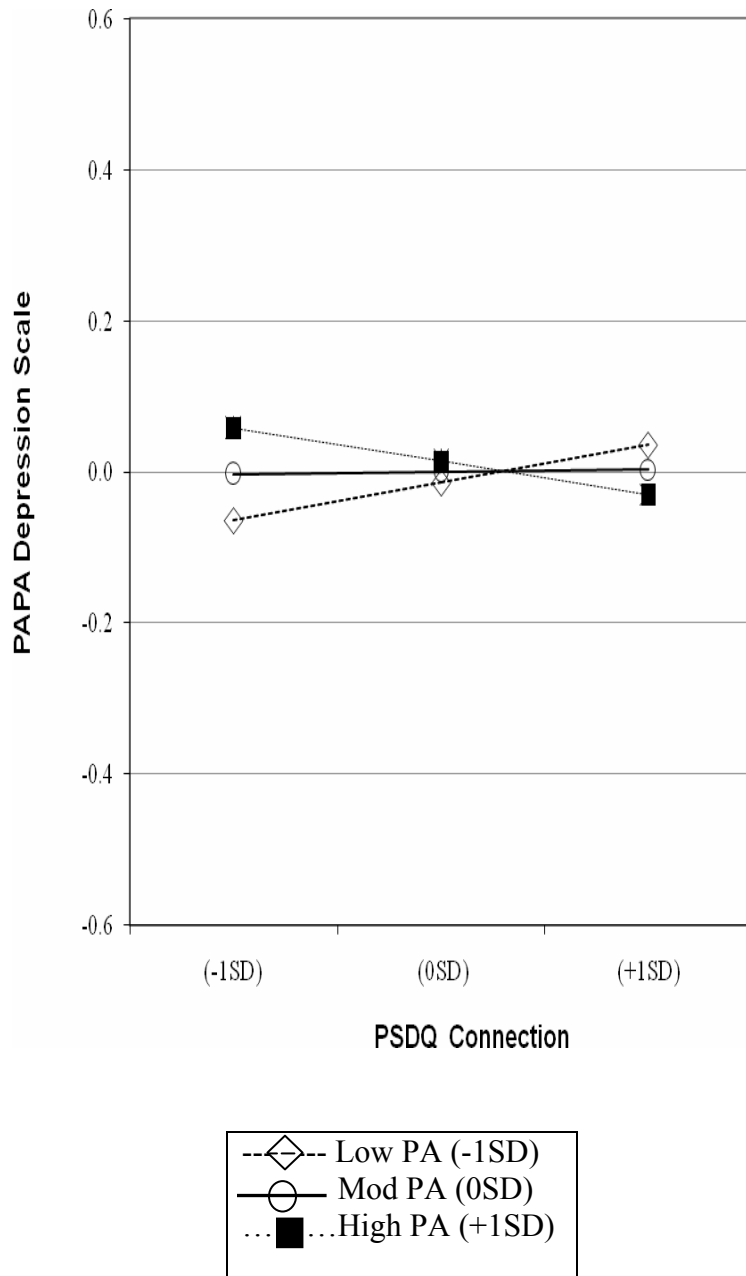


Figure 13

Interaction of positive affect and PSDQ connection in predicting PAPA depression scale when PSDQ hostility is high

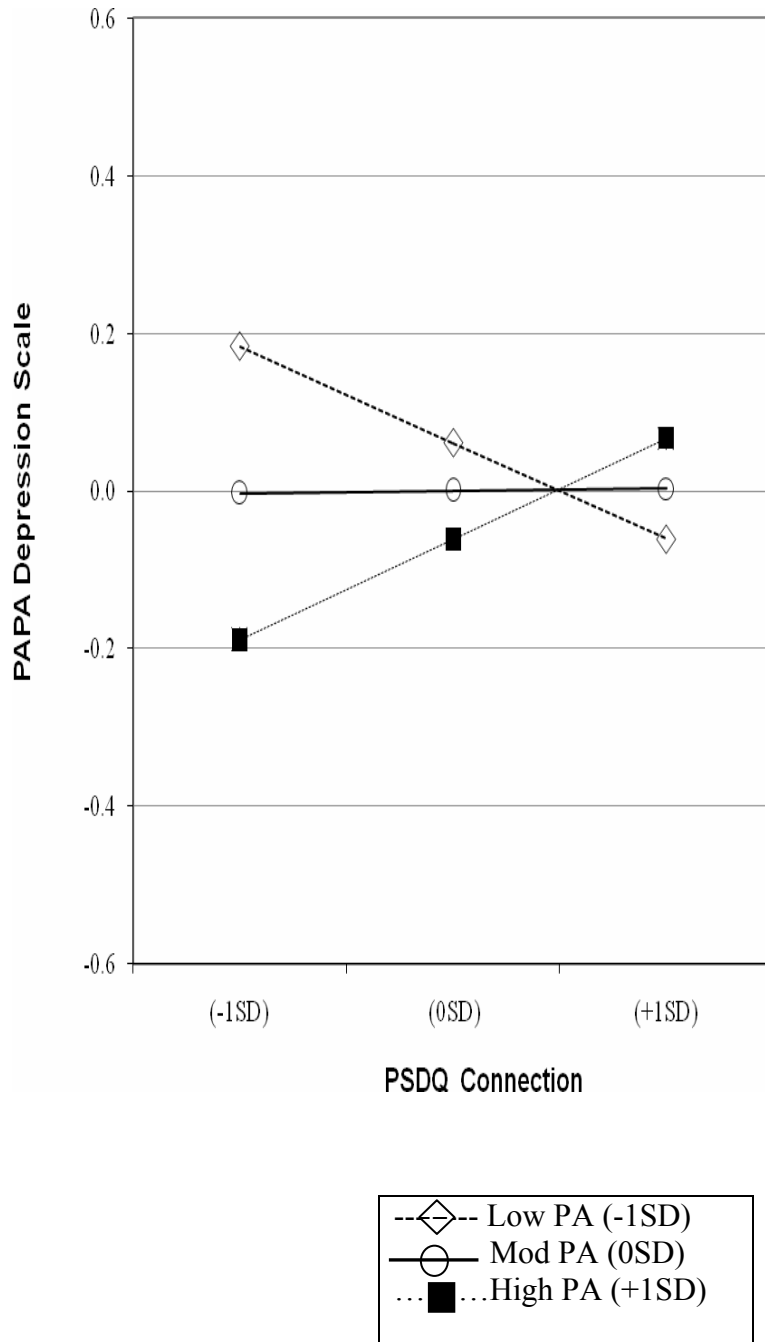


Figure 14

Interaction of positive affect and PSDQ connection in predicting PAPA depression when PCI hostility is low

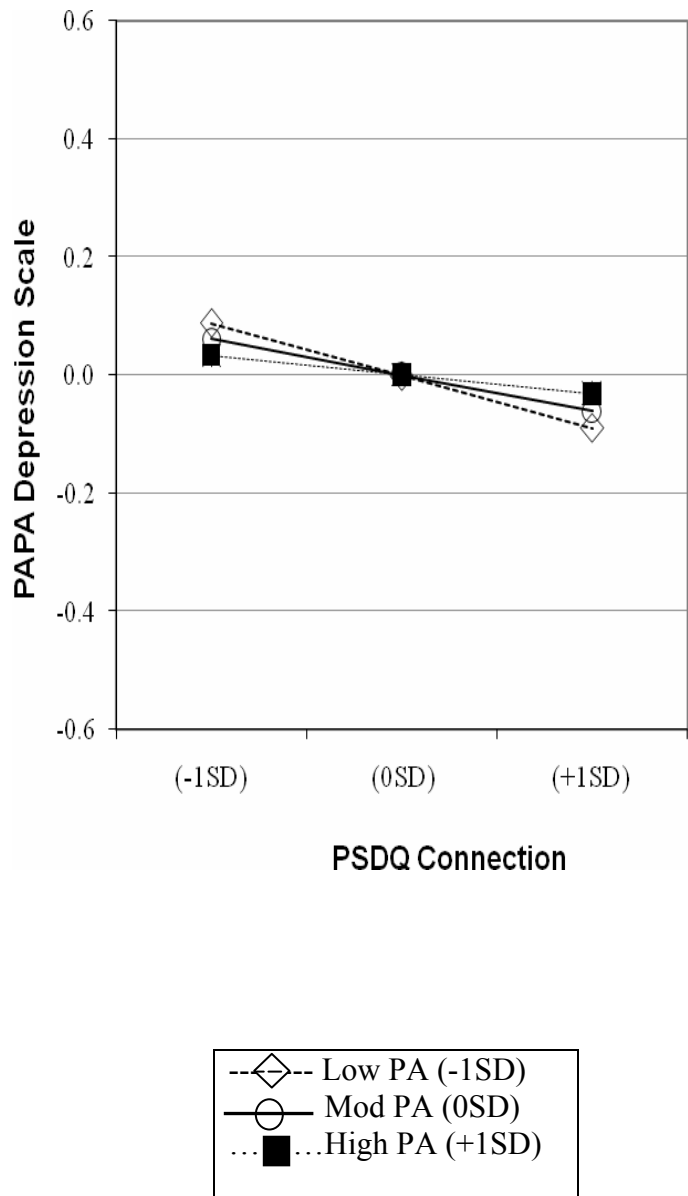


Figure 15

Interaction of positive affect and PSDQ connection in predicting PAPA depression when PCI hostility is high

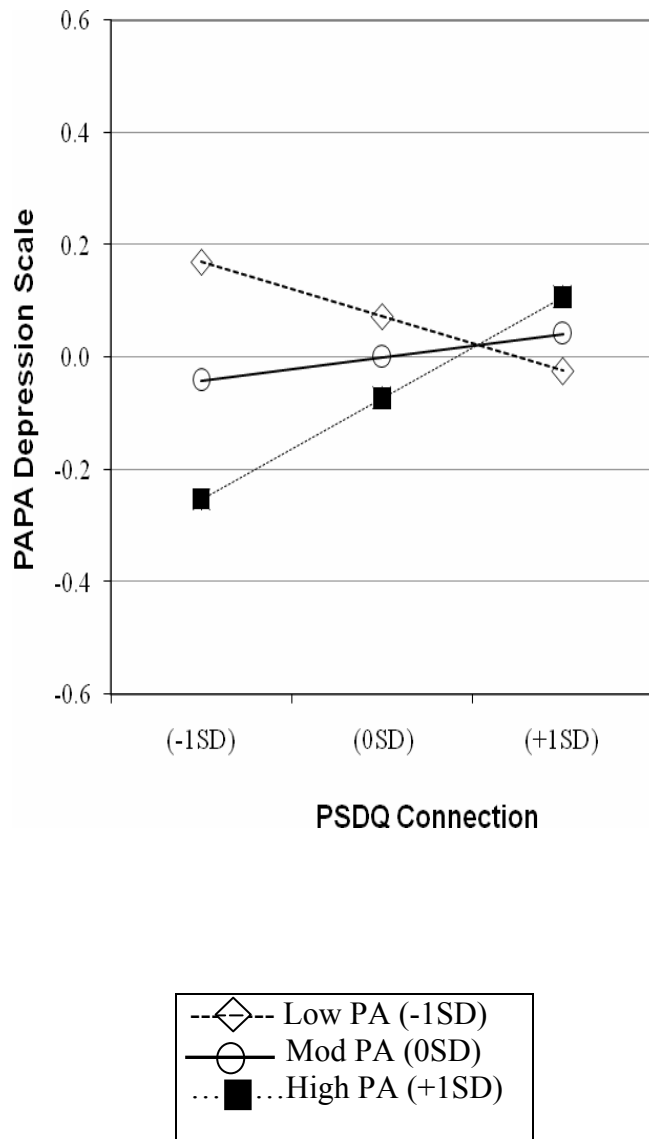


Figure 16

Interaction of BI and PSDQ autonomy in predicting CBCL anxiety problems

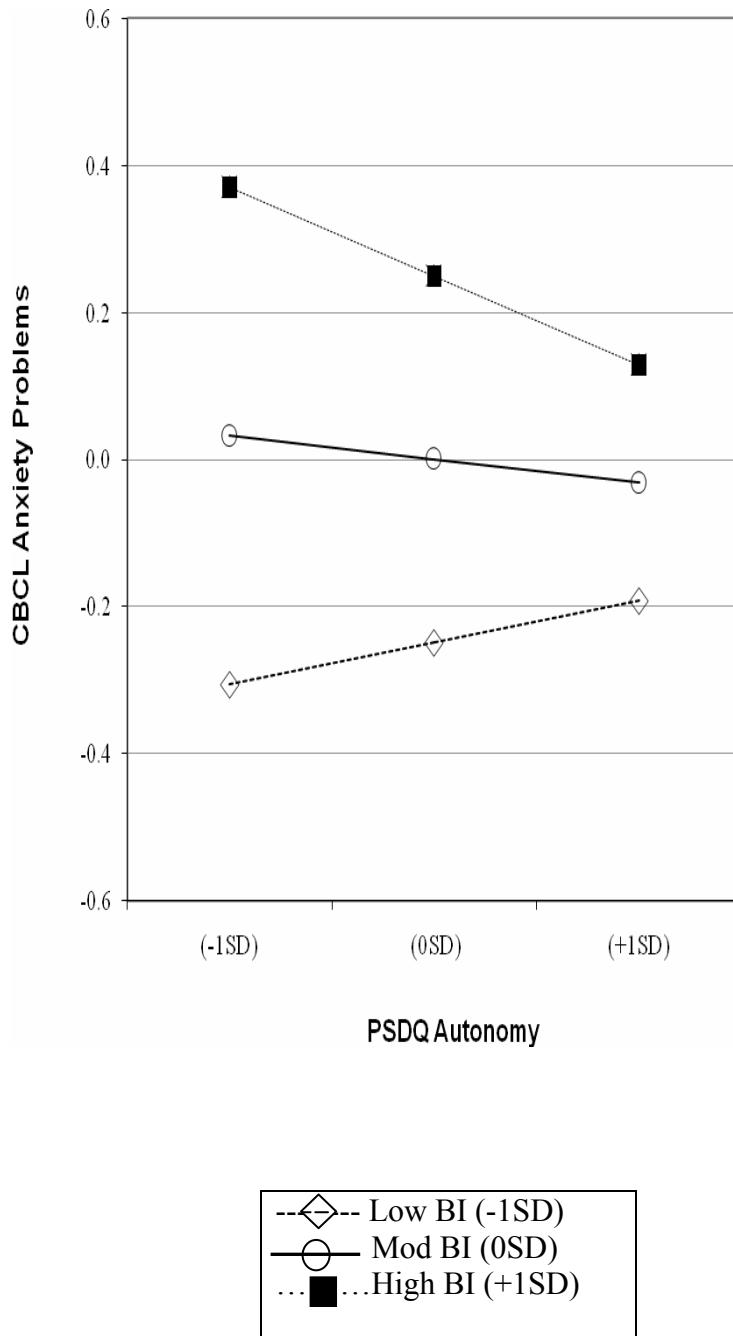


Figure 17

Interaction of BI and PSDQ overprotectiveness in predicting CBCL anxiety problems

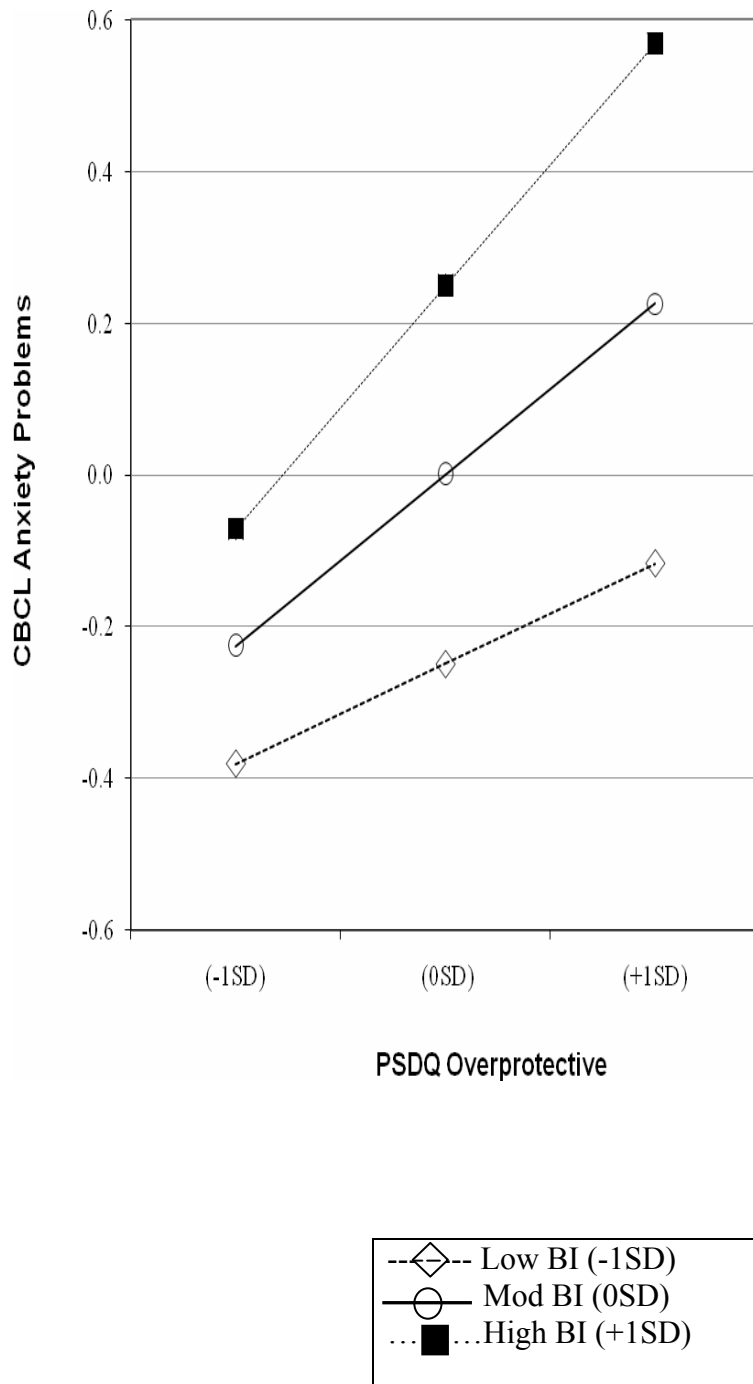


Figure 18

Interaction of BI and PSDQ autonomy in predicting PAPA specific phobia scale

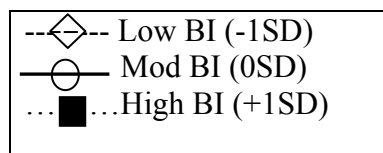
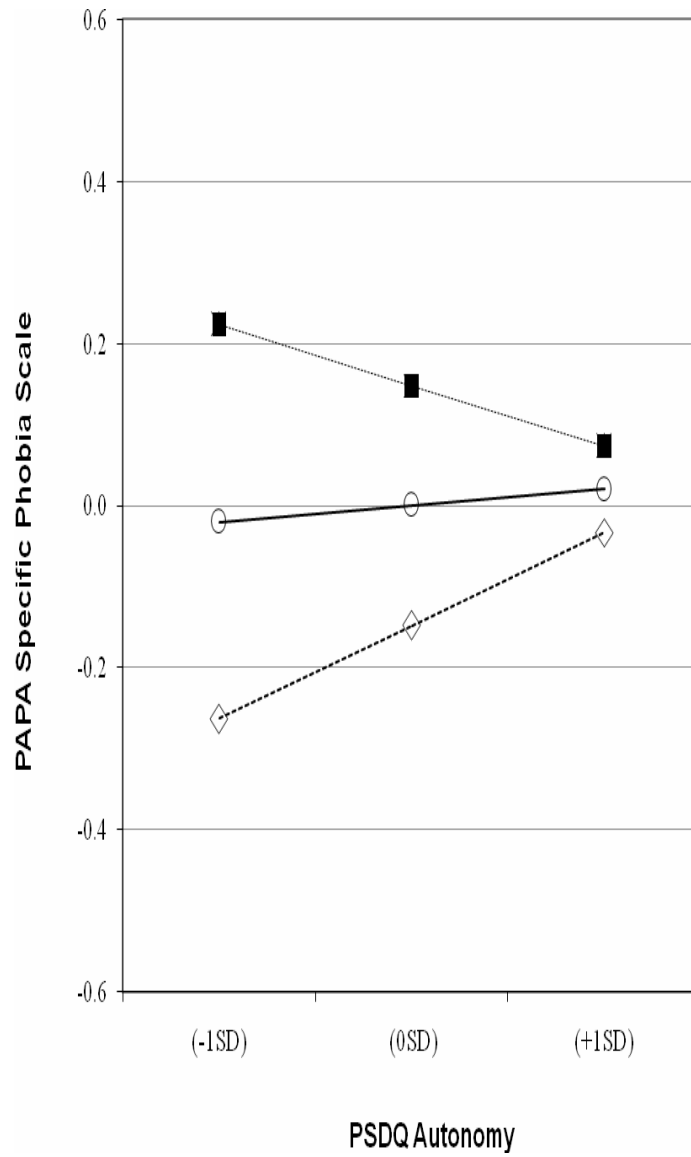


Figure 19

Interaction of BI and PSDQ overprotectiveness in predicting PAPA specific phobia scale

