Published in final edited form as:
J Abnorm Child Psychol. 2009 November ; 37(8): 1063–1075. doi:10.1007/s10802-009-9331-3.

Impact of Behavioral Inhibition and Parenting Style on Internalizing and Externalizing Problems from Early Childhood through Adolescence

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Abstract

Behavioral inhibition (BI) is characterized by a pattern of extreme social reticence, risk for internalizing behavior problems, and possible protection against externalizing behavior problems. Parenting style may also contribute to these associations between BI and behavior problems (BP). A sample of 113 children was assessed for BI in the laboratory at 14 and 24 months of age, self-report of maternal parenting style at 7 years of age, and maternal report of child internalizing and externalizing BP at 4, 7, and 15 years. Internalizing problems at age 4 were greatest among behaviorally inhibited children who also were exposed to permissive parenting. Furthermore, greater authoritative parenting was associated with less of an increase in internalizing behavior problems over time and greater authoritarian parenting was associated with a steeper decline in externalizing problems. Results highlight the importance of considering child and environmental factors in longitudinal patterns of BP across childhood and adolescence.

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Keywords

Internalizing; Externalizing; Parenting; Temperament; Longitudinal

Internalizing and externalizing behavior problems (BP), from depressed affect and aggression to withdrawn behavior and delinquency, manifest across childhood and adolescence (Bongers et al. 2003; Sterba et al. 2007). Research on the development of these BP suggests that, on average, internalizing problems increase and externalizing problems decrease with age (Bongers et al. 2003). However, there is individual variability in the initial levels and rate of change in these problem behaviors, such that some children and adolescents show stability and some show change over time. Furthermore, chronically high levels of problem behavior can result in specific clinical outcomes such as extreme antisocial behavior, suicide, or treatment resistance (Broidy et al. 2003; Cicchetti and Toth 1998). It is important to understand the factors that differentiate chronic, elevated patterns of problem behaviors from more typical trajectories in order to inform prevention efforts and promote positive socioemotional development. The current study examines temperament and parenting styles as they influence internalizing and externalizing BP over time.

Behavioral Inhibition and Behavior Problems

Individual differences in temperament influence children's ability to display socially appropriate behavior (Rothbart and Bates 2006). One type of temperament, behavioral inhibition (BI), includes negative emotionality and motor reactivity to novelty in infancy (Kagan et al. 1984), vigilant and withdrawn behavior in response to novelty in toddlerhood (Calkins et al. 1996), and extreme social reticence in preschool and later childhood (Fox et al. 2001b; Rubin et al. 2002). In addition, enhanced amygdala activation to novelty and activation of “fear” circuitry have been shown to underlie this avoidance of novel stimuli (Kagan 2001; LeDoux et al. 1988; Pérez-Edgar et al. 2007; Schwartz et al. 2003). Thus, inhibited behaviors, such as avoidance of novelty, represent coping mechanisms by which this fearful reaction is decreased. Over time, coping with fear through avoidance is thought to reinforce the associated physiological responses and behaviors leading to continued BI and social wariness (Fox et al. 2001a). Therefore, as children mature throughout childhood, the manifestations of temperament in reaction to novel social stimuli become increasingly relevant for social behavior and psychopathology (Fox et al. 2001b).

Evidence indicates that shy and withdrawn behavior in reaction to social interactions with peers may manifest as internalizing problems in childhood (Biederman et al. 2001) and adolescence (Caspi et al. 1996; Lonigan et al. 2003; Rubin et al. 1995). In addition, many of the characteristics of BI, such as social withdrawal, negative affect, and vigilance, parallel clinical descriptions of anxiety disorders (American Psychological Association 2007). In fact, children's levels of BI are related specifically to their symptoms of social anxiety (e.g., Chronis-Tuscano et al. in press; Coplan et al. 2006; van Brakel et al. 2006).

Compared to the association with internalizing BP, the link between BI and externalizing problems is less well understood. In general, BI, social withdrawal, and other correlates of BI, such as early fearfulness predict fewer externalizing behaviors later in life (Kimonis et al. 2006; Pine et al. 2000). The enhanced reactivity to novelty and typical avoidance patterns of behaviorally inhibited children are thought to protect them, over time, from approach-oriented, aggressive or destructive behavior. However, Vitaro and colleagues showed that children who display reactive aggression were rated as more withdrawn and temperamentally reactive than non-aggressive children (Vitaro et al. 2002). Studies also suggest BI may be linked to greater externalizing behaviors in adolescence, such as substance use and delinquency, because of the

social reward properties these acts convey (Moffitt et al. 1996; Rubin and Burgess 2001). These data are further supported by recent work linking early BI to increased reward sensitivity at the neural level later in development (Bar-Haim et al. in press; Guyer et al. 2006). Moreover, internalizing and externalizing problems generally tend to exhibit relatively strong concurrent associations, though these appear less robust in longitudinal studies (Angold et al. 1999; Pine et al. 2000). Given the limited and inconsistent findings linking BI to the development of externalizing problems, further longitudinal investigation of these associations is warranted.

Parenting Style and Behavioral Problems

One factor that may moderate the association between BI and BP is parenting. Previous research suggests the parenting context is an important factor in these associations (Calkins and Degnan 2006; Rubin and Burgess 2002). Parenting style, in particular, may have important implications, since it is thought to provide an emotional climate for the parent-child relationship (Baumrind 1967). Styles are distinct from specific parenting practices or behaviors. A parenting style is an attitude that is expressed toward the child across a wide-range of situations, whereas practices or behaviors are expressed toward the child's behavior in specific situations (Darling and Steinberg 1993). Baumrind's (1971) original conceptualization of parenting style included parents' attitudes and values about parenting, beliefs about development, and the parenting practices they utilize with their children. As these parenting attitudes, values, beliefs, and behaviors are maintained, stable styles of parenting tend to emerge (Darling and Steinberg 1993). More recently these styles have been defined by the interaction of parental warmth/responsiveness and control/demandingness, with control/demandingness separated into restrictiveness and firm control (Maccoby and Martin 1983). Authoritative parents are high on warmth and firm control; authoritarian parents are high on restrictiveness and firm control, and low on warmth; permissive parents are high on warmth and low on both types of control (Baumrind 1991). Specifically, authoritative parenting might include high warmth and involvement, clear communication of expectations, reasoning, democratic participation, and general pleasantness, while authoritarian parenting might be characterized by high parental control, verbal hostility, restrictiveness, and other punitive discipline strategies (Robinson et al. 1995). Furthermore, permissive parenting might include lax or inconsistent discipline, a general ignorance of child misbehavior, and lack of self-confidence about parenting (Robinson et al. 1995). Overall, while parenting practices may influence child behavior during specific situations, parenting styles are thought to influence the effectiveness of parents' socialization attempts by providing a context from which the children are parented and develop over time (Darling and Steinberg 1993).

There is an extensive literature linking these parenting styles to child and adolescent BP. In general, authoritative parenting is negatively associated with internalizing and externalizing problems in childhood and adolescence (e.g., Steinberg et al. 1994; Steinberg et al. 2006). On the other hand, both permissive and authoritarian parenting are positively associated with internalizing and externalizing problems, including internalized distress, conduct disorder, and delinquent behavior (e.g., Querido et al. 2002; Thompson et al. 2003). For instance, parent-reported authoritative parenting was associated with less disruptive behavior in a sample of 3 to 6 year olds (Querido et al. 2002). In a study of adolescents, Steinberg and colleagues (1994) found that adolescent-reported authoritative parenting was associated with maintaining a higher level of social competence and adjustment across a two-year period of high school. In contrast, authoritarian parenting was associated with increased internalized distress, while permissive parenting was associated with less distress and more externalizing problems.

Temperament and Parenting Style in Relation to Behavior Problems

Despite these documented associations, previous work has suggested that direct effects of parenting are modest and that interactions between biological and environmental factors are more likely to affect the development of BP and psychopathology (McLeod et al. 2007). Specifically, the effects of parenting may vary by child temperament (Propper and Moore 2006; Wood et al. 2003). Whereas authoritative parenting may reduce the risks associated with various child characteristics and problem behaviors, negative parenting styles (i.e., authoritarian and permissive parenting) may heighten these risks for children with extreme temperaments (Propper and Moore 2006;Woodetal. 2003). Given that parent-child relationships are bidirectional in nature (Bell 1968; Cook and Kenny 2005), it is difficult to disentangle these effects. Therefore, both temperament and parenting style may show transactional effects (Sameroff and Mackenzie 2003), where they influence one another over time and extend joint effects on BP throughout development.

Temperament, Parenting, and Behavior Problems

Indirect effects of temperament and parenting in relation to internalizing problems suggest that intrusive and overprotective maternal behavior with children who are high in BI leads to greater social withdrawal later in childhood (Degnan et al. 2008; Rubin et al. 2002). Children who display heightened BI may elicit protection from others, and this protection may help maintain their inhibited behavior over time (e.g., Mills and Rubin 1993). In contrast, children who display early BI, but are not exposed to over-protective parenting, tend to show less social fear across childhood (Degnan et al. 2008; Rubin et al. 2002). In addition, studies show that negative parental control increases internalizing problems in children who are over-controlled or high on fearfulness (Van Leeuwen et al. 2004) and may contribute to anxiety in adolescence (Van Brakel et al. 2006).

Research examining temperament, parenting, and externalizing BP has also found evidence for indirect effects (Calkins and Degnan 2006). For example, harsh discipline and low fearfulness predicts increases in girls' externalizing BP from childhood to adolescence (Leve et al. 2005). In addition, research on samples of children who are difficult or easily frustrated has shown that parental control may exacerbate the child's frustration and lead to greater externalizing behavior (Degnan et al. 2008). Gilliom and Shaw (2004) found that high negative maternal control interacted with low fearfulness to predict stable, high externalizing trajectories, while Van Leeuwen and colleagues (2004) reported that externalizing problems were enhanced in the presence of negative parental control for children characterized as undercontrolled (low on conscientiousness and benevolence). However, the effects of parenting on externalizing problems for children high in BI are less well understood.

Parenting Styles, BI, and Behavior Problems

Although there is recent evidence for temperament × parenting interactions in the prediction of internalizing and externalizing behavior (Hastings et al. 2005; Russell et al. 2003), limited work has examined the specific combination of parenting styles and BI in relation to problem behavior. In the few studies examining parenting style and temperament, either BI or BP were not investigated. Russell and colleagues (2003) found that low sociability combined with high authoritarian parenting was associated with less prosocial behavior; however, interactions between shyness and parenting were not associated with prosocial or aggressive behavior. Similarly, Hastings and colleagues (2005) found that gender, BI, and authoritative parenting interacted to predict prosocial behavior at age 4, but did not assess their relation to BP. Specifically, authoritative parenting predicted greater prosocial behavior among less inhibited girls, but more inhibited boys. Overall, while a few studies report on the combined effects of

temperament and parenting styles on prosocial behavior, associations between these factors and BP are less common in the literature.

Summary and Hypotheses

Researchers have argued that externalizing problems are more likely to develop when negative parenting and difficult temperament co-occur (Rothbart and Bates 2006), and that internalizing problems are more likely to occur when children with heightened reactivity to novelty have parents who evince greater control or over-protectiveness during mother-child interactions (Rubin and Burgess 2002). However, there is limited work examining parenting styles and BP in temperamentally extreme samples. In addition, even less work has explored these factors in relation to longitudinal patterns of BP.

The current study examined the relations between BI in toddlerhood, parenting style in childhood, and trajectories of internalizing and externalizing BP from four years of age through early adolescence in a sample of children representing a wide range of temperamental reactivity to novelty. It was expected that BI, observed in toddlerhood, would relate to greater internalizing problems and fewer externalizing problems initially and over time. Parenting styles, self-reported when children were 7 years old, were also expected to relate to internalizing and externalizing BP, both initially and over time. Specifically, negative parenting (i.e., authoritarian and permissive parenting) was expected to relate to greater internalizing and externalizing problems. In addition, positive parenting (i.e., authoritative parenting) was expected to relate to fewer internalizing and externalizing problems initially and over time. Most important, parenting style and temperament were expected to jointly impact the level of BP over time. Specifically, the combination of negative parenting and high BI was expected to result in an increase in BP, whereas the combination of authoritative parenting and low BI was expected to result in a decrease in BP.

Methods

Participants

This report includes 113 families participating in a larger longitudinal study of infants followed from 4 months to 15 years of age. After contacting families by mail and receiving background surveys from interested parents, families were initially screened to ensure that infants were full term, normally developing, and that their parents were right-handed. Infants whose families met these criteria (n=443) were screened at 4 months of age to assess their reactivity to novel auditory and visual stimuli. Videotapes of the screening procedure were coded for positive and negative affect and motor activity during the presentation of the novel stimuli. Details of this screening procedure have been described previously (Calkins et al. 1996; Fox et al. 2001b). Infants were selected based on their classification into one of three different groups: High negative affect/high motor activity (37%), high positive affect/high motor activity (29%), and low affect/low motor activity (34%). This selection procedure provided a sample of 217 infants (female, *n*=114; male, *n* = 103) with a wide range of temperamental reactivity to novelty. Infants were primarily Caucasian (98% European American) and were from middle to upper middle class homes.

Procedures

The current study examined information collected from this sample when the children were approximately 14 months, 24 months, 4, 7, and 15 years of age. At 14 and 24 months, mothers brought their toddlers into the laboratory and the children were assessed for BI using a standard paradigm of novel stimuli and situations. In addition, mothers completed questionnaires assessing parenting style when children were 7 years of age and child BP when children were

4, 7, and 15 years of age. At each of the child assessments, the mothers gave informed consent for their children to participate. When children were adolescents, both parental consent and adolescent assent were obtained prior to data collection.

Measures

BI At 14 and 24 months of age, participants were observed in a laboratory paradigm designed to assess individual reactions to novel stimuli. At 14 months, infants were presented with an unfamiliar room, an adult stranger, and a novel toy/object (robot). At 24 months, toddlers were presented with the same stimuli with the addition of an inflatable tunnel to crawl through. These stimuli and inter-rater reliability have been previously described (Calkins et al. 1996; Fox et al. 2001b). At 14 months, the index of BI consisted of a sum of the following standardized measures recorded during each task (α=0.58): Latency to vocalize, latency to approach toys/stranger/robot, proportion of time spent in proximity to mother, and frequency of negative affect. At 24 months, the index of BI consisted of a sum of the following standardized measures recorded during each task (α=0.73): Latency to approach toys/stranger/robot/tunnel and proportion of time spent in proximity to mother. The mean (standard deviation) of BI at 14 months was 0.00 (5.05) and at 24 months was 0.00 (4.32). The BI composites from both ages were then averaged (r=0.39, p<0.001) to create an overall observed measure of BI across toddlerhood (M=0.01, sd=0.81).

Maternal parenting styles—Mothers self-reported their parenting styles by completing the Parenting Practices Questionnaire (Robinson et al. 2001) when their child was 7 years of age, a time by which parenting styles should be well developed (Darling and Steinberg 1993). This questionnaire assesses three global parenting dimensions consistent with Baumrind's (1967) parenting styles: Authoritative, authoritarian, and permissive. The *authoritative* subscale consists of 27 items (α=0.88) measuring warmth and involvement, clear communication of expectations, reasoning, democratic participation, and general pleasantness. The *authoritarian* subscale consists of 20 items (α=0.77) measuring verbal hostility, corporal punishment, punitive strategies, and directiveness. The *permissive* subscale consists of 15 items (α=0.75) measuring lack of follow through, ignoring misbehavior, and lack of self-confidence about parenting. An examination of the items for the permissive scale suggested that it measured aspects of permissive and inconsistent parenting, thus this measure is referred to as *permissive/inconsistent* throughout the current study. These subscales have been found to show reliability in a sample of preschool and school-age children (Robinson et al. 2001). Parents responded to the stem question “I exhibit this behavior...,” on a Likert-type scale which ranged from 1 (*never)* to 5 *(always)*, for each parenting behavior. The means (standard deviation) in the current sample were 4.05 (0.36) for authoritative parenting, 1.83 (0.26) for authoritarian parenting, and 1.88 (0.32) for permissive parenting. Authoritative parenting was negatively correlated with authoritarian (r=–0.38, p<0.01) and permissive/inconsistent (r=–0.19, p<0.05) parenting styles. Additionally, authoritarian and permissive/inconsistent parenting were positively correlated (r=0.45, p<0.01), likely because of their shared negative valence.

Child behavior problems—The Child Behavior Checklist's (CBCL; Achenbach 1991, 2001) internalizing and externalizing subscales were used as indices of mother-reported child BP at each age. When the children were 4 and 7 years of age, mothers completed the CBCL for 4–18 year olds (Achenbach 1991). When the children were 15 years of age, mothers completed the CBCL for 6 –18 year olds (Achenbach 2001). These scales are reported to be reliable indices of various internalizing and externalizing BP across childhood (Achenbach 1991, 2001). Both versions include an *internalizing* subscale, which consists of items measuring anxiety, depression, withdrawn behavior, and somatic complaints. At 4 and 7 years of age, the subscale consisted of 31 items such as “Cries,” “Worries,” “Shy,” and “Headaches.” At 15 years of age, the subscale consisted of 32 items such as “Fears school,” “Nervous,”

"Nightmares," and "Rather be alone." Both versions also include an *externalizing* subscale, which consists of items measuring aggression and delinquent behaviors. At 4 and 7 years of age, the subscale consisted of 33 items such as "Argues," "Fights," "Lies," and "Steals." At 15 years of age, the subscale consisted of 35 items such as "Mean to others," "Attacks others," "Runs away," and "Uses drugs." The mother indicated how true each item was of her child by circling 0 if not true, 1 if sometimes true, or 2 if often true. The raw scores for each of the subscales were used in the current study, as this is what is suggested for research studies when clinical cutoffs and sub-grouping is not required (Achenbach 1991). Means (standard deviations) in the current sample for internalizing BP were 4.31 (3.53) at 4 years, 5.82 (5.11) at 7 years, and 7.46 (7.49) at 15 years. Means (standard deviations) in the current sample for externalizing BP were 9.51 (5.96) at 4 years, 7.66 (6.37) at 7 years, and 5.92 (6.76) at 15 years.

Attrition

One-hundred fourteen children (female, n=61; male, n=53) had complete data on BI and maternal parenting style. Attrition occurred over the years of the study due to families relocating, withdrawing from the study, or neglecting to complete questionnaires. Previous work has reported that attrition was not related to 4-month reactivity (Fox et al. 2001b). Families with missing data on BI and/or parenting style were not significantly different from the overall sample by gender, χ^2 (1, N=217)=0.09, p=0.76, race, χ^2 (3, N=157)=2.39, p=0.49, 4-month reactivity, χ^2 (2, N=153)=0.09, p=0.96, 4-year internalizing, t (135)=–0.07, p=0.94, 7-year internalizing, t (131)=–0.67, p=0.51, 15-year internalizing, t (103)=–0.13, p=0.90, 4-year externalizing, t (135)=–1.05, p=0.29, 7-year externalizing, t (126)=–0.66, p=0.51, or 15-year externalizing, t (103)=1.37, p=0.17.

Of the 114 participants with complete data on BI and parenting measures, 103 had complete 4-year CBCL data, 106 had complete 7-year CBCL data, and 65 had complete 15-year CBCL data. Families with complete CBCL data were not significantly different from those with patterns of missing CBCL data by gender, χ^2 (1, N=114)=0.72, p=0.39, race, χ^2 (2, N=99) =1.15, p=0.56, or 4-month reactivity, χ^2 (2, N= 101)=1.86, p=0.39. In addition, the present analysis used maximum likelihood estimation, which analyzes the entire sample (N=114), allowing data to be missing longitudinally as long as the data are missing at random (MAR; Little and Rubin 1987). The present data met the assumption that it was missing completely at random (MCAR), Little's MCAR χ^2 (120)=102.41, p=0.88, thus, assessment points at which not all participants had data as well as participants with missing assessment data were analyzed.

Data Analysis

To investigate the longitudinal trajectories of externalizing and internalizing BP across childhood and adolescence, multilevel models were computed using hierarchical linear modeling software (HLM; Raudenbush and Bryk 2002). This approach estimates each individual's initial level and change across time and outputs the average level and change across time, as well as the amount of individual variation in those estimates. In addition, it tests predictors of the individual differences in level and change over time. A multilevel model has two levels: one level represents the between subject variation in the repeated measures and one level represents the within subject variation. Thus, parameters from level one describe the normative or average developmental trajectory for the sample and parameters from level two allow each individual to have his/her own growth trajectory.

Analyses for the present study were conducted in two steps. First, unconditional baseline models (i.e., without predictors) were run in order to determine whether there was significant within- and between-person variance for each dependent variable. Significant variation at each level was determined for each of the outcome variables: Internalizing problems' intra-class correlation was 0.29 (or 29% between-person variation) and externalizing problems' intra-

class correlation was 0.55 (or 55% between-person variation). Second, predictors were added in order to test whether BI, parenting style, or their interaction explained the individual differences in the externalizing and internalizing trajectories. Level 1 variables included time-covarying covariates (internalizing problems, externalizing problems, age) whereas level 2 variables included the time-invariant, person-level predictors (BI, parenting styles). Furthermore, all parenting style variables (authoritarian, authoritative, permissive) were entered into the equation simultaneously in order to examine the unique effect of each parenting style while controlling for the others. This statistical approach allowed us to evaluate, for example, whether internalizing problems are higher for those with more permissive parenting styles, if this relation changes as children get older, and if this relation changes differentially as a function of early BI.

Results

Preliminary Analyses

Before the multi-level models were analyzed, Pearson correlations between all of the predictors and between the predictors and the individual measures of BP were computed. BI was significantly related to authoritarian parenting, r=0.19, p=0.05, such that higher BI in toddlerhood was associated with parents' reporting higher authoritarian parenting when their children were 7 years of age. In addition, Authoritarian parenting was significantly related to 4-year externalizing scores, r=0.32, p<0.01, 7-year internalizing scores, r=0.21, p=0.03, and 7-year externalizing scores, r=0.29, p<0.01. Permissive parenting was also significantly related to 7 year internalizing scores, r=0.27, p=0.01, and 7-year externalizing scores, r=0.33, p<0.01. Therefore, parents of children with higher externalizing at age 4 or greater internalizing or externalizing at age 7 reported a greater Authoritarian parenting style. Parents of children with higher internalizing or externalizing problems at age 7 also reported a greater Permissive parenting style. BP at 15 years of age were not directly related to BI or parenting style.

Multi-level Models

First, the main effect models for age (baseline model), BI, and parenting predicting internalizing and externalizing problems are presented. Then, full models including all interactions (BI×age, Parenting×age, and BI×Parenting×age) follow. Statistics for the main effect models are shown in Table 1 and statistics for the full models are shown in Table 2.All predictor variables were grand mean-centered. Age was centered such that the intercept indicated when the outcome variables were first measured (age 4).

Age

An age-only model was estimated for both internalizing and externalizing problems. The average level and slope for each model is shown in Tables 1 (main effects) and 2 (interaction effects). On average, the level of internalizing problems at age 4 was significantly greater than zero and significantly increased across time. Conversely, the average level of externalizing problems at age 4 was significantly greater than zero, but significantly decreased across time. The amount of within-person variability accounted for by age was 6.18% for internalizing problems and 10.26% for externalizing problems, respectively.

BI Models

Internalizing—BI was significantly related to the level of internalizing problems. For every standardized unit increase in BI, participants increased their level of internalizing problems at 4 years of age by 1.11 unstandardized units. As described previously, the average trajectory of internalizing problems increased across time. There was also a significant interaction of BI with age, such that children with higher BI scores demonstrated less of an increase in problems

over time. Thus, children with higher BI scores had more internalizing problems at age 4 and maintained their level of internalizing problems over time, while those with lower BI scores had fewer internalizing problems at age 4, but increased in internalizing problems over time.

Externalizing—BI was not significantly related to the level of externalizing problems at age 4. However, there was a significant interaction of BI with age, such that children with higher BI scores demonstrated more of a decrease in problems over time. As described previously, the average trajectory of externalizing problems decreased across time. Therefore, children with higher BI scores decreased more sharply in their externalizing problems over time. Conversely, those with lower behavior inhibition scores showed a smaller decrease in externalizing problems over time.

Parenting Styles Models

Internalizing—Of the three parenting styles, only permissive parenting was significantly related to the level of internalizing problems. Controlling for internalizing problems across age, an increase of 3.55 in internalizing problems at age 4 corresponded to every standardized unit increase in permissive parenting style at age 7. While internalizing problems increased across time, as previously indicated in the age-only growth model, they did not differentially change over time by parenting style.

Externalizing—Of the three parenting styles, only authoritarian parenting was significantly related to the level of externalizing problems. Controlling for externalizing problems across age, an increase of 5.92 in externalizing problems at age 4 corresponded to every standardized unit increase in authoritarian parenting style at age 7. While externalizing problems decreased across time, as previously indicated in the age-only growth model, this pattern differed as a function of parenting style at the trend level.

Parenting Styles by BI Models

Internalizing—A significant interaction between BI and permissive parenting indicated that children with higher BI who also had parents with higher permissive parenting styles had the highest internalizing problems at age 4 (Fig. 1), controlling for internalizing problems across age. BI did not interact with any of the other parenting styles to shape the initial level of internalizing problems.

Direct effects were found for both BI and parenting style in relation to change in internalizing problems. With all three parenting styles in the model, BI maintained a significant interaction with age to predict internalizing problems. While children with higher BI scores demonstrated less of an increase in problems over time, as previously indicated in the BI growth model, this effect was maintained above and beyond the effect of parenting style (Fig. 2). In addition, when BI was in the model, authoritative parenting style significantly interacted with age to predict internalizing problems. While internalizing problems increased across time on average, as previously indicated in the age-only growth model, children with mothers high on authoritative parenting style demonstrated less of an increase in internalizing problems over time (Fig. 3). Thus, controlling for BI, children with mothers higher on authoritative parenting style displayed less of an increase in internalizing problems, whereas those with mothers lower on authoritative parenting increased in internalizing problems over time. There were no interactions between BI and parenting in relation to the change in internalizing problems over time.

Externalizing—There were no significant interactions of parenting styles with BI to predict either the initial level (age 4) or change in externalizing problems over time. However, when BI was in the model, authoritarian parenting did significantly interact with age to predict change

in externalizing problems. While externalizing problems decreased over time on average, as previously indicated in the age-only growth model, children with mothers high in authoritarian parenting demonstrated a greater decline in externalizing problems over time (Fig. 4). Thus, controlling for BI, children with mothers higher on authoritarian parenting style displayed a steeper decline in their externalizing problems, while those with mothers lower on authoritarian parenting style displayed a lower level of externalizing problems and decreased to a lesser extent over time.

Discussion

This study examined the effects of BI and parenting style on both the initial level and change over time in internalizing and externalizing BP from early childhood to adolescence. Given the negative effects of, and stability in, BP over time, understanding what factors differentiate chronic, elevated patterns from more typical trajectories is important for the development of prevention and intervention efforts. Both child and maternal factors, such as temperament and parenting style, have been shown to influence children's ability to effectively control their emotions and behavior (Calkins and Degnan 2006; Rubin and Burgess 2002). Therefore, BI, authoritative, authoritarian, and permissive parenting styles, and the interaction of BI with these parenting styles were examined as predictors of longitudinal trajectories of BP from 4 to 15 years of age.

Longitudinal Patterns of Behavior Problems

The first goal of this study was to examine the average level and growth in BP across this time period in a sample of children selected in infancy for a wide-range of temperamental reactivity to novelty. Similar patterns to those found in normative, community samples were found in the current sample (Bongers et al. 2003). On average, children showed internalizing and externalizing problems significantly greater than zero at 4 years of age, and over time the level of internalizing problems increased, while the level of externalizing problems decreased. Therefore, even in a sample of temperamentally extreme children typical longitudinal patterns of BP were found.

BI and Behavior Problems

The second goal of the study was to examine whether the level of BI in toddlerhood predicted the initial level and growth in BP across childhood and adolescence. Shy and withdrawn social behavior has been shown to manifest itself as internalizing problems in childhood (Biederman et al. 2001) and adolescence (Caspi et al. 1996; Lonigan et al. 2003). In comparison, BI and correlates such as fearfulness are typically associated with fewer externalizing behaviors in pre-adolescence (Kimonis et al. 2006). The enhanced reactivity to novelty and typical avoidance patterns of behaviorally inhibited children is thought to put them at risk for internalizing disorders such as anxiety, and protect them from approach-oriented behaviors such as aggression or delinquency. Indeed, in the current study, toddlers with higher BI showed higher levels of internalizing problems in preschool and maintained their level of internalizing problems across childhood and adolescence, above and beyond any effects of parenting style (Fig. 2).

In contrast, these heightened levels of BI did not impact the level of externalizing problems in preschool, but did contribute to a greater decline in these problems across childhood and adolescence. These results are supported in the literature. There is some research that suggests greater BI may be linked to greater externalizing behaviors in adolescence (Moffitt et al. 1996), but others report that fearful, or behaviorally inhibited children, are less likely to display these behaviors (Kimonis et al. 2006). Furthermore, the measure of externalizing behavior in the present study included both aggressive and delinquent behaviors, whereas studies finding

greater externalizing behavior for behaviorally inhibited adolescents typically focus exclusively on delinquent behaviors such as substance use (Rubin and Burgess 2001).

Parenting Style and Behavior Problems

The third goal of the study was to examine whether the level of authoritative, authoritarian, or permissive parenting in childhood was associated with the initial level and growth in BP across childhood and adolescence. Whereas authoritative parenting is thought to contribute to lower internalizing and externalizing problems in childhood and adolescence (Steinberg et al. 1994; 2006), permissive and authoritarian parenting are both thought to contribute to greater BP (Querido et al. 2002; Thompson et al. 2003). The present results indicate that greater permissive parenting is related to greater preschool internalizing problems and authoritarian parenting is related to greater preschool externalizing problems. However, parenting style did not directly contribute to growth in BP over time. This is supported in the literature, as previous work has suggested that the effects of parenting often depend on child temperament (Degnan et al. 2008; Wood et al. 2003). Whereas authoritative parenting may reduce the risks associated with various child characteristics and problem behaviors, negative parenting may heighten the risks for children who are temperamentally extreme. Moreover, the present results cannot confirm the direction of effects since parenting was measured in middle childhood and was related to the level of preschool BP. Child temperament may elicit certain parenting styles just as parenting styles may affect the relations between child temperament and behavior. It is possible that early levels of behavior problems influence parenting styles and behavior in middle childhood, which in turn influence later behavior problems, as seen here in adolescence. Research designs are needed that help clarify the specific directions through which these effects are operating. Specifically, studies that include repeated assessments of both parenting and behavior problems across development would allow for a structural analysis of the autoregressive (within construct, over time) and bidirectional (between constructs, over time) effects simultaneously. In addition, this type of analysis would test whether the behavior problems were influencing parenting over time, or parenting was influencing behavior problems over time, or whether these constructs were working alongside one another to affect child outcomes.

BI, Parenting Style, and Behavior Problems

The fourth goal of the study was to examine whether BI and parenting styles were jointly associated with initial levels and growth in BP across childhood and adolescence. There is limited work examining parenting styles in relation to BP in samples of children with a wide range of temperamental reactivity to novelty. In addition, even less work has explored these factors in relation to longitudinal patterns of BP over time. However, given the literature examining transactional effects of parenting and temperament on BP, it was expected that authoritative parenting would ameliorate any negative effects of BI and authoritarian and permissive parenting would exacerbate any negative effects of BI on BP. The current study found that internalizing problems at age 4 were greatest among behaviorally inhibited children who also had permissive mothers (Fig. 1). Furthermore, when BI was controlled for in the model, greater authoritative parenting was associated with less of an increase in internalizing BP over time (Fig. 3) and greater authoritarian parenting was associated with a steeper decline in their externalizing problems (Fig. 4). Support for these effects in the extant literature is mixed.

Authoritative parenting is thought to ameliorate problem behavior and indeed, in the current study, it contributes to fewer internalizing problems over time. In addition, permissive parenting is thought to exacerbate problem behavior as it does in the current study for behaviorally inhibited toddlers. Authoritarian parenting is thought to exacerbate problem behavior. In the current study, however, authoritarian parenting was associated with fewer

externalizing problems over time, albeit only when controlling for level of BI. These results suggest that the role of certain parenting styles may be different for children with BI. There is considerable evidence that oversolicitous parenting has negative effects among children with BI (Degnan et al. 2008; Rubin et al. 2002); however, this type of parenting behavior often seems positive and would likely result in adaptive outcomes for children without high BI. Parenting an inhibited child may involve understanding the child's social developmental needs and supporting more independent behavior across childhood. In contrast, highly involved mothers may attempt to guard children from negative experiences while limiting their children's opportunities to accomplish tasks on their own. This protection and control has been shown to have especially negative social developmental outcomes when combined with a child's dispositional proneness to inhibition and wariness (Rubin and Burgess 2002).

Opposite effects might exist for authoritarian parenting and BI. While this type of parenting may appear insensitive and maladaptive for most children, it may help children with BI develop more positive social behavior. Specifically, it may help these children develop ways of coping in the social world that counteracts the development of externalizing BP (e.g., delinquency, substance use) as they enter into adolescence. Unfortunately there is limited work examining externalizing behavior across childhood in samples of behaviorally inhibited children. Previous work has suggested that the social facilitating effects associated with substance use may be more appealing to behaviorally inhibited adolescents who have difficulty in social relationships with their same age peers (Rubin and Burgess 2001). In addition, behaviorally inhibited children may lack the social skills necessary to navigate frustrating or frightening social environments and thus may display externalizing behaviors when faced with these types of situations. Future work is needed to explore the specific risk behaviorally inhibited children and adolescents may have for specific forms of externalizing problems and the environmental factors that exacerbate or attenuate the development of these problem behaviors.

It is important to note that each parenting style was examined independently in the current study, because the measure of parenting style allowed every mother to have a score for each style. In addition, these measures are moderately related. For instance, parents' level of authoritative parenting was negatively related to their level of permissive or authoritarian parenting and their level of permissive parenting was positively related to their level of authoritarian parenting. Future work should examine these styles in combination, as there may be important parenting profiles that differentially influence certain BP over time.

Strengths and Limitations

Several strengths of this study provide greater confidence in the significance of the results. First, few studies have used both infant and child characteristics and environmental factors to predict adolescent outcomes. A developmental psychopathology framework calls for the examination of person-environment interactions over time in order to generate more theoretically sound results. Secondly, few studies have focused on the development of children with extreme temperaments into adolescence. Even fewer studies have examined behaviorally inhibited children from childhood through adolescence. Thirdly, few studies have used multiple methods (i.e., behavioral observations, questionnaires) within a prospective, long-term time frame. Behavioral assessments in toddlerhood have rarely been followed through adolescence and the use of an observed measure of BI reduced mother-reporter bias and common method variance. Additionally, these methodological strengths allowed us to use flexible modeling techniques that not only estimate growth patterns in problem behaviors, but also determine person-level factors that influence growth patterns. The predictive validity of developmental models is heightened when they can be analyzed at multiple levels within a temperamentally heterogeneous sample.

Despite these strengths, the study does have limitations. One, power to detect significant interactive effects may have been compromised by having a smaller sample size. As such, the power to detect all of the interaction effects may not have been sufficient. A Monte Carlo power analysis determined that the model had sufficient power to detect all of the interactions predicting internalizing behaviors and all but two of the interactions predicting externalizing behaviors (BI by Authoritative predicting externalizing at age 4 and BI by Authoritarian predicting externalizing problems over time). Future studies should determine whether those two interactions are significant in other, larger samples. Two, the measures of parenting style and BI were each only analyzed at one point in development. Parental style is believed to represent a relatively stable, overarching emotional context for the parent-child relationship and thus, its influence should extend across multiple situations and developmental stages. Given the temporal sequence of the measures, the correlations found in the preliminary analyses suggest that BI in toddlerhood and/or externalizing behavior at 4 years of age may have contributed to the level of authoritarian parenting reported when children were 7 years of age. Similarly, the concurrent associations between authoritarian and permissive parenting and 7-year BP may indicate that these child-to-parent effects continued as children developed. However, since BI and parental style were only measured once, the direction of effects between the child and parent measures cannot be confirmed in the current sample. Additionally, the effect of peer relationships throughout this developmental period is missing. Future work should explore how parenting, temperament, peer relationships, and BP jointly influence each other within and across time points.

Overall, research is needed to identify the specific mechanisms through which parenting and temperament influence BP over time. Authoritative parents may be more sensitive to the needs of children with greater BI. Perhaps children with greater BI evoke a response that is more warm and nurturing. Alternatively, children who are behaviorally inhibited may evoke poor responses from others (e.g., greater parental control), which may in turn cause internalizing problems or lead individuals to actively seek out maladaptive environments. However, increasing evidence indicates that contextual factors such as parenting behaviors also interact with temperament to modify the relations between temperament and behavioral outcomes (Degnan and Fox 2007).

Summary and Conclusions

Many researchers have described the importance of including person by environment interactions to predict child and adolescent development (Bronfenbrenner 2005; Rutter 1997), yet researchers are only beginning to test these models empirically. The results of the present study demonstrate that the parenting context and child temperament jointly influence the risk for internalizing and externalizing problems over time. Child characteristics and parenting styles moderated internalizing and externalizing growth curves, from four to fifteen years of age. Future research is needed to examine how child temperament and parenting modify each other, and if those modifications influence the impact of temperament and parenting on BP over time.

Acknowledgments

This research was supported by National Institutes of Health awards (MH 074454 and HD 17899) to the last author. The authors would like to thank all of the research staff who assisted in data collection and coding. Above all, we thank the children and families who participated for their invaluable time and effort over the years of the study.

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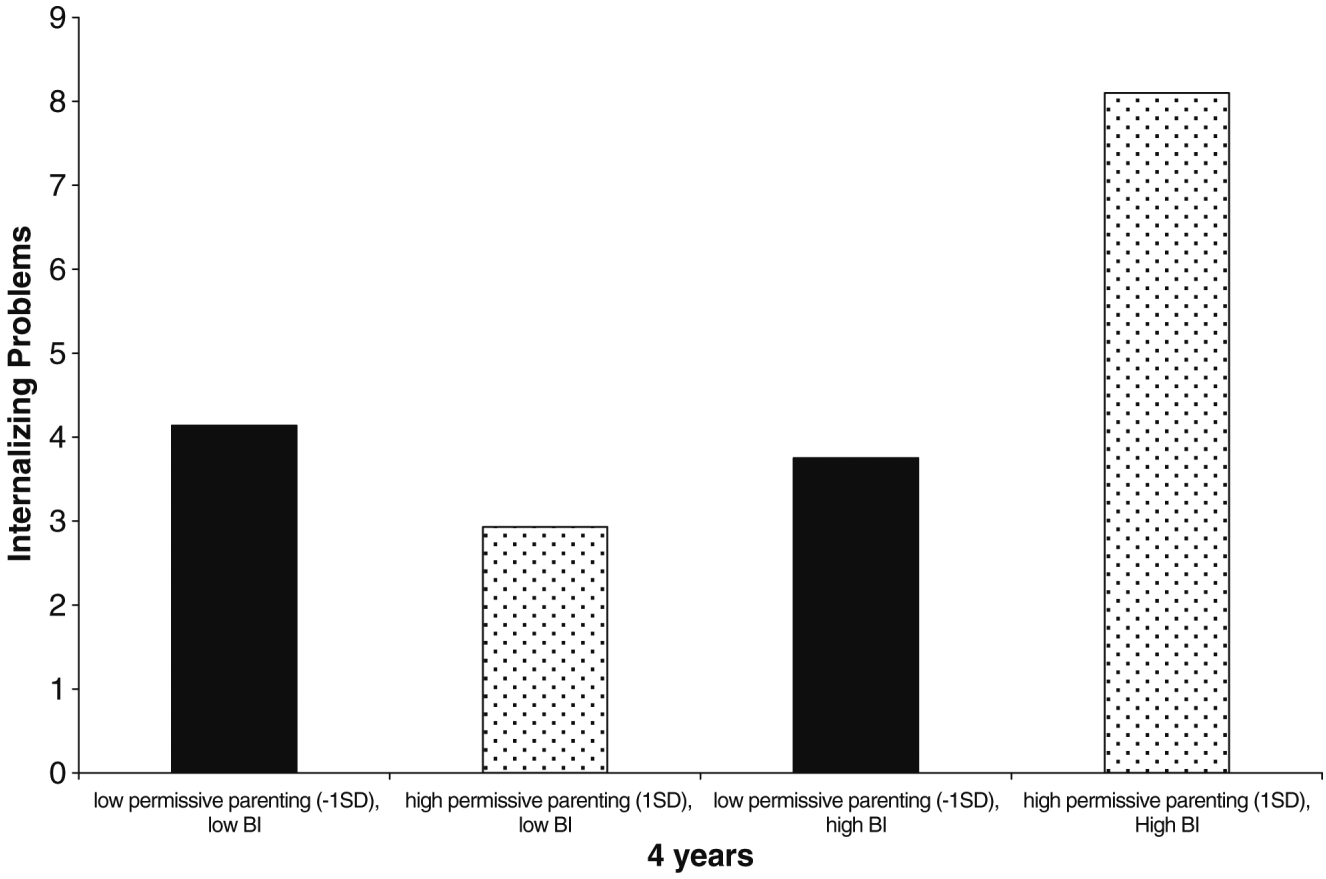

Fig. 1.
Behavioral inhibition (BI) by permissive parenting and internalizing problems at 4 years of age

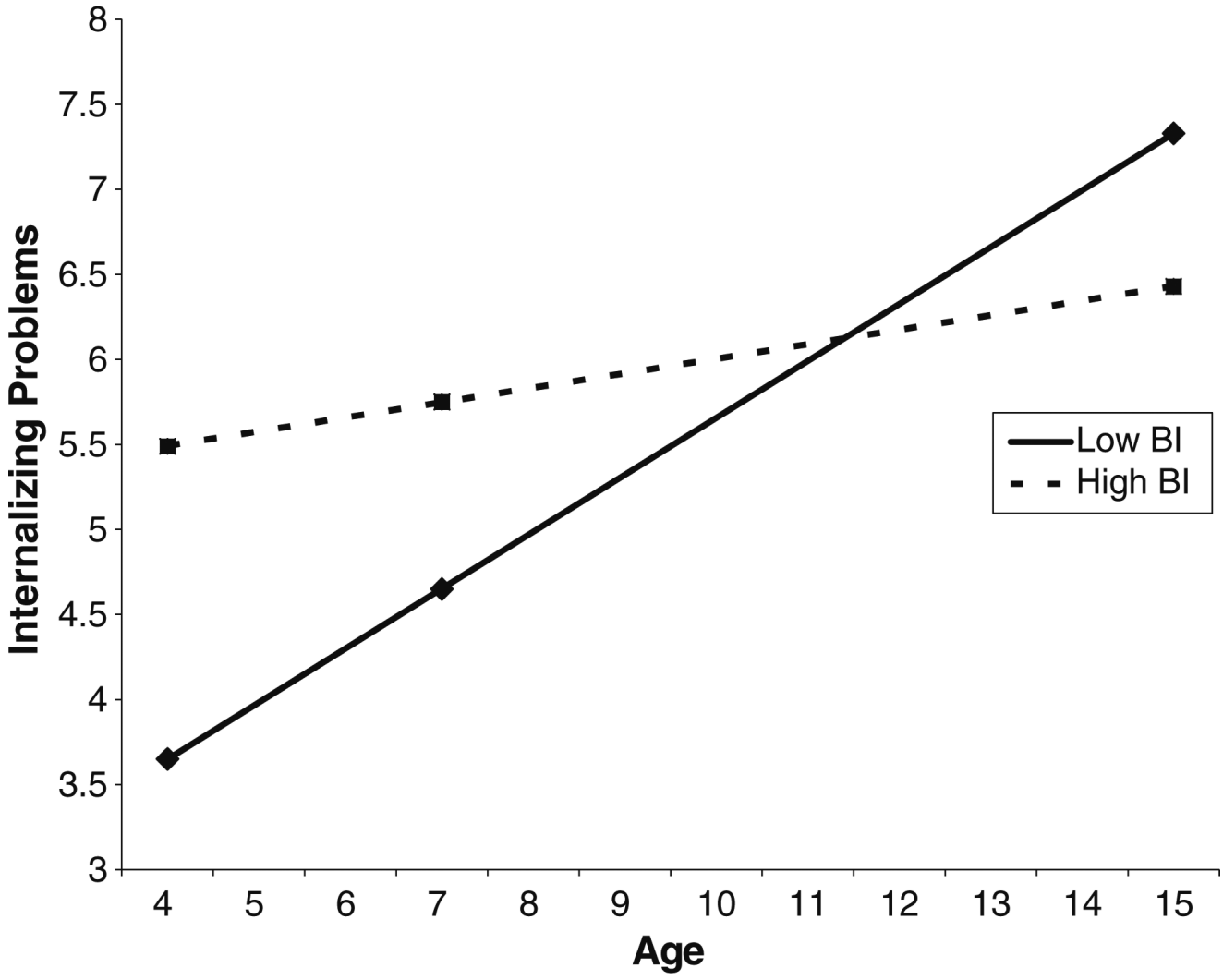

Fig. 2.
Behavioral inhibition (BI) and internalizing problems across time

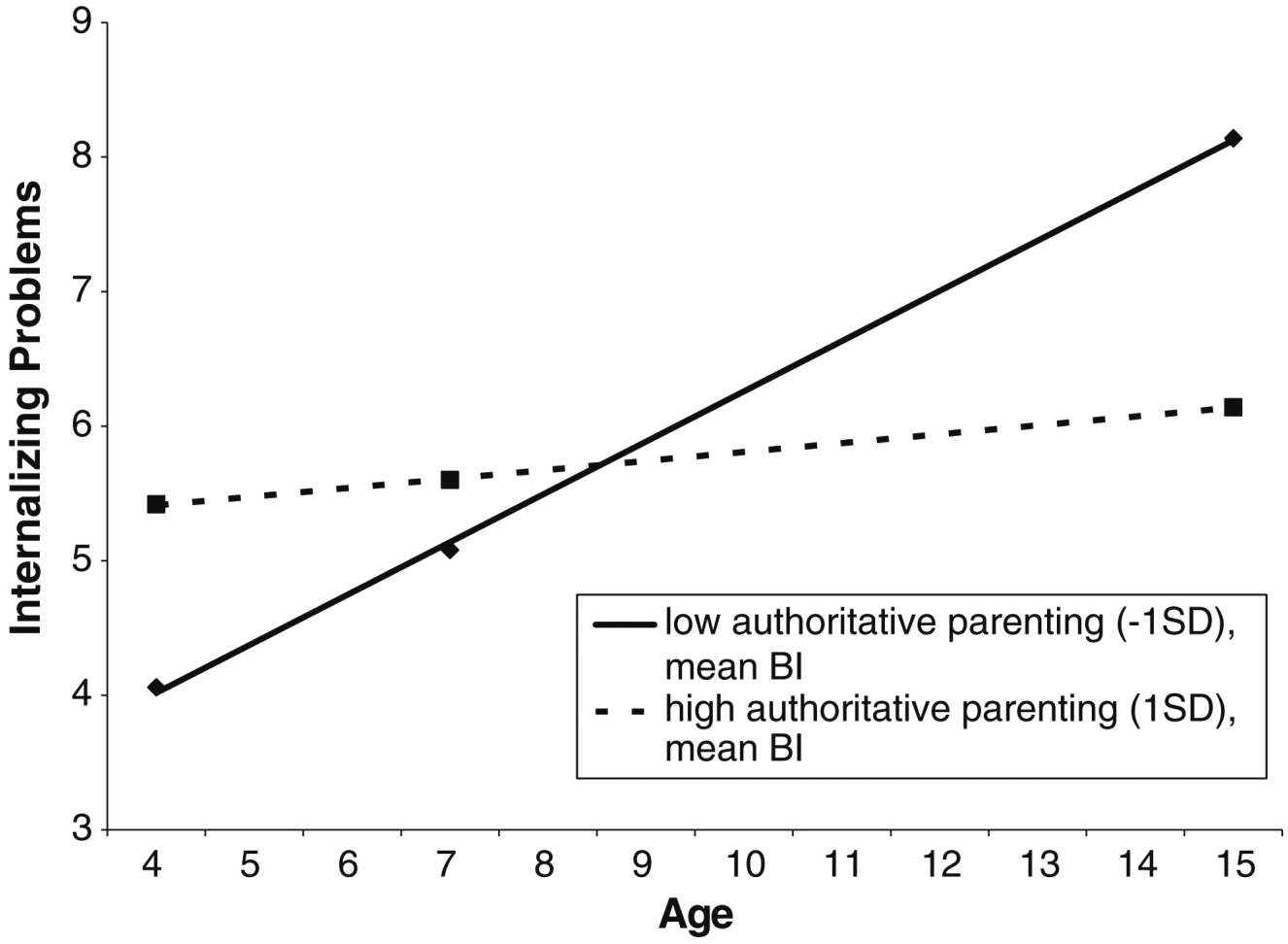

Fig. 3.
Authoritative parenting and internalizing problems across time

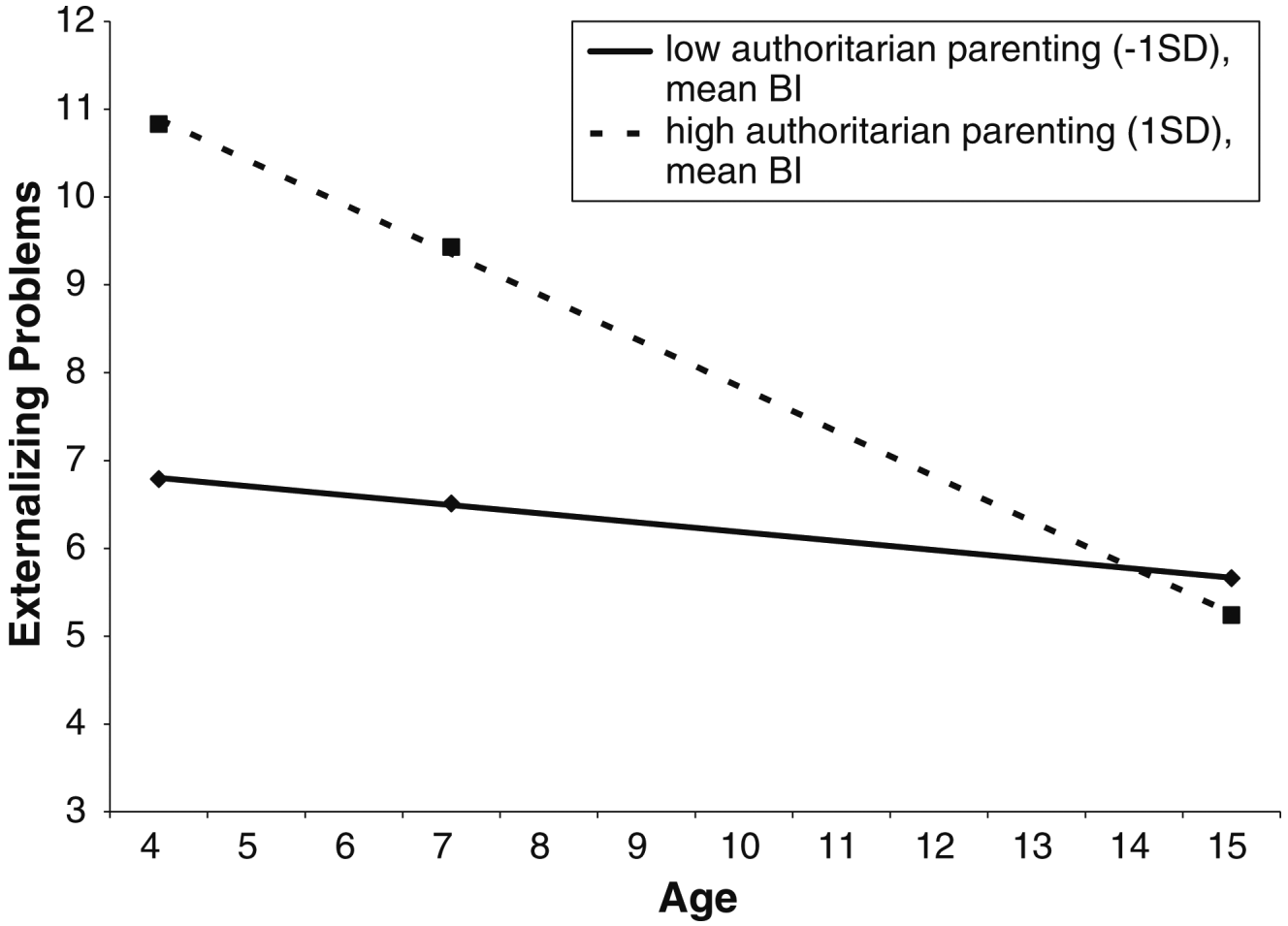

Fig. 4.
Authoritarian parenting and externalizing problems across time

Table 1

Main Effects of Behavioral Inhibition (BI) and Parenting Style on Behavior Problem Trajectories

	Internalizing		Externalizing	
	B	se	B	se
Age Only Model				
Intercept (age 4), γ_{00}	4.55***	0.42	8.97***	0.53
Age (slope), γ_{10}	0.22***	0.06	–0.32***	0.05
BI Model				
Intercept (age 4), γ_{00}	4.57***	0.42	9.00***	0.53
BI, γ_{01}	1.11*	0.50	1.15**	0.64
Age (slope), γ_{10}	0.21***	0.05	–0.32***	0.05
BI*Age (slope), γ_{11}	–0.15*	0.07	–0.14*	0.07
Parenting Style Model				
Intercept (age 4), γ_{00}	4.60***	0.46	8.80***	0.57
Authoritative, γ_{01}	0.41	1.41	–1.24	1.74
Authoritarian, γ_{02}	1.31	2.23	5.92*	2.76
Permissive/Inconsistent, γ_{03}	3.55*	1.69	3.11	2.05
Age (slope), γ_{10}	0.26***	0.07	–0.26***	0.06
Authoritative*Age (slope), γ_{11}	0.07	0.23	0.38**	0.22
Authoritarian*Age (slope), γ_{12}	–0.15	0.30	–0.52**	0.29
Permissive/Inconsistent*Age (slope), γ_{13}	–0.34	0.27	–0.02	0.26

* $p<0.05$

** $p<0.10$

*** $p<0.001$

Table 2

Indirect Effects of Behavioral Inhibition (BI) and Parenting Style on Behavior Problems

	Internalizing		Externalizing	
	B	se	B	se
Intercept (age 4), γ_{00}	4.73***	0.45	8.81***	0.57
Authoritative, γ_{01}	1.89	1.41	–0.91	1.76
Authoritarian, γ_{02}	0.96	2.24	6.30*	2.81
Permissive/Inconsistent, γ_{03}	2.46	1.69	2.42	2.09
BI, γ_{04}	1.44*	0.59	–0.05	0.74
BI*Authoritative, γ_{05}	0.93	1.66	–0.31	2.07
BI*Authoritarian, γ_{06}	–1.47	3.01	1.30	3.81
BI*Permissive/Inconsistent, γ_{07}	5.23***	1.84	1.62	2.22
Age (slope), γ_{08}	0.20**	0.06	–0.28***	0.06
Authoritative*Age (slope), γ_{09}	–0.39*	0.19	0.21	0.18
Authoritarian*Age (slope), γ_{10}	–0.12	0.27	–0.58*	0.26
Permissive/Inconsistent*Age (slope), γ_{11}	–0.07	0.24	0.09	0.23
BI*Age (slope), γ_{12}	–0.28**	0.08	–0.08	0.08
BI*Authoritative*Age (slope), γ_{13}	–0.29	0.23	–0.07	0.21
BI*Authoritarian*Age (slope), γ_{14}	0.20	0.39	–0.08	0.37
BI*Permissive/Inconsistent*Age (slope), γ_{15}	–0.13	0.29	0.10	0.28

* $p<0.05$.

** $p<0.01$.

*** $p<0.001$.