

EARLY SCREENING

OF AN ANXIETY-PRONE TEMPERAMENT
IN YOUNG DUTCH CHILDREN
WITH A MULTI-ETHNIC BACKGROUND

Leonie J. Vreeke

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Early Screening of an Anxiety-prone Temperament in Young Dutch Children with a Multi-ethnic Background

Vroegtijdige signalering van een angst-gevoelig temperament
in jonge Nederlandse kinderen van verschillende etnische achtergronden

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CONTENTS

| | | |
|------------------|--|-----|
| Chapter 1 | General introduction | 7 |
| Chapter 2 | The assessment of an inhibited, anxiety-prone temperament in a Dutch multi-ethnic population of preschool children | 15 |
| Chapter 3 | Non-parametric IRT analysis of the Behavioral Inhibition Questionnaire-Short Form in Dutch children with a multi-ethnic background | 31 |
| Chapter 4 | Skittish, shielded, and scared: Relations among behavioral inhibition, overprotective parenting, and anxiety in native and non-native Dutch preschool children | 47 |
| Chapter 5 | Relations between behavioral inhibition, Big Five personality factors, and anxiety disorder symptoms in non-clinical and clinically anxious children | 65 |
| Chapter 6 | Summary and Discussion | 77 |
| | Samenvatting (Summary in Dutch) | 89 |
| | References | 99 |
| | Dankwoord (Acknowledgements in Dutch) | 113 |
| | Publications | 115 |
| | Curriculum Vitae | 117 |

1

General introduction

This chapter is adapted and translated from:

Vreeke, L. J., & Muris, P. (2010). Geremde en verlegen kinderen. Kind en Adolescent Praktijk, 9, 123-125.

Case Michael

Michael is 8 years old, and is referred to a psychologist because he has anxiety problems. Michael's parents indicate that he is fearful of playing with other children. He is afraid that they will laugh at him or that they will tease him, although his parents state that this has actually never happened. During the intake, Michael's parents tell that he has always been shy and withdrawn. When he first entered school, he was afraid to talk to the teacher and the other kids in his class. Each morning, going to school caused a big fuss: Michael cried and asked his mother whether he could stay at home. His parents indicate that Michael still finds it difficult to go to school after holidays, even though he is well acquainted with his class members. They also indicate that he doesn't like the physical education lessons, because he is afraid of hurting himself while doing the exercises. When being asked what kind of boy Michael is, his mother responds: 'He is quiet, shy and timid. Michael never seems immediately enthusiastic about something but always waits to see which way the cat jumps.'

INTRODUCTION

Fear and anxiety are normal phenomena during children's development. They both represent natural and adaptive emotions that help children to protect themselves against potential dangers (Muris, 2007). In most children, fear and anxiety are quite mild and they will disappear as quickly as they appeared. However, some children develop an anxiety disorder; in these children, the fear and anxiety becomes so chronic and intense that they start to interfere with daily life. Although this scenario only occurs in a minority of the youths, anxiety disorders are among the most common psychiatric disorders in children (Bernstein, Borchardt, & Perwien, 1996). Nevertheless, children with anxiety disorders are less likely to get in contact with mental health services than children with externalizing problems (Ford, Hamilton, Meltzer, & Goodman, 2007). Possibly, this is because the behavior of children with externalizing disorders is more disturbing to parents and teachers. Usually, the anxiety problems go unnoticed for a long period of time: in general, an anxious child is quiet and often non-disturbing. Only when the anxiety problems become so severe that the child has problems at school or does not dare to go anywhere, parents seek help. However, many anxious children do not receive treatment. The age at which anxiety problems have their onset is, as seen in the case of Michael, often already at a fairly young age. Typically, before children with anxiety problems receive an appropriate intervention, many years have passed (Thompson, Hunt, & Issakidis, 2004), and the pathological anxiety already has had a large negative impact on the lives of these children. Untreated childhood anxiety problems may lead to other disorders during

adolescence, among which depression (Stein et al., 2001), and alcohol- and drug abuse (Zimmermann et al., 2003). In addition, children with anxiety disorders are at increased risk for dropping out at school (Van Ameringen, Mancini, & Furvolden, 2003).

Behavioral inhibition

Thus, there are good reasons for trying to detect and treat anxiety problems in children at an early point in their development. Already at a very young age there are clear markers of children's anxiety proneness. A concept which is particularly interesting in this context is behavioral inhibition. Behavioral inhibition can be defined as a pattern of behaviors characterized by symptoms of shyness, withdrawal and distress in response to unfamiliar and challenging situations (Kagan, 1989). Behavioral inhibition appears to be a stable temperamental trait with a genetic basis. Longitudinal studies have indicated that the majority of the children who were defined as inhibited at 2 years, still show this behavior six years later when confronted with a new situation or when they meet new people (Kagan, Reznick, & Snidman, 1988). There is also evidence that behavioral inhibition can be seen as a vulnerability factor for the development of anxiety disorders (Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker et al., 2007). One of the first studies examining the relation between behavioral inhibition and anxiety problems was conducted by Biederman, Rosenbaum, Hirshfeld, Faraone, and Bolduc (1990). In this study, children's level of behavioral inhibition was assessed by means of observations, while structured clinical interviews with parents were conducted to determine presence of psychiatric disorders in the children. Findings indicated that inhibited children displayed a higher frequency of (multiple) anxiety disorders as compared to uninhibited children. In a follow-up study three years later (Biederman et al., 1993), it was found that among the inhibited children, the rates of anxiety disorders had markedly increased from baseline to follow-up, whereas this increase was not found in the uninhibited children. Additional analyses indicated that especially stable inhibited children were more susceptible to develop anxiety disorders over time.

All in all, these results indicate that it is important to assess behavioral inhibition at a young age. In this way, it is possible to detect children at risk for developing anxiety disorders (Van Brakel, Muris, & Bögels, 2001), and to be able to implement preventive and early interventions to help these youngsters.

The role of parents

Even though behavioral inhibition appears to be a fairly stable temperamental trait, the level of behavioral inhibition may change over time. Parents may have significant impact on the continuation or discontinuation of this trait. Some parents give in to the avoidance tendency of their child, whereas other parents deal with these behaviors in an adequate way. Only a few studies have examined the relation between parental behaviors and behavioral inhibition (e.g., Park, Belsky, Putnam, & Crnic, 1997; Wood, McLeod, Sigman, Hwang, & Chu, 2003).

Park and colleagues found that intrusive mothers diminished the inhibited behaviors of their children. More specifically, imperative parental rearing practices could decrease inhibition because the child is forced to do things he/she finds scary. In this way, the child gets practice in fearful situations, and experiences that the fear is more or less ungrounded. On the other hand, overprotective parents might be a little frightened and anxious themselves and tend to support avoiding anxious situations. In this way, the child does not get much practice in challenging situations, causing the fears to persist. In addition, fearful parents also act as a model; the child watches how the parent reacts to the fearful situation and will probably behave in the same anxious way (Askew & Field, 2008).

How is behavioral inhibition measured in young children?

Behavioral inhibition has typically been measured by means of observation procedures. Children were observed while being confronted with new, unfamiliar objects (e.g., a moving robot) or unfamiliar people (e.g., a masked person) in a laboratory or in their natural environment. Is the child eager and willing to explore the situation, or does he/she stay in close proximity to the parent? In older children, reactions to unfamiliar peers have also been measured. For example, children have been asked to rehearse a play with several unfamiliar peers, while observing how talkative the child is with the other children. These observation procedures have both advantages and disadvantages. An advantage is that the inhibited behaviors can be measured objectively. A disadvantage is that these observation procedures are time-consuming and labor-intensive. This method leads to data which have to be coded by experienced and trained researchers. In addition, observation procedures limit the range of inhibited behaviors of the child to the unnatural laboratory situation. Observations of the child in a more naturalistic setting do not limit the behavior of the child, but the observer and/or the camera might influence the behavior of the child. Further, it is difficult to follow the behaviors of a young, playful and quickly moving child and the observer can be influenced by his or her expectations. In addition, these observation procedures have limited utility for screening inhibited children in large epidemiological and longitudinal studies.

Another way of measuring inhibited behaviors is by means of a questionnaire. An important advantage of such a questionnaire is that they are a quick, easy and relatively economical way of collecting data. In the Netherlands, there is a need for such measures of behavioral inhibition, especially for young children. This fits the conclusion of Hale, Raaijmakers, Muris, and Meeus (2005), who state that more research on the early detection of internalizing problems is relevant and necessary in the Dutch population.

The Behavioral Inhibition Questionnaire (BIQ)

A promising scale for this purpose is the Behavioral Inhibition Questionnaire (BIQ; Bishop, Spence, & McDonald, 2003), a 30-item parent-rating measure for assessing behavioral inhibition in six contexts: unfamiliar peers, unfamiliar adults, preschool/separation, physical chal-

lenging situations, performance situations, and unfamiliar situations in general. Interestingly, a shorter 14-item version of the scale, the BIQ-Short Form (BIQ-SF), has been construed, which has considerable potential for clinical, prevention as well as research purposes. Until recently, the BIQ-SF was only available in English. In this dissertation, we examine the psychometric properties of the Dutch version of the BIQ-SF, by means of Classical Test Theory and Item Response Theory.

THE AIMS OF THIS DISSERTATION

Several studies have clearly indicated that children identified as behaviorally inhibited at a given point-in-time run greater risk for fear and anxiety problems during their later development (e.g., Biederman et al., 1993). Early identification of anxiety-prone children makes it possible to implement early prevention and intervention programs (e.g., Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005), in order to alter the trajectory of anxiety development. Therefore, the first goal of the present dissertation was to study the psychometric properties of a short, easy-to-administer measure for behavioral inhibition, the Dutch version of the BIQ-SF. Previous studies examining the reliability and validity of this scale have predominantly focused on children of Caucasian origin (i.e., > 85% in all studies; Bishop et al., 2003; Broeren & Muris, 2010; Edwards, 2007; Kim et al., 2011). However, research has demonstrated that children from various cultures display different levels of behavioral inhibition (Chen et al., 1998; Rubin et al., 2006), and there is also evidence from another Dutch investigation showing that children with an ethnic minority background run greater risk for developing anxiety problems (Hale et al., 2005). Therefore, in this dissertation we especially focus on examining the psychometric properties of this instrument in children with a more diverse ethnical background.

Further, while it is clear that behavioral inhibition is associated with a heightened risk for developing anxiety pathology, it is also true that not all temperamentally vulnerable children develop fear and anxiety problems. Under which circumstances do certain children develop these anxiety problems? Current empirical evidence points in the direction of multifactorial models, in which both indigenous (biological, genetic) and exogenous (environmental) factors contribute to the development and maintenance of anxiety pathology in youths (e.g., Craske, 2003; Muris, 2007a; Rapee, 2001). One of the environmental risk factors thought to be involved in the pathogenesis of childhood anxiety is parental overprotection. Because overprotective parents want to shield their child for possible adverse outcomes, their child does not get exposure to various (new) situations. In this way, an overprotective parenting style may promote the avoidant, inhibited behavior to be preserved, which in turn leads to anxiety problems. Therefore, the second aim of this dissertation was to examine behavioral inhibition

and overprotective parenting as correlates and predictors of anxiety disorder symptoms in young children.

Big Five personality factors have also been associated with anxiety; especially a personality characterized by a combination of high levels of neuroticism and low levels of extraversion could be seen as a vulnerability factor for developing anxiety disorders in adults and youths. A previous study (Muris et al., 2009) found that even after controlling for the influence of neuroticism, extraversion and other Big Five personality factors, behavioral inhibition was still positively associated with anxiety symptoms, which underlines the importance of this temperamental variable in the pathogenesis of childhood anxiety. However, this study solely relied on a sample of non-clinical children. Replication of these findings in a clinical population seems important as this would further underline the unique role of behavioral inhibition beyond basic personality traits in childhood anxiety disorders. Therefore, the third aim of this dissertation was to examine the association between personality factors and behavioral inhibition and anxiety in non-clinical and clinically anxious children.

The current dissertation describes a series of four studies, which are informative about the three above described aims. The first and primary aim of the present dissertation was to study the psychometric properties of the BIQ-SF as a short, easy-to-administer measure of behavioral inhibition in young children; **Chapter 2** reports the psychometric properties of the BIQ-SF scores in a multi-ethnic community population of Dutch boys and girls. **Chapter 3** extends this examination of the psychometric properties of this scale carrying out analysis according to the Item Response Theory. The second aim of this dissertation was to examine behavioral inhibition and overprotective parenting as correlates and predictors of anxiety disorder symptoms. In **Chapter 4** we explored cross-sectional as well as prospective relations among behavioral inhibition, overprotective parenting, and anxiety symptoms in non-clinical children. The third aim of this thesis was to examine the association between personality factors and behavioral inhibition and anxiety. In **Chapter 5** we describe the relations between behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms in non-clinical and clinically anxious children. Finally, **Chapter 6** provides a summary of the main findings. Implications of the findings are discussed and avenues for future research are suggested.

2 The assessment of an inhibited, anxiety-prone temperament in a Dutch multi-ethnic population of preschool children

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ABSTRACT

The Behavioral Inhibition Questionnaire-Short Form (BIQ-SF) is a 14-item parent-rating scale for assessing an inhibited, anxiety-prone temperament in preschool children. This study examined the psychometric properties of the BIQ-SF scores in a multi-ethnic community population of Dutch boys and girls aged 2.5 to 6 years (total $N = 2343$, from which various subsamples were derived). Results revealed that the factor structure of the BIQ-SF was as hypothesized: a model with 6 correlated factors representing children's inhibited behaviors in various social and non-social contexts provided a good fit for the data. The internal consistency of the BIQ-SF was generally satisfactory and scores on the scale were found to be fairly stable over a time period of up to 2 years. Parent-teacher agreement was acceptable, and relations between the BIQ-SF and observations of an inhibited temperament were moderate. Finally, BIQ-SF scores were positively associated with measures of anxiety and internalizing symptoms, whereas no significant links were found with externalizing symptoms. Altogether, these results provide support for the reliability and validity of the BIQ-SF as an economical method for assessing behavioral inhibition and anxiety proneness in young children.

INTRODUCTION

Anxiety disorders are among the most prevalent psychiatric disorders in children and adolescents (e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). However, it usually takes a long time before these children are referred to clinical services. As a result, anxiety problems tend to persist thereby having a fairly large impact on the lives of children before they receive treatment (Thompson, Hunt, & Issakidis, 2004). In order to minimize the adverse effects of anxiety problems on children's lives, it is important to identify anxiety-prone and anxious children at a young age, so that prevention and intervention programs can be implemented as early as possible (e.g., Dadds, Holland, Laurens, Mullins, & Barrett, 1999; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005).

One construct that seems particularly valuable for the early detection of anxiety-prone and anxious children is behavioral inhibition. This temperamental trait refers to the tendency to react with extreme shyness and withdrawal to novel objects, unknown situations, and unfamiliar people (Kagan, Reznick, & Snidman, 1988). There is a growing body of evidence showing that behavioral inhibition indeed may be a prime risk factor for the development of anxiety problems (see for reviews: Fox, Henderson, Marshall, Nicols, & Ghera, 2005; Hirshfeld-Becker et al., 2008). An exemplary study is the longitudinal investigation by Biederman et al. (1993), which demonstrated that inhibited preschool children were more likely to develop serious anxiety problems, including multiple anxiety disorders, separation anxiety disorder, social phobia, and agoraphobia over a three year period than a control group of non-inhibited children. As a result of these and other findings (e.g., Kagan, Snidman, Zenter, & Peterson, 1999; Muris, Van Brakel, Arntz, & Schouten, 2011), current models on the etiology of childhood anxiety disorders consistently include behavioral inhibition as an important vulnerability factor (e.g., Muris, 2007). Studies have indicated that behavioral inhibition is a genetically-based factor (e.g., Robinson, Kagan, Reznick, & Corley, 1992), that is normally distributed in the child population with about 15% of the young people showing this temperament characteristic in the extreme (Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984; Kagan, Reznick, & Gibbons, 1989; Kagan, Reznick, & Snidman, 1988). Most importantly, research has indicated that behavioral inhibition can be detected at a fairly young age, with some studies even documenting markers of this temperament factor in children as young as 4 months (Kagan & Snidman, 1991). This underlines that behavioral inhibition is a highly relevant construct that can be useful for detecting vulnerable, anxiety-prone children at an early point during their development.

The assessment of behavioral inhibition has been typically confined to extensive laboratory procedures, during which features of the inhibited temperament (i.e., latency to approach, reluctance to speech, and proximity to the parents) are observed while children are confronted with various unfamiliar social (e.g., an unknown peer or adult) and non-social (e.g., a black box or a novel computer game) stimuli (e.g., Kagan, 1989). Although these lab observa-

tions certainly provide valuable information on children's level of behavioral inhibition, they represent a rather time-consuming way of measuring this construct, and as such these procedures have limited utility for screening inhibited children in large community samples and longitudinal studies. For this reason, questionnaires such as the Short Temperament Scale for Children (Sanson, Prior, Garino, Oberklaid, & Sewill, 1987) and the Child Temperament Scale (Thomas & Chess, 1977) have been employed to measure temperamental anxiety proneness in children. Although these scales have proven to be useful in this regard, it is also true that they measure a broader concept of temperament than behavioral inhibition. Meanwhile, a number of scales have been construed with a specific focus on behavioral inhibition (e.g., Gest, 1997; Van Brakel & Muris, 2006), but these scales predominantly measure the social aspects of this temperament construct rather than inhibited behavior in response to a broad range of novel stimuli and situations (Kagan et al., 1989).

A promising alternative might be the Behavioral Inhibition Questionnaire (BIQ; Bishop, Spence, & Mc Donalds, 2003), a 30-item parent-rating scale for assessing behavioral inhibition in six contexts: unfamiliar peers, unfamiliar adults, separation/preschool, physical challenging situations, performance situations, and unfamiliar situations in general. Studies examining the psychometric qualities of English and Dutch versions of the BIQ have generally yielded promising results (Bishop et al., 2003; Broeren & Muris, 2010; Edwards, 2007; Kim et al., 2011). That is, support was found for the internal consistency of the scale, with most alphas for the total and subscales scores ranging between .70 and .90. Test-retest correlations indicated moderate stability for a time period of 12 months (r 's between .58 and .79). Further, support was found for the hypothesized 6-correlated factors structure of the scale, reflecting inhibited behavior in various specific contexts. In addition, agreement between mother and father reports of the BIQ was relatively good (r 's between .69 and .84), while agreement between parent and teacher report appeared to be moderate (r 's between .41 and .62). In addition, support was found for the validity of the scale: BIQ scores were positively correlated with related constructs as assessed with various child temperament questionnaires (r 's between .78 and .89). Finally, it was found that the BIQ scores were low to moderately correlated with observational ratings of behavioral inhibition in a laboratory setting (r 's between .25 and .46).

Interestingly, a shorter 14-item version of the scale, the BIQ-Short Form (BIQ-SF), has been construed, which of course has considerable potential for clinical, prevention as well as research purposes. So far, only one study has been conducted in which the reliability and validity of the BIQ-SF were examined (Edwards, 2007). Results indicated that the BIQ-SF has comparable psychometric properties as the full-length version. That is, support was found for the 6-correlated factors structure of the scale, and the total and subscale scores show adequate internal consistency (with alphas ranging between .61 and .94), moderate 12-month test-retest reliability (r 's between .57 and .76), and good validity as indicated by a strong correlation with the inverse score on the approach subscale of a general child temperament questionnaire ($r = .87$).

More research on the reliability and validity of the BIQ and BIQ-SF in multi-ethnic populations is needed, since previous studies have predominantly focused on children of Caucasian origin (i.e., > 85% in all studies; Bishop et al., 2003; Broeren & Muris, 2010; Edwards, 2007; Kim et al., 2011). Yet, research has demonstrated that children from various cultures display different levels of behavioral inhibition (Chen et al., 1998; Rubin et al., 2006), and there is also evidence from another Dutch investigation showing that children with an ethnic minority background run greater risk for developing anxiety disorders (Hale et al., 2005). Thus, it would certainly be valuable to further explore the psychometric properties of this instrument in a more ethnically diverse group. Further, as previous studies have indicated that girls seem to be more anxiety-prone than boys (Craske, 2003), it seems also relevant to examine gender differences on this instrument.

With this in mind, the current study was set up to further examine the psychometric properties of the BIQ-SF in a large community sample of young Dutch children with a multi-ethnic background. The following aspects of the BIQ-SF were subjected to a psychometric evaluation: (a) the hypothesized 6-correlated factors structure of the scale was tested by means of a confirmatory factor analysis, (b) various types of reliability were investigated including the internal consistency, test-retest reliability, and cross-informant agreement, and (c) several aspects of the validity were explored such as the relations with anxiety and internalizing (i.e., convergent validity) and externalizing (i.e., divergent validity) symptoms as well as the relations between BIQ-SF scores of parents and teachers and laboratory observations of an inhibited temperament (i.e., predictive validity). Further, (d) gender and ethnic differences in behavioral inhibition as indexed by the BIQ-SF were explored.

METHOD

Participants and procedure

Parents (in most cases the mother) of 2343 2.5 to 6-year-old non-clinical children ($M = 3.59$, $SD = 0.77$; 1189 boys and 1147 girls)¹ completed the BIQ-SF. More than two-third of the parents ($N = 1636$) were visiting the infant welfare center in Rotterdam, the Netherlands, and participated in a longitudinal study on the relation between behavioral inhibition and anxiety in young children. Other parents were recruited via playgroups and a mailing of the local council in Gouda and Woerden, two smaller cities in the vicinity of Rotterdam. The ethnic background of this sample was mixed: 65% was from original Dutch descent, 6% had a Surinam, 6% a Moroccan, 4% a Turkish, 3% an Antillean, and 16% another ethnic background. No exact information about socioeconomic status was available, but in the Netherlands a

¹ Parents of 7 children did not report the gender of their child.

non-Dutch ethnicity is usually indicative for a lower SES. To assess the temporal stability and validity of the BIQ-SF, 1636 parents were contacted again one year later, and asked to complete the BIQ-SF for a second time, along with a set of other questionnaires. Of the parents in our longitudinal study, 70 were moved or could not be contacted again, 94 responded to our mailing stating explicitly that they were not willing to participate again, while 740 parents did not respond at all to our mailing. Thus, almost half of the parents eventually agreed to participate in this follow-up assessment ($n = 732$; 45%). To examine selection bias, BIQ-SF scores of parents who did and did not participate in this follow-up assessment were compared, but no significant differences were found. Due to missing values, data of 716 children were used to explore the test-retest stability and validity of the BIQ-SF (371 boys and 345 girls). These

Table 1. Schematic overview of the present study.

| | | |
|--|--|--|
| Time 1 October-December 2008 | Sample $N = 2343$ (of which 1636 in longitudinal sample) Mean age = 3.59 years 65% original Dutch, 3% Antillean, 6% Surinam, 6% Moroccan, 4% Turkish, and 16% other ethnic background | Assessment BIQ-SF (parent) |
| | ↓ 55% drop-out | |
| Time 2 October-December 2009 | Sample $n = 732$ Mean age = 4.47 years 70% original Dutch, 3% Antillean, 6% Surinam, 3% Moroccan, 4% Turkish, and 15% other ethnic background | Assessment BIQ-SF PAS-R SDQ (parent) |
| | ↓ 61% drop-out | |
| Time 3 October-December 2010 | Sample $n = 284$ Mean age = 5.47 years 72% original Dutch, 2% Antillean, 6% Surinam, 3% Moroccan, 2% Turkish, and 16% other ethnic background | Assessment BIQ-SF (parent) |
| | ↓ 35% drop-out | |
| Time 4 January-April 2011 | Sample $n = 184$ Mean age = 5.55 years 68% original Dutch, 1% Antillean, 6% Surinam, 2% Moroccan, 2% Turkish, and 20% other ethnic background | Assessment Behavioral observation For $n = 122$: BIQ-SF PAS-R (teacher) |

Note. BIQ-SF = Behavioral Inhibition Questionnaire-Short Form, PAS-R = Preschool Anxiety Scale-Revised, SDQ = Strengths and Difficulties Questionnaire.

children received a small present for their parents' participation (e.g., a sticker book). Another year later, the 732 parents were approached again with the request to fill out the BIQ-SF for a third time to assess the test-retest stability after 2 years. At this time, parents of 284 children (153 boys and 131 girls; 39%) agreed to participate. Again, parents who participated in this two-year follow up did not differ from the non-participating parents on any of the BIQ-SF scores. A randomly selected subsample of these children ($n = 184$; 97 boys and 87 girls; 65%) attended an individual assessment of approximately thirty minutes at the university laboratory to assess their temperament by means of behavioral observations (see below). Finally, teachers of the 184 children participating in the behavioral observations were also contacted and asked to complete the BIQ-SF as well as a standardized rating scale for measuring anxiety symptoms. One-hundred-and-twenty-two teachers (i.e., 67%) responded positively to this request and returned the materials to the researchers. Table 1 provides a schematic overview of the participants and procedures during each assessment occasion of this study.

Questionnaires

The *Behavioral Inhibition Questionnaire-Short Form (BIQ-SF; Edwards, 2007)* is an abbreviated 14-item version of the original BIQ (Bishop et al., 2003), which is a parent-report instrument assessing behavioral inhibition in six contexts: unfamiliar peers (3 items; e.g., 'My child is shy when first meeting new children'), unfamiliar adults (2 items; e.g., 'My child is very quiet with adult strangers'), performing in front of others (2 items; e.g., 'My child dislikes being the centre of attention'), preschool/separation (2 items; e.g., 'My child gets upset at being left in new situations for the first time, e.g., kindergarten'), unfamiliar situations (2 items; e.g., 'My child approaches new situations or activities very hesitantly'), and physical challenges (2 items; e.g., 'My child is hesitant to explore new play equipment'). Parents answer the questions on a 6-point Likert scale, ranging from 1 (*hardly ever*) to 6 (*almost always*). BIQ-SF total scores are calculated by summing the scores on all items (range 14-84), with higher scores being indicative for higher levels of inhibited behavior. In addition, subscale scores can be computed by summing across relevant items. As already noted in the introduction, the psychometric properties of the original BIQ are good (Bishop et al., 2003; Broeren & Muris, 2010; Kim et al., 2011), and there is also tentative support for the reliability and validity of the BIQ-SF (Edwards, 2007).

The *Preschool Anxiety Scale-Revised (PAS-R; Edwards, Rapee, Kennedy, & Spence, 2010)* is an adaptation of the Preschool Anxiety Scale (PAS; Spence, Rapee, McDonald, & Ingram, 2001), a 30-item parent-based questionnaire assessing anxiety disorder symptoms in young children. More specifically, the PAS-R measures symptoms of social anxiety disorder (7 items; e.g., 'My child is afraid to go up to a group of children to join their activities'), separation anxiety disorder (5 items; e.g., 'My child would be upset at sleeping away from home'), generalized anxiety disorder (7 items; e.g., 'My child has difficulty stopping him/herself from worrying'), specific fears (i.e., specific phobia; 9 items; e.g., 'My child is frightened of dogs'),

and obsessive-compulsive disorder (2 items; e.g., 'My child becomes distressed by thoughts or images in his/her head'). Items are rated by parents on a 5-point scale ranging from 0 (*not at all true*) to 4 (*very often true*). PAS-R total scores can be calculated by summing the scores on all items (range 0-120), and subscale scores are computed by summing relevant items. Adequate internal consistency, test-retest reliability, cross-informant reliability, and construct validity for the scale have been demonstrated (Edwards et al., 2010; Spence et al., 2001), with the reliability of the obsessive-compulsive scale being somewhat lower than for the other scales.

The *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997, 2001) is a 25-item parent-rating scale of emotional and behavioral problems as well as abilities and strengths in children aged 3-16 years. The SDQ consists of five scales of five items each, generating scores for conduct problems (e.g., 'Steals from home, school or elsewhere'), hyperactivity-inattention (e.g., 'Restless, overactive, cannot stay still for long'), emotional symptoms (e.g., 'Many worries, often seems worried'), peer problems (e.g., 'Rather solitary, tends to play alone'), and prosocial behavior (e.g., 'Helpful if someone is hurt, upset or feeling ill'). Items are scored on a 3-point scale from 0 (*not true*) to 2 (*certainly true*) indicating how well they correspond to the child's behavior during the past six months. Subscale scores can be computed by summing across items after recoding a number of reversed items. In the present study, the emotional symptoms and peer problems subscales of the SDQ were combined into an 'internalizing' subscale, whereas the conduct and hyperactivity-inattention subscales were joined into an 'externalizing' subscale (range from 0-20; Goodman, Lamping, & Ploubidis, 2010). Satisfactory psychometric properties of the SDQ have been reported in various studies (e.g., Goodman, 1997, 2001; Muris, Meesters, & Van den Berg, 2003b; Van Widenfelt, Goedhart, Treffers, & Goodman, 2003).

The teacher versions of the BIQ-SF and the PAS-R were identical to the scales as completed by the parents, except that instructions and items were rephrased in terms of the teacher's perspective (e.g., 'This child dislikes being the centre of attention'). Good psychometric properties have also been documented for the teacher version of the 30-item BIQ (Bishop et al., 2003; Edwards, 2007; Kim et al., 2011).

It should be mentioned that the PAS-R and the SDQ proved to be reliable in terms of internal consistency. That is, Cronbach's alphas for various (sub)scales were well above the .70, except for the obsessive compulsive subscale of the PAS-R (alphas being .38 and .58 for the parent and teacher version, respectively), a result which is in line with previous studies.

Behavioral observations

A number of behavioral tasks, based on the procedures used by Asendorpf (1990), Kagan et al. (1989), Bishop et al. (2003), Edwards (2007), and Van Brakel, Muris, and Bögels (2004), were used in order to assess observable manifestations of the inhibited temperament. Parents and children were observed during a lab assessment that included both social and non-social

tasks. A standardized protocol (see Table 2) was used that was carried out by four trained master students in psychology (all female). Children were videotaped so that it was possible to score their behavior afterwards, and to be able to compute the interrater reliability for the various behavioral inhibition indexes. For this purpose, two other master psychology students were extensively trained by the principal investigator in coding these behaviors. Training included a review of the coding manual, observation of videotaped examples of the behaviors being coded, and coding practice until consistency was reached. Coders were blind to the BIQ-SF scores of the children. Interrater reliability was calculated with single-measure intraclass correlations (ICCs) coefficients. The following variables were coded across these tasks: number of encouragements (ICC = .85), latency of speech (ICC = .80), and latency to approach (ICC = .93). In addition, the overall level of behavioral inhibition across these tasks was scored on a 10-point scale, ranging from 1 (*extremely uninhibited*) to 10 (*extremely inhibited*) (ICC = .80). For statistical analysis, all the measures were averaged across the different observers for each child. A more detailed description of the lab assessment and the coding procedures are available from the first author.

The ethical committee of psychology of Erasmus University provided official approval for this observation procedure.

Table 2.
Brief description of various episodes during the observation procedure.

| Episode | |
|---------------------|---|
| Opening questions | The child is asked a series of simple, standardized questions (e.g., 'What's the name of your school?'; 'Do you have many friends at school?') by the first experimenter in the presence of the mother. |
| Separation | After these questions, the mother is asked to leave the observation room. |
| Three minutes alone | The first experimenter also leaves the room quickly after mother's departure, and the child is left alone with some toys in the room for three minutes. |
| Stranger | Thereafter, an unfamiliar female student enters the room, and starts to build a tower of wooden blocks without making any contact with the child. If the child does not approach spontaneously, after one minute, the student starts to invite him or her to join in. |
| Singing a song | The unfamiliar student leaves the room, and the first experimenter returns with a big Winnie the Pooh wearing a birthday hat. The experimenter asks the child to sing a birthday song because it is Pooh bear's birthday. |
| Throw a ball | The child is asked to throw a ball in a basket from a distance at his/her preference. |
| Jumping | The child is asked to fall as straight as possible forward and backward on a big mattress. |
| Black boxes | The child is asked to feel in two closed black boxes and has to guess what is inside by feeling with his/her hand. |
| Mystery Guest | An unfamiliar person (i.e., a third female student) wearing a cape, a mask, and a wig enters the room. The child is asked to "unmask" this so-called mystery guest in order to check the identity of this person. |

Data analysis

Confirmatory factor analysis was performed using Analysis of Moment Structures (AMOS; version 17) to estimate how well the proposed model (i.e., a six-correlated factors model)

as found in the previous study by Edwards (2007) fitted the Dutch BIQ-SF. The estimation method employed was maximum likelihood. As the likelihood ratio chi-square (χ^2) is often large and significant in large samples, other indices are generally used to test the goodness-of-fit of a model: the Comparative Fit Index (CFI), the goodness-of-fit index (GFI), Tucker Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA; Byrne, 2001). The possible values of the CFI, GFI, and TLI range between 0 and 1, with values $> .95$ indicating good fit. For the RMSEA, smaller values indicate a better fit, with values $< .08$ being indicative of a satisfactory model fit (Hu & Bentler, 1999).

Further, Cronbach's alphas were computed to determine the internal consistency of the total and subscale scores for both the parent and teacher versions of the BIQ-SF. Gender differences in total and subscale scores of the parent and teacher BIQ-SF were investigated by means of a multivariate analysis of variance (i.e., MANOVA). A MANOVA was also performed to test differences in BIQ-SF scores among Dutch children and children from other ethnic decent. To assess the test-retest reliability of the BIQ-SF, one and two year Pearson correlation coefficients were calculated for the parent BIQ-SF. Further, single-measure intraclass correlations (ICC) coefficients were calculated between parent and teacher reports of the BIQ-SF to examine the cross-informant reliability.

For the parent report, convergent and divergent validity were evaluated by calculating Pearson correlation coefficients between behavioral inhibition on the one hand, and symptoms of anxiety, internalizing and externalizing symptoms on the other hand. For the teacher version of the BIQ-SF, convergent validity was assessed by calculating Pearson correlation coefficients between behavioral inhibition and teacher reported symptoms of anxiety.

Finally, as a test of the predictive validity of the BIQ-SF, parent and teacher reports of behavioral inhibition were related to direct observations of specific behaviors that have been shown to be indicative of an inhibited temperament (e.g., Asendorpf, 1990; Hill, Lowers, Locke, Snidman, & Kagan, 1999; Van Brakel et al., 2004).

RESULTS

Confirmatory factor analysis

A confirmatory factor analysis was performed to test the fit of the hypothesized 6-correlated factors model.² The goodness-of-fit indices for this model were as follows: RMSEA = .05, CFI =

² Following the suggestion of an anonymous reviewer, an exploratory factor analysis (i.e., principal components analysis with oblimin rotation) was also performed on the BIQ-SF data. This analysis yielded three components with an eigenvalue > 1 , which accounted for 63.71% of the total variance. The first component consisted of items belonging to the performance situations, unfamiliar adults, unfamiliar peers, and unfamiliar situations subscales, the second component only contained items of the physical challenges subscale, while the third component was composed of items of the preschool/separation subscale.

.98, GFI = .97, and TLI = .96, which indicates that this model provided a good fit for the data in this Dutch multi-ethnic sample. Highly comparable results were obtained when analyzing the data of native Dutch children (RMSEA = .06, CFI = .98, GFI = .97, and TLI = .96) and children with another ethnic background (RMSEA = .06, CFI = .97, GFI = .97, and TLI = .95) separately. For the teacher version of the BIQ-SF, the 6-correlated factors model also yielded a satisfactory fit, with RMSEA = .01, CFI = .99, GFI = .98, and TLI = .99. Standardized item loadings for this model as obtained for the parent and teacher version of the BIQ-SF are presented in Table 3. Correlations among factors were positive and ranged between .37 and .83 for the parent version and between .59 and .85 for the teacher version. We also explored whether the covariance among the 6 factors can be explained by a single higher-order factor of behavioral inhibition (see Bishop et al., 2003; Kim et al., 2011). This '6-correlated factors loading onto 1 higher-order factor model' also provided a satisfactory fit for the parent (RMSEA = .06, CFI = .97, GFI = .97, TLI = .97) and teacher version (RMSEA = .02, CFI = .92, GFI = .95, TLI = .95) of the BIQ-SF.

Table 3.

Results of the confirmatory factor analysis: Standardized factor loadings as obtained for the 6-correlated factors model for the parent (N = 2343) and teacher version (n = 122) of the BIQ. Data for the teacher version are displayed in parentheses.

| Factor | Items (abbreviated) | I | II | III | IV | V | VI |
|------------------------|--|-----------|----|-----------|-----------|-----------|-----------|
| Peers | Shy when first meeting new children | .81 (.79) | | | | | |
| | Approaching a group of children and join in | .86 (.92) | | | | | |
| | Watching other children rather than join | .81 (.84) | | | | | |
| Physical Challenge | Cautious in activities involving physical challenge | .68 (.78) | | | | | |
| | Hesitant to explore new play equipment | .71 (.81) | | | | | |
| Preschool/ Separation | Upset when left alone in new situation | | | .80 (.74) | | | |
| | Takes many days to adjust to new situations | | | .88 (.94) | | | |
| Performance Situations | Dislikes being centre of attention | | | | .84 (.74) | | |
| | Reluctant to perform in front of others | | | | .75 (.94) | | |
| Unfamiliar Adults | Quiet around new (adult) guests | | | | | .90 (.95) | |
| | Quiet with adult strangers | | | | | .94 (.92) | |
| Unfamiliar Situations | Hesitant in approaching new situations or activities | | | | | | .80 (.90) |
| Situations | Clingy in homes of unknown people | | | | | | .76 (.78) |
| | Nervous or uncomfortable in new situations | | | | | | .79 (.89) |

Note. BIQ-SF = Behavioral Inhibition Questionnaire-Short Form.

Reliability

Mean scores (standard deviations) and reliability indices of the parent and teacher versions of the BIQ-SF are presented in Table 4. As can be seen, the Cronbach's alphas of the parent-version of the BIQ-SF were .92 for total score and between .77 and .91 for various subscales,

Table 4.

Mean scores (standard deviations) and reliability indices for the parent and teacher versions of the BIQ-SF.

| | Parent | | | | Teacher | | |
|------------------------|--|--------------------------------|--|--|---|-------------------------------|---|
| | <i>M</i> (<i>SD</i>) (<i>N</i> = 2343) | <i>α</i> (<i>N</i> = 2343) | <i>r</i> ₁ (<i>n</i> = 716) | <i>r</i> ₂ (<i>n</i> = 284) | <i>M</i> (<i>SD</i>) (<i>n</i> = 122) | <i>α</i> (<i>n</i> = 122) | Parent/teacher ICC (<i>n</i> = 122) |
| BIQ-SF | | | | | | | |
| Total score | 34.42 (11.72) | .92 | .73** | .65** | 31.47 (12.84) | .95 | .40** |
| Peers | 7.98 (3.32) | .86 | .66** | .60** | 6.86 (3.09) | .89 | .34** |
| Physical challenges | 3.82 (1.91) | .61 | .56** | .36** | 3.82 (1.98) | .72 | .25** |
| Preschool/separation | 4.59 (2.22) | .82 | .56** | .54** | 4.06 (1.90) | .80 | .22* |
| Performance situations | 4.94 (2.26) | .77 | .59** | .52** | 5.13 (2.46) | .88 | .35** |
| Unfamiliar adults | 5.05 (2.38) | .91 | .60** | .58** | 4.90 (2.49) | .94 | .41** |
| Unfamiliar situations | 8.01 (2.98) | .81 | .65** | .54** | 6.72 (3.27) | .89 | .23* |

Note. BIQ-SF = Behavioral Inhibition Questionnaire-Short Form. *r*₁ = 1-year test-retest correlation, *r*₂ = 2-years test-retest correlation, ICC = Intraclass correlations **p* < .05, ***p* < .01.

with only the physical challenges subscale BIQ-SF being somewhat lower ($\alpha = .61$). These results indicate good internal consistency for the total score and various subscales, with the exception of the physical subscale. For the teacher report, Cronbach's alphas of the BIQ-SF total score ($\alpha = .95$) and various subscales (α 's between .72 and .94) were highly comparable.

Further, the 12-month correlations of the BIQ-SF scales (parent report) indicated moderate stability (r 's between .56 and .73, p 's < .001). Correlations were somewhat lower over the 24-month period (r 's between .36 and .65, p 's < .001).

The correspondence between parent and teacher BIQ-SF total scores was moderate (ICC = .40, p < .01). The cross-informant agreement for various subscales was in a similar range (ICC's between .22 and .41, p 's < .01).

Convergent and divergent validity

Table 5 shows the correlations between parent- and teacher-reported BIQ-SF scales on the one hand, and the PAS-R and SDQ scores on the other hand. As can be seen, significant and positive correlations were found between the BIQ-SF total and subscale scores and anxiety scores as obtained with the PAS-R. Note also that this was true for the parent as well as the teacher version of the BIQ-SF. Tests for comparing correlated correlation coefficients (Meng, Rosenthal, & Rubin, 1992) showed that the links with anxiety symptoms were stronger for the teacher report than for the parent version of the BIQ-SF (with exception of the peers subscale all $t_s(838) \geq 2.91$, p 's < .01). Further, for the parent version, BIQ-SF total and subscale scores were found to be significantly and positively associated with the internalizing subscale of the SDQ (r 's between .38 and .63, p 's < .001), whereas non-significant relations were observed with the externalizing subscale of the SDQ. The only exceptions were the BIQ-SF preschool/

Table 5.

Correlations between the various BIQ-SF scales on the one hand, and PAS-R and SDQ scales on the other hand.

| | Parent (<i>n</i> = 716) | | Teacher (<i>n</i> = 122) | |
|------------------------|--------------------------|----------------------|---------------------------|-------|
| | PAS-R | SDQ Internalizing | SDQ Externalizing | PAS-R |
| BIQ-SF | | | | |
| Total score | .67** | .42** | .05 | .80** |
| Peers | .53** | .37** | -.01 | .61** |
| Physical challenges | .38** | .26** | -.03 | .61** |
| Preschool/separation | .57** | .36** | .13** | .69** |
| Performance situations | .46** | .29** | -.01 | .63** |
| Unfamiliar adults | .49** | .27** | .06 | .72** |
| Unfamiliar situations | .63** | .38** | .09* | .81** |

Note: BIQ-SF = Behavioral Inhibition Questionnaire-Short Form; PAS-R = Preschool Anxiety Scale-Revised; SDQ = Strengths and Difficulties Questionnaire. * $p < .05$, ** $p < .01$.

separation and the unfamiliar situations subscales, which displayed small, but significant positive associations with the SDQ externalizing subscale.

Predictive validity: Relations with observation measures of behavioral inhibition

Correlations between the BIQ-SF total score and behavioral observations of the children's inhibited temperament are shown in Table 6. All correlations between the behavioral observations and questionnaire scores were in the low to moderate range, but nonetheless in the expected direction. That is, parent report of behavioral inhibition was positively and significantly related to latency of speech, number of encouragements, and latency to approach, as well as to the overall observational measure of behavioral inhibition (r 's between .18 and .24). The teacher version of the BIQ-SF was only significantly related to the overall observational measure of behavioral inhibition and latency to approach (r 's being .25 and

Table 6.

Correlations between the BIQ-SF of parents and teachers and indices of an inhibited temperament.

| | Parent BIQ-SF (<i>n</i> = 184) | Teacher BIQ-SF (<i>n</i> = 122) |
|--------------------------|------------------------------------|-------------------------------------|
| Observer ratings of BI | .24** | .25** |
| Latency of speech | .19** | .06 |
| Number of encouragements | .18* | .15 |
| Latency to approach | .20** | .27** |

Note: BI = behavioral inhibition, BIQ-SF = Behavioral Inhibition Questionnaire-Short Form. * $p < .05$, ** $p < .01$.

.27, respectively), while no significant correlations were observed with latency of speech and number of encouragements (r 's being .06 and .15, respectively).

Gender and ethnic differences

Gender differences were examined for the parent and teacher versions of the BIQ-SF by means of a MANOVA. For the parent report, boys and girls displayed comparable BIQ-SF total scores, but on the subscales some gender differences were observed. That is, parents rated boys as significantly more inhibited on the performance subscale [means being 5.14 ($SD = 2.29$) versus 4.72 ($SD = 2.18$); $F(2,2336) = 19.77, p < .001, \eta^2 = .008$], whereas girls were scored as significantly more inhibited when meeting unfamiliar adults [means being 4.91 ($SD = 2.37$) versus 5.20 ($SD = 2.38$); $F(2,2336) = 8.34, p < .01, \eta^2 = .004$]. For teacher report, no significant gender differences were observed.

A MANOVA was also carried out to evaluate differences on BIQ-SF scales among the most sizable ethnic groups in this study (i.e., original Dutch, Surinam, Moroccan, Turkish, and Antillean). No significant differences between these groups were observed for the BIQ-SF total score and most of the subscales. However, on the unfamiliar situations subscale, a significant difference was found [$F(4,2132) = 3.24, p < .05, \eta^2 = .007$]. Post-hoc tests (which controlled for unequal sample sizes) indicated that Turkish children scored significantly lower on this subscale as compared to the other groups [means being 6.91 ($SD = 2.67$) for Turkish versus 8.05 ($SD = 2.94$) for Dutch, 8.23 ($SD = 2.97$) for Surinam, 8.03 ($SD = 3.40$) for Moroccan, and 8.11 ($SD = 3.03$) for Antillean children (all p 's $< .05$)].

DISCUSSION

The aim of this study was to examine the reliability and validity of a parent and teacher rating questionnaire for measuring an inhibited, anxiety-prone temperament in young children. Results were largely in line with the findings of previous research (Bishop et al., 2003; Broeren & Muris, 2010; Edwards, 2007; Kim et al., 2011), and indicate that the BIQ-SF has good psychometric qualities. Confirmatory factor analysis provided support for a model of 6-correlated factors, which reflects the intended subscales of peers, physical challenging situations, preschool/separation, performance situations, unfamiliar adults, and unfamiliar situations (Edwards, 2007). Moreover, a higher-order model also provided a satisfactory explanation for the covariance among the 6 first-order factors, which justifies the employment of the BIQ-SF total scale.

The internal consistency of the total BIQ-SF and subscale scores was found to be moderate to good, and this was true for both the teacher and the parent version. Further, test-retest correlations of the BIQ-SF over 12 and 24 months indicated that behavioral inhibition scores were fairly stable across time. The magnitude of the correlations was comparable with those

reported in previous studies on the test-retest stability of the BIQ and the BIQ-SF, with longitudinal data on behavioral inhibition showing that this temperamental trait may change during early childhood, but still is an enduring characteristic in most of the children (Reznick et al., 1986; Fox et al., 2001).

This study also provides support for the convergent and divergent validity of the BIQ-SF. That is, substantial and positive correlations were found between BIQ total and subscale scores and scores on the PAS-R (parent and teacher report), a questionnaire assessing anxiety disorder symptoms in young children, and the SDQ internalizing subscale (parent report), whereas small and mostly non-significant correlations were found between the BIQ-SF and the SDQ externalizing subscale (see for a similar result: Broeren & Muris, 2010). Further, significant correlations were found between the BIQ-SF (parents and teachers report), and observable indicators of this temperamental trait such as latency of speech, number of encouragements needed, and latency to approach during various behavioral tasks. It was found that the parent version of the BIQ-SF was more strongly correlated with observational indices of behavioral inhibition than the teacher version, probably because parents are able to observe their child responding to a broader range of stimuli and situations in daily life, and therefore may have a slightly better impression of their child's inhibited behavior. Admittedly, correlations between BIQ-SF scores and observational measures were rather modest, which is in line with previous research investigating the link between questionnaire and observational data of behavioral inhibition in children (e.g., Bishop et al., 2003; Garcia Coll et al., 1984; Kim et al., 2011; Van Brakel et al., 2004). This is most likely due to the fact that questionnaire items are formulated in a more general way thereby covering a wide range of inhibited behaviors, whereas the behavioral observations are carried out in a number of specific, non-naturalistic situations. Further, as noted by Epstein (1979, 1980), the sampling error is large when observing temperamental traits on only one occasion. Such traits can be more reliably assessed when the pertinent behavior is observed and averaged across a wide range of events. Behavior observed on a single occasion provides a rather limited sample of the child's behavior, which is strongly linked to that particular situation and difficult to generalize to other contexts. Finally, previous studies examining the relations between behavioral inhibition and observational measures also demonstrated that there are marked individual differences in maternal accuracy when predicting child behavior (Kiel & Buss, 2006, 2011).

In the present study, few gender differences in behavioral inhibition were documented, which is in keeping with previous studies (e.g., Garcia-Coll et al., 1984) and indicates that this temperamental trait is equally relevant for boys and girls. Nevertheless, on two BIQ-SF subscales a significant gender difference did emerge. First, consistent with findings by Edwards (2007), Broeren and Muris (2010), and Kim et al. (2011), parents rated boys as significantly more inhibited in performance situations than girls. In contrast, girls were rated as significantly more inhibited when meeting unfamiliar adults, a result which is in line with a study by Kochanska (1991). Although the findings suggest that there are gender differences in behav-

ioral inhibition between boys and girls depending on the situational context, it should also be noted that these gender differences were small in absolute terms and mainly emerged as a result of the large sample size, and thus may have relatively little practical value.

This study made use of a large multi-ethnic population and so we were able to explore differences in behavioral inhibition across original (Caucasian) Dutch children and children with a Surinam, a Moroccan, a Turkish, and an Antillean background. In general, results indicated that all ethnic subgroups displayed comparable levels of behavioral inhibition. The only difference was that Turkish children scored significantly lower on the unfamiliar situations subscale of the BIQ-SF as compared to the other ethnic groups. Interestingly, this finding is in contrast with a finding by Bengi-Arslan, Verhulst, Van der Ende, and Erol (1997), who observed that parents of Turkish children scored their offspring as higher on anxiety as compared to other Dutch peers. Thus, while Turkish children are scored lower on an inhibited, anxiety-prone temperament, they appear to display higher levels of anxiety problems. This apparently contradictory result can be explained in various ways. On the one hand, it could be speculated that parents of Turkish children provide lower scores on the unfamiliar situations subscales because of cultural differences in the perception and expectations of children's behaviors when confronting such events. Otherwise, it should also be kept in mind that anxiety pathology is determined by multiple factors (Muris, 2007; Vasey & Dadds, 2001), which means that behavioral inhibition is only one of the multiple vulnerability and risk factors. Thus, an anxiety problem may even arise without the presence of an inhibited temperament.

Several limitations of this study should be mentioned. First, the convergent validity of the BIQ-SF was examined through its relations with questionnaires for measuring anxiety and internalizing symptoms. However, it would be useful to validate the scale against an alternative instrument for measuring children's inhibited temperament. Second, the attrition rates in this study were substantial, which of course introduces the possibility of a selection bias. However, statistical analyses could not detect differences in levels of behavioral inhibition scores between children of whom parents continued to participate in the study versus children of parents who dropped out. Third and finally, the teacher sample was rather small, although the psychometric properties of the teacher version of the BIQ-SF were highly comparable to those obtained for the parent version. Besides these limitations, several strengths of this study should also be mentioned. First, part of this study relied on a longitudinal design with a large, multi-ethnic sample. In addition, this study relied on both multi-informant questionnaire data as well as a behavioral observation.

To conclude, the results of this study indicate that the BIQ-SF has good psychometric properties. With only 14 items, this instrument provides a reliable, valid and economical method for assessing inhibition and anxiety proneness in children at a fairly young age. Early detection of vulnerable youth makes it possible to implement prevention programs, which focus on the elimination of avoidance behavior in children and anxious and overprotective rearing styles of parents.

3

Non-parametric IRT analysis of the Behavioral Inhibition Questionnaire-Short Form in Dutch children with a multi-ethnic background

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Non-parametric IRT analysis of the Behavioral Inhibition

Questionnaire-Short Form in Dutch children with a multi-ethnic background.

ABSTRACT

The Behavioral Inhibition Questionnaire-Short Form (BIQ-SF) is a 14-item parent-rating scale for assessing an inhibited, anxiety-prone temperament in young (preschool) children. In this study, parents of a large multi-ethnic community sample of Dutch children aged 1 to 13 years (total N = 2610) completed the BIQ-SF. Mokken Scale Analysis (MSA) was conducted to examine the scalability of the BIQ-SF across various age groups and ethnic subpopulations. Results of the analyses of data obtained from parents with a native Dutch background indicated that 11 of the 14 BIQ-SF items form a unidimensional scale and have a positive relationship with behavioral inhibition. This appeared not only true for the target population of preschoolers but also for older kindergarten and primary school children. When analyzing the data of parents from the two largest ethnic minority groups of preschoolers in The Netherlands (i.e., Turkish/Moroccan and Surinam/Antillean), it was found that only a limited set of BIQ-SF items (respectively 7 and 6) provided a good fit. These results indicate that the BIQ-SF is adequate for assessing behavioral inhibition in native Dutch children of various ages, but that scores on the scale should be interpreted with caution in ethnic minority groups, as quite a number of items of the BIQ-SF are poor indicators of this construct in these children.

INTRODUCTION

Behavioral inhibition is one of the most stable temperamental traits of children, referring to shy and reticent behavior in response to unknown situations and unfamiliar others (Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, & Snidman, 1988). Research has consistently indicated that behavioral inhibition is associated with the development of childhood (social) anxiety (Biederman et al., 1993; Hirshfeld et al., 1992; Hudson, Dodd, Lyneham, & Bovopoulos, 2011b; Muris, Van Brakel, Arntz, & Schouten, 2011; Schwartz, Snidman, & Kagan, 1999) and depression (Caspi, Moffitt, Newman, & Silva, 1996; Muris, Merckelbach, Wessel, & Van de Ven, 1999b). Interestingly, behavioral inhibition can already be assessed at a very early point in children's development, even before the age that these internalizing problems have their onset (Kagan & Snidman, 1991). As such, this temperament construct has important implications for prevention, as it provides an opportunity for the implementation of brief, relatively inexpensive early intervention programs targeting anxiety and depression in children (e.g., Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2010).

Various methods have been employed to measure behavioral inhibition in children. Several studies have relied on observation paradigms during which children are exposed to unfamiliar social and non-social stimuli (e.g., Biederman et al., 2001; Hirshfeld et al., 1992; Hirshfeld-Becker et al., 2003; Kagan et al., 1988; Schwartz et al., 1999). During such encounters, reactions of caution, shyness, silence, and latency to approach are recorded as they are considered as valid indicators of the inhibited temperament. Although observation certainly provides valuable information about children's level of behavioral inhibition, it also reflects a quite time-consuming method, which has limited utility when screening large community samples to identify children at risk. For this purpose, questionnaires are a good alternative as they are easy and quick to administer. The Behavioral Inhibition Questionnaire (BIQ; Bishop, Spence, & McDonald, 2003) is a good example of such a measure. This parent-rating scale provides an index of children's inhibited behaviors in 6 different contexts, i.e., unfamiliar peers, physical challenging situations, preschool/separation situations, performance situations, unfamiliar adults, and unfamiliar situations in general. The BIQ has been especially developed as an index of behavioral inhibition for children in the preschool age, which of course makes this instrument pre-eminently appropriate for prevention and early intervention purposes. The latter is particularly true for the shortened version, the Behavioral Inhibition Questionnaire-Short Form (BIQ-SF; Edwards, 2007) that only contains 14 items covering the core features of the behavioral inhibition construct.

So far, research has indicated that the BIQ-SF generally possesses good psychometric properties (Edwards, 2007; Vreeke et al., 2012). An exception concerns the construct validity of the scale which has been tested by means of confirmatory factor analysis (CFA). In theory, one would expect an optimal fit for a model in which the six domains of inhibited behaviors

load onto one higher-order factor of general behavioral inhibition. However, research has not always found evidence for such a model, with most studies demonstrating that a 6-correlated factors model provides the best fit for BIQ-SF data (Edwards, 2007; Vreeke et al., 2012). Obviously, this suggests that although inhibited behaviors in various contexts are to some extent related, they cannot be covered by one overall temperament trait. From a practical point-of-view, this would imply that the use of the total BIQ-SF score is not appropriate for screening purposes because it does not reflect a single construct.

Before accepting the conclusion that the BIQ-SF does not provide a good index of children's general level of behavioral inhibition, an alternative explanation for the negative findings as obtained with CFA needs to be considered. Although widely used for testing the factor structure of questionnaires, there are serious doubts whether CFA is the appropriate technique in the case of polychotomously scored scales of 'abnormal' behavior (Sijtsma, Debets, & Molenaar, 1990). That is, the items of questionnaires such as the BIQ-SF typically describe manifestations of aberrant behavior and then make use of an ordinal Likert scale to measure their frequency or intensity. In non-clinical populations, however, responses on the most extreme scoring categories ("often" and "almost always") are rather sparse and as a consequence, the data distribution of most items is positively skewed. This distributional property of the items leads to a violation of the assumption of multivariate normality, which makes the use of statistical methods such as CFA problematic.

An alternative statistical tool which does not suffer from the distributional problems of the CFA and which can be used to investigate the dimensionality of an itemset and assess the fit and properties of an ordinal scale comes from Mokken Scale Analysis (hereafter: MSA; Sijtsma & Molenaar, 2002). In this paper we will use MSA to investigate the dimensionality and the scalability of the BIQ-SF in a population of Dutch preschool children. An additional aim was to compare the scaling properties of the BIQ-SF in preschool children, which is the target population for which this scale has been especially developed, to other age groups (i.e., kindergarten and primary school children).

Mokken Scale Analysis (MSA) is an alternative statistical technique that belongs to the class of statistical models called non-parametric item response theory (IRT), which are capable of dealing with this problem of non-normally distributed items (Junker & Sijtsma, 2001; Sijtsma & Meijer, 2007; Sijtsma & Molenaar, 2002). Monotone Homogeneity Model (MHM) is a variant of MSA that is particularly relevant within the context of the present paper, as this method can be used to test the scalability of a questionnaire, which can be defined as the extent to which respondents can be accurately ordered by the sum of item scores on a scale (Sijtsma & Molenaar, 2002). In the present study, the MHM was employed to examine the scalability of the BIQ-SF in a population of Dutch children. Our main goal was to demonstrate that items of this scale constitute a score that can be used to reliably order children on the latent trait of behavioral inhibition. Such a result would provide evidence for the unidimensionality of the BIQ-SF, and thus support the use of the total score of the scale. An additional aim was to com-

pare the scaling properties of the BIQ-SF in preschool children, which is the target population for which this scale has been especially developed, to other age groups (i.e., kindergarten and primary school children). Finally, although there is evidence that behavioral inhibition is a universal trait that can be observed in children from countries in every part of the world (Chen et al., 1998; Rubin et al., 2006), few studies have investigated to what extent parents with different cultural backgrounds respond in a comparable way to questionnaires such as the BIQ-SF. The Netherlands, where the current study was conducted, is a multicultural country. Apart from native Dutch inhabitants, two broad categories of non-Western ethnic minorities can be distinguished, which each are characterized by a similar migration history and religion: Turkish/Moroccan and Surinam/Antillean (National Institute for Public Health and Environment, 2011). As a substantial amount of BIQ-SF data were collected for these two Dutch minorities, we also used the MHM to examine whether the scale properties generalize to these cultural groups.

METHOD

Participants and procedure

Parents (in most cases the mother) of more than 2500 1 to 13-year-old non-clinical children ($M = 3.96$, $SD = 1.90$; 1326 boys and 1283 girls) completed the BIQ-SF (see below) after being recruited via the infant welfare center, playground, or school of the children, or by a postal mailing. For the present study, we restricted our analysis to subsets of this population (see Table 1). First, we employed the data of native Dutch preschool children (aged < 4 years), which can be considered as the target population for the BIQ-SF. Second, the data of 511 kindergarten (aged 4 to 6 years) and 348 primary school children (aged > 6 years) were used to examine the scalability of the questionnaire in older native Dutch children. Third, BIQ-SF data completed by the parents of 188 Turkish/Moroccan and 214 Surinam/Antillean preschool children were used to investigate the properties of the scale in Dutch preschoolers with an ethnic minority background. The numbers of children with missing values were fairly

Table 1.
Numbers of children in various age and ethnic groups for which parents completed the BIQ-SF.

| Age groups | Ethnic groups | | | |
|-----------------------------|---------------|------------------|-------------------|--------------------|
| | Native Dutch | Turkish/Moroccan | Surinam/Antillean | Other [†] |
| Preschool (< 4 years) | 1256 (41)* | 188 (22)* | 214 (11)* | 329 |
| Kindergarten (4 to 6 years) | 511 (8)* | 48 | 11 | 68 |
| Primary school (> 6 years) | 348 (6)* | 31 | 3 | 31 |

Note. Between parentheses, numbers of children for which missing values were observed are given. * Data employed for the Mokken Scale Analysis. † Children with a different background. In total, 103 nationalities were represented in this group.

low (e.g., 3.26% in the target population of native Dutch preschool children), which suggests that parents understood the items of the BIQ-SF rather well. Note that the Turkish/Moroccan group was a negative exception in this regard: 11.70% of the questionnaires completed by these parents contained missing values. Missing data were imputed following the method as described by Van Ginkel, Van der Ark, and Sijtsma (2007).

Questionnaire

As noted in the introduction, the BIQ-SF (Edwards, 2007) is a short 14-item scale for measuring inhibited behaviors of children in various contexts. Items (see Appendix) have to be rated by parents using 6-point Likert scales, ranging from 1 (*hardly ever*) to 6 (*almost always*). It is the intention of the BIQ-SF to produce a total score (by summing the rating across all items), which is indicative for children's general level of behavioral inhibition. Traditional psychometric analysis has indicated that the BIQ-SF total score possesses satisfactory reliability and validity (Edwards, 2007; Vreeke et al., 2012).

Mokken Scale Analysis Assumptions

Mokken scale analysis can be used to assess the fit of non-parametric IRT models, one of which is the Monotone Homogeneity Model (hereafter: MHM; Junker & Sijtsma, 2001; Sijtsma & Meijer, 2007; Sijtsma & Molenaar, 2002; Stout, 2002). The MHM is based on three assumptions: (1) *Unidimensionality*, which means that all items of a scale measure a single latent construct (θ). In case of the BIQ-SF, all items should assess behavioral inhibition, which is considered as a unitary temperament trait, (2) *Monotonicity*; which means that the higher a respondent's location on the latent trait the more likely it is that (s)he gives higher scores on the items measuring that latent trait. For example, children who are more inhibited (θ) are more likely to obtain a higher score on item 1: "My child is shy when (s)he first meets unknown children". This can be examined by inspecting the Item Step Response Functions (ISFRs) for each item. Basically, the ISFRs show the proportions of positive responses on each response category of an item within each separate total test score group, and these functions are required to be "monotonely nondecreasing" (Mokken, 1971). (3) The last assumption for the MHM is *local independence*; this means that a parent's response to an item is not influenced by his or her responses to the other items in the same questionnaire. For the BIQ-SF items this indicates that respondents should preferably approach each new item independent of the previous items so as not to deliberately construct a particular, possibly invalid image of their child.

Mokken scale analysis (MSA) Scalability coefficients

MSA use three kinds of scalability coefficients: H_{jk} for pairs of items; H_j for items; and H for the scale. The H_{jk} , H_j ; and H coefficients form the basis of the definition of a scale (see Sijtsma & Molenaar, 2002, pp. 67–68). The MHM implies that each coefficient, H_{jk} , H_j ; and H has a value between 0 and 1. In order to accept a set of items as a Mokken scale, Mokken (1971)

determined as a rule of thumb that each $H_{jk} > 0$, each $H_j > .30$. This also implies that $H > 0.30$. A set of items is considered as unscalable for practical aims if $H < .3$. H values between .3 and .4 indicate a weak scale, H values between .4 and .5 indicate a medium scale, whereas H values from .5 indicate a strong scale (Mokken, 1971; Sijtsma & Molenaar, 2002).

The dimensionality of an item set and the scalability (expressed by H) for each item subset that represents a dimension can be investigated by means of the statistical package MSA for Polytomous items (MSP; Molenaar & Sijtsma, 2000, MSP in R; Van der Ark, 2007). The constant c can be employed to determine the strength of a scale. An automated procedure can be carried out to compute this statistic for the BIQ-SF under the condition that c will be at least .3, which is generally regarded as the lower bound for a scale (Sijtsma & Molenaar, 2002). Initially, the procedure takes the H -values of all items into account, and then deletes items from the test one at a time until an acceptable c is found. One can also perform this procedure by adopting the more stringent criterion of $c = .5$ in order to explore which items of a questionnaire constitute a strong scale (Sijtsma & Molenaar, 2002).

Fit of the MHM to the Data

The cognitive processes that drove the responses of parents on the BIQ-SF items might not necessarily be congruent with the MHM and the three assumptions. That is, the data collected by means of the questionnaire may be multidimensional; the relationship between item score and latent trait may not always be monotone; and while filling out the BIQ-SF, some parents may tend to construct a particular coherent, perhaps also socially desirable image of their children that only partly reflects the true level of behavioral inhibition. This violation of local independence may result in a multidimensional data structure (e.g., Stout, 2002). Because one or more of these assumptions can be violated it must be checked whether the assumptions were not violated and whether the MHM indeed fits the data. If it fits, by implication, the properties of the model, such as an ordinal scale, hold for the data. If it does not fit, a possible cause may be multidimensionality; that is, several latent traits drive the item responses and different sets of items can be identified, each of which measures a different latent trait.

When these three assumptions of the MHM are not violated and the MHM fit the data well, then the total score X_+ can be used to order people on the latent trait θ . For the BIQ-SF this would result in an ordering of the children on behavioral inhibition.

RESULTS

Native Dutch preschool children

The coefficient H of a scale containing all 14 items is .51 ($se = .01$), indicating a strong scale (Sijtsma & Molenaar, 2002). Figure 1 shows the H coefficients of the individual items and their 95% confidence interval. In general H_{jk} 's below lowerbound value .3 are considered to

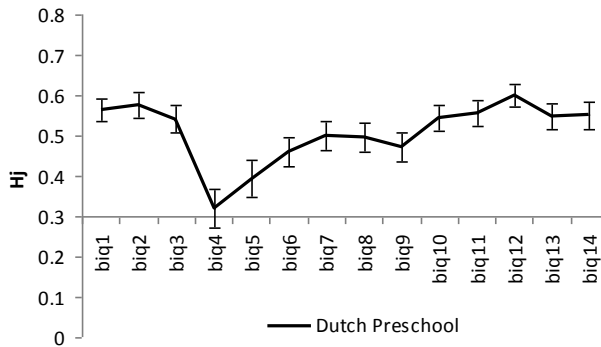


Figure 1. H_j coefficients of the individual items and the 95% confidence interval in Dutch preschool aged children.

be small indicating that based on such items children cannot be accurately ordered along the underlying scale. Only the confidence interval of the H_j of item 4 ('My child is cautious in activities that involve physical challenge (for example: climbing, jumping from heights)') contains the value .3. Figure 2 shows the item-step response function of item 4. The item-step response functions of all item steps are flat along the scale. This indicates that a child's score on item 4 does hardly tell anything about the scores of this child on the remaining items. In other words, item 4 does not fit well in the scale. The monotonicity check showed that none of the items had severe nonmonotonicity violations.

An automated item selection procedure was performed with lowerbound values ($c = .3$, $c = .4$, and $c = .5$) to investigate whether the items formed a weak, medium or strong scale. Table 2 shows that with lowerbound value $c = .3$ all items were included in the scale. For a medium scale ($c = .4$)

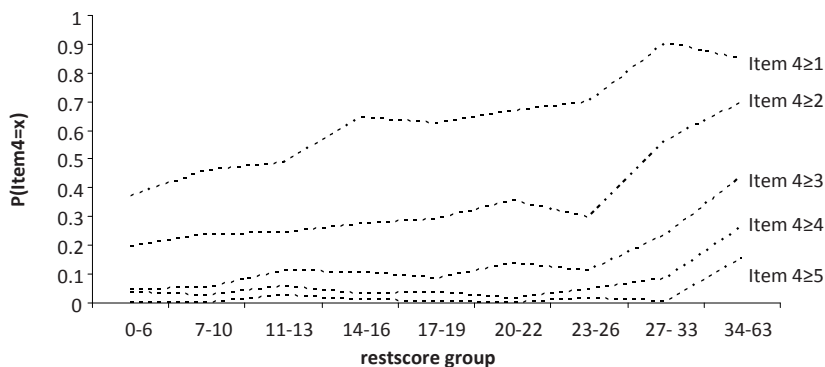


Figure 2. The item step response function of item 4 of the Behavioral Inhibition Questionnaire-Short Form in Dutch preschool aged children, parent report.

items 4 and 5 do not fit anymore. From $c = .5$ (strong scale) not only items 4 and 5 but also item 9 is removed from the scale. The remaining 11 items form a strong scale ($H = .59$, $se = .02$), on which children can accurately be ordered and which is reliable (Guttman Lambda.2 = .93).

Older native Dutch children

The coefficient H of a scale containing all 14 items is .51 ($se = .01$). The H_j 's of children aged 4 to 6 are quite similar to the H_j 's of the preschool children. Figure 3 shows that the 95% CI of the H_j highly overlap between the two subpopulations. The monotonicity check showed that none of the items had severe nonmonotonicity violations. Table 2 shows the scales that were formed with the lowerbound values .3, .4, and .5. The results were the same as for the Dutch preschoolers. The strong scale ($c = .5$) contained the same 11 items and can accurately order the children on behavioral inhibition ($H = .59$, $se = .02$). The reliability of this scale is high again (Guttman Lambda_2 = .93).

The results of the children from the primary school population were completely in line with the preschool and kindergarten populations. That is, the coefficient H of a scale containing all 14 items is .52 ($se = .03$). Figure 4 shows that the 95% CI of the H_j highly overlap between the preschool and primary school population. The monotonicity check showed that none of the items had severe nonmonotonicity violations.

Table 2 shows the scales that were formed with the lowerbound values .3, .4, and .5. Again, the results were the same as for the Dutch preschoolers. The strong scale ($c = .5$) contained 11 items and can accurately order the children on behavioral inhibition ($H = .61$, $se = .03$). The reliability of this scale is high (Guttman Lambda_2 = .94).

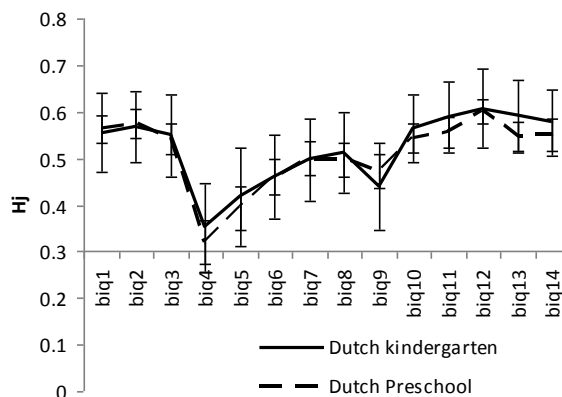


Figure 3. H coefficients of the individual items and the 95% confidence interval in Dutch preschool and kindergarten aged children on the Behavioral Inhibition Questionnaire-Short Form, parent report.

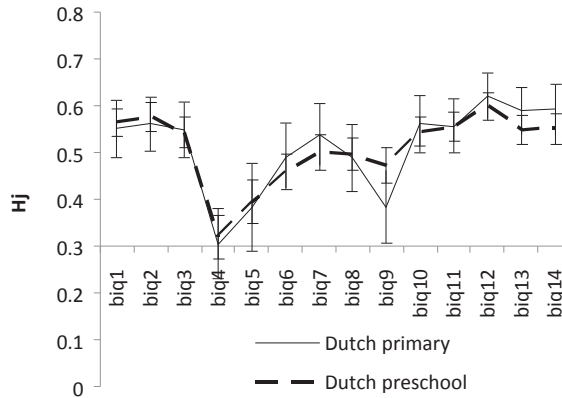


Figure 4. H coefficients of the individual items and the 95% confidence interval in Dutch preschool and primary school aged children on the Behavioral Inhibition Questionnaire-Short Form, parent report.

Table 2. Items included in the scale when lowerbound values were $c = .3$, $c = .4$, and $c = .5$ for the five populations.

| | Dutch <4 | | | Dutch 4-6 | | | Dutch >6 | | | Turkish/Moroccan | | | Surinam/Antillean | | |
|-------|----------|--------|--------|-----------|--------|--------|----------|--------|--------|------------------|--------|--------|-------------------|--------|--------|
| | $c=.3$ | $c=.4$ | $c=.5$ | $c=.3$ | $c=.4$ | $c=.5$ | $c=.3$ | $c=.4$ | $c=.5$ | $c=.3$ | $c=.4$ | $c=.5$ | $c=.3$ | $c=.4$ | $c=.5$ |
| biq1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| biq2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| biq3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| biq4 | ✓ | ✗ | ✗ | ✓ | ✗ | ✗ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
| biq5 | ✓ | ✗ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
| biq6 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ |
| biq7 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ |
| biq8 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ | ✗ | ✗ |
| biq9 | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✓ | ✗ | ✓ | ✗ | ✗ | ✓ | ✗ | ✗ |
| biq10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| biq11 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| biq12 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ |
| biq13 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| biq14 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Note. ✓ = item is included in the scale; ✗ = item is not included in the scale.

Turkish/Moroccan background, preschool children

The coefficient H of a scale containing all 14 items is .42 ($se = .03$). Figure 5 shows that the H_j 's of the Turkish and Moroccan children is again significantly lower than the H_j 's of the group of children who has a Dutch origin for all items. The confidence intervals of items 4, 5, 6, 8 and 9 contain the H_j value .3. The monotonicity check showed that the monotonicity assumption

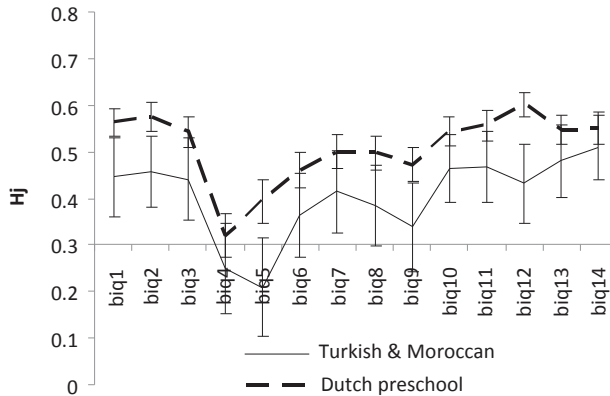


Figure 5. H coefficients of the individual items and the 95% confidence interval in Dutch preschool aged and Turkish and Moroccan preschool aged children on the Behavioral Inhibition Questionnaire-Short Form, parent report.

was not violated. Table 2 shows that when a lowerbound H_j value of .3 is set, items 4 and 5 are removed from the scale. When the lowerbound is set to .4, than the items 4 and 5, and 9 are removed. When the lowerbound value is set to .5, the items 1, 2, 3, 10, 11, 13 and 14 remained in the scale. This strong 7-item scale can accurately order the children ($H = .60$, $se = .04$) and the reliability is good (Guttman $\lambda_2 = .89$).

Surinam/Antillean background, preschool children

The coefficient H of a scale containing all 14 items is .41 ($se = .03$). This indicates that scale quality of the complete set of 14 items is lower than the quality of the scale of the Dutch background preschoolers. Figure 6 shows that for all items, the H_j 's of the Surinam and Antillean children are significantly lower than the H_j 's of the group of children who has a Dutch origin. The confidence intervals of items 4, 5, 8 and 9 contain the H_j value .3, indicating that these items have rather flat item response functions and cannot be useful to accurately order children on the scale.

The monotonicity check showed that the monotonicity assumption was not violated. Table 2 shows the scales that are constructed with increasing lowerbound values. When a lowerbound H_j value of .3 is set, items 4 and 5 are rejected from the scale. When the lowerbound c is set to .4 in addition to items 4 and 5, item 9 is removed. When the lowerbound value is set to .5, indicating a strong scale, only item 1, 10, 11, 12, 13 and 14 remained in the scale. On this 6-item scale children can accurately be ordered ($H = 0.57$, $se = 0.04$) and the scale has a good reliability (Guttman $\lambda_2 = .87$).

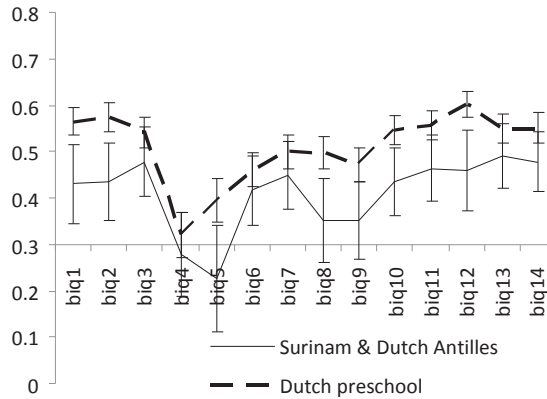


Figure 6. H coefficients of the individual items and the 95% confidence interval in Dutch preschool aged and Surinam and Dutch Antilles preschool aged children on the Behavioral Inhibition Questionnaire-Short Form, parent report.

DISCUSSION

The aim of this study was to examine the dimensionality and the scalability of the BIQ-SF, a parent rating questionnaire for measuring an inhibited, anxiety-prone temperament in a large community sample of young Dutch preschool children as well as children in various subpopulations, by means of Mokken Scale Analysis. Results indicated that in the Dutch target population (i.e., preschool children), 11 out of the 14 items of the BIQ-SF form a strong unidimensional scale and have a positive monotone relationship with inhibition, on which we can accurately and reliably order preschool children. The same results hold true for Dutch background kindergarten children and for Dutch background primary school children. However, for Turkish/Moroccan and Surinam/Antillean preschool children, this 11-item scale did not provide a good fit. For Turkish/Moroccan children, it was found that a 7-item scale proved to accurately order the children on behavioral inhibition and had good reliability. For Surinam/Antillean children, a 6-item scale proved to accurately order the children on behavioral inhibition and to have good reliability.

Bishop et al. (2003) intended to make a rating scale assessing behavioral inhibition in six contexts: unfamiliar peers, unfamiliar adults, separation/preschool, physical challenging situations, performance situations, and unfamiliar situations in general. In the current study, it was found that several items did not fit well in the scale. Previous studies examining the BIQ-SF with CFA did not always found evidence for a model with one higher order factor (Edwards, 2007; Vreeke et al., 2012). This study adds important information about the misfit of specific items. Especially items 4 and 5 displayed bad fitting in the scale, in all the subpopulations. Item 4 ('My child is cautious in activities that involve physical challenge (for

example: climbing, jumping from heights') and item 5 ('My child is hesitant to explore new play equipment') were construed by Bishop et al. (2003) to represent the 'physical challenges' behavioral inhibition subscale. However, it appears that the physical challenges subscale does not contribute to the overall behavioral inhibition. These results mimic the moderate psychometric properties of the physical subscale in previous studies (i.e., lower reliability and lower loading of this subscale on the higher order behavioral inhibition factor (Bishop et al., 2003; Broeren & Muris, 2010; Edwards, 2007). A possible explanation might be that most children in our study were still relatively young (mean age of the primary school aged children was 7.25 years, $sd = 1.22$, 94% was between 6 and 8 years old). Studies indicate that fears of bodily injury and physical danger typically arise later in childhood (Bauer, 1976). Thus, it might be possible that all children in our study are wary and cautious in these situations. Only a small group of children (i.e., the inhibited children) might maintain displaying these inhibited behavior in situations involving physical challenges and could be discriminated on these items when they are older. The same could be true for item 9 ('My child is reluctant to perform in front of others (for example: singing, dancing), as research has indicated that especially older children (i.e., 12–15-year-olds) display higher levels of behavioral inhibition in performance situations such as singing and dancing in front of a group (Broeren & Muris, 2010). The resulting scale of 11 items in the Dutch background population seems to represent items regarding unfamiliar peers, preschool/separation situations, unfamiliar adults, unfamiliar situations and being in the center of attention.

Further, this study indicated that the results of this scale proved to be equally good in preschool children, kindergarten children and primary school children. This result is in line with a previous finding by Broeren and Muris (2010), in which the full length BIQ was found to have high reliability as measured by Cronbach's alpha in three age groups: 4–7-year-olds, 8–11-year-olds, and 12–15-year-olds. As behavioral inhibition is considered to be a vulnerability factor to anxiety pathology operating throughout the entire childhood (Fox et al., 2005), this instrument seems to reliably order children on behavioral inhibition across different age groups.

In addition, as this study made use of a large multi-ethnic population, we were able to explore differences across native (Caucasian) Dutch children and non-native Dutch children. Interestingly, the results for the two foreign populations showed that the scale properties of the BIQ-SF were less positive. In the Turkish/Moroccan group, 7 of the 14 items form a strong scale, in the Surinam/Antillean group, only 6 out of the 14 items form a strong scale. The non-fitting items represented the physical challenges subscale, preschool/separation subscale, and performance situations subscale. The remaining items in both groups display the unfamiliar peers, unfamiliar adults and unfamiliar situations items. The results of this study seem to indicate that psychological "meanings" of behavioral inhibition vary across culture, as some of the items contributed to the behavioral inhibition score in native Dutch children, did not contribute to the behavioral inhibition score in the non-native Dutch

children. Previous studies have found that children from non-western societies display more anxious, sensitive, passive, reticent, and socially restrained behaviors in novel situations than their western counterparts (e.g., Bengi-Arslan, Verhulst, Ende, & Erol, 1997; Chen et al., 1998; Farver & Howes, 1988; Weisz et al., 1988). Possibly, the perception of parents of the inhibited behavior of their children may be influenced by cultural values and social conventions. That is, in western cultures, children are encouraged to be assertive and independent in challenging situations. Acquiring autonomy, self-reliance, and assertive social skills are important socialization goals in these cultures. In contrast, in traditional and collectivistic societies, shy and inhibited behaviors are valued and encouraged (e.g., Chen et al., 1998; Chen, Rubin, & Sun, 1992). It is possible that the behavior non-native Dutch children display in physical challenges situations, preschool/separation, and performance situations are not perceived by their parents as 'inhibited' behaviors and therefore do not contribute to the overall behavioral inhibition score. Another speculative possibility might be that parents of non-native Dutch children have another perception of psychological testing and questionnaires in general. If this speculation holds true, a multi method way of measuring behavioral inhibition (i.e., questionnaire and observation measures) would be preferable.

To conclude, the results of this study indicate that an 11 item version of the original 14 item BIQ-SF has good psychometric properties in Dutch native children. In Turkish/Moroccan and Surinam/Antillean preschool children, it was found that a scale of respectively 7 and 6 items proved to reliably and accurately order these children. A possible practical implication of this result would be to use different versions of the BIQ-SF in different ethnic subpopulations. However, the particularization of an instrument is not an optimal choice, since this would hamper comparability of findings across different studies and different populations. Therefore, further research should investigate the utility of this instrument in different subpopulations. A possible way to investigate this is by examining the predictive validity (i.e., is the instrument capable of detecting children at risk at developing anxiety disorders), and examining whether this is dependent on cultural background.

APPENDIX

Items of the Behavioral Inhibition Questionnaire-Short Form (BIQ-SF; Bishop et al., 2003; Edwards, 2007).

- 1 My child is shy when first meeting new children.
 - 2 My child is reluctant to approach a group of unfamiliar children to ask to join in.
 - 3 My child tends to watch other children rather than join in their games.
 - 4 My child is cautious in activities that involve physical challenge (e.g., climbing, jumping from heights).
 - 5 My child is hesitant to explore new play equipment.
 - 6 My child gets upset when being left in new situations for the first time.
 - 7 It takes many days for my child to adjust to new situations.
 - 8 My child dislikes being the centre of attention.
 - 9 My child is reluctant to perform in front of others.
 - 10 My child is very quiet around new (adult) guests to our home.
 - 11 My child is very quiet with adult strangers.
 - 12 My child approaches new situations or activities very hesitantly.
 - 13 My child is clingy when we visit the homes of people we don't know well.
 - 14 My child seems nervous or uncomfortable in new situations.
-

4

Skittish, shielded, and scared: Relations among behavioral inhibition, overprotective parenting, and anxiety in native and non-native Dutch preschool children

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Skittish, shielded, and scared: Relations among behavioral inhibition, overprotective parenting, and anxiety in native and non-native Dutch preschool children.

ABSTRACT

This study examined behavioral inhibition and overprotective parenting as correlates and predictors of anxiety disorder symptoms in preschoolers with a multi-ethnic background ($N = 168$). Parents of 3- to 6-year-old children completed a set of questionnaires twice, 12 months apart. Parents were also interviewed with the Anxiety Disorders Interview Schedule for DSM-IV at the 12-month point to assess the clinical severity of children's anxiety symptoms. Behavioral inhibition consistently emerged as a significant concurrent correlate of anxiety symptoms and this was particularly true for social anxiety symptoms. Overprotective parenting also emerged as a significant correlate of anxiety, but only in the case of non-social anxiety symptoms and mainly in non-native Dutch children. Prospective analyses revealed that behavioral inhibition was a significant predictor of social anxiety symptoms, while overprotective parenting did not explain significant additional variance in the development of children's anxiety over time. The support for an interactive effect of behavioral inhibition and overprotective parenting was unconvincing. Finally, it was found that children who exhibited stable high levels of behavioral inhibition throughout the study ran the greatest risk for developing an anxiety disorder.

INTRODUCTION

Anxiety disorders belong to the most prevalent types of psychopathology among children and adolescents: about 5% of all children meet the diagnostic criteria of an anxiety disorder and cumulative figures indicate that almost 20% of all youth suffer from a clinically significant anxiety problem at some point before the age of 16 (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Verhulst, van der Ende, Ferdinand, & Kasius, 1997). However, the internalizing nature of anxiety means that this problem often remains hidden, thereby hindering referral to clinical treatment settings (Angold, Costello, Farmer, Burns, & Erkanli, 1999). Nevertheless, there may be clear markers of anxiety problems that are already visible during the early stages of development. One important candidate in this regard is behavioral inhibition, which refers to the temperament characteristic of being unusually shy and withdrawn when confronted with new and unknown stimuli and situations (Kagan, 1994).

Research has provided support for an intimate link between behavioral inhibition and fear, anxiety, and their disorders among children and adolescents (Fox, Henderson, Marshall, Nichols, & Ghera, 2005). For example, cross-sectional data have indicated that higher levels of behavioral inhibition are accompanied by higher levels of fear and anxiety in preschoolers (Biederman et al., 1990, 2001; Dyson, Klein, Olino, Dougherty, & Durbin, 2011; Hudson, Dodd, & Bovopoulos, 2011a; Shamir-Essakow, Ungerer, & Rapee, 2005; White, McDermott, Degnan, Henderson, & Fox, 2011), primary school aged children (Van Brakel, Muris, & Bögels, 2004; Van Brakel, Muris, Bögels, & Thomassen, 2006), and adolescents (Carpentier, Elkin, & Starnes, 2009; Muris et al., 1999b, 2001, 2003a, 2009). More importantly, prospective research has shown that children identified as behaviorally inhibited at a given point-in-time run greater risk for fear and anxiety problems during their later development. An exemplary study was conducted by Biederman et al. (1993), who followed a sample containing inhibited and uninhibited preschool children throughout their early childhood years. Results indicated that during the first assessment, inhibited children already displayed significantly more anxiety disorders than uninhibited children. Interestingly, at the re-assessment, 3 years later, the inhibited children had displayed a significant increase in anxiety problems from baseline to follow-up, whereas such a marked increase was not observed in the uninhibited group. Other studies have generally replicated these results (Brozina & Abela, 2006; Hudson, Dodd, Lyneham, & Bovopoulos, 2011b; Kagan, Snidman, Zentner, & Peterson, 1999), thereby underlining that behavioral inhibition should be viewed as a vulnerability factor for anxiety disorders in youth, with some studies suggesting that this temperament characteristic should be conceived as a more specific risk factor in the development of social anxiety disorder (Biederman et al., 2001; Chronis-Tuscano et al., 2009; Hayward, Killen, Kraemer, & Taylor, 1998; Hirshfeld-Becker et al., 2007; Muris, Van Brakel, Arntz, & Schouten, 2011; Schwartz, Snidman, & Kagan, 1999).

While it is clear that behavioral inhibition is associated with a heightened risk for developing anxiety pathology, it is also true that not all temperamentally vulnerable children develop

fear and anxiety problems. For example, in the study by Biederman et al. (1993) described above, only around 40% of the inhibited youngsters suffered from an anxiety disorder at the follow-up assessment. This means that the majority of these children did not display clinically significant signs of this type of psychopathology. This fits nicely with recent etiological models of childhood anxiety which stress the importance of an interplay between child temperament and environmental risk factors (e.g., Lahat, Hong, & Fox, 2011; Muris, 2007; Rapee, 2001; Rubin, Coplan, & Bowker, 2009). One of the environmental risk factors thought to be involved in the pathogenesis of childhood anxiety is overprotective parenting. Parents with this parenting style try to shield their child from potential danger and distress by intrusively providing unnecessary help to the child and restricting its exposure to a broad range of situations. The net effect is that the child's fear and anxiety are enhanced because parents increase the awareness of danger, reduce the level of perceived control, and promote avoidance behavior in their offspring (Rapee, 1997).

Research has indeed demonstrated that overprotective parenting is associated with or even predictive of anxiety problems in youths (e.g., Hudson & Rapee, 2001, 2002; Lieb et al., 2000; see for reviews McLeod, Wood, & Weisz, 2007; Van der Bruggen, Stams, & Bögels, 2008), and it has been hypothesized this may be especially true in the preschool years where the family environment plays a dominant role in children's lives (Baumrind, 1967). However, few studies have actually addressed the additive and/or interactive role of behavioral inhibition and parental overprotection in the development of anxiety problems in young children. One exception is an investigation by Edwards, Rapee, and Kennedy (2010) who examined temperamental and parental predictors of anxiety symptoms in preschool children ($N = 638$). Mothers and fathers completed a survey containing measures of children's behavioral inhibition, parents' overprotective parenting, and anxiety disorders symptoms in the offspring. The assessment was carried out twice, 12 months apart, so that it became possible to study prospective links among these variables. Results showed that children's anxiety symptoms were fairly stable over time. Nevertheless, it was found that behavioral inhibition (as indicated by mothers) and overprotective parenting (of both parents) made significant unique contributions to children's anxiety symptoms at time 2. Unfortunately, interactive effects of behavioral inhibition and overprotective parenting were not investigated in this research.

Two other studies were conducted by Hudson and colleagues (2011a, 2011b). The first was a cross-sectional investigation (Hudson et al., 2011a) exploring additive and interactive influences of observed and parent-rated behavioral inhibition and maternal overprotective parenting (which was defined as overinvolvement) as well as a number of other environmental variables on anxiety diagnoses in 202 high- and low-risk children aged between 3 and 5 years. It was found that behavioral inhibition was a significant correlate of children's anxiety problems. Further, parental overprotection was also associated with anxiety, but no longer had a significant impact after controlling for other environmental factors. Finally, no evidence was found indicating that behavioral inhibition and overprotection had an interactive effect

on anxiety. Hudson et al. (2011b) followed these children for 2 years in order to examine the contributions of behavioral inhibition and maternal overprotective parenting in the development of anxiety over time. The results showed that after controlling for baseline anxiety levels, behavioral inhibition was associated with an increased likelihood of children meeting the criteria for an anxiety disorder at follow-up. However, again no additive or interactive effects of maternal overprotective parenting were observed. Yet, the data did show that this parenting style enhanced children's level of behavioral inhibition over time, which suggests there still may be an (indirect) effect on anxiety in later childhood.

Given the paucity of studies examining additive and interactive effects of temperamental vulnerability and family environment on anxiety in young children, the present study further explored relations among behavioral inhibition, overprotective parenting, and anxiety symptoms in a sample of preschool children in the Netherlands. An important difference with previous research was that the children in the present study had a multi-cultural background, which provided the opportunity to compare native and non-native Dutch children. All earlier studies on the relations between behavioral inhibition, overprotective parenting, and anxiety during early childhood have been conducted in mono-ethnic Caucasian samples (Edwards et al., 2010; Hudson et al., 2011a, 2011b). Nevertheless, a comparison across children with different ethnic backgrounds can be considered as interesting for a number of reasons. To begin with, there is evidence to suggest that the construct of behavioral inhibition may have a different connotation in various cultural groups. For example, Rubin et al. (2006) used a structured observation procedure to compare levels of behavioral inhibition in preschool children of five nations. The authors found that children in China and South-Korea were more inhibited than children in Australia and Italy, which may well have to do with the fact that in Eastern, collectivistic cultures shyness and inhibited behavior are more valued than in Western cultures. In a similar vein, there are also indications that rearing behaviors vary across cultures (Lansford & Bornstein, 2011; Rubin, 1998), and this may also be true for overprotective parenting. For instance, Chen et al. (1998) noted that parents of Chinese children displayed higher levels of protection and concern towards their offspring than parents of Canadian children. Finally, there is also evidence indicating that anxiety levels differ significantly across children from various countries, with children from non-Western nations generally displaying higher levels than children of Western nations (e.g., Essau, Leung, Conradt, Cheng, & Wong, 2008; Muris, Schmidt, Engelbrecht, & Perold, 2002). Even within countries, it has been shown that children from non-native, ethnic minorities exhibit higher levels of anxiety as compared to children from native inhabitants (Hale, Raaijmakers, Muris, & Meeus, 2005), although this is certainly not always the case (Safren et al., 2000).

Thus, in the current study, behavioral inhibition, overprotective parenting, and anxiety symptoms were assessed by asking parents of 3- to 6-year-old native and non-native Dutch children to complete a set of questionnaires twice, approximately 12 months apart. Regression analyses were conducted to investigate the unique contributions of behavioral inhibi-

tion and overprotective parenting as well as their interaction to children's anxiety symptoms, both cross-sectionally and prospectively. Because some studies have indicated that behavioral inhibition is particularly relevant for social anxiety disorder (Chronis-Tuscano et al., 2009; Hayward et al., 1998; Hirshfeld-Becker et al., 2007; Muris et al., 2011; Schwartz et al., 1999), a distinction was made between this type of anxiety and other anxiety problems.

METHOD

Participants

A community sample of one-hundred-and sixty-eight parents of 3- to 6-year-old children visiting the infant welfare center in Rotterdam, the Netherlands participated in this study. These parents completed a set of questionnaires at baseline and at a 12-month follow-up, and subsequently agreed to be extensively questioned about the anxiety symptoms of their child by means of semi-structured clinical interview. There were 90 boys and 78 girls in this sample, who had a mean age of 4.54 years ($SD = 0.48$) at the beginning of the study. As noted earlier, the ethnic background of the children was mixed: 53.0% were of original Dutch descent, 11.9% came from Surinam and the Netherlands Antilles, 2.4% from Morocco, 4.2% from Turkey, while 27% had roots in a variety of other countries.

Assessment

The short version of the *Behavioral Inhibition Questionnaire* (BIQ-SF; Bishop, Spence, & McDonald, 2003; Edwards, 2007) is a 14-item parent-report instrument for assessing behavioral inhibition in preschool children. Item examples are "My child is shy when first meeting new children", "My child gets upset when being left in new situations for the first time, for example kindergarten", and "My child approaches new situations or activities very hesitantly", which have to be answered on 6-point Likert scales, ranging from 1 (*hardly ever*) to 6 (*almost always*). A BIQ-SF total score is calculated by summing the scores on all items (range 14-84), with higher scores being indicative of higher levels of behavioral inhibition. The psychometric properties of the original 30-item BIQ are good (Bishop et al., 2003; Broeren & Muris, 2010; Kim et al., 2011), and there is also support for the reliability and validity of the BIQ-SF (Edwards, 2007; Vreeke et al., 2012).

The *Parental Overprotection Measure* (POM; Edwards, 2007) consists of 19 items, which were taken and adapted from existing measures assessing parental rearing behavior. The POM was designed to specifically assess 'overprotective parenting', and no other features of parental control, such as intrusiveness and psychological control. Edwards (2007) noted that they had three criteria in mind when construing the measure: (1) Items were required to describe the parents' behavior in specific situations rather than to reflect more general parental attitudes and beliefs; (2) Items had to refer to situations that were possibly perceived as psychologi-

cally or physically threatening to the child in order to fit the definition of 'overprotective'; and (3) Items had to be relevant for parents of preschool-aged children. Examples of POM items are "I am reluctant for my child to play some sports for fear he/she might get hurt", "I protect my child from criticism", and "I accompany my child on all outings". Items have to be scored on a 5-point scale ranging from 0 (*not at all*) to 4 (*very much*). The scale was found to have high internal consistency and strong test-retest reliability over a 12-month period. Evidence for the validity of the scale was demonstrated by means of significant correlations between mothers' POM scores and observations of overprotective behavior while the child carried out a mildly threatening experimental task (Edwards, 2007).

The *Preschool Anxiety Scale-Revised (PAS-R)* (Edwards, Rapee, Kennedy, & Spence, 2010) is an adaptation of the *Preschool Anxiety Scale (PAS)* (Spence, Rapee, McDonald, & Ingram, 2001), a parent-based questionnaire for measuring symptoms of social anxiety, separation anxiety, generalized anxiety, specific fears, and obsessive-compulsive difficulties. Items are rated on a 5-point scale ranging from 0 (*not at all true*) to 4 (*very often true*). As this study intended to make a comparison between social anxiety and other anxiety difficulties, we used the social anxiety subscale and a combined score of the remaining anxiety subscales. Adequate reliability and validity have been demonstrated for the PAS and the PAS-R (Edwards, 2007; Spence et al., 2001).

The *Anxiety Disorders Interview Schedule for DSM-IV, Parent Version* (hereafter abbreviated as ADIS-P; Silverman & Albano, 1996) was used to interview the parents to get an impression of the clinical severity of children's anxiety symptoms. The ADIS-P is a semi-structured interview questioning about symptoms of various anxiety (and frequent comorbid) disorders, thereby covering the criteria as described in the DSM-IV (American Psychiatric Association, 1994). The ADIS-P has been shown to have adequate inter-rater and test-retest reliability (Siebelink & Treffers, 2001; Silverman & Albano, 1996; Silverman, Saavedra, & Pina, 2001), and this appears also true when using the interview in parents of younger children (Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005).

RESULTS

General findings

Before addressing the main findings, a number of general findings should be discussed. To begin with, all questionnaires proved to be reliable in terms of internal consistency and test-retest reliability. That is, Cronbach's alphas at the baseline and follow-up assessment were respectively .90 and .91 for the BIQ-SF, .89 and .90 for the POM, .88 and .87 for PAS-R social anxiety, and .85 and .87 for PAS-R other anxiety problems. Test-retest correlations (12 months) were .79 for the BIQ-SF, .78 for the POM, and respectively .66 and .68 for PAS-R social anxiety and other anxiety symptoms. This indicates that all measures showed considerable

Table 1. Mean scores (standard deviations) on various questionnaires for the total sample and for native and non-native Dutch children as well as reliability coefficients

| | Baseline | | | | Follow-up | | | Test-retest | |
|-------------------------|---------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------|----------|
| | Total sample | | Non-native | | Total sample | Native | | α | <i>r</i> |
| | Mean | SD | Mean | SD | | Mean | SD | | |
| BIQ-SF | | | | | | | | | |
| Behavioral inhibition | 32.96 (10.73) | 34.34 (10.72) ^a | 30.30 (9.12) ^b | 32.96 (12.68) ^b | 32.17 (10.01) | 34.08 (11.01) ^a | 29.81 (8.82) ^b | .91 | .79 |
| POM | | | | | | | | | |
| Parental overprotection | 29.20 (12.21) | 25.94 (9.44) ^a | 32.96 (12.68) ^b | .89 | 26.50 (12.04) [*] | 23.42 (10.02) ^a | 30.50 (12.58) ^b | .90 | .78 |
| PAS-R | | | | | | | | | |
| Social anxiety | 6.66 (5.06) | 7.61 (4.92) ^a | 5.31 (4.54) ^b | .88 | 6.80 (4.83) | 7.81 (5.14) ^a | 5.76 (4.37) ^b | .87 | .66 |
| Other anxiety symptoms | 18.25 (10.40) | 18.53 (9.10) ^a | 17.19 (10.36) ^a | .85 | 18.36 (10.40) | 18.69 (10.56) ^a | 17.72 (10.95) ^a | .87 | .68 |

Note. *N*'s were 168 for the total sample, 89 for native Dutch children, and 79 for non-native Dutch children. BIQ-SF = Behavioral Inhibition Questionnaire-Short Form, PAS-R = Preschool Anxiety Scale-Revised; POM = Parental Overprotection Measure. Means not sharing similar subscripts differ at $p < .05$. All test-retest correlations were significant at $p < .001$. * Significant difference with baseline score at $p < .001$.

stability over the 1-year period, although paired *t*-tests revealed that overprotection scores significantly decreased from baseline to follow-up [$t(282) = 5.62, p < .001$], and this appeared true for both native and non-native Dutch children [t 's being 5.29 and 2.91, respectively, both p 's $< .01$]. Further, no significant sex differences were found with regard to any of the study variables [all $t(166)$'s $\leq 1.56, p$'s $\geq .12$]. However, native and non-native Dutch children displayed significantly different scores on the BIQ-SF [baseline: $t(166) = 2.61, p < .05$; follow-up: $t(166) = 2.75, p < .01$], POM [baseline: $t(166) = 4.10, p < .001$; follow-up: $t(166) = 4.05, p < .001$], and PAS-R social anxiety [baseline: $t(166) = 3.14, p < .01$; follow-up: $t(166) = 2.77, p < .01$]. As can be seen in Table 1, parents of native Dutch children consistently reported higher levels of behavioral inhibition and social anxiety for their offspring, whereas parents of non-native Dutch children reported higher levels of parental overprotection. Finally, there was no significant association between temperamental vulnerability and the family environment variable: that is, correlations between behavioral inhibition and overprotective parenting were $-.01$ at the baseline and $-.07$ at the follow-up assessment (with similar correlation coefficients being obtained for native and non-native Dutch children).

Behavioral inhibition, overprotection, and anxiety

Cross-sectional analyses

Hierarchical regression analyses were carried out in which behavioral inhibition and parental overprotection (step 1) and the interaction term of these variables (step 2) were the predictors, and social anxiety and other anxiety symptoms were the dependent variables. The results are displayed in Table 2 and can be catalogued as follows. First of all, the data consistently showed that behavioral inhibition was a significant correlate of childhood anxiety symptoms. Note also that in all cases, beta values were significantly larger in the case of social anxiety as compared to other anxiety symptoms [all t 's ≥ 3.61 , all p 's $< .001$]. Second, parental overprotection made a significant independent contribution, but this only appeared to be the case in most of the regression analyses predicting non-social anxiety symptoms. Third, in general comparable results were found for native and non-native Dutch children. The only notable difference was that in native Dutch children follow-up scores of other anxiety symptoms were merely associated with behavioral inhibition, whereas in non-native Dutch children behavioral inhibition and overprotective parenting emerged as significant, independent correlates (see Table 2). Fourth and finally, an interactive effect of behavioral inhibition and overprotective parenting was only found in non-native Dutch children in the models predicting other anxiety symptoms. As shown in Figure 1, on both assessment occasions, a combination of high behavioral inhibition and high overprotection was associated with higher levels of non-social anxiety symptoms in these children.

Prospective analyses

To study the contributions of behavioral inhibition and overprotective parenting to the development of anxiety symptoms over time, further hierarchical regression analyses were

Table 2. Main results of hierarchical regression analyses examining additive and interactive effects of behavioral inhibition and parental overprotection on anxiety on both occasions separately (cross-sectional analyses).

| | Total sample | | | Native | | | Non-native | | |
|------------------------------------|--------------|----------------|---------|--------|----------------|---------|------------|----------------|---------|
| | B | $(\Delta) R^2$ | β | B | $(\Delta) R^2$ | β | B | $(\Delta) R^2$ | β |
| Social anxiety (baseline) | | | | | | | | | |
| 1. Behavioral inhibition (BI) | .79*** | .63*** | .79*** | .79*** | .62*** | .78*** | .79*** | .62*** | .78*** |
| Parental overprotection (PO) | -.06 | | .01 | .01 | | -.07 | -.06 | | -.07 |
| 2. BI x PO | .01 | .00 | -.05 | -.05 | .00 | .03 | .01 | .00 | .03 |
| Other anxiety symptoms (baseline) | | | | | | | | | |
| 1. Behavioral inhibition (BI) | .46*** | .25*** | .46*** | .46*** | .28*** | .43*** | .46*** | .28*** | .43*** |
| Parental overprotection (PO) | .21** | | .24* | .24* | | .20* | .21** | | .20* |
| 2. BI x PO | .12 | .02 | .01 | .01 | .00 | .23* | .12 | .02 | .23* |
| Social anxiety (follow-up) | | | | | | | | | |
| 1. Behavioral inhibition (BI) | .85*** | .73*** | .88*** | .88*** | .77*** | .79*** | .85*** | .77*** | .79*** |
| Parental overprotection (PO) | -.02 | | .02 | .02 | | -.05 | -.02 | | -.05 |
| 2. BI x PO | .02 | .00 | .05 | .05 | .00 | -.03 | .02 | .00 | -.03 |
| Other anxiety symptoms (follow-up) | | | | | | | | | |
| 1. Behavioral inhibition (BI) | .48*** | .27*** | .62*** | .62*** | .40*** | .30** | .48*** | .40*** | .30** |
| Parental overprotection (PO) | .23*** | | .08 | .08 | | .33** | .23*** | | .33** |
| 2. BI x PO | .01 | .00 | -.07 | -.07 | .01 | .25* | .01 | .01 | .25* |

Note: N 's were 168 for the total sample, 89 for native Dutch children, and 79 for non-native Dutch children.

* $p < .05$, ** $p < .01$, *** $p < .001$. Inspection of tolerance and variance inflation factor (VIF) statistics did not reveal problems with multicollinearity in any of the regression models.

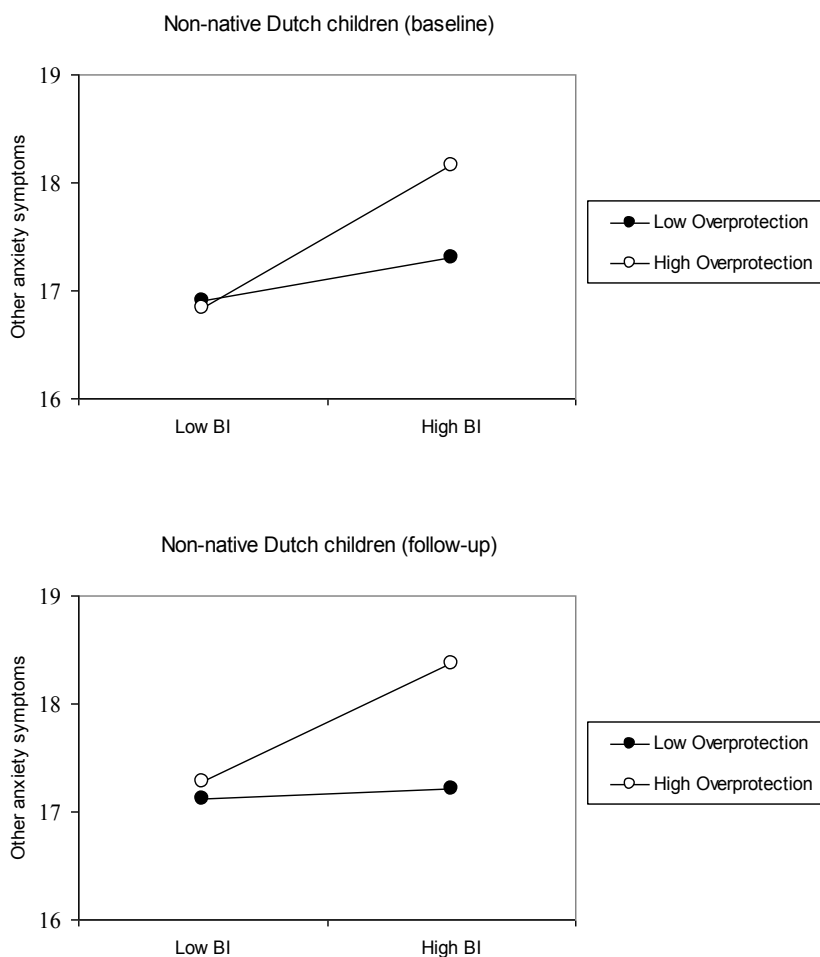


Figure 1. Plots showing the interactive effects of behavioral inhibition (BI) and parental overprotection on other (non-social) anxiety symptoms in non-native Dutch children (cross-sectional analyses).

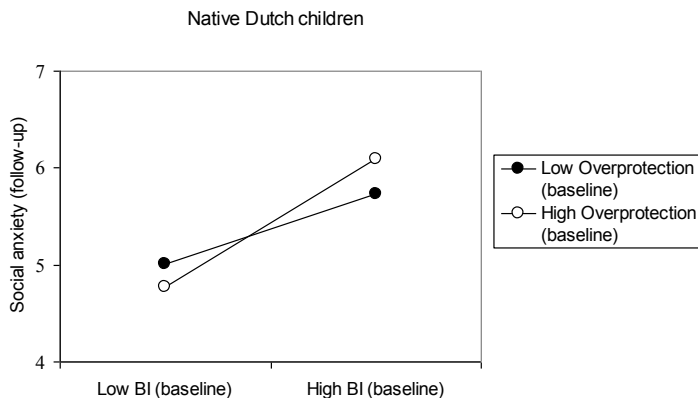
carried out in which we controlled for baseline anxiety levels (step 1), before entering behavioral inhibition and overprotection (step 2) and their interaction term (step 3) to the model. Results demonstrate that in the case of social anxiety, behavioral inhibition emerged as a significant predictor (Table 3). Thus, even after controlling for initial social anxiety symptoms, behavioral inhibition at baseline was clearly associated with higher levels of social anxiety at the follow-up assessment 1 year later, and this appeared true for native as well as non-native Dutch children (i.e., β 's of .51 and .35, which did not significantly differ, $t(166) = 1.25$, $p = .21$). The predictive power of behavioral inhibition on other anxiety symptoms was considerably smaller and only made a significant contribution to the model among native Dutch children ($\beta = .19$).

Table 3. Main results of hierarchical regression analyses examining additive and interaction effects of behavioral inhibition and parental overprotection on follow-up anxiety symptoms (prospective analyses).

| | Total sample | | Native | | Non-native | |
|--------------------------------------|--------------|----------------|---------|----------------|------------|----------------|
| | β | $(\Delta) R^2$ | β | $(\Delta) R^2$ | β | $(\Delta) R^2$ |
| Social anxiety (follow-up) | | | | | | |
| 1. Social anxiety (baseline) | .66*** | .44*** | .66*** | .44*** | .62*** | .39*** |
| 2. Behavioral inhibition (BI) | .45*** | .08*** | .51*** | .10*** | .35** | .06* |
| Parental overprotection (PO) | -.06 | | .03 | | -.12 | |
| 3. BI x PO | .01 | .00 | .15* | .02* | -.13 | .01 |
| Other anxiety symptoms (follow-up) | | | | | | |
| 1. Other anxiety symptoms (baseline) | .68*** | .46*** | .67*** | .46*** | .68*** | .46*** |
| 2. Behavioral inhibition (BI) | .11 | .01 | .19* | .04* | .02 | .01 |
| Parental overprotection (PO) | .03 | | -.10 | | .12 | |
| 3. BI x PO | -.05 | .00 | .06 | .00 | -.08 | .00 |

Note. *N*'s were 168 for the total sample, 89 for native Dutch children, and 79 for non-native Dutch children. * $p < .05$, ** $p < .01$, *** $p < .001$. Inspection of tolerance and variance inflation factor (VIF) statistics did not reveal problems with multicollinearity in any of the regression models.

The role of overprotective parenting on the development of children's anxiety symptoms over time was marginal. None of the analyses revealed a significant main effect of overprotection to follow-up anxiety scores. However, in the model predicting social anxiety symptoms in native Dutch children, a significant interaction effect of behavioral inhibition and overprotection was found. As shown in Figure 2, in the case of high behavioral inhibition, high overprotective parenting was prospectively associated with the highest levels of social anxiety. Yet, in the case of low behavioral inhibition, high overprotective parenting was accompanied by relatively low levels of social anxiety.

**Figure 2.** Plot showing the interactive effect of behavioral inhibition (BI) and parental overprotection on follow-up social anxiety symptoms in native Dutch children (prospective analysis)

Anxiety disorders

The semi-structured interview administered to children's parents (ADIS-P) revealed that only 18 children (10.7%) suffered from at least one anxiety disorder. The most prevalent anxiety disorder in this young population was specific phobia ($n = 15$), followed by social phobia ($n = 4$) and separation anxiety disorder ($n = 1$). As behavioral inhibition was found to be a consistent correlate of childhood anxiety symptoms, we explored the potential of this temperament characteristic to predict anxiety disorders in this population of preschoolers. Using the lower and upper 20% cutoff scores of the BIQ-SF as assessed on both occasions, children were divided into three groups: stable low behavioral inhibition ($n = 32$, 19 native and 13 non-native children), stable high behavioral inhibition ($n = 32$, 17 native and 15 non-native children), and unstable/medium behavioral inhibition ($n = 104$, 53 native and 51 non-native children).³ A comparison of the percentages of children with anxiety disorders between the three groups clearly indicated that stable high BI children ran a greater risk of developing a clinically significant anxiety problem than children in the stable low and unstable/medium BI groups (percentages being respectively 28.1% versus 6.3 and 6.7%; Fisher exact test = 10.08, $p < .01$). Further analysis indicated that similar results were found when analyzing social

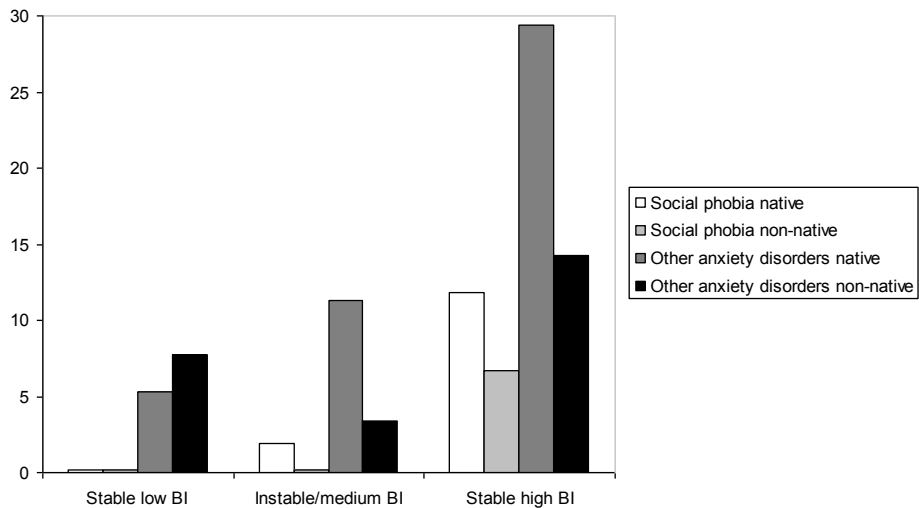


Figure 3. Percentages of native and non-native children with stable low, unstable/medium behavioral inhibition, and stable high levels of behavioral inhibition (BI) who fulfill the DSM-IV criteria for social phobia or other anxiety disorders

³ As native and non-native Dutch children were significantly different in terms of BIQ-SF scores, specific cut-off scores were employed to create these groups within each ethnic group. Stable low BI children scored below the 20% cut-off score on both occasions and stable high BI children scored above the 80% cut-off score on both occasions. Children not fulfilling this stringent criterion were defined as instable/medium BI children.

anxiety disorder (Fisher exact test = 5.65, $p = .05$) and other anxiety disorders (Fisher exact test = 5.89, $p < .05$) separately. In all cases, stable high BI children exhibited the highest levels of anxiety disorders and this seemed irrespective of children's ethnic background (see Figure 3), although this observation could not be statistically substantiated due to the relatively low prevalence rate of anxiety disorders.

DISCUSSION

The aim of this study was to examine the additive and interactive effects of behavioral inhibition and overprotective parenting on social and non-social anxiety disorder symptoms in young Dutch children with a multi-ethnic background, both in a cross-sectional and prospective way. The results first of all indicated that behavioral inhibition was a consistent correlate of anxiety disorder symptoms. At both assessment points, BIQ-SF (behavioral inhibition) scores were substantially and positively connected to PAS-R (anxiety) scores, with associations being stronger for social anxiety symptoms than for other anxiety symptoms. A similar pattern of results was obtained in the prospective analysis. That is, behavioral inhibition was found to be a significant predictor of anxiety symptoms over time, but this was particularly true for social anxiety and less clear for non-social anxiety symptoms. It has been argued that the stronger association between behavioral inhibition and social anxiety can be explained by the shared content of instruments for measuring these constructs (Broeren & Muris, 2010; Turner et al., 1996; Van Brakel et al., 2004). Although this seems certainly true, it is important to note that behavioral inhibition in the prospective analysis emerged as significant predictor of social anxiety symptoms, even after controlling for (the shared variance with) initial social anxiety levels. These results provides further support for the notion that behavioral inhibition should be viewed as a temperamental factor that predisposes children to develop social anxiety disorder (Biederman et al., 2001; Chronis-Tuscano et al., 2009; Hayward et al., 1998; Hirshfeld-Becker et al., 2007; Muris et al., 2011; Schwartz et al., 1999). Further, in the analysis examining the link between behavioral inhibition and clinical anxiety problems (by means of the ADIS-P), it was found that this temperamental vulnerability factor was not merely associated with social anxiety disorder but also with other anxiety problems, which of course is in contrast with the critique that the link between behavioral inhibition and anxiety is merely an artifact of the shared assessment of social wariness.

The link between overprotective parenting and anxiety was less evident. In the cross-sectional analysis, this variable was uniquely linked to non-social anxiety symptoms, suggesting that these parental behaviors may play some role in fear and anxiety symptoms that are unrelated to the social context. Yet, in the prospective analysis, no main effect of overprotective parenting on anxiety symptoms over time was observed. When adding these findings to the existing literature (Edwards et al., 2010; Hudson et al., 2011a, 2011b), the conclusion

seems warranted that this style of parenting in itself has none or at best little predictive power for childhood anxiety symptoms once the effects of behavioral inhibition are ruled out. Note however that this conclusion may only be valid for children at a preschool age who are only followed for a fairly short interval (i.e., 1 to 2 years), and that perchance the detrimental effects of overprotective parenting only become manifest after a longer time period, most likely after a developmental transition has taken place (e.g., Manassis, Hudson, Webb, & Albano, 2005). Another possibility is that (over)protective parenting is not a pathogenic style for preschool children. That is, it may be perfectly normal for parents to protect their young offspring to some extent against the unknown external world, and to gradually teach them to deal with all these new stimuli and situations. This also fits with the observation that in the present investigation, parental overprotection scores displayed a significant decline over time, which indicates that parents granted more autonomy when their children were older. However, it is well conceivable that when parents maintain the overprotective style over time, this may hinder their offspring in learning to cope with threatening situations and associated anxiety. A recent investigation by Lewis-Morrarty and colleagues (2012) seems to provide some evidence for these possibilities. In this longitudinal study, 176 participants were recruited as infants and repeatedly assessed during the early childhood years via observations and parent-report scales to establish their level of behavioral inhibition. At the age of 7, maternal overprotective behaviors were measured observationally by means of a series of parent-child interaction tasks. When participants reached adolescence, social anxiety symptoms were assessed by means of self- and parent-report questionnaires. Analyses of these prospective data indicated that mothers' overprotective parenting at 7 years predicted higher social anxiety symptoms during adolescence, whereas behavioral inhibition across early childhood did not emerge as a significant predictor of later social anxiety symptoms. This indicates that when children are followed over a longer interval and parenting behavior is assessed on a later point during childhood, overprotective parenting may emerge as a more clear-cut predictor of anxiety.

According to the developmental psychopathology account, multiple risk and vulnerability factors not only have an additive effect but also interact with each other to increase the probability that children will develop an anxiety problem (Muris, 2007; Vasey & Dadds, 2001). As such it was predicted that a combination of temperamental vulnerability (behavioral inhibition) and an adverse family environment (overprotective parents) would be associated with relatively high anxiety scores. The current data yielded some although by no means strong support for this hypothesis. That is, the cross-sectional analysis revealed a significant interaction effect of behavioral inhibition and overprotective parenting but only in the models explaining non-social anxiety symptoms of non-native Dutch children, whereas the prospective data showed such an effect accounting for the social anxiety symptoms of native Dutch children. Inspection of these interaction effects revealed a consistent picture: a combination of high behavioral inhibition and high overprotective parenting was always associated

with higher levels of anxiety symptoms. With regard to this finding, it should be noted that previous studies by Hudson and colleagues (2011a; 2011b) did not document the interactive effect of behavioral inhibition and overprotective parenting on anxiety symptoms in preschool children. A possible explanation for these contrasting findings is that studies have used somewhat different measures of overprotection. More precisely, Hudson et al. (2011a, 2011b) used a scale that mainly contained questions focusing on child safety and personal autonomy as reflected in daily activities such as eating, dressing, and play (see Thomasgard & Metz, 1999). The present investigation relied on the POM, of which items more explicitly measured parental behaviors in situations where children faced the potential for threat and therefore may be more relevant within the context of childhood anxiety.

An important aspect of the present research involved the comparison between native and non-native Dutch children. In line with previous research comparing children with various cultural backgrounds significant differences across native (i.e., Caucasian) and non-native Dutch children were found with regard to temperament (Rubin et al., 2006), parenting (Chen et al., 1998), and anxious symptoms (Hale et al., 2005). That is, at both assessment points, parents of native Dutch children reported higher levels of behavioral inhibition and social anxiety symptoms for their offspring and lower levels of overprotective parenting compared to parents of non-native Dutch children. The finding that native Dutch children display higher behavioral inhibition and anxiety scores than non-native Dutch children is in contrast with the results reported by Hale et al. (2005) for their adolescent population and at least suggests that at a preschool age children with an ethnic minority background are not necessarily more anxiety-prone and anxious than native Dutch children (for a thorough discussion of the relation between ethnicity and anxiety, see Safren et al., 2000). Further, despite the lower anxiety levels in their offspring, parents of non-native children reported higher levels of parental overprotection. This counterintuitive result (as one would expect lower anxiety levels to be accompanied by lower levels of overprotection) suggests that non-native Dutch parents adopt an overprotective style for other than anxiety-shielding motives. In the literature, it has been noted that parents of ethnic minority groups tend to rely on an authoritarian rearing style (e.g., Steinberg, Dornbusch, & Brown, 1992), and it may well be that this was reflected in higher “overprotection” scores of the non-native Dutch parents in our study (Chao, 1994; Chen et al., 1998). This explanation makes even more sense when acknowledging the fact that a significant part of the Dutch non-native children display increased levels of externalizing problems (e.g., Stevens, Vollebergh, Pels, & Crijnen, 2007), which have been shown to be also significantly associated with overprotective parenting (Gere, Villabo, Torgersen, & Kendall, 2012).

This study provides further support for the idea that persistently inhibited children run a particularly high risk for developing anxiety disorders (for a review, see Hirshfeld-Becker et al., 2008). In support of this suggestion, the percentage of children who fulfilled the criteria for an anxiety disorder was significantly higher among the stable high inhibition group

as compared to the stable low and unstable/medium inhibition groups (i.e., 28.1% versus 6.3 and 6.7%). The most prevalent anxiety disorder in this preschool aged sample was not social phobia but specific phobia. Note that this finding is in line with the developmental course of fear and anxiety phenomena, which typically shows that at a preschool age fear is mostly directed at a set of concrete stimuli and situations (e.g., darkness, animals, heights), whereas the more cognitive anxiety symptoms including social concerns and fear of negative evaluation mainly emerge during middle childhood and adolescence (Gullone, 2000). It also needs to be pointed out that although stable high inhibited children ran the greatest risk for anxiety disorders, the majority of this group did not display clinically significant anxiety problems. This underlines the current theoretical notion that the origins of childhood anxiety pathology cannot be explained by the presence of a single factor (in this case behavioral inhibition), but that multiple risk, vulnerability, and protective variables should be taken into consideration (Muris, 2007; Vasey & Dadds, 2001).

Several limitations should be mentioned. First, in spite of the longitudinal set-up of this study, children were only followed for twelve months. This period may have been too short to observe the pathogenic effects of behavioral inhibition and overprotective parenting (see *supra*). This is also illustrated by the fairly high test-retest correlations obtained for various constructs, in particular for anxiety - showing that anxiety is a very stable construct and it is difficult to demonstrate predictors (Edwards et al., 2010). Further, it would have been preferable if we had followed the children during their entrance into primary school, as such a stressful transition point often uncovers underlying vulnerabilities for developing psychopathological symptoms such as anxiety (e.g., Brozina & Abela, 2006). Second, this study merely focused on overprotective parenting. Several studies and models (e.g., Rapee, 2001) have indicated that other related parent-related constructs are also involved in the development of childhood anxiety problems (see e.g., Wood, McLeod, Sigman, Hwang, & Chu, 2003). In particular the assessment of parental anxiety seems relevant as it can be expected that anxious parents perceive more dangers in the external environment, and as a result tend to overprotect their children from these possible threats. As such, parental overprotection might mediate the association between parent and child anxiety. Future studies should include this and other family context variables (e.g., modeling, negative information transmission). Third, as all data were obtained from a single assessor (i.e., parents), it is possible that the observed associations are inflated due to shared method variance. Moreover, there are indications that parents are less capable of rating fear and anxiety in their children, and for this reason, children are often regarded as the main informant in case of this type of internalizing symptom (Greco & Morris, 2004). However, it should be borne in mind that the children in the present study were too young to reliably report on constructs such as behavioral inhibition, parenting, and anxiety. Also, the inclusion of observational measures of overprotective parenting would have made the results more valid as parents may have been guided by social desirable response tendencies. Fourth, a non-native, ethnic minority status in Western countries such as the

Netherlands is usually indicative of a lower socioeconomic status, and it has been argued that children with this background are more susceptible to develop psychopathology (e.g., Hale, Raaijmakers, Muris, & Meeus, 2005), probably because they grow up under more stressful conditions. However, because SES was not systematically measured in this study, it was not possible to examine this issue. Fifth and finally, the non-native Dutch sample consisted of a rather heterogeneous group of ethnic minorities, which were each too small for the purpose of separate analyses. Given the differences observed between native and non-native Dutch groups, it seems certainly worthwhile to further investigate the role of behavioral inhibition and overprotective parenting in the development of anxiety disorders symptoms within each of these ethnic groups.

Despite these limitations, this longitudinal study provides new insights into the risk factors behavioral inhibition and overprotective parenting in the development of anxiety disorder symptoms. It emphasizes the role of behavioral inhibition in the pathogenesis of childhood anxiety, and also points out that there seem to be clear ethnic differences with regard to the contribution of this vulnerability factor. Given the fact that behavioral inhibition can be reliably identified at a fairly young age (Bishop et al., 2003; Broeren & Muris, 2010; Vreeke et al., 2012), this temperament variable may be an important target for prevention. Recent studies targeting the correction of inhibited behaviors in preschool children by prompting parents to expose their offspring to novel stimuli and situations have yielded promising results (Kennedy, Rapee, & Edwards, 2009; Rapee et al., 2005). Such interventions could also target overprotective parenting. Although this type of parenting seems normative and adaptive when children are of such a young age, it may become pathogenic if parents are not able to adopt a more autonomy-promoting style when children become older. Perhaps an psychoeducational approach can be adopted to make parents aware of this, so that they can modify their rearing behaviors at the appropriate time.

5

Relations between behavioral inhibition, Big Five personality factors, and anxiety disorder symptoms in non-clinical and clinically anxious children

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ABSTRACT

This study examined the relations between behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms in non-clinical children ($n = 147$) and clinically anxious children ($n = 45$) aged 6-13 years. Parents completed the Behavioral Inhibition Questionnaire-Short Form (BIQ-SF), the Big Five Questionnaire for Children (BFQ-C), and the Screen for Child Anxiety Related Emotional Disorders-Revised (SCARED-R). Results indicated that, compared to parents of non-clinical children, parents of clinically anxious children rated their offspring higher on neuroticism and behavioral inhibition, but lower on extraversion, conscientiousness, and intellect/openness. Further, extraversion emerged as the strongest correlate of an inhibited temperament, and this appeared true for the clinically anxious as well as the non-clinical children. Finally, in both the clinical and non-clinical samples, higher levels of behavioral inhibition and neuroticism were unique and significant predictors of anxiety disorders symptoms.

INTRODUCTION

Some people run greater risk for developing anxiety disorders than others. Two personality traits that seem to be particularly relevant for understanding this enhanced vulnerability for anxiety problems are neuroticism and extraversion. Individuals scoring high on neuroticism are emotionally unstable and as such would display a proneness to experience negative emotions such as fear and anxiety. Not surprisingly, neuroticism has been regarded as a predisposition to develop all kinds of psychopathology, including the anxiety disorders (Eysenck & Eysenck, 1985). The personality trait of extraversion is concerned with the tendency of being concerned with or obtaining gratification from the external environment. Individuals high on this trait are generally sociable, enthusiastic, lively, and assertive. There is evidence indicating that low extraversion (i.e., introversion) is closely associated with anxiety problems (Bienvenu et al., 2004; Trull & Sher, 1994), which is not surprising as it is easy to see how this personality feature promotes avoidance behavior. Thus, a personality characterized by a combination of high levels of neuroticism and low levels of extraversion could be seen as a vulnerability factor for developing anxiety disorders in adults (Craske, 2003) and youths (Muris & Ollendick, 2005; Nigg, 2006).

It is of interest to note that this constellation of personality factors can already be identified at a fairly young age. More precisely, Kagan (1989) described a temperament typology in toddlers, which referred to the tendency to react with shyness, fear, and withdrawal in response to novel or challenging situations. There is ample evidence that this typology of behavioral inhibition should be viewed as a vulnerability factor, which puts children at risk for developing anxiety disorders (Fox et al., 2005).

Previous research in 8- to 13-year-old non-clinical children (Muris et al., 2009; Muris & Dietvorst, 2006), examining the underlying personality factors of behavioral inhibition, has indeed confirmed the notion that behavioral inhibition is best characterized by high levels of neuroticism and low levels of extraversion. Further, it was found that even after controlling for the influence of neuroticism, extraversion and other Big Five personality factors, behavioral inhibition was still positively associated with anxiety symptoms, which underlines the importance of this temperamental variable in the pathogenesis of childhood anxiety problems. However, these earlier studies solely relied on samples of non-clinical children, and so it remains to be seen whether this pattern of results also emerges in clinically anxious children. Replication of these findings in a clinical population seems important as this would further underline the unique role of behavioral inhibition beyond basic personality traits in childhood anxiety disorders. With this in mind, the current study was conducted. Parents of non-clinical ($n = 147$) and clinically anxious ($n = 45$) children completed questionnaires measuring behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms in their offspring. In this way, it became possible to investigate differences between non-clinical and clinically anxious children with regard to (a) levels of behavioral inhibition and

Big Five personality traits, and (b) the pattern of correlations among behavioral inhibition, personality traits, and anxiety disorder symptoms. Further, within the samples of non-clinical and clinically anxious children it was examined (c) to what extent neuroticism, extraversion, and other personality traits accounted for unique variance in behavioral inhibition, and (d) whether behavioral inhibition explained unique variance in anxiety disorder symptoms beyond Big Five personality traits.

METHOD

Participants and procedure

Parents of 380 children from four primary schools in the neighborhood of Rotterdam, The Netherlands, were approached by mail. In the letter, parents received information about the study and were asked to provide consent for their participation in the study. Parents who agreed to participate filled out the set of questionnaires and returned them to the researchers in a reply-paid envelope. One-hundred-and-fifty-five parents (41%) responded positively to the mailing. Due to missing variables, questionnaires of 147 parents (125 mothers, 17 fathers, 1 both parents, and 4 other caretakers) were eventually used for the data analyses. The children in this non-clinical sample (74 boys and 73 girls) had a mean age of 9.07 years ($SD = 1.65$, range 6-13). Parents reported no clear signs of anxiety or other psychopathology for these children, although this was not formally checked by means of a standardized interview. As these children were not referred to a clinic for psychological help, they were defined as 'non-clinical'.

Additionally, 45 parents of children who were referred to a specialized academic anxiety clinic filled out the questionnaires (in all cases this concerned the mother as she was always present with the child during the visit at the clinic). These children (18 boys and 27 girls) had a mean age of 9.47 years ($SD = 1.42$, range 6-12). Clinical diagnosis was determined by interviewing parents with the Dutch translation of the *Anxiety Disorders Interview Schedule for Children* (ADIS-C), *parent version* (Silverman & Albano, 1996; Siebelink & Treffers, 2001). The ADIS-C is a semi-structured interview designed specifically for diagnosing anxiety and other common disorders in children and adolescents. The children in this sample had a primary diagnosis of separation anxiety disorder ($n = 4$), social anxiety disorder ($n = 11$), specific phobia ($n = 12$), generalized anxiety disorder ($n = 5$), and obsessive compulsive disorder ($n = 1$). Twelve children were diagnosed with an anxiety disorder not otherwise specified. Some children also met the criteria of other psychiatric disorders, such as depressive disorder ($n = 5$), dysthymic disorder ($n = 2$), oppositional defiant disorder ($n = 2$), and enuresis ($n = 2$).

Questionnaires

The *Behavioral Inhibition Questionnaire* (BIQ; Bishop, Spence, & McDonald, 2003) is a 30-item parent-report instrument assessing Kagan's (1994) temperament characteristic of behavioral inhibition in three domains: social novelty (e.g., 'My child is shy when first meeting new children'), physically challenging situations ('My child is hesitant to explore new play equipment'), and situational novelty (e.g., 'My child approaches new situations or activities very hesitantly'). Parents rate all items on a 6-point Likert scale, ranging from 1 (hardly ever) to 6 (almost always). In the present study, the 14-item short form of the BIQ, (i.e., the BIQ-SF) was used (Edwards, 2007). The BIQ and the BIQ-SF have been shown to possess good reliability and validity (Bishop et al., 2003; Edwards, 2007), and this is also true for the Dutch versions of these scales (Broeren & Muris, 2010).

The *Big Five Questionnaire for Children* (BFQ-C; Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003) is a 65-item scale assessing the five basic traits of personality (i.e., the Big Five) in children and adolescents: (1) extraversion, which refers to energy, positive emotions and the tendency to seek stimulation in the company of others, enthusiasm, assertiveness, and self-confidence (e.g., 'My child easily makes friends'), (2) agreeableness, which pertains to an inclination to be compassionate and cooperative towards others (e.g. 'My child understands when others need my help'), (3) conscientiousness, which has to do with self-discipline, orderliness, precision, and the fulfillments of commitments (e.g., 'My child likes to keep all my school things in a great order'), (4) neuroticism, which reflects the tendency to easily experience unpleasant emotions such as anxiety, depression, discontent, and anger (e.g., 'My child easily gets angry'), and (5) intellect/openness, which has to do with intellectual skills and an appreciation for art, adventure, curiosity, and variety of experience (e.g., "My child knows many things"; 'My child would like to travel and to know the habits of other countries'). Items are rated on a 5-point Likert scale, ranging from 1 (almost never) to 5 (almost always). Various studies found support for the psychometric properties of the BFQ-C (Barbaranelli et al., 2003; Barbaranelli, Fida, Paciello, Di Gunta, & Caprara, 2008; Muris, Meesters, & Diederens, 2005).

The revised version of the *Screen for Child Anxiety Related Emotional Disorders-Revised* (SCARED-R; Muris, Dreesen, Bögels, Weckx, & Van Melick, 2004) was used. The SCARED-R is an extension of the original 41-item SCARED (Birmaher et al., 1999), which intends to measure symptoms of anxiety disorders in youths. Muris, Merckelbach, Schmidt, and Mayer (1999a) adapted the original SCARED by adding items in an attempt to measure symptoms of the entire spectrum of DSM-defined anxiety disorders in children and adolescents. Thus, the resulting SCARED-R consists of 69 items assessing symptoms of panic disorder, separation anxiety disorder, generalized anxiety disorder, social phobia, specific phobias, obsessive-compulsive disorder, and traumatic stress disorder. Parents have to indicate how frequently their child experiences each anxiety symptom on a 3-point Likert scale, with almost never = 0, sometimes = 1, and often = 2. Research has indicated that the SCARED-R is a reliable and valid questionnaire for measuring childhood anxiety problems (e.g., Muris et al., 1999a, 2004).

Data analysis

Data were analyzed by means of the Statistical Package of Social Sciences (SPSS). Cronbach's alphas were computed to examine the reliability of the questionnaires. *T*-tests were conducted to explore sex differences and to compare non-clinical and clinically anxious children on various measures. Further, partial correlations (controlling for the influence of sex) were calculated among behavioral inhibition, anxiety symptoms, and personality traits in non-clinical as well as clinically anxious children. Finally, hierarchical regression analyses were carried out to examine (a) the unique contributions of the various personality traits to behavioral inhibition, and (b) the contribution of behavioral inhibition and various personality traits to anxiety symptoms in both non-clinical and clinically anxious children.

RESULTS

General findings

All questionnaires proved to be reliable in terms of internal consistency. That is, Cronbach's alphas for the various questionnaires were all between .75 and .92 (see Table 1). Further, significant sex differences were observed for a number of Big Five personality traits. More specifically, in the non-clinical sample, parents rated girls as more conscientious [$M = 34.79$, $SD = 6.02$ for girls vs. $M = 32.25$, $SD = 6.30$ for boys; $t(145) = 2.50$, $p < .05$], whereas they reported boys as more neurotic [$M = 22.08$, $SD = 6.40$ for boys vs. $M = 19.80$, $SD = 5.52$ for girls; $t(145) = 2.31$, $p < .05$]. In the clinically anxious sample, girls were rated as more agreeable [$M = 37.74$, $SD = 4.22$ for girls vs. $M = 34.13$, $SD = 5.14$ for boys; $t(43) = 2.49$, $p < .05$] but lower

Table 1

Means (standard deviations) and Cronbach's alphas for various questionnaires, as completed by parents of non-clinical and clinically anxious children.

| | Non-clinical children ($n = 147$) | | Clinically anxious children ($n = 45$) | |
|--------------------------|--|----------|---|----------|
| | M (SD) | α | M (SD) | α |
| BIQ | 32.83 (11.61) ^a | .92 | 49.29 (14.16) ^b | .90 |
| BFQ-C Extraversion | 36.37 (5.54) ^a | .79 | 30.56 (5.38) ^b | .75 |
| BFQ-C Agreeableness | 37.31 (5.57) ^a | .87 | 36.30 (4.81) ^a | .81 |
| BFQ-C Conscientiousness | 33.51 (6.27) ^a | .88 | 30.60 (6.34) ^b | .83 |
| BFQ-C Neuroticism | 20.95 (6.06) ^a | .86 | 23.74 (6.48) ^b | .87 |
| BFQ-C Intellect/Openness | 36.96 (6.76) ^a | .86 | 31.39 (5.72) ^b | .77 |
| SCARED-R | 20.50 (13.68) ^a | .92 | 37.89 (15.57) ^b | .91 |

Note: BIQ = Behavioral Inhibition Questionnaire; BFQ-C = Big Five Questionnaire for Children, SCARED-R = Screen for Child Anxiety Related Emotional Disorders-Revised. Means with different subscripts differ at $p < .05$.

on intellect/openness [$M = 30.04$, $SD = 5.57$ for girls vs. $M = 33.41$ $SD = 5.46$ for boys ; $t(43) = 2.00$, $p < .05$]. No significant differences between boys and girls were found for behavioral inhibition and anxiety disorder symptoms.

Differences between non-clinical and clinically anxious children

As can be seen in Table 1, significant differences were found between non-clinical and clinically anxious children on various parent-rated questionnaires. As expected, parents rated clinically anxious children as significantly higher on behavioral inhibition [$t(190) = 7.86$, $p < .001$] and anxiety [$t(190) = 7.22$, $p < .001$]. In addition, parents rated clinically anxious children as higher on neuroticism [$t(190) = 2.65$, $p < .05$], but lower on extraversion [$t(190) = 6.20$, $p < .001$], conscientiousness [$t(190) = 2.72$, $p < .05$], and intellect/openness [$t(190) = 5.00$, $p < .001$] than their non-clinical counterparts.

Correlations among behavioral inhibition, personality factors, and anxiety

Because of the observed sex differences for a number of variables, it was decided to perform a partial correlation analysis (which controlled for the influence of sex) to study the relations among the BIQ, BFQ-C, and SCARED-R. As can be seen in Table 2, a highly similar pattern was found for non-clinical and clinically anxious children. That is, behavioral inhibition was negatively correlated with extraversion (r 's being $-.50$ and $-.58$ in the non-clinical and clinically anxious group, respectively) and agreeableness (r 's being $-.16$ and $-.40$). Further, a substantial positive correlation was found between behavioral inhibition and anxiety disorder symptoms as indexed by the SCARED-R (r 's being $.47$ and $.52$ in the non-clinical and clinically anxious group, respectively). In addition, in the non-clinical group, neuroticism was positively correlated with anxiety disorders ($r = .39$), while extraversion was negatively associated with such

Table 2

Partial correlations (corrected for sex) between parent-rated questionnaires measuring behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms, computed for non-clinical children ($n = 147$, below the diagonal), and clinically anxious children ($n = 45$, above the diagonal) separately.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------------|--------|--------|--------|--------|-------|-------|-------|
| 1. BIQ total score | — | -.58** | -.40* | .03 | .01 | -.08 | .52** |
| 2. BFQ-C Extraversion | -.50** | — | .45* | .27 | .05 | .43* | -.25 |
| 3. BFQ-C Agreeableness | -.16* | .49** | — | .59** | -.22 | .29 | -.21 |
| 4. BFQ-C Conscientiousness | .12 | .30** | .55** | — | -.11 | .47** | -.16 |
| 5. BFQ-C Neuroticism | .04 | .02 | -.35** | -.27** | — | -.17 | .23 |
| 6. BFQ-C Intellect/Openness | -.02 | .41** | .40** | .61** | -.19 | — | -.07 |
| 7. SCARED-R total score | .47** | -.24* | -.17 | -.05 | .39** | -.13 | — |

Note: BIQ = Behavioral Inhibition Questionnaire; BFQ-C = Big Five Questionnaire for Children, SCARED-R = Screen for Child Anxiety Related Emotional Disorders-Revised. * $p < .05$, ** $p < .05/21$

symptoms ($r = -.24$). In the clinically anxious group, comparable correlations were found (of respectively $r = .23$ and $r = -.25$), but here these relations were non-significant. The latter was probably due to the small sample size of this group, as tests for comparing correlation coefficients revealed no significant differences in the magnitudes of these correlations between non-clinical and clinically anxious children [both $t(190) s \leq 1.01$, $p's \geq .31$].

Predicting behavioral inhibition from personality traits

Hierarchical regression analyses were carried out to examine the unique contributions of the various personality traits to behavioral inhibition as measured by the BIQ (while controlling for sex by entering this variable on step 1). In both the non-clinical and the clinically anxious group, extraversion was the strongest predictor of an inhibited temperament: as expected, beta values were negative (β 's being $-.63$ and $-.54$ in the non-clinical and clinically anxious group, respectively), indicating that lower levels of extraversion were associated with higher levels of behavioral inhibition (see Table 3). In addition, in the non-clinical group, neuroticism was found to make a small but unique positive contribution to behavioral inhibition ($\beta = .16$), which means that in these children, higher levels of neuroticism tended to be accompanied

Table 3

Main results of the regression analyses predicting BIQ behavioral inhibition from Big Five personality traits.

| | B | SE | β | ΔR^2 |
|--|-------|------|---------|--------------|
| <i>Behavioral inhibition: Non-clinical children (n = 147)</i> | | | | |
| Step 1 | | | | .00 |
| Sex | -.88 | 1.72 | -.04 | |
| Step 2 | | | | .35** |
| BFQ-C Extraversion | -1.31 | .18 | -.63** | |
| BFQ-C Agreeableness | .01 | .20 | .01 | |
| BFQ-C Conscientiousness | .57 | .18 | .31* | |
| BFQ-C Neuroticism | .30 | .15 | .16* | |
| BFQ-C Intellect/Openness | .13 | .16 | .08 | |
| <i>Behavioral inhibition: Clinically anxious children (n = 45)</i> | | | | |
| Step 1 | | | | .00 |
| Sex | .70 | 4.24 | .02 | |
| Step 2 | | | | .48** |
| BFQ-C Extraversion | -1.42 | .39 | -.54** | |
| BFQ-C Agreeableness | -1.18 | .50 | -.42* | |
| BFQ-C Conscientiousness | .81 | .37 | .36* | |
| BFQ-C Neuroticism | .00 | .29 | .01 | |
| BFQ-C Intellect/Openness | .25 | .38 | .10 | |

Note: BIQ = Behavioral Inhibition Questionnaire; BFQ-C = Big Five Questionnaire for Children. * $p < .05$, ** $p < .01$.

by higher levels of behavioral inhibition. This relation was not found in the clinically anxious group. The regression models further indicated that conscientiousness was positively related to behavioral inhibition in both groups (β 's being .31 and .36 in the non-clinical and clinically anxious group, respectively). Finally, in the clinically anxious group, agreeableness was negatively related to behavioral inhibition, which implies that higher levels of this personality trait are associated with lower levels of behavioral inhibition ($\beta = -.42$). Altogether, the personality traits accounted for 35% of the variance in behavioral inhibition scores in the non-clinical group, and 48% of the variance in this temperament characteristic in the clinically anxious group.

Table 4

Main results of the regression analyses predicting children's DSM-defined anxiety disorder symptoms (SCARED-R) from behavioral inhibition and Big Five personality traits.

| | B | SE | β | ΔR^2 |
|--|-------|------|---------|--------------|
| <i>Anxiety disorder symptoms: Non-clinical children (n = 147)</i> | | | | |
| Step 1 | | | | .01 |
| Sex | 2.28 | 2.02 | .08 | |
| Step 2 | | | | .24** |
| BFQ-C Extraversion | -.09 | .25 | -.04 | |
| BFQ-C Agreeableness | .17 | .23 | .07 | |
| BFQ-C Conscientiousness | .06 | .22 | .03 | |
| BFQ-C Neuroticism | .88 | .18 | .39** | |
| BFQ-C Intellect/Openness | -.15 | .22 | -.07 | |
| Step 3 | | | | .12** |
| BIQ Behavioral inhibition | .52 | .10 | .44** | |
| <i>Anxiety disorder symptoms: Clinically anxious children (n = 45)</i> | | | | |
| Step 1 | | | | .08* |
| Sex | -2.98 | 4.87 | -.10 | |
| Step 2 | | | | .13 |
| BFQ-C Extraversion | .18 | .52 | .06 | |
| BFQ-C Agreeableness | .88 | .61 | .29 | |
| BFQ-C Conscientiousness | -.91 | .45 | -.37* | |
| BFQ-C Neuroticism | .62 | .34 | .26* | |
| BFQ-C Intellect/Openness | .26 | .44 | .09 | |
| Step 3 | | | | .24** |
| BIQ Behavioral inhibition | .72 | .19 | .66** | |

Note: BIQ = Behavioral Inhibition Questionnaire; BFQ-C = Big Five Questionnaire for Children, SCARED-R = Screen for Child Anxiety Related Emotional Disorders-Revised. * $p < .10$, ** $p < .001$.

Predicting anxiety from behavioral inhibition and personality traits

Hierarchical regression analyses were also carried out to examine the unique contributions of sex (step 1), Big Five personality traits (step 2), and behavioral inhibition (step 3) to anxiety disorder symptoms. Predictor variables were found to account for respectively 37% and 45% of the variance in SCARED-R scores in the non-clinical and clinically anxious group. As shown in Table 4, in both the non-clinical and the clinically anxious group, neuroticism accounted for a unique proportion of the variance in SCARED-R scores (β 's being .39 and .26, respectively). As expected, the positive betas indicate that higher levels of neuroticism were associated with higher levels of anxiety symptoms. In the clinically anxious group, conscientiousness was also found to make a unique, negative contribution to anxiety symptoms ($\beta = -.37$), which means that higher levels of this personality trait were associated with lower levels of anxiety symptoms. Most importantly, behavioral inhibition was also found to explain a substantial, additional proportion of the variance in SCARED-R scores in both the non-clinical and the clinically anxious group (12% and 24% respectively). The positive betas of respectively .44 and .66 indicate that higher levels of this temperament characteristic were linked to higher levels of anxiety symptoms.

DISCUSSION

In this study relations between behavioral inhibition, anxiety disorder symptoms and Big Five personality traits were investigated by administering a set of questionnaires in the parents of non-clinical and clinically anxious children. First of all, it was found that parents of clinically anxious children rated their offspring as higher on behavioral inhibition and neuroticism, but lower on extraversion, conscientiousness and intellect/openness as compared to parents of non-clinical youth. The difference between both groups on behavioral inhibition, neuroticism, and extraversion were of course as expected, because there is ample evidence in the literature indicating that children and adolescents with anxiety disorders are characterized by high neuroticism, behavioral inhibition and introversion (the inverse of extraversion; Muris & Ollendick, 2005; Nigg, 2006).

Further, in keeping with previous studies (Muris & Dietvorst, 2006; Muris et al., 2009), results indicated that behavioral inhibition in children can best be characterized by low levels of the Big Five personality trait of extraversion (see for similar results in adults: Shatz, 2005). Depue and Collins (1999) have suggested that extraversion stems from a biological system promoting active approach and exploration of the environment. As behavioral inhibition is typified by hesitation in exploring the environment, it seems logical that higher scores on this temperamental characteristic are associated with lower scores on the personality trait of extraversion. In addition, studies on the lower-order facets of extraversion have revealed

that social inhibition/shyness consistently makes a negative contribution to this supertrait (Eysenck & Eysenck, 1985).

Besides extraversion, neuroticism was found to make a small but unique contribution to the prediction of behavioral inhibition, although it needs to be mentioned that this was only the case in the sample of non-clinical children. This result corresponds with previous findings indicating that behavioral inhibition at least shares some features with neuroticism (Muris & Dietvorst, 2006; Muris et al., 2009). It is unclear why this result was not found in the clinically anxious youth. One explanation is that these children in general already displayed fairly high levels of both neuroticism and behavioral inhibition, as a result of which the positive correlation between these constructs did not emerge in this population.

Although extraversion and neuroticism seem to be important correlates of behavioral inhibition, results from the regression analysis also indicated that these personality traits only accounted for 35% to 48% of the variance in behavioral inhibition in respectively non-clinical children and clinically anxious children. This indicates that an inhibited temperament is not fully covered by these basic personality traits, but may also involve a number of other features. An obvious candidate may be the lack of emotion regulation skills, as implicated by a study of Muris and Dietvorst (2006), who found that behaviorally inhibited children display low levels of the protective temperament factor of effortful control.

The differences in conscientiousness and intellect/openness between non-clinical and clinically anxious children are more difficult to explain, although it can be argued that children with anxiety problems have more difficulty with fulfilling commitments as a result of their avoidance behavior (which manifest itself in lower conscientiousness scores) and are more reluctant to expose themselves to adventure and new situations (resulting in lower levels of intellect/openness). The regression models further indicated that conscientiousness was positively related to behavioral inhibition in both samples. However, these relations were not found in the correlational analysis. These contrasting findings might be due to shared variance among the personality traits (Field, 2009).

An additional finding of this investigation was that there were significant differences between boys and girls with regard to some of the Big Five traits. These sex differences were largely in keeping with those observed in previous samples of non-clinical children (Muris et al., 2009; Barbaranelli et al., 2003; Muris, Meesters, & Diederer, 2005), and further demonstrate that differences in personality between males and females already occur at a fairly young age (Mathews, Deary, & Whiteman, 2003), which would also be predicted from theoretical accounts assuming that gender differences have a clear genetic basis (Maccoby, 2000). Surprisingly, no sex differences were observed for behavioral inhibition and anxiety symptoms. This is clearly in disagreement with the common observation that girls/women display higher levels of fear and anxiety, and thus are also considered to be more prone to such internalizing symptoms, as compared to boys/men (Craske, 2003). It is possible that this result occurred because we solely relied on parent data for documenting these phenomena.

There is quite some evidence in the literature suggesting that parents are less capable of rating internal symptoms and processes in their offspring (Greco & Morris, 2004). As such the inclusion of self-report data would have yielded important cross-validated or even additional information.

Besides this obvious shortcoming, a number of other limitations of the present study should be noted. First, the fact that this study only relied on data obtained from a single assessor, also implicates that the observed associations were elevated due to shared method variance. In a similar vein, it would have been interesting if we had measured behavioral inhibition by means of an observational procedure in the laboratory. Second, the clinically anxious sample was rather small and consisted of a heterogeneous group of anxiety disorders. It would be worthwhile to explore the links between behavioral inhibition, personality traits and symptoms levels for various types of anxiety disorders, in particular because it has been suggested that an inhibited temperament may be more relevant for social phobia than for other anxiety disorders (e.g., Muris, Van Brakel, Arntz, & Schouten, 2011). Third, a cross-sectional design was used, which does not make it possible to examine the cause-effect relations between behavioral inhibition and neuroticism on the one hand, and children's anxiety problems on the other.

SUMMARY

The present results yield further insight in the underlying personality factors of behavioral inhibition, and indicate that extraversion is most strongly associated with an inhibited temperament in both clinically anxious as well as non-clinical children. Further, findings demonstrate that behavioral inhibition explained an additional, unique proportion of the variance in anxiety disorder symptoms of clinically anxious and non-clinical children, even after controlling for personality traits, which implies that behavioral inhibition should be seen as an important correlate of anxiety pathology. This is an important finding, as it suggests that this temperamental characteristic has considerable predictive power for childhood anxiety problems, even beyond common vulnerability factors such as neuroticism and introversion. Behavioral inhibition already becomes manifest at a young age, with some studies indicating that signs of this temperament characteristic are already observable at the age of four months (Kagan & Snidman, 1991). Recent studies have indicated an early intervention program targeting parents are effective in reducing the development of anxiety problems in behaviorally inhibited children (Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005; Kennedy, Rapee, & Edwards, 2009). As behavioral inhibition is a vulnerability factor that can be reliably identified with brief and easy-to-administer screening instruments (Bishop et al., 2003; Edwards, 2007; Broeren & Muris, 2010), this temperament factor may be an important target for prevention (Muris et al., 2011).

6 Summary and conclusions

SUMMARY OF MAIN FINDINGS

Behaviorally inhibited children run greater risk for developing fear and (social) anxiety problems (e.g., Biederman et al., 1993). Therefore, it is important to develop psychometrically sound instruments that can be used to detect vulnerable children before they become highly anxious. Thus, the first and primary aim of this dissertation was to examine the psychometric properties of the Behavioral Inhibition Questionnaire – Short Form (BIQ-SF; Bishop, Spence, & McDonalds, 2003; Edwards, 2007), a 14-item parent-rating scale for assessing an inhibited, anxiety-prone temperament in preschool children in a Dutch, multi-ethnic population (**Chapter 2 and 3**).

In addition, although there is abundant evidence indicating that behavioral inhibition is associated with a heightened risk for developing anxiety pathology, it is also clear that not all temperamentally vulnerable children develop fear and anxiety problems. It is possible that family environment factors act as additive risk factors, increasing the risk of developing pathological anxiety in children. One of the family environment factors thought to be involved in the pathogenesis of childhood anxiety is parental overprotection. Therefore, the second aim of this dissertation was to examine behavioral inhibition and overprotective parenting as correlates and predictors of anxiety disorder symptoms in young children (**Chapter 4**). The third aim of this dissertation was to examine the association between personality factors and behavioral inhibition and anxiety symptoms in non-clinical and clinically anxious children (**Chapter 5**).

Results on the three aforementioned aims are summarized and briefly discussed. Furthermore, results are evaluated in the light of a multifactorial model for the pathogenesis of childhood anxiety. Some concluding remarks and suggestions for future research will be given.

Psychometric properties of the BIQ-SF

In Chapter 2, the psychometric properties of the BIQ-SF scores were examined in a multi-ethnic community population of Dutch boys and girls. Results indicated that the internal consistency of the BIQ-SF was generally satisfactory and that scores on the scale were found to be fairly stable over a time period of two years. Confirmatory factor analysis provided support for a model of six correlated factors, which reflected the intended subscales of peers, physical challenging situations, preschool/separation, performance situations, unfamiliar adults, and unfamiliar situations (Edwards, 2007). Further, acceptable parent-teacher agreement and moderate relations between the BIQ-SF and observations of an inhibited temperament were found. In addition, results showed that BIQ-SF scores were positively associated with measures of anxiety and internalizing symptoms, while no substantial links were found with externalizing symptoms. Altogether, these results indicate that the BIQ-SF can be regarded as a reliable, valid and economical method for assessing behavioral inhibition and anxiety proneness in young children.

These results seem promising. However, classical test theory only provides partial support for the quality of a scale (Wismeijer, Sijtsma, van Assen, & Vingerhoets, 2008). Therefore, in Chapter 3 we used Mokken Scale Analysis (MSA) to investigate the dimensionality and the scalability of the BIQ-SF across various age groups and ethnic subpopulations. Results of these analyses indicated that an 11-item version of the original 14-item BIQ-SF forms a unidimensional scale for native Dutch children. This is not only the case for preschool aged children but also for older kindergarten and primary school children. In Turkish/Moroccan and Surinam/Antillean preschool children, it was found that a scale of respectively 7 and 6 items from the BIQ-SF was capable of reliably and accurately ordering these children on the latent construct of behavioral inhibition. Taken together, these results indicate that the BIQ-SF is adequate for assessing behavioral inhibition in native Dutch children of various ages, but that several items did not discriminate well between children scoring high and children scoring low on behavioral inhibition in ethnic minority groups.

Assessment of behavioral inhibition in native Dutch children

Although the results mentioned in Chapter 2 of this dissertation provide support for the use of the BIQ-SF as a brief screening instrument of behavioral inhibition in children, results of Mokken Scale Analysis (MSA) revealed a somewhat different picture and indicated that some items did not discriminate well between children scoring high and children scoring low on behavioral inhibition. In other words, there are items that do not contribute to the overall behavioral inhibition score. This is especially true for item 4 ('My child is cautious in activities that involve physical challenge, for example: climbing, jumping from heights') and item 5 ('My child is hesitant to explore new play equipment'), which both represent the 'physical challenges' subscale, emerged as bad indicators of the behavioral inhibition construct. Also item 9 ('My child is reluctant to perform in front of others (for example: singing, dancing)'), displayed a bad fit with the remainder of the scale.

A possible explanation for the bad fitting of these items, might be that most children in our sample were too young to display differences in fears of bodily injury and physical danger. Anxiety research has shown that these fears arise during middle childhood (Bauer, 1976). Before that, all children tend to be cautious and inhibited in situations involving physical challenges. Thus, it might be possible that items concerning these fears did not discriminate well between children scoring high and children scoring low on behavioral inhibition in our sample. The same holds for item 9, as research has indicated that especially older children display higher levels of behavioral inhibition in performance situations (Broeren & Muris, 2010). However, more research is necessary to examine the misfit of these items.

Behavioral observations versus questionnaires

Originally, the assessment of behavioral inhibition relied on time-consuming behavioral observations and complex coding procedures. The Behavioral Inhibition Questionnaire-Short

Form, a quick and easy to administer instrument, might be a useful alternative in this regard. However, the extent to which behavioral observations and questionnaires tap the same construct is open to discussion. Typically, a moderate correlation is found between parent ratings and observations of behavioral inhibition (e.g., Van Brakel, Muris & Bogels, 2004; Edwards, 2007). The study reported in Chapter 2 also demonstrates that the correlations between parent ratings of behavioral inhibition and observations of behavioral inhibition are rather modest. Previous studies indicated that the level of behavioral inhibition is dependent on the specific circumstances in which it is measured. For example, a study by Stevenson-Hinde and Glover (1996) found large discrepancies in shyness (which can be regarded as an equivalent of behavioral inhibition) across different contexts. That is, some children who were regarded as 'extremely shy' when observed at home were classified as 'not shy at all' when measured in the laboratory. Thus, the context has clear influence on the results of the behavioral observation. The behavioral observations in our laboratory may have restricted the behaviors of the child to a limited set of specific, non-naturalistic situations at a given point in time, whereas parents draw on their general experience in a variety of situations over time when filling out a questionnaire. This problem could be circumvented by using a multi-method assessment. However, such an approach is not feasible when studying larger populations for epidemiological and research purposes. Therefore, the short and easy to administer BIQ-SF is a useful alternative in this regard.

Behavioral inhibition, overprotective parenting and children's anxiety symptoms

In Chapter 4, the additive and interactive effects of behavioral inhibition and overprotective parenting on social and non-social anxiety disorder symptoms in young Dutch children with a multi-ethnic background were examined. In this study, parents of 3- to 6-year-old children were asked to complete a set of questionnaires measuring behavioral inhibition, anxiety symptoms and overprotective parenting twice, 12 months apart. In addition, parents were interviewed with the Anxiety Disorders Interview Schedule for DSM-IV at the second assessment occasion to assess the clinical severity of the children's anxiety symptoms. Results of cross-sectional analyses indicated that behavioral inhibition consistently emerged as a significant correlate of anxiety symptoms, with associations being stronger for social anxiety than for non-social anxiety symptoms. In the prospective analyses, behavioral inhibition also emerged as a significant predictor of social anxiety symptoms. In the cross-sectional analyses, overprotective parenting emerged as a significant correlate of anxiety, but only in the case of non-social anxiety symptoms and mainly in non-native Dutch children. In the prospective analyses, overprotective parenting did not explain significant additional variance in the development of children's anxiety over time, and the support for an interactive effect of behavioral inhibition and overprotective parenting was unconvincing. Finally, it was found

that children who exhibited stable high levels of behavioral inhibition throughout the study ran the greatest risk for developing an anxiety disorder.

Behavioral inhibition in ethnic subgroups

Results in Chapter 2 indicated that all ethnic subgroups displayed comparable levels of behavioral inhibition. The only difference found was that parents of Turkish children reported lower levels of behavioral inhibition in unfamiliar situations, possibly because of cultural differences in perceptions and expectations of their children when confronted with these events. In contrast, results from Chapter 4 indicated that parents of native Dutch children reported higher levels of behavioral inhibition as compared to parents of non-native Dutch children.

However, group comparisons of the general level of behavioral inhibition are not sufficient to investigate whether a scale can be used across different populations. It is possible that two subgroups have equal group averages but rather different relationships between the item responses and the latent trait. Therefore, Item Response Theory (IRT) is a more appropriate way to investigate the scale properties because it examines biases at an item level. In the two ethnic minority populations examined with IRT in Chapter 3, (i.e., Turkish/Moroccan and Surinam/Antillean) it was found that the BIQ-SF has indeed different scale properties. That is, in the Turkish/Moroccan group, 7 out of the 14 items form a strong scale, whereas in the Surinam/Antillean group, only 6 out of the 14 items constitute a strong scale. A possible practical implication of this result would be to use different versions of the BIQ-SF in different ethnic subpopulations. However, the particularization of an instrument is not an optimal choice, since this would hamper comparability of findings across different studies and different populations. To examine the utility of this instrument, we examined whether the BIQ-SF is capable of detecting anxiety prone children. Results in Chapter 4 indicated that children that are stable high on behavioral inhibition, as measured with the BIQ-SF, exhibited the highest levels of anxiety disorders. Although it could not be statistically substantiated, this seemed irrespective of children's ethnical background. Thus, these results seem to indicate that for practical implications, the BIQ-SF is equally sensitive in detecting anxiety prone children from different ethnical backgrounds. However, more research in larger samples is necessary in order to test this idea.

Behavioral inhibition and (social) anxiety

An important methodological issue in research on behavioral inhibition concerns the overlap between behavioral inhibition and (social) anxiety. In this dissertation, the relation between behavioral inhibition and social anxiety symptoms was stronger than the relation between behavioral inhibition and non-social anxiety symptoms. It has been argued that this stronger association can be explained by the shared content of the instruments that are used to assess these constructs (e.g., Broeren & Muris, 2010; Van Brakel et al., 2004). However, results in this

dissertation indicate that even after controlling for initial social anxiety levels, behavioral inhibition was still found to significantly predict social anxiety, a result that has been found in other studies as well (e.g., Hudson et al., 2012). In addition, it was found that behavioral inhibition was not only associated with social anxiety, but also with other clinical anxiety problems, which is in contrast with the critique that behavioral inhibition is merely an artifact of the shared assessment of social wariness.

Behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms

In Chapter 5, relations between behavioral inhibition, Big Five personality traits, and anxiety disorder symptoms were examined in non-clinical children and clinically anxious children. Results indicated that parents of clinically anxious children rated their offspring as higher on neuroticism and behavioral inhibition, and lower on extraversion, conscientiousness, and intellect/openness as compared to parents of non-clinical youth. Further, extraversion emerged as the strongest correlate of an inhibited temperament, in both the clinically anxious as well as the non-clinical children. In addition, in both the clinical and non-clinical samples, neuroticism was a unique and significant correlate of anxiety disorders symptoms. Finally, it was found that behavioral inhibition explained an additional, unique proportion of the variance in anxiety disorder symptoms of clinically anxious and non-clinical children, even after controlling for personality traits. This further underlines the importance of behavioral inhibition as a correlate of anxiety pathology.

Behavioral inhibition and personality factors

Behavioral inhibition is a stable temperamental trait with a clear genetic basis. Temperament is thought to be a precursor of later personality development, reflecting normal and stable variations in emotionality, behavior, reactivity and regulation across contexts (e.g., Kagan, 1994; Rothbart & Bates, 1998). The results described in Chapter 5 underlined the unique role of behavioral inhibition beyond basic personality traits in childhood anxiety disorder symptoms. Since behavioral inhibition can be identified at a fairly young age, before personality factors can be measured, this temperamental factor might be an important target for prevention.

A MULTIFACTORIAL MODEL FOR THE PATHOGENESIS OF CHILDHOOD ANXIETY

The results of this dissertation provide support for a multifactorial model for the pathogenesis of childhood anxiety, in which various vulnerability and protective factors operate in a dynamic way in the development and maintenance of anxiety disorder symptoms (e.g.,

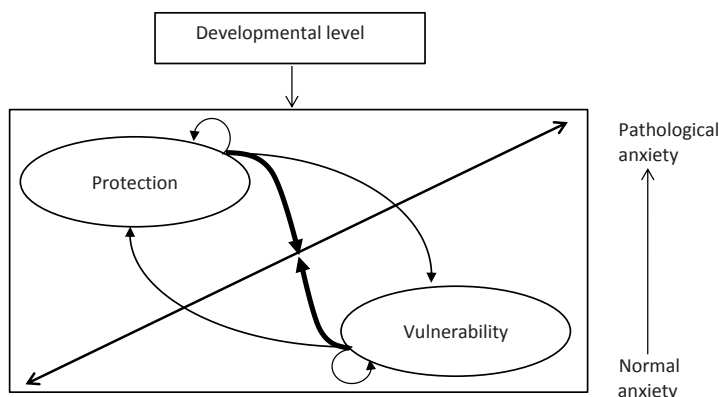


Figure 1. A dynamic, multifactorial model for the pathogenesis of childhood anxiety disorders (Muris, 2007).

Muris, 2007; Rapee, 2001). In Figure 1, a multifactorial model proposed by Muris (2007a) is depicted.

This model is based on the assumption that there is a continuum with normal fear and anxiety on the one end, and pathological manifestations of anxiety on the other end. At each point during children's development, their level of anxiety is determined by the constellation of protective and vulnerability factors. This model assumes that protective and vulnerability factors operate in a dynamic way, allowing these factors to influence, reinforce or interact with each other. When high vulnerability is combined with low protective factors, the probability rises (or 'increases') that the child develops an anxiety disorder. It is assumed that the developmental level of the child plays a role in the origin, manifestation and continuation of the anxiety problems.

Results from the studies in this dissertation clearly indicate that behavioral inhibition can be seen as a vulnerability factor for anxiety disorders. However, although the results in Chapter 4 indicated that stable inhibited children ran greatest risk of developing anxiety disorders, the majority of the group did not develop clinically significant anxiety problems. A recent meta-analysis found that an inhibited temperament was associated with a greater than sevenfold increase in the risk of developing social anxiety disorder (Clauss & Blackford, 2012), but also indicated that only 43% of the inhibited children developed a social anxiety disorder. These results imply multifinality (i.e., the same antecedent may have different developmental outcomes). This fits nicely with the multifactorial model described above, which indicates that vulnerability factors do not operate in isolation, but that multiple risk, vulnerability and protective variables are involved.

Another risk factor that is thought to be involved in the pathogenesis of childhood anxiety and that we examined in this dissertation is parental overprotection. Because overprotective parents want to shield their child for possible adverse outcomes, their child does not get exposed to various (new) situations. Thus, an overprotective parenting style may promote the

avoidant, inhibited behavior to be preserved, which in turn might lead to anxiety problems. However, results in this dissertation indicated that this style of parenting does not explain the development of anxiety disorder symptoms over the two year period. This might be explained by the speculative thought that (over)protective parenting is not a pathogenic style for preschool aged children, but that this parenting style only becomes detrimental when parents maintain this parenting style over time. In this way, their children might not learn how to cope with threatening situations, which is fearful and might lead to avoidance of various situations. Another recent study indeed found evidence for this idea (Lewis-Morrarty and colleagues, 2012). This study indicated that when children are followed over a longer time interval and parenting behavior is assessed on a later point during childhood, overprotective parenting may emerge as a more clear-cut predictor of anxiety symptoms.

Besides behavioral inhibition and overprotective parenting, we examined the association between Big Five personality factors and anxiety. Results indicated that especially a personality characterized by a combination of high levels of neuroticism and low levels of extraversion could be seen as a vulnerability factor for developing anxiety disorders in adults and youths. It has been argued that behavioral inhibition is the observable manifestation of these underlying personality factors, making it an important target for prevention.

According to this multifactorial model, several risk and vulnerability factors interact with each other. In Chapter 4, we examined the interaction effect of behavioral inhibition and overprotective parenting on anxiety disorder symptoms. We expected that a combination of temperamental vulnerability (behavioral inhibition) and an adverse family environment (overprotective parenting) would be associated with higher anxiety scores. Although we found some support for this hypothesis, this support was unconvincing. We speculated that overprotective parenting is not a pathogenic parenting strategy for preschool aged children, as it is normal for parents to protect their young children against new, fearful situations and stimuli. Another speculative possibility is that the follow up period was too short to examine the pathogenic effects of this parenting style.

In sum, the results described in this dissertation provide partial support the multifactorial model of Muris (2007), indicating that various potential predisposing factors have an additive effect on anxiety. However, we found little support found for interactive effects of the vulnerability factors behavioral inhibition and overprotective parenting on childhood anxiety.

LIMITATIONS

There are some limitations that need to be taken into account. First, a selection bias could have affected the generalizability of the results presented in this dissertation. Especially in the longitudinal study, attrition rates were substantial. This might have caused differences in the parents participating in the study compared to the parents not participating, even

though statistical analyses indicated that there were no differences in behavioral inhibition scores between children of parents continuing in the study and children of parents who dropped out.

Second, in our longitudinal study, children's behavioral inhibition and anxiety scores were only assessed on three points in time over a two year period, whereas other studies (e.g., Biederman et al., 1993; Lewis-Morrarty et al., 2012) collected data over a more extended time period. When there is less time in between, the measurements will be more stable, making it more difficult to detect changes. Furthermore, the results found in this dissertation regarding the effects of overprotective parenting may only be valid for children at a preschool age who are only followed for a fairly short interval (i.e., 1 to 2 years). It is possible that the detrimental effects of overprotective parenting only become manifest after a longer time period, most likely after a developmental transition has taken place (e.g., Manassis, Hudson, Webb, & Albano, 2005). In addition, it remains unclear how behavioral inhibition relates to other disorder symptoms over a longer period of time as the association between behavioral inhibition and for example depressive symptoms may only become manifest in adolescence (Brozina & Abela, 2006). More longitudinal studies, preferably from birth to adulthood, are necessary in order to study the longitudinal effects of behavioral inhibition and the role of overprotective parenting in the development of anxiety disorder symptoms.

Third, several models have stressed the importance of other parent-related constructs that are involved in the development of child anxiety problems (e.g., Wood, McLeod, Sigman, Hwang, & Chu, 2003), such as parental anxiety. It seems important to examine multiple risk factors for child anxiety and the interrelations between those risk factors.

Fourth, a non-native ethnic minority status in the Netherlands is usually indicative of a lower socioeconomic status (SES). This may contribute to a higher susceptibility for developing anxiety disorders (Hale et al., 2005). However, SES was not systematically measured in the studies included in this dissertation, and therefore we could not control for this possible confounder.

Lastly, the non-native Dutch sample in this dissertation consisted of a heterogeneous group, which was too small to examine in separate analyses. Given the differences found, it seems worthwhile to look in more detail to the differences within each of these ethnic groups.

CLINICAL IMPLICATIONS AND FUTURE DIRECTIONS

Suggestions for further research for each study individually have already been given in the separate chapters, and the limitations mentioned above also indicate future directions. However, in this paragraph, several general issues for further research will be considered.

The results in this dissertation clearly emphasize the role of behavioral inhibition in the development of childhood anxiety disorders. Thus, this construct indeed seems important as an early marker of anxiety problems in children. The primary aim of this dissertation was to examine whether the BIQ-SF is a reliable and valid screening instrument for measuring this construct in young children. Examining the psychometric properties of instruments is essential in psychological practice, as questionnaires are used in the diagnostic process and guide practitioners in making decisions. Results indicated that especially in native Dutch children, the BIQ-SF is a reliable and valid instrument to measure behavioral inhibition. Further, the BIQ-SF proved to be able to detect vulnerable children at risk for developing anxiety disorders. That is, children scoring stable high on the BIQ-SF ran greatest risk at developing a clinically significant anxiety problem. In addition, the results of this dissertation stress the importance of examining the psychometric properties of a scale in ethnically diverse samples, as clear differences were found between native and non-native Dutch children. Although the results indicated that the scale had less favorable scale properties in children from non-native Dutch descent, this did not seem to have an impact on the predictive validity of the BIQ-SF in these children. However, as this observation could not be statistically affirmed because of the low prevalence rate of anxiety disorders in our sample, conclusions based on the BIQ-SF scores in these subgroups of children should be interpreted with caution. More research in larger samples of children with diverse ethnic backgrounds seems warranted.

Further, the results of this dissertation indicate that it is important to use statistical analysis such as Mokken Scale Analysis (MSA) in order to examine the quality of a scale. This analysis method provides useful information regarding the fit of items in a scale, and is capable of examining the scale properties across various age groups and (ethnic) subpopulations, and should be used more often when examining the psychometric properties of psychological tests and instruments.

As another suggestion, it seems important to examine more extensively the precise role of overprotective parenting in the development of pathological anxiety. Results in this dissertation indicated that the role of overprotective parenting on the development of children's anxiety symptoms over time was marginal in young children. That is, none of the analyses revealed a significant main effect of overprotection on anxiety scores over two-years-time in the 3- to 6-year-old children in our sample. More longitudinal research is necessary in order to determine whether overprotective parenting should also be targeted in prevention programs, and if so, at what age. As it is possible that the detrimental effect of this parenting style may only become pathogenic if parents are not able to adopt a more autonomy-promoting style when children become older, more research is necessary in order to determine whether and at what age parents should modify their rearing behaviors.

To conclude, the results in this dissertation indicated that the BIQ-SF, a quick and easy questionnaire measuring behavioral inhibition, proved to be able to detect vulnerable children at risk for developing anxiety disorders already at a young age. The early identification

of anxiety prone-children with the BIQ-SF makes it possible to implement early prevention and intervention programs, in order to alter the trajectory of pathological anxiety development. Recently, Rapee and colleagues (2005; 2010) developed the Cool Little Kids program, an early intervention parent-education program aiming to prevent behaviorally inhibited preschoolers developing anxiety disorders by prompting parents to motivate their children to get exposure to novel stimuli and situations. This preventive intervention has proven to be effective; behaviorally inhibited children whose parents participated in the program showed a decrease in anxiety and behavioral inhibition as compared to controls. At this moment, we are conducting a first study to examine the efficacy of this preventive intervention at the Erasmus University Rotterdam.

Nederlandse samenvatting

Casus Michael

Michael is 8 jaar en wordt door zijn ouders aangemeld bij een psycholoog omdat hij last heeft van angstklachten. De ouders van Michael vertellen dat hij bang is dat andere kinderen hem uitlachen, pesten of stom vinden, terwijl dit volgens zijn ouders nog nooit gebeurd is. Tijdens het intakegesprek vertellen de ouders dat Michael altijd al erg verlegen en teruggetrokken is geweest. Toen hij voor het eerst naar school ging, durfde hij aanvankelijk niet met de juffrouw en de kinderen in zijn klas te praten. Elke dag dat zijn moeder hem in die tijd naar school bracht was er sprake van een klein drama: Michael huilde en vroeg zijn moeder of ze bij hem wilde blijven. Nog steeds heeft hij na een vakantie opstartproblemen, al kent hij zijn klasgenoten inmiddels goed. Ook vindt Michael het nooit leuk tijdens de gymles: hij is angstig bij het uitvoeren van de oefeningen, en is bang dat hij zich zal bezeren. Op de vraag wat Michael voor jongen is, antwoordt zijn moeder: "Hij is stil, verlegen en schuchter. Michael lijkt nooit ergens meteen enthousiast over, maar kijkt altijd eerst de kat uit te boom."

INLEIDING

Angst is een normaal fenomeen tijdens de ontwikkeling van kinderen. Het is in feite een aangeboren reactie die ervoor zorgt dat kinderen zichzelf beschermen tegen mogelijk gevaar (Muris, 2007). Bij de meeste kinderen zijn de angsten mild en verdwijnen ze weer even snel als ze tevoorschijn zijn gekomen. Sommige kinderen ontwikkelen echter een angststoornis; bij hen wordt de angst zo hevig dat ze een belemmering gaat vormen in het dagelijks leven. Angststoornissen behoren tot de meest voorkomende psychische stoornissen bij kinderen (Bernstein e.a., 1996). De angst manifesteert zich doorgaans al op jonge leeftijd. Echter, voordat mensen met angstproblemen hulp zoeken zijn er vaak al jaren voorbij (Thompson e.a., 2004), waardoor de angst een negatieve invloed op het leven heeft uitgeoefend. Onbehandelde angststoornissen lijken tot andere stoornissen in de adolescentie te leiden, onder andere depressie (Stein e.a., 2001) en alcohol- en drugsmisbruik (Zimmerman e.a., 2003). Daarnaast hebben kinderen met angststoornissen een grotere kans op vroegtijdig schoolverlaten (Van Ameringen e.a., 2003).

Gedragshibitie als signaal van angst

Gezien de ernstige gevolgen van een onbehandelde angststoornis is het van belang om angstproblemen van kinderen in een vroeg stadium op te sporen en te behandelen. Een concept dat in dit verband relevant is, is gedragshibitie. Gedragshibitie kan gedefinieerd worden als een patroon van gedragingen, waarbij een kind in onbekende en uitdagende

situaties symptomen van angst en stress laat zien (Kagan, 1989). Geïnhibeerde kinderen kunnen bijvoorbeeld erg verlegen en afwachtend zijn als ze nieuwe kinderen ontmoeten. Het lijkt erop dat gedragsinhibitie aangeboren is en stabiel is over de tijd. Zo is uit onderzoek gebleken dat 75% van de kinderen die op 2- jarige leeftijd geïnhibeerd gedrag vertoonde, 6 jaar later nog steeds hetzelfde geïnhibeerde gedrag liet zien als ze in een nieuwe situatie kwamen of nieuwe mensen ontmoetten (Kagan e.a., 1988). Er is bewijs dat geïnhibeerde kinderen gevoeliger zijn voor het ontwikkelen van angststoornissen (Fox e.a., 2005) en meer specifiek wijzen sommige onderzoeken uit dat gedragsinhibitie in het bijzonder een rol speelt bij het ontwikkelen van een sociale angststoornis (Chronis-Tuscano e.a., 2009; Hayward e a., 1998; Hirshfeld-Becker e.a., 2007; Muris e.a., 2011). Een sociale angststoornis wordt gezien als een psychische aandoening en houdt in dat een persoon angstig, onzeker of verlegen is bij alledaagse sociale interacties en gebeurtenissen, bijvoorbeeld bij het naar school gaan of boodschappen doen.

Hoe kan gedragsinhibitie bij jonge kinderen gemeten worden?

Aangezien geïnhibeerde kinderen een grotere kans lopen op het ontwikkelen van een (sociale) angststoornis, is het belangrijk om gedragsinhibitie op jonge leeftijd vast te stellen. Het meten van gedragsinhibitie is lange tijd door middel van observaties in het laboratorium of de natuurlijke omgeving gedaan. Een voordeel van zo'n observatiemethode is dat het geïnhibeerde gedrag objectief vastgesteld kan worden. Een nadeel is dat dit arbeidsintensief en duur is, omdat het gedrag van het kind gefilmd wordt en deze film achteraf door getrainde medewerkers minutieus bekeken en gecodeerd moet worden. Bovendien is het niet mogelijk om een volledige indruk van het geïnhibeerde gedrag van het kind te krijgen, omdat de observatie beperkt blijft tot een aantal specifieke situaties in het laboratorium of thuis. Ook kan het observeren van het gedrag met zich meebrengen dat het kind zich anders gedraagt dan normaal, omdat het kind weet dat het gefilmd en in de gaten gehouden wordt. Het afnemen van een vragenlijst kan een geschikter alternatief zijn. Voordelen van het afnemen van een vragenlijst bij de ouders of leerkrachten van de kinderen is dat het een snelle, makkelijke en goedkope manier is om informatie te verzamelen. Ouders of leerkrachten zijn zich bewuster van het gedrag van het kind over verschillende situaties heen, waardoor deze methode misschien zelfs een vollediger beeld kan geven van de gedragsinhibitie bij het kind.

De rol van ouders

Eerder onderzoek heeft aangetoond dat circa 40% van de geïnhibeerde kinderen drie jaar na het meten van gedragsinhibitie een angststoornis had (Biederman e.a., 1993). Ondanks dat er veel onderzoeken zijn die aantonen dat verlegen, geremde kinderen meer kans hebben op het ontwikkelen van angstklachten, is het dus niet zo dat alle geïnhibeerde kinderen verlegen en geremd blijven en angstklachten ontwikkelen. Daarom is het belangrijk om te onderzoeken welke factoren eraan bijdragen dat sommigen van deze kwetsbare kinderen

angstklachten ontwikkelen, zodat we in preventieve interventies hierop in kunnen spelen. Een mogelijke risicofactor is de rol van ouders. Sommige ouders gaan mee in het vermijdingsgedrag van het kind, terwijl anderen dit gedragspatroon juist doorbreken. Een stimulerende opvoedstijl zou er aan kunnen bijdragen dat het kind minder geïnhibeerd wordt, omdat het kind aangezet wordt om enge/ spannende dingen te ondernemen. Het kind krijgt hierdoor oefening in spannende situaties, waardoor het merkt dat de angst vaak ongegrond is. Bezorgde, overbeschermdende ouders daarentegen staan hun kind toe om enge situaties te vermijden, waardoor het kind geen ervaring krijgt in deze (nieuwe) situaties. Op deze manier zouden de angsten kunnen blijven bestaan.

Persoonlijkheidskenmerken

Bepaalde persoonlijkheidskenmerken kunnen ook een risicofactor zijn voor het ontwikkelen van een angststoornis. Volgens het Big Five Model van persoonlijkheidskenmerken zijn er vijf basis persoonlijkheidskenmerken, namelijk (1) intellect/openheid voor ervaringen, (2) conscientieusheid, (3) extravertie, (4) goedertierenheid en (5) neuroticisme (ook wel emotionele instabiliteit genoemd). Met deze dimensies kan de persoonlijkheid van personen beschreven worden. Twee persoonlijkheidsfactoren lijken in het bijzonder geassocieerd te zijn met angst; voornamelijk personen die gekarakteriseerd kunnen worden als emotioneel instabiel (ook wel: neurotisch) en laag extravert (ook wel: introvert) lijken meer risico te lopen om angststoornissen te ontwikkelen. Muris en collega's (2009) deden onderzoek naar de relatie tussen persoonlijkheidsfactoren, angst en gedragsinhibitie bij kinderen. Echter, in dat onderzoek werden alleen kinderen zonder angststoornis onderzocht. Replicatie van deze bevindingen in een groep klinisch-angstige kinderen zou de unieke rol van gedragsinhibitie in de ontwikkeling van angststoornissen verder aan kunnen tonen.

Etniciteit

Eerdere onderzoeken naar de relaties tussen gedragsinhibitie, angst en overbeschermdende opvoeding zijn uitgevoerd in voornamelijk mono-etnische, blanke steekproeven (Edwards e.a., 2010; Hudson e.a., 2011a; 2011b). Ook de onderzoeken naar de validiteit en de betrouwbaarheid van de BIQ-SF hebben zich voornamelijk op blanke Europese en blanke Amerikaanse kinderen gefocussed (i.e., > 85% in alle studies; Bishop e.a., 2003; Broeren & Muris, 2010; Edwards, 2007; Kim e.a., 2011).

Echter, er zijn meerdere redenen om kinderen met verschillende etnische achtergronden te vergelijken. Ten eerste weten we uit eerder onderzoek dat kinderen van verschillende culturen verschillen in gedragsinhibitie vertonen (Chen e.a., 1998; Rubin e.a., 2006). Ook weten we dat opvoedgedrag verschilt tussen verschillende culturen. Dit geldt wellicht ook voor overbeschermdende opvoeding. Zo vonden Chen en collega's (1998) dat ouders van Chinese kinderen zich beschermender en bezorgder opstelden tegen hun kinderen dan ouders van Canadese kinderen. Daarnaast is er bewijs uit een Nederlands onderzoek dat kinderen van

een etnische minderheid een groter risico lopen op het ontwikkelen van angst klachten (Hale e.a., 2005). Daarom is het van belang om specifiek naar de rol van etniciteit te kijken in zowel het meten van gedragsinhibitie, als in de relaties tussen gedragsinhibitie, angst en opvoedgedrag.

De Behavioral Inhibition Questionnaire-Short Form (BIQ-SF)

Het primaire doel van deze dissertatie was het bestuderen van de eigenschappen van een korte, makkelijk af te nemen vragenlijst voor gedragsinhibitie, de Nederlandse versie van de Behavioral Inhibition Questionnaire-Short Form (BIQ-SF; Bishop, Spence, & Mc Donalds, 2003; Edwards, 2007). De BIQ-SF is een ouder- en leerkrachtvragenlijst die gedragsinhibitie bij jonge kinderen meet. De lijst bestaat uit 14 items (vragen) die betrekking hebben op hoe het kind omgaat met onbekende sociale situaties, onbekende niet-sociale situaties en fysiek uitdagende situaties. Aan de hand van de antwoorden op deze vragen kon een score worden berekend: hoe hoger deze score, hoe geïnhibeerder het kind (zoals aangegeven door de invuller). In dit proefschrift onderzochten we de psychometrische eigenschappen van deze vragenlijst.

DE STUDIES IN DIT PROEFSCHRIFT

In dit proefschrift worden vier studies beschreven. In **Hoofdstuk 2 en 3** van dit proefschrift onderzochten we de psychometrische eigenschappen van de BIQ-SF, een vragenlijst om gedragsinhibitie te meten. In **Hoofdstuk 4** bekeken we de relaties tussen gedragsinhibitie, overbeschermende opvoeding en angstsymptomen in niet-klinisch angstige kinderen. Tot slot bekeken we in **Hoofdstuk 5** de relaties tussen persoonlijkheidsfactoren, gedragsinhibitie en symptomen van angststoornissen bij niet-klinische en klinisch angstige kinderen.

Psychometrische eigenschappen van de BIQ-SF

In **Hoofdstuk 2** keken we naar de psychometrische eigenschappen van de BIQ-SF in een steekproef van 2343 Nederlandse jongens en meisjes tussen de 2,5 en 6 jaar oud van verschillende etnische achtergronden. De ouders van deze kinderen vulden de vragenlijst in, waarna we ze één en twee jaar later nogmaals benaderden om weer de BIQ-SF en andere vragenlijsten in te vullen. Resultaten wezen uit dat de scores op de BIQ-SF vragenlijst redelijk stabiel waren over een periode van twee jaar. Dit toont aan dat gedragsinhibitie kan veranderen in de kindertijd, maar dat het in de meeste kinderen een stabiel blijvende eigenschap is. Verder vroegen we de ouders en de kinderen in het kader van een vervolgmeting na twee jaar om naar de Erasmus Universiteit te komen om daar in het laboratorium bepaalde taken uit te voeren. De kinderen werden hierbij aan een serie van nieuwe situaties blootgesteld. Zo kwam er bijvoorbeeld een gekostumeerd persoon de kamer binnen en werd aan de kinderen

gevraagd of zij de cape, de pruik en het masker van deze persoon af wilden zetten, en vroegen we de kinderen om zich zo recht mogelijk te laten vallen op een matras. Het gedrag van de kinderen tijdens de situaties werd met een niet-zichtbare camera opgenomen en later beoordeeld. We keken hierbij onder andere naar het aantal aanmoedelingen dat het kind nodig had om de taken uit te voeren, en de aarzeling van het kind om te spreken. We vonden dat de relatie tussen wat de ouders rapporteerden op de BIQ-SF en de gedragsobservaties van een geïnhibeed temperament zwak tot matig was. Met andere woorden: de overeenstemming tussen wat ouders rapporteerden ten aanzien van het geïnhibeede gedrag van het kind en wat wij observeerden in het laboratorium ten aanzien van het geïnhibeede gedrag van het kind was niet erg hoog. Dit kan komen doordat de items in de vragenlijst op een meer algemene manier geformuleerd waren, waardoor ze een grote verscheidenheid aan geïnhibeede gedragingen meten over een langere tijdperiode, terwijl de observaties uitgevoerd waren in een heel specifieke, tijdgebonden en onnatuurlijke setting (het laboratorium op de Erasmus Universiteit). We weten bijvoorbeeld uit eerder onderzoek dat het observeren van temperament op één meetmoment veel ruis (meetfouten) met zich mee kan brengen (Epstein, 1979; 1980).

Verder vroegen we de leerkracht van het kind de BIQ-SF in te vullen, zodat we de scores van de ouders en de leerkrachten op de BIQ-SF konden vergelijken. We vonden een gematigde overeenstemming tussen de ouder- en de leerkrachtbeoordeling (interbeoordelaar betrouwbaarheid). Ook vonden we dat de BIQ-SF goed samenhang met vragenlijsten die hetzelfde gedrag maten (convergente validiteit) en niet samenhang met vragenlijsten die ander gedrag maten (divergente validiteit). Al met al wijzen de resultaten uit dat de BIQ-SF gezien kan worden als een goed bruikbare methode om gedragsinhibitie te beoordelen bij jonge kinderen.

In **Hoofdstuk 3** hebben we nog verder gekeken naar de psychometrische kwaliteit van de BIQ-SF met behulp van Mokken Scale Analyse. Met deze analyse konden we de kwaliteit van de schaal en de veertien losse items beoordelen in verschillende leeftijdsgroepen en in etnische subgroepen. Resultaten van de analyses lieten zien dat 11 van de 14 items van de BIQ-SF een unidimensionele schaal vormden voor autochtone Nederlandse kinderen. Dit gold voor kinderen van kleuterleeftijd tot kinderen in de lagere schoolleeftijd. Deze analyses geven aan dat de BIQ-SF een behoorlijk sterke schaal is. De items 4, 5 en 9 lijken minder goed te zijn voor het beoordelen van gedragsinhibitie, maar voor de Nederlandse kinderen wel voldoende.

Verder vonden we dat een deel van de BIQ-SF (6 of 7 items) betrouwbaar en accuraat de gedragsinhibitie kon meten bij Turkse/Marokkaanse en Surinaamse/Antilliaanse peuters. Er lijkt dus een verschil te zijn in het meten van gedragsinhibitie bij Nederlandse kinderen en kinderen van een andere etnische achtergrond. Ook geven deze analyses aan dat meerdere items het minder goed doen bij kinderen met een andere etnische achtergrond dan de Nederlandse. Een mogelijke verklaring hiervoor is dat de perceptie van ouders van

het geïnhibeerde gedrag van hun kinderen beïnvloed kan zijn door de culturele waarden en normen. Zo weten we uit eerder onderzoek dat in westerse culturen, kinderen aangeemoedigd worden om assertief en onafhankelijk te zijn, terwijl in oosterse culturen verlegen en teruggetrokken gedragingen meer gewaardeerd worden. Het is mogelijk dat sommige geïnhibeerde gedragingen door ouders van kinderen met een niet-Nederlandse achtergrond anders geïnterpreteerd worden.

Alhoewel deze analyses aangaven dat meerdere items minder goed zijn voor het beoordelen van gedragsinhibitie, toch leek dit toch geen invloed te hebben op het voorspellen van het ontwikkelen van angststoornissen. Al met al wijst dit uit dat de BIQ-SF goed te gebruiken is om kinderen met een risico op het ontwikkelen van angststoornissen op te sporen. Er leek hierin geen verschil te zijn in het voorspellen van angststoornissen bij autochtone Nederlandse kinderen en kinderen met een niet-Nederlandse achtergrond, maar meer onderzoek in grotere steekproeven is nodig om dit met meer zekerheid te kunnen stellen.

Gedragsinhibitie en overbeschermende opvoeding als voorspellers van angstsymptomen

In **Hoofdstuk 4** hebben we de relatie tussen gedragsinhibitie, overbeschermende opvoeding en angstsymptomen in peuters en kleuters met een multi-etnische achtergrond bekeken. We vroegen ouders van 3-tot 6-jaar oude kinderen om vragenlijsten over gedragsinhibitie, angst en overbeschermende opvoeding tweemaal in te vullen, met twaalf maanden tijd ertussen. Om de ernst van de angstsymptomen van de kinderen te bepalen werden de ouders daarnaast op het tweede meetmoment geïnterviewd met een klinisch angstinterview, de *Anxiety Disorders Interview Schedule for DSM-IV*. Met dit interview kunnen angststoornissen gediagnosticeerd worden. Resultaten lieten zien dat gedragsinhibitie een significante voorspeller was voor sociale angstsymptomen. De rol van overbeschermende opvoeding op het voorspellen van angstsymptomen was niet overtuigend. Een mogelijke verklaring is dat overbeschermende opvoeding tijdens de kleuterleeftijd nog geen negatieve invloed heeft op de ontwikkeling van kinderen, omdat het wellicht een volkomen normale benadering van ouders is om hun jonge kinderen te beschermen en om hen geleidelijk aan alle nieuwe stimuli en situaties te laten wennen. Het is denkbaar dat ouders die deze opvoedstijl blijven behouden, ook als het kind ouder is, hun kinderen hinderen bij het leren omgaan met dreigende situaties en geassocieerde angst.

Verder vonden we dat ouders van Nederlandse kinderen hogere niveau's van angst en gedragsinhibitie, maar lagere niveau's van overbeschermende opvoeding rapporteerden dan ouders van kinderen met een niet-Nederlandse achtergrond. Tenslotte vonden we dat kinderen die tijdens de verschillende meetmomenten gedurende het onderzoek constant hoge niveau's van gedragsinhibitie lieten zien, de meeste kans liepen op het ontwikkelen van een angststoornis.

Gedragsinhibitie, persoonlijkheidskenmerken en angstsymptomen.

In **Hoofdstuk 5** onderzochten we de relaties tussen gedragsinhibitie, persoonlijkheidskenmerken en angstsymptomen in 147 niet-klinische en 45 klinisch angstige kinderen. We vroegen de ouders van deze kinderen om vragenlijsten in te vullen over gedragsinhibitie, angst en Big Five persoonlijkheidskenmerken. Resultaten wezen uit dat ouders van angstige kinderen, vergeleken met ouders van niet-angstige kinderen, hun kinderen hoger beoordeelden op gedragsinhibitie en emotionele instabiliteit (neuroticisme), en lager op extraversie, nauwgezetheid en intellect/openheid voor nieuwe ervaringen. Verder keken we of persoonlijkheidskenmerken gedragsinhibitie konden voorspellen. We vonden dat een lagere mate van extraversie de sterkste voorspeller was van een geïnhibeerd temperament. Dit was voor zowel de klinisch angstige kinderen als de niet-klinisch angstige kinderen. Verder werd gevonden dat emotionele instabiliteit een unieke en significante voorspeller van angstsymptomen was. Tenslotte werd gevonden dat in zowel de klinisch angstige kinderen als de niet-klinisch angstige kinderen, een uniek deel van angst door gedragsinhibitie voorspeld kon worden, hetgeen erop wijst dat gedragsinhibitie een belangrijk concept is in de ontwikkeling van de angststoornissen bij kinderen.

TOT SLOT

Al met al laten de resultaten uit dit proefschrift zien dat de BIQ-SF, een korte en makkelijk af te nemen vragenlijst, geschikt is om gedragsinhibitie te meten en om kwetsbare kinderen met een verhoogd risico op de ontwikkeling van angstproblemen op te sporen. Sensitieve screeningsinstrumenten die kwetsbare jonge kinderen kunnen signaleren zijn erg belangrijk, aangezien er dan preventieve interventie plaats kan vinden. Onderzoek van Rapee e.a. (2005; 2010) uit Australië wijst uit dat dit zinvol kan zijn. Geïnhibeerde kinderen, waarvan de ouders psycho-educatie over angst en gedragsinhibitie, opvoedtechnieken, exposure oefeningen en uitleg over cognitieve herstructurering kregen, hadden na een jaar minder angstdiagnoses dan de gedragsgeïnhibeerde kinderen waarvan de ouders geen therapie kregen. Aan de Erasmus Universiteit werken we momenteel aan een onderzoek waarin de effecten van deze behandeling voor gedragsinhibitie in een Nederlandse populatie worden onderzocht.

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List of publications

- Van der Linden, D., Vreeke, L.J. & Muris, P. (2013). Don't be afraid of the General Factor of Personality (GFP): Its relationship with behavioral inhibition and anxiety symptoms in children. *Personality and Individual Differences*, 54, 367–371. DOI: 10.1016/j.paid.2012.10.002
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- Vreeke, L.J., Muris, P., Mayer, B., Huijding, J., Bos, A., Van der Veen, M., Raat, H., & Verheij, F. (2012). The assessment of an inhibited, anxiety-prone temperament in a Dutch multi-ethnic population of preschool children. *European Child and Adolescent Psychiatry*, 21, 623-633. DOI 10.1007/s00787-012-0299-0
- Vreeke, L.J., & Muris P. (2010). Geremde en verlegen kinderen. *Kind en Adolescent Praktijk*, 9, 123-125.

SUBMITTED MANUSCRIPTS

- Vreeke, L.J., Muris, P., Mayer, B., Huijding, J. & Rapee, R. M. (under review). Skittish, shielded, and scared: Relations among behavioral inhibition, overprotective parenting, and anxiety in native and non-native Dutch preschool children.
- Vreeke, L.J., Bouwmeester, S., Muris, P., & Mayer, B. (submitted). Non-parametric IRT analysis of the Behavioral Inhibition Questionnaire-Short Form in Dutch children with a multi-ethnic background.
- Heyne, D., Vreeke, L.J., Maric, M., Boelens, H., Van Widenfelt, B. (submitted). Identifying the function of school attendance problems: An adapted version of the School Refusal Assessment Scale–Revised.

PRESENTATIONS

- Vreeke, L.J., Muris, P., Mayer, B., Huijding, J., Van Sevenbergen, J. (Januari 2012). Behavioral inhibition as a vulnerability factor for anxiety in children. Research school of Experimental Psychopathology (EPP): Symposium 'Test development and test construction" - Heeze, the Netherlands.
- Vreeke, L.J., Muris, P., Mayer, B., Huijding, J., Van Sevenbergen, J. (September 2011). Behavioral inhibition as a vulnerability factor for anxiety in children. Erasmus Graduate Research Day 2011 - Rotterdam, the Netherlands.

Vreeke, L.J., & Muris, P. (September 2011). Behavioral inhibition as a vulnerability factor of anxiety disorders symptoms in children. The European Association of Behavioral and Cognitive Therapy (EABCT) – Reykjavik, Iceland.

Vreeke, L.J., & Muris, P. (June 2011). Behavioral inhibition as a vulnerability factor for social anxiety in children. Social Anxiety Masterclass, Leiden University – Leiden, the Netherlands.

POSTER PRESENTATIONS

Vreeke, L.J., Muris, P., & Mayer, B. (June 2010). Relations between behavioral inhibition, Big Five personality factors, and anxiety disorder symptoms in clinical and non-clinical children. Poster presented at the World Congress of Behavioral and Cognitive Therapy (WCBCT) – Boston, USA.

Vreeke, L.J., & Muris, P. (September 2010). Psychometric properties of the Behavioral Inhibition Questionnaire: A brief measure of anxiety vulnerability in children. Poster presented at the Erasmus Graduate Research Day – Rotterdam, the Netherlands.

Vreeke, L.J., & Muris, P. (March 2010). Psychometric properties of the Behavioral Inhibition Questionnaire: A brief measure of anxiety vulnerability in children. Poster presented at the European Scientific Association on Residential and Foster Care for Children and Adolescents (EUSARF) – Groningen, the Netherlands.

Vreeke, L.J., & Muris, P. (September 2009). Psychometric properties of the Behavioral Inhibition Questionnaire: A brief measure of anxiety vulnerability in children. Poster presented at The European Association of Behavioral and Cognitive Therapy (EABCT) – Dubrovnik, Croatia.

Vreeke, L.J., & Muris, P. (September 2009). Psychometric properties of the Behavioral Inhibition Questionnaire: A brief measure of anxiety vulnerability in children. Poster presented at the Research school of Experimental Psychopathology (EPP) day - Utrecht, the Netherlands.

Curriculum Vitae

Leonie Vreeke was born on September 10th, 1983, in Gouda, the Netherlands. She completed her secondary education in 2001 at the Sint Antoniuscollege, Gouda. In the same year, she started studying Psychology at Leiden University. She received her Master's degree in Developmental and Educational Psychology in 2006. Her master thesis concerned the translation and evaluation of an instrument for measuring school attendance problems. After her graduation, she worked as a junior policy advisor at the Ministry of Education, Culture and Science, where she was involved in the new policy regarding tailored education for children with special needs. After that, she worked as a junior scientific teacher at Leiden University, for the Departments Educational and Child Studies - Child & Family Studies and Developmental and Educational Psychology. In May 2008, Leonie started as a PhD student at the Institute for Psychology at the Erasmus University Rotterdam. The results of this PhD project are reported in the present dissertation. During her PhD, she was PhD student representative in the Educational Committee of the Dutch-Flemish Postgraduate School 'Experimental Psychopathology' for two years. As PhD student she also taught a number of theoretical and practical courses and supervised several bachelor and master theses. In addition, she was involved in developing the new master 'Clinical Child and Adolescent Psychology'. In this master, she coordinated and taught the Master course 'Developmental Psychopathology'. At the time of this writing Leonie is employed as a senior researcher at Yulius Mental Health Care Organization, department Yulius Academy, where she is involved in several research projects studying the effectiveness of new, innovative treatments for children and adolescents with Attention Deficit Hyperactivity Disorder.

