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ORIGINAL PAPER

Underlying Personality Characteristics of Behavioral Inhibition in Children

Peter Muris · Roeland Dietvorst

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Abstract Behavioral inhibition refers to the tendency of children to be unusually shy and to react with fear and withdrawal in situations that are novel and/or unfamiliar, and is generally regarded as a vulnerability factor for developing anxiety disorders. The present study investigated the hypothesis that behavioral inhibition is characterized by a specific constellation of two underlying personality characteristics, namely high levels of neuroticism and low levels of effortful control. For this purpose, 71 children completed measures of behavioral inhibition, neuroticism, attention control (which is a key element of effortful control), and insecure attachment. Results showed that children high on behavioral inhibition were indeed characterized by higher levels of neuroticism and lower levels of attention control. However, this pattern of personality characteristics was not specific for behavioral inhibition. That is, insecurely attached children were also characterized by high neuroticism and low attention control. The implications of these findings are briefly discussed.

Keywords Behavioral inhibition · Neuroticism · Attention control · Insecure attachment

Introduction

Behavioral inhibition can be defined as the tendency of children to be unusually shy and to react with fear and withdrawal in situations that are novel and/or unfamiliar [1]. Research has shown that behaviorally inhibited youths seem to be at increased risk for developing anxiety disorders. For example, in a longitudinal study by Biederman and colleagues [2], pre-school children were followed for a 3-year period. Results showed that children initially identified as behaviorally inhibited were subsequently more likely to develop anxiety disorders compared to control children (i.e., children who at study onset were not classified as behaviorally inhibited). Not only social phobia, but also separation anxiety disorder, and multiple anxiety disorders were significantly more prevalent in behaviorally inhibited children. Further

P. Muris (✉) · R. Dietvorst
Institute of Psychology, Erasmus University Rotterdam, Burgemeester Oudlaan 50, Suite T13-37,
P.O. Box 1738, 3000 DR Rotterdam, The Netherlands
e-mail: muris@fsw.eur.nl

support for a link between behavioral inhibition and anxiety in older youths comes from a series of studies conducted by Muris and colleagues [3–6]. In these studies, children, adolescents, and their parents completed the Behavioral Inhibition Instrument (BII), a brief self-report instrument for assessing behavioral inhibition in young people. Results showed that children who were identified as high on behavioral inhibition displayed higher levels of anxiety symptoms compared to children who were classified as low on behavioral inhibition. All the above-mentioned studies suggest that behavioral inhibition is associated with the development of a broad range of anxiety symptoms and anxiety disorders [7, 8]

Several authors have argued that behavioral inhibition is the perceptible manifestation of one or more underlying personality dimensions [9, 10]. The most important candidate in this respect is "neuroticism", also known as "negative affectivity" or "emotionality", which can be defined as psychological instability and proneness to experience negative emotions, and thus bears strong similarity to behavioral inhibition. Another candidate is effortful control, which refers to regulative, executive functioning-based processes including the focusing and shifting of attention (i.e., attention control) and the ability to inhibit behavior when appropriate (i.e., inhibitory control) [11]. As such, effortful control plays an important role in the self-regulation of emotion and coping with distress. Recently, Lonigan and colleagues [12] have postulated the idea that behaviorally inhibited children not only display behaviors such as inhibited approach and verbal signs of distress, which are consistent with hypothesized high levels of neuroticism, but also exhibit inflexible and ineffective coping behavior, which seems to suggest low levels of effortful control [13].

Taken together, behavioral inhibition has been conceptualized as a temperament-based vulnerability factor to childhood anxiety problems [7, 8], but several critics have noted that the relatively stable behavioral pattern as observed in inhibited children have their origins in underlying personality factors [9, 10]. Lonigan and colleagues' [12, 13] hypothesis that behaviorally inhibited children are characterized by high levels of neuroticism and low levels of effortful control is particularly interesting, as their view is in keeping with current personality theories on the etiology of psychopathology, which assume that not only reactive traits (e.g., neuroticism) but also regulative traits (e.g., effortful control) play a role in the development of childhood disorders [14]. So far, no study has examined the links between personality characteristics such as neuroticism and effortful control and behavioral inhibition in children. The present study was set-up as an attempt to address this issue. Seventy-one primary school children completed the BII as an index of behavioral inhibition as well as questionnaires measuring neuroticism and attention control, which is a key element of effortful control [11]. It was hypothesized that behavioral inhibition would be accompanied by high levels of neuroticism but low levels of attention control. To investigate whether this pattern of underlying personality traits is specific for behavioral inhibition, we also included an instrument tapping another individual difference-based vulnerability factor that may be relevant for the pathogenesis of anxiety disorders, namely insecure attachment [15].

Method

Participants and Procedure

Participants were 71 primary school children (27 boys and 43 girls) who were recruited from grades 4 to 6 of a regular primary school in Rotterdam, The Netherlands. Children had a mean age of 10.4 years (SD = 1.0, range 8–13 years). The majority of the children (88.7%) were Caucasian. Initially, the parents of 110 children were approached by sending them a letter which provided them with information about the study and asked them whether they agreed

that their child would participate. Only the 71 children of whom parents gave their informed consent participated in the study, which means that the response rate was 64.5%. Children completed the questionnaires at school during a classroom session. A research assistant and the teacher were always present to ensure confidential and independent responding.

Questionnaires

The *Behavioral Inhibition Instrument* (BII) [3] was based on similar measures that are employed for assessing behavioral inhibition in adults [16, 17]. Briefly, the instrument consists of two parts. The first part provides children with three descriptions: (1) "As long as I remember, I am shy when I have to talk to an unfamiliar person. On such occasions, I am nervous, I am not able to laugh, and I do not know what to say" (high behavioral inhibition), (2) "As long as I remember, I talk easily to an unfamiliar person. On such occasions, I feel good, I am able to laugh and I know precisely what I have to say" (low behavioral inhibition), and (3) "I am someone falling in between 1 and 2" (moderate behavioral inhibition). Children are asked to assign themselves to one of these three behavioral inhibition categories. The second part of the BII is the Behavioral Inhibition Scale (BIS) which consists of 4 items: shyness ("I am shy when I have to talk to an unfamiliar person"), communication ("I talk easily to an unfamiliar person"), fearfulness ("I feel nervous when I have to talk to an unfamiliar person"), and smiling ("I feel good and I am able to laugh, when I talk to an unfamiliar person"). Each item is rated on a 4-point Likert scale with $1 = never$, $2 = sometimes$, $3 = often$, and $4 = always$. After recoding the positive items, scores are summed to yield a total BIS score ranging from 4 (not apprehensive, not shy and very sociable when meeting an unfamiliar person) to 16 (very apprehensive and shy and not capable of initiating social interaction with an unfamiliar person). Previous research has yielded support for the reliability and validity of the BII. To begin with, in a recent study by Van Brakel et al. [6], the relation between the BII and observable manifestations of behavioral inhibition was examined. Moderate but significant relations were found between parent- and teacher-reported behavioral inhibition of the child as measured by the BII and an observational index of this temperamental trait, thus providing evidence for the validity of the scale. Further, an investigation by Muris et al. [5] showed that self-report BII scores had acceptable correlations with parent ratings on the BII. Finally, the reliability of the BII appears good: the BIS is generally found to possess satisfactory internal consistency [5, 6], and a recent study has demonstrated that scores on this instrument are fairly stable over a 2-year period, with a test-retest correlation of 0.77 [18].

The neuroticism scale of the shortened *Junior version of the Eysenck Personality Questionnaire* (JEPQ) [19] consists of 12 dichotomous (i.e., yes/no) items (e.g., "Is it easy to make you feel sad or angry?"). A total score can be computed by summing the yes-responses on all items (range 0–12), with higher scores reflecting higher levels of neuroticism. The psychometric properties of the JEPQ are satisfactory [20–22].

The *Attention Control Scale for Children* (ACS-C) is a simplified version of the Attention Control Scale [23], a 20-item self-report questionnaire measuring this type of effortful control. Items such as "When concentrating, I do not notice what happens around me" and "I can easily write or read, while I am talking on the phone" have to be scored on a 4-point scale with $0 = never$, $1 = sometimes$, $2 = often$, and $3 = always$. After recoding inversely formulated items, a total score can be computed by summing across items with higher scores reflecting higher levels of attention control. So far, relatively little is known about the psychometric properties of the ACS-C. However, the scale has proved to be reliable in terms of internal consistency ($\alpha = 0.80$) and possesses satisfactory parent–child agreement ($r = 0.72$). Furthermore, ACS-C scores correlate positively with perceived control

($r = 0.22$) and teacher-reported school performance ($r = 0.45$), which at least provides some support for the validity of the scale [24, 25].

The *Attachment Questionnaire for Children* (AQ-C) [26] consists of three descriptions concerning children's feelings about and perceptions of their relationships with other children: (1) "I find it easy to become close friends with other children. I trust them and I am comfortable depending on them. I do not worry about being abandoned or about another child getting too close friends with me." (secure attachment); (2) "I am uncomfortable to be close friends with other children. I find it difficult to trust them completely, difficult to depend on them. I get nervous when another child wants to become close friends with me. Friends often come more close to me than I want them to." (avoidant attachment); and (3) "I often find that other children do not want to get as close as I would like them to be. I am often worried that my best friend doesn't really like me and wants to end our friendship. I prefer to do everything together with my best friend. However, this desire sometimes scares other children away." (ambivalent attachment). Children are provided with these descriptions and instructed to choose the description that applies best to them. In this way, they classify themselves as either securely, avoidantly, or ambivalently attached. In a study by Muris et al. [27], the connection between the AQ-C and a concurrent measure of attachment, the Inventory of Parent and Peer Attachment [28], was examined. Results showed that adolescents who classified themselves as securely attached on the AQ-C displayed a higher quality of attachment to both parents and peers than adolescents who classified themselves as insecurely (i.e., avoidantly or ambivalently) attached on the AQ-C. Clearly, this finding can be taken as evidence for the validity of the AQ-C.

In the present study, scales were found to have satisfactory reliability, with Cronbach's alphas being 0.64 for the BIS, 0.69 for the ACS-C, and 0.79 for the neuroticism scale of the JEPQ. For the BII descriptions and the AQ-C, internal consistency could not be computed as these measures only consisted of one item.

Statistical Analysis

The main hypotheses were tested by means of correlations and multivariate analyses of variance (ANOVAs). For the purpose of the latter analyses, standardized values were employed in order to achieve a comparable range for neuroticism and attention control scores. The range of both variables would otherwise be quite distinct due to the different number of items and response format of the pertinent questionnaires.

Results

General Findings

The numbers (percentages) of adolescents who classified themselves as either low, moderate, or high behaviorally inhibited by means of the BII descriptions were 13 (18.3%), 40 (56.3%), and 18 (25.4%), respectively. An analysis of variance (ANOVA) comparing the BIS scores of the three behavioral inhibition groups revealed a significant effect of group, $F(2, 68) = 22.0$, $p < 0.001$. As expected, children who classified themselves as low on behavioral inhibition scored relatively low on the BIS ($M = 7.8$, SD $= 2.0$), children who classified themselves as high on behavioral inhibition scored relatively high on the BIS ($M = 12.1$, SD $= 1.1$), whereas children who classified themselves as moderate on behavioral inhibition scored in between ($M = 10.0$, SD $= 1.9$; post-hoc comparisons showed that all group differences

were significant at $p < 0.001$). This finding indicates that the two parts of the BII yielded convergent information.

Behavioral Inhibition and Neuroticism/Attention Control

The link between behavioral inhibition and underlying personality factors was investigated in two ways. First of all, scores on neuroticism and attention control scales were compared for the low, moderate, and high behavioral inhibition groups by means of a multivariate ANOVA. This analysis revealed a significant multivariate effect of group, $F(4, 132) = 3.0$, $p < 0.05$. Univariate follow-up tests indicated significant effects for both neuroticism, $F(2, 68) = 4.7$, $p < 0.01$, and attention control, $F(2, 68) = 3.1$, $p < 0.05$. Figure 1 displays standardized scores of neuroticism and attention control for the three groups. As can be seen, high behavioral inhibition children clearly reported the highest levels of neuroticism and the lowest levels of attention control. The reverse was true for the low behavioral inhibition children who displayed relatively low levels of neuroticism and high levels of attention control, whereas moderate behavioral inhibition children scored in between on both variables. Post-hoc difference tests indicated that for both personality factors, it was in particular the high behavioral inhibition group, which differed significantly from the two other groups (all ps < 0.05). Second, correlations were computed between BIS, on the one hand, and neuroticism and attention control, on the other hand. As expected, results revealed a positive correlation between behavioral inhibition and neuroticism, $r = 0.43$, $p < 0.001$, and a negative correlation between behavioral inhibition and attention control, $r = -0.38$, $p < 0.001$, again indicating that higher levels of behavioral inhibition were accompanied by higher levels of neuroticism but lower levels of attention control.

Attachment and Neuroticism/Attention Control

The numbers (percentages) of children who defined themselves as either securely, avoidantly, and ambivalently attached were 53 (74.6%), 12 (16.9%), and 6 (8.5%), respectively. A multivariate ANOVA was carried out to compare the neuroticism and attention control levels of these three groups. This analysis yielded a significant multivariate effect of group, $F(4, 132) = 5.5$, $p < 0.001$, with univariate follow-up tests showing significant effects for neuroticism, $F(2, 68) = 6.9$, $p < 0.01$, and attention control, $F(2, 68) = 10.0$, $p < 0.001$. Post-hoc difference tests indicated that children who defined themselves as either avoidantly

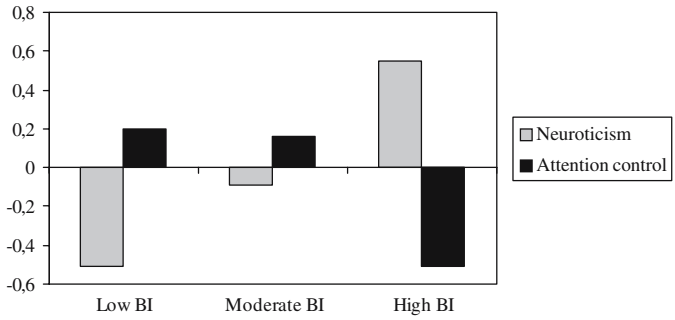

Fig. 1 Levels of neuroticism and attention control (standardized values) in the low, moderate, and high behavioral inhibition (BI) groups

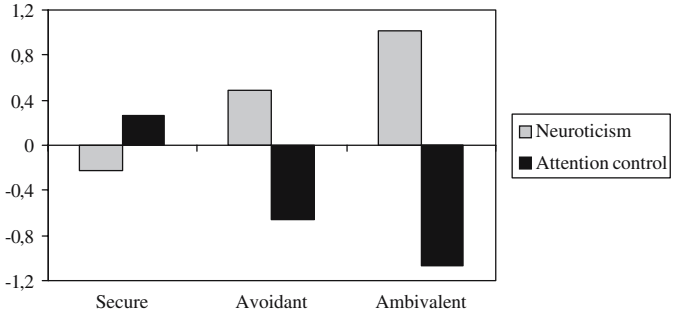

Fig. 2 Levels of neuroticism and attention control (standardized values) in the secure, avoidant, and ambivalent attachment groups

or ambivalently attached displayed higher levels of neuroticism but lower levels of attention control than children who classified themselves as securely attached (all ps < 0.05; see Fig. 2).

Behavioral Inhibition, Attachment, and Personality Characteristics

The overlap between behavioral inhibition and attachment was modest. Inspection of a 2 (secure versus insecure attachment) $\times 2$ (low and moderate versus high behavioral inhibition) cross-table revealed an agreement of 74.6% for defining children as "not at risk" or "at risk" on the basis of both vulnerability factors (Cohen's $\kappa = 0.33$). To examine the personality characteristics of children with various combinations of behavioural inhibition and attachment status, neuroticism and attention control scores were compared across four groups: (1) a no-risk group ($n = 44$) of children who defined themselves as securely attached and low or moderate on behavioral inhibition, (2) an insecurely attached group ($n = 9$) of children who indicated that they were avoidantly or ambivalently attached but who reported no clear signs of behavioral inhibition, (3) a high behavioral inhibition group ($n = 9$) who defined themselves as high on behavioral inhibition, but who also indicated to be securely attached, and (4) a high-risk group ($n = 9$) who classified themselves as both high on behavioral inhibition and insecurely attached. A multivariate ANOVA indicated that the groups were different in terms of personality factors [$F(6, 130) = 4.5$, $p < 0.001$]. Univariate follow-up tests indicated significant differences for both neuroticism, $F(3, 67) = 7.3$, $p < 0.001$, and attention control, $F(3, 67) = 6.2$, $p < 0.01$. As can be seen in Fig. 3, the presence of one of the risk factors (i.e., insecure attachment and high behavioral inhibition) was associated with higher levels of neuroticism and lower levels of attention control (all post-hoc comparisons with the no-risk control group were significant at $p < 0.05$). Although the high-risk group seemed to display the highest neuroticism and the lowest attention control scores, this was not substantiated by statistical tests (all ps > 0.05).

Discussion

During the past two decades, evidence has accumulated showing that behavioral inhibition is an important temperament-based characteristic, which predisposes children to develop anxiety disorders [7, 8]. Several authors have noted that behavioral inhibition should be viewed as the perceptible manifestation of one or more underlying personality factors [9].

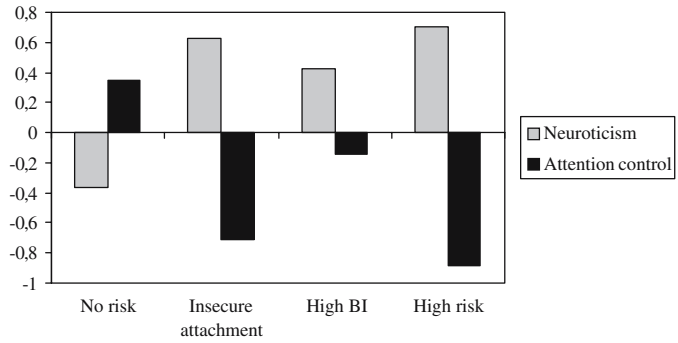

Fig. 3 Levels of neuroticism and attention control (standardized values) in the no-risk, insecurely attached, high behavioral inhibited, and high-risk groups

The present study examined Lonigan et al.'s [12] hypothesis that behavioral inhibition has its foundation in two important personality characteristics, namely neuroticism and effortful control. Results showed that children high on behavioral inhibition were indeed characterized by higher levels of neuroticism and lower levels of attention control (which is an important aspect of effortful control) as compared to children low or moderate on this characteristic.

"Behavioral inhibition to the unfamiliar" refers to a normal inborn tendency, which is not only present in human children but is typically shown by the newborns of almost all mammals [1]. It can best be viewed as an adaptive reaction, which enhances approach-seeking behavior to the primary caregiver (in most cases the mother) and ultimately promotes survival chances [29]. Normally, this tendency gradually disappears when children get older, as they learn about their environment, which makes less stimuli unfamiliar, and acquire coping skills, which enable them to deal with novel and unfamiliar situations in a more effective way. It makes sense that in children with high levels of neuroticism and low levels of effortful control this developmental process derails, firstly because these children become easily distressed by novelty and unfamiliar stimuli and hence are more prone to aversive conditioning [30], and secondly because they are characterized by less capacity for emotional self-regulation [31].

Although behavioral inhibition showed the expected links with neuroticism and attention control, it is important to mention that insecure attachment was associated with a similar pattern of personality characteristics. More precisely, avoidantly and ambivalently attached children also displayed high levels of neuroticism and low levels of attention control. On the one hand, it can be argued that this finding was due to the shared variance between attachment and behavioral inhibition, although it should be mentioned that the overlap was quite modest among these two vulnerability factors [32]. On the other hand, it may well be the case that the personality constellation of high neuroticism and low attention control also applies to children who are insecurely attached. For example, several researchers have noted that insecurely attached children are also characterized by high levels of distress and poor self-regulation [33]. Thus, behavioral inhibition and insecure attachment may be associated with a comparable underlying personality structure (i.e., high neuroticism, low effortful control), which makes clear why both factors appear to be involved in the pathogenesis of childhood anxiety disorders [34]. Note in passing that this conclusion fits nicely with current accounts on the development of personality in youths, which propose that personality factors have both genetic (e.g., behavioral inhibition) and environmental links (e.g., attachment) [35].

Admittedly, the present study suffers from various limitations. First of all, the study solely relied on self-report, thereby introducing the problem of shared method variance. This seems particularly relevant for our measures of behavioral inhibition and attachment, which have some important features in common (e.g., difficulties in relationships with other people). Nevertheless, there is evidence indicating that behavioral inhibition and attachment (as measured by the very same instruments as used in the current study) each represent a unique part of a child's vulnerability to anxiety problems [32]. However, it is clear that the inclusion of parental data would have provided important cross-validational information. Second, the sample size was rather small, and as a result it was not possible the evaluate the unique and additive links between behavioral inhibition and attachment, on the one hand, and neuroticism and attention control, on the other hand. Third, the measures of behavioral inhibition and attachment that were employed in this study (i.e., BII and AQ-C) have been developed recently by our research team. Although the empirical support for the validity of these instruments is steadily accumulating [3–6, 18, 26, 27, 32], independent validation by other research groups is certainly needed [36]. Fourth and finally, the study focused on neuroticism and effortful control as underlying personality factors of behavioral inhibition, but it is possible that other personality factors are also relevant. For example, it may well be that behaviorally inhibited children score particularly low on extraversion [18]. Despite these shortcomings, this study provides initial information on the personality basis of behavioral inhibition, and the results certainly warrant further research on the exact nature of this vulnerability factor to childhood anxiety problems.

Summary

Behavioral inhibition is widely accepted as a temperament-based vulnerability factor to childhood anxiety disorders. The results of the present study seem to indicate that behavioral inhibition is based on at least two important personality characteristics, namely neuroticism and effortful control. This finding fits nicely with current personality theories on the etiology of psychopathology, which assume that not only reactive but also regulative traits play an important role in the etiology of childhood disorders. Future studies should further investigate to what extent the observed personality structure is specific to behavioral inhibition, whether other personality factors (such as extraversion) are also involved, and whether high levels of behavioral inhibition can be effectively decreased not only by reducing children's reactivity but also by promoting their regulative skills.

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