

# Propriedades Psicométricas da Versão Brasileira do *Behavioral Inhibition Instrument* (BII) e Associações com Sintomas Psicopatológicos

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## RESUMO

Os objetivos desse estudo foram investigar propriedades psicométricas da versão brasileira do *Behavioral Inhibition Instrument* (BII) e suas associações com sintomas de ansiedade e depressão em crianças e adolescentes. Participaram 838 estudantes com idades entre 9-18 anos ( $M=12,89$ ;  $DP=2,10$ ) de uma amostra comunitária respondendo a versão brasileira do BII e questionários de autorrelato de sintomas de ansiedade e depressão. Os resultados demonstraram que a prevalência de crianças e adolescentes na categoria de alta inibição comportamental foi de 16,6%. O BII apresentou propriedades psicométricas satisfatórias com maiores níveis de inibição comportamental correlacionados a maiores níveis de sintomas de ansiedade e depressão, especialmente para sintomas de fobia social. Além disso, participantes com altos escores de inibição comportamental tiveram maior probabilidade de apresentar sintomas de ansiedade em um espectro clínico ou subclínico, especialmente para fobia social. Implicações para intervenções preventivas precoces são brevemente discutidas.

**Palavras-chave:** Psicometria; Inibição comportamental; Ansiedade; Crianças; Adolescentes.

## ABSTRACT

*Psychometric Properties of the Brazilian Version of the Behavioral Inhibition Instrument (BII) and Associations With Psychopathological Symptoms*

The aims of this study were to investigate psychometric properties of the Behavioral Inhibition Instrument (BII) and their association with depression and anxiety symptoms in children and adolescents. Eight hundred and thirty-eight students aged 9-18 years ( $M=12.89$ ,  $SD=2.10$ ) from a community sample answered the Brazilian-Portuguese version of the BII and self-report questionnaires of depression and anxiety symptoms. Results showed the prevalence of children and adolescents in the high behavioral inhibition (BI) category was 16.6%. The BII presented satisfactory psychometric properties with higher levels of BI being correlated to higher levels of depression and anxiety symptoms, especially social phobia symptoms. Also participants with higher BI scores were more likely to present anxiety symptoms in a subclinical or clinical range, especially for social phobia. Implications for early preventive interventions are briefly discussed.

**Keywords:** Psychometrics; Behavioral inhibition; Anxiety; Children; Adolescents

## RESUMEN

*Propiedades Psicométricas de la Versión Brasileña del Behavioral Inhibition Instrument (BII) e Sus Asociaciones con Síntomas Psicopatológicos*

Los objetivos de este estudio fueron investigar las propiedades psicométricas de la versión brasileña del *Behavioral Inhibition Instrument* (BII) y sus asociaciones con los síntomas de ansiedad y depresión en niños y adolescentes. Ochocientos treinta y ocho (838) estudiantes con edades entre 9 y 18 años ( $M=12,89$ ;  $DP=2,10$ ) de una muestra comunitaria respondieron a la versión brasileña del BII y a cuestionarios auto-aplicables de síntomas de ansiedad y depresión. Los resultados demuestran que el predominio de niños y adolescentes en la categoría de alta inhibición conductual fue de 16,6%. El BII presentó propiedades psicométricas satisfactorias con mayores niveles de inhibición conductual correlacionándose a mayores niveles de síntomas de ansiedad y depresión, especialmente para fobia social. Además, los participantes con altos puntajes de inhibición conductual tuvieron mayor probabilidad de presentar síntomas de ansiedad en un espectro clínico o subclínico, especialmente para fobia social. Algunas implicancias para realizar intervenciones preventivas precoces son brevemente discutidas.

**Palabras clave:** Psicometría; Inhibición conductual; Ansiedad; Niños; Adolescentes.

Behavioral inhibition (BI) refers to an individual temperamental characteristic associated with persistent tendency to respond with restraint or withdrawal, showing reticence, fearfulness and/or avoidance behaviors to novel situations or unfamiliar people (Kagan et al. 1988; Hirshfeld-Becker et al. 2008). BI is one of the most consistent early behavioral risk factors for the development of anxiety disorders (AD) in early and middle childhood and adolescence, specifically for social anxiety disorders (Hirshfeld-Becker et al. 2008; Muris et al. 2011). It can be evaluated throughout behavioral observations and rating scales (e.g. Ballestri et al. 2012; van Brakel et al. 2004).

The Behavioral Inhibition Instrument (BII; Muris et al. 1999) is an enhanced version of the Behavioral Inhibition Scale (BIS; Gest 1997) and is considered a valid and reliable measure for assessing typical BI features in childhood and adolescence that is able to classify children and adolescents in categories of either low, middle or high behaviorally inhibited (Gest 1997; Muris et al. 1999; Muris et al. 2003; Muris et al. 2001; van Brakel and Muris 2006). Furthermore, a recent study (van Brakel et al. 2004) has shown that BI scores assessed by the BIS were significantly correlated to BI scores obtained through observational methods that considered behaviors such as spontaneous talking, number of smiles, and number of proposals for play in unfamiliar social situations and tasks in children. Taking into account the evidences of all these studies, the BII was found to be a promising instrument for the assessment of behavioral inhibition features in youth.

The main objectives of the present study are: (1) to investigate the psychometric properties of the Brazilian-Portuguese version of the BIS (factor structure, by means of Confirmatory Factor Analysis, and internal consistency), and (2) to investigate how the BI measure (BIS scores and BI categories) correlates to anxiety and depression symptoms in children and adolescents. Based on previous research (e.g. Muris et al. 1999, 2001, 2011; van Brakel et al. 2004) we hypothesize that the higher levels of BI will be associated to higher levels of anxiety symptoms – especially social phobia symptoms – and depression symptoms for both children and adolescents recruited to participate in this study from the same community area.

## METHODS

### Sample and Procedures

Eight hundred and thirty-eight Brazilian students aged 9-18 years ( $M=12.89$ ,  $SD=2.10$ ) participated in this study, including 435 (51.9%) females with a mean

age of 13.03 years old ( $SD=2.08$ ) and 403 (48.1%) males with a mean age of 13.03 years old ( $SD=2.11$ ). There were 372 (44.4%) children (age range: 9-12 years old,  $M=10.97$ ,  $SD=.94$ ) and 466 (55.6%) adolescents (age range: 13-18 years old,  $M=14.43$ ,  $SD=1.37$ ). The participants were part of a larger sample ( $N=2.457$ ) that participated in the cross-sectional study denominated the Multidimensional Evaluation and Treatment of Anxiety in Children and Adolescents – the PROTAIA Project –, designed to investigate AD in children and adolescents. Further information about the study design can be found elsewhere (Salum et al. 2011).

For this specific study, children and adolescents were recruited from four schools that belong to the Primary Care Unit of the *Hospital de Clínicas de Porto Alegre – Universidade Federal do Rio Grande do Sul* (HCPA-UFRGS) catchment area. The BII was administered to all students from these 4 schools that agreed to participate. All participants were asked to complete the Brazilian-Portuguese versions of the BII and of the Screen for Child Anxiety Related Emotional Disorders (SCARED; Isolan et al. 2011) Child-Version in the schools. A random sub-sample ( $n=168$ ) of participants was also invited to answer the Childhood Depression Inventory (CDI; Kovacs 1992).

### Measurement Instruments

The Behavioral Inhibition Instrument (BII; Muris et al. 1999) consists of two parts. The first part is the Behavioral Inhibition Scale (BIS; Gest 1997), composed of 4 items that investigate a feature of the construct of behavioral inhibition (BI): 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”). Respondents scored each item on a 4-point scale (0= never; 1 = sometimes; 2 = often; 3 = always). After reversing the scores of the positive items (items 2 and 4), the answers were summed into a total BIS score, ranging from 0 to 12, with higher scores reflecting higher levels of BI. The second part of the BII provides children and adolescents 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”, (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”, and (3) “I am someone falling in between 1 and 2”. Respondents have to choose which one of these definitions best describes themselves. That choice

assigns them to one of three BI categories: high, low, or middle behaviorally inhibited, respectively. The BII was translated to Brazilian-Portuguese by 2 clinicians and 2 researchers with experience in AD. A consensus version was created after discussing disagreements between the four versions.

The Screen for Child Anxiety Related Emotional Disorders (SCARED) is a self-report instrument used to measure anxiety for children and adolescents (Birmaher et al. 1997, 1999; Isolan et al. 2011). The questionnaire is composed by 41 items, divided into five factors: panic/somatic (13 items); generalized anxiety (9 items); separation anxiety (8 items); social phobia (7 items), and school phobia (4 items). For each item, respondents choose the number that best describes how they have been feeling during the past 3 months on a 3-point scale (0 = not true or hardly ever true; 1 = sometimes true; 2 = true or often true). Therefore, total scores range from 0 to 82 with higher scores reflecting higher levels of anxiety. Subscale scores can also be obtained for each factor by summing across relevant items. The SCARED has showed good reliability and validity evidences (Birmaher et al. 1997, 1999) and it was adapted and validated to use in Brazil also demonstrating good psychometric properties (Isolan et al. 2011).

The Children's Depression Inventory (CDI) (Kovacz 1992) is a 27-item self-report instrument to assess cognitive and somatic symptoms associated with depression in youth. Respondents rate the items on a 3-point scale ranging from 0 (not true) to 2 (very true) reflecting the degree of the depressive symptoms described during the past 2 weeks. Therefore, total scores range from 0 to 54 with higher scores indicating higher levels of depression symptoms. The CDI has showed adequate reliability and validity evidences (Kovacz 1992) and it was adapted and validated to Brazilian-Portuguese also demonstrating good psychometric properties (Golfeto et al. 2002).

## Data Analysis

A Confirmatory Factor Analysis (CFA) was conducted to investigate the factor structure of the Brazilian-Portuguese version of the BIS. The multivariate distribution of the BIS item scores was examined obtaining the Mardia's normalized multivariate kurtosis coefficient offered through the EQS version 6.1 software program. The value of Mardia's normalized multivariate kurtosis was 3.335, allowing the assumption of a multivariate normal distribution within the sample for the items of the BIS (Bentler 2005). The Maximum Likelihood (ML) estimation method was used to test the hypothesized

model of a single latent factor of behavioral inhibition related to all four items of the BIS. Goodness-of-fit indexes used for evaluating the adequacy of the model were: Chi-square ( $\chi^2$ ); Comparative Fit Index (CFI); Tucker-Lewis Index (TLI); Adjusted Goodness-of-Fit Index (AGFI); Root Mean Square Error of Approximation with 90% Confidence Interval (RMSEA – 90% CI); and Standardized Root Mean Square Residual (SRMR). Criteria used to interpret the indexes were based on specialized literature (Byrne 2010; Hu and Bentler 1999): values of the CFI, TLI, and AGFI above .90 or close to .95 represent a good fit; values of the RMSEA and SRMR close to or below .05 represent a good fit, and below .08 represent an acceptable fit. The internal consistency of the BIS score was assessed by the Cronbach's alpha coefficient.

Chi-square tests were used to investigate sex and age differences on the three behavioral inhibition (BI) categories (low/middle/high). Moreover, analyses of variance (ANOVA) and effect size statistics (Cohen's *d*) were used to investigate sex and age differences on the BIS scores. Regarding psychopathological symptoms, a MANOVA was used to investigate differences on the three BI categories and the two sex groups in the SCARED subscale scores. Pearson correlations with 95% Confidence Intervals (95% CI) were used to investigate correlations between the BIS scores and the other instruments (SCARED and CDI) scores.

Chi-square tests and odds ratios were calculated to investigate differences in the three BI categories concerning (sub)clinical cases (i.e. both clinical and subclinical cases) of AD based on the SCARED subscale cutoff scores recommended by DeSousa et al. (submitted for publication). A Receiver Operating Characteristic (ROC) curve analysis was used to evaluate the sensitivity and specificity of the BIS to the (sub)clinical cases of AD. The index of accuracy used in the ROC curve analysis was the Area Under the Curve (AUC) and the Youden's J index was used to determine the optimal cutoff point (OCP) score for the BIS (Böhning et al. 2008; Shaik, 2011). All *p*-values are based on two-tailed tests with alphas set at 5%.

## RESULTS

Factor structure and internal consistency of the Brazilian-Portuguese version of the BIS

All four items of the BIS were significantly intercorrelated ( $p < .001$ ) with correlations ranging from  $-.351$  to  $.495$  according to theoretical expectations. As depicted in Table 1, the one factor hypothesized model (Model 1) did not provide a good fit to the data. The Lagrange Multiplier (LM) test suggested

the introduction of a correlation between the errors of items 2 and 4 as a parameter that could be related to the improvement of the fit of the model. Although this practice should be avoided, specialized literature argues that it is possible to introduce correlated errors if there is some clear overlap in item content (Byrne 2010). Thus, considering both the LM test results and the overlap in the contents of items 2 (“I talk easily to an unfamiliar person”) and 4 (“I feel good and I am able to laugh when I talk to an unfamiliar person”) of the BIS, the model was re-specified, including this error covariance (Model 2).

This re-estimation resulted in a significant improvement in model fit ( $\Delta\chi^2=87.44, df=1, p<.001$ ). The correlation between the errors was significant and its value was higher than .30, supporting its inclusion in the model. Also, Model 2 had overall good fit indexes (CFI, TLI, AGFI, SRMR). All factor loadings in Model 2 were higher than .30, with the shyness item presenting the highest loading, followed respectively by the fearfulness, communication, and smiling items (Table 1). Regarding the internal consistency of the BIS, the Cronbach’s alpha coefficient was .661.

**Descriptive analyses, sex and age differences on the BII**

The prevalence of children and adolescents in the high BI category was 16.6% (medium BI category = 48.0%, low BI category = 35.4%). There were significant differences between boys and girls ( $\chi^2=21.63, df=2, p<.001$ ) concerning the three behavioral inhibition (BI)categories (high, middle, and low behaviorally inhibited). Girls (high BI=18.6%, middle BI=53.3%, low BI=28.0%) reported more frequently to be in a higher BI category than boys (high BI=14.4%, middle BI=42.2%, low BI =43.4%). There were no significant differences between children and adolescents in these three categories ( $\chi^2=3.71, df=2, p=.156$ ).

The scores of the BIS were significantly different between boys and girls ( $F(1, 836)=33.35, p<.001$ ), and children and adolescents ( $F(1, 836)=6.13, p<.014$ ). Girls ( $M=5.55, SD=2.71$ ) were found to score higher on the scale than boys ( $M=4.48, SD=2.65$ ) and children ( $M=5.29, SD=2.73$ ) were found to score higher than adolescents ( $M=4.82, SD=2.72$ ). However, although the sex differences showed a moderate effect magnitude (Cohen’s  $d=.40, 95\% CI=.26-.54$ ), the age differences showed a small effect magnitude (Cohen’s  $d=.17, 95\% CI=.04-.31$ ).

**Behavioral inhibition, psychopathological symptoms and (sub)clinical cases of anxiety disorders**

Results of the MANOVA based on the Wilks’ Lambda criterion showed that the combined dependent variables (SCARED subscale scores) were significantly different between sex groups ( $F=8.29, p<.001, \eta_p^2=.049$ ) and BI categories ( $F=29.23, p<.001, \eta_p^2=.153$ ), but not for the sex by BI category interaction ( $F=1.59, p=.104, \eta_p^2=.010$ ). As depicted in Table 2, girls were found to score significantly higher on the SCARED subscale scores as compared to boys. Regarding the BI categories, in most cases, the post hoc tests with Bonferroni adjustment for multiple comparisons revealed a linear association between the BI and the SCARED subscale scores. In general, the lower the BI category of the children, the lower their scores on the subscales, and the higher the BI category, the higher the subscale scores, whereas children that reported to be in the middle BI category scored in between. Only the school phobia subscale score did not differ significantly among the BI categories. The effect size of these differences was the strongest for the social phobia subscale score.

TABLE 1  
Confirmatory Factor Analysis (CFA) of the Brazilian-Portuguese Version of the Behavioral Inhibition Scale (BIS)

Models	$\chi^2 (df)$	<i>p</i>	$\chi^2/df$	SRMR	CFI	TLI	AGFI	RMSEA (90% CI)	Standardized Regression Weights	Factor Variance	Covariance	Correlation
Model 1	96.38 (2)	<.001	48.19	.077	.825	.476	.727	.237 (.198-.279), <i>p</i> <.001	(i1) .691 (i2) -.534 (i3) .634 (i4) -.431	.393		
Model 2	8.94 (1)	.003	8.94	.019	.985	.912	.947	.097 (.046-.160), <i>p</i> =.061	(i1) .779 (i2) -.439 (i3) .635 (i4) -.302	.499	(e2-e4) .317, <i>p</i> <.001	(e2-e4) .349

Model 1: one-factor model, Model 2: one-factor model with covariance set between errors of items 2 and 4, i1: item 1, i2: item 2, i3: item 3, i4: item 4, e2: error of item 2, e4: error of item 4.

TABLE 2  
Results of the MANOVA with Behavioral Inhibition (BI) categories and sex as independent variables and the Screen for Child Anxiety Related Emotional Disorders (SCARED) subscale scores as dependent variables

	Total by BI category			Total by sex		Low BI		Middle BI		High BI		F-values( $\eta_p^2$ )			
	Low	Middle	High	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	BI category	Post hoc test	Sex	BI × Sex
Panic M (SD)	2.92 (3.47)	4.82 (4.43)	6.44 (5.08)	3.45 (3.66)	5.32 (4.84)	2.56 (3.06)	3.46 (3.94)	3.48 (3.23)	5.81 (4.91)	6.11 (5.06)	6.67 (5.11)	31.28 (.071), $p < .001$	H>M>L	15.12 (.018), $p < .001$	3.52 (.009), $p = .030$
Generalized anxiety M (SD)	6.77 (3.47)	8.27 (3.86)	8.86 (3.65)	7.10 (3.59)	8.53 (3.83)	6.50 (3.27)	7.16 (3.73)	7.37 (3.66)	8.94 (3.88)	8.12 (4.01)	9.38 (3.29)	16.14 (.038), $p < .001$	H, M>L	16.48 (.020), $p < .001$	1.29 (.003), $p = .276$
Social phobia M (SD)	2.92 (2.32)	5.27 (2.68)	7.59 (3.01)	4.11 (2.82)	5.48 (3.16)	2.62 (2.23)	3.35 (2.38)	4.71 (2.35)	5.68 (2.84)	6.91 (2.99)	8.08 (2.94)	144.54 (.262), $p < .001$	H>M>L	22.21 (.026), $p < .001$	.348 (.001), $p = .706$
Separation anxiety M (SD)	3.91 (2.56)	4.92 (2.88)	6.24 (3.22)	4.07 (2.46)	5.45 (3.18)	3.62 (2.20)	4.35 (2.97)	4.10 (2.47)	5.53 (3.02)	5.34 (2.78)	6.88 (3.37)	26.48 (.061), $p < .001$	H>M>L	32.30 (.038), $p < .001$	1.63 (.004), $p = .196$
School phobia M (SD)	.97 (1.00)	1.17 (1.16)	1.29 (1.44)	1.01 (1.08)	1.23 (1.23)	.93 (.99)	1.05 (1.02)	1.08 (1.04)	1.24 (1.23)	1.06 (1.38)	1.46 (1.46)	2.99 (.007), $p = .051$	-	6.36 (.008), $p = .012$	.688 (.002), $p = .503$

H: high, M: middle, L: low.

Table 3 depicts the Pearson correlations analyses between the BIS scores, the SCARED total and subscale scores and the CDI scores. Higher levels of behavioral inhibition were correlated to higher levels of psychopathology in terms of anxiety and depression symptoms. The analyses of the upper and lower bounds of the  $r$ -values 95% confidence intervals suggested that the correlation between the BIS scores and the SCARED social phobia subscale scores was stronger in terms of effect size than the correlations between the BIS scores and all other SCARED subscale scores, the SCARED total scores and the CDI scores. Therefore, higher levels of behavioral inhibition measured by the BIS were more strongly correlated to higher levels of social phobia anxiety than to other types of anxiety symptoms and to depression symptoms measure by the SCARED and CDI instruments.

TABLE 3

Pearson correlations with 95% Confidence Intervals (95% CI) between the Behavioral Inhibition Scale (BIS) scores on one hand, and the Screen for Child Anxiety Related Emotional Disorders (SCARED) scores and the Children's Depression Inventory scores on the other hand.

		BIS		
		$r$	95% CI	$p$
SCARED	Total	.436	.379-.490	<.001
	Panic subscale	.311	.248-.371	<.001
	Generalized anxiety subscale	.265	.200-.328	<.001
	Social phobia subscale	.599	.553-.641	<.001
	Separation anxiety subscale	.276	.211-.338	<.001
	School phobia subscale	.168	.100-.233	<.001
CDI	Total	.372	.234-.496	<.001

Cutoff scores recommended by DeSousa et al. (submitted for publication) were used to identify children and adolescents who exhibited SCARED subscale scores in the (sub)clinical range for social phobia ( $n=167$ , 19.9%), generalized anxiety disorder ( $n=280$ , 33.4%), and separation anxiety disorder ( $n=145$ , 17.3%). As depicted in Table 4, results of the  $\chi^2$  tests showed significant differences between participants in the low, middle and high BI categories for all three SCARED scores. The high BI category had the highest percentages of children with (sub)clinical SCARED scores, followed respectively by the middle and the low BI categories. The odds ratios (OR) with 95% confidence intervals for the three specific AD also supported this result, i.e. the stronger association contrasting high and low BI categories for the social phobia (sub)clinical cases than the other two AD assessed (Table 4). In line with these results, the ROC curve analysis showed that the BIS scores significantly differentiated the participants in the (sub)clinical range for social phobia (AUC = .806, 95% CI = .769-.844,  $p < .001$ ) with an OCP of 6 accounting for a sensitivity of .796 and specificity of .647.

## DISCUSSION

The Brazilian-Portuguese version of the Behavioral Inhibition Scale (BIS) presented satisfactory psychometric properties in terms of factor structure and internal consistency. However, the significant correlation needed between the errors of items 2 and 4 in the factor structure of the BIS might argue for a reconsideration of these items due to the potential

TABLE 4.  
Percentages and Odds Ratios (OR) of anxiety disorders (sub)clinical cases in the Behavioral Inhibition (BI) categories of the Behavioral Inhibition Instrument (BII).

	BI category (%)			$\chi^2$ (df)	Reference × Contrast	Logistic Regression Analysis						
	Low	Middle	High			OR	95% CI	p	Reference × Contrast	OR	95% CI	p
Social phobia (sub)clinical cases	6.12	22.59	53.54	115.53 (2), $p < .001$	Low BI × Middle BI	4.48	2.59-7.76	<.001	Low BI × High BI	17.70	9.69-32.30	<.001
Generalized anxiety (sub)clinical cases	24.54	42.39	45.67	26.68 (2), $p < .001$		2.26	1.60-3.20	<.001		2.59	1.66-4.04	<.001
Separation anxiety (sub)clinical cases	10.55	19.62	36.36	36.56 (2), $p < .001$		2.07	1.30-3.29	.002		4.85	2.84-8.27	<.001

(Sub)clinical: both clinical and subclinical; *df*: degrees of freedom; CI: Confidence Interval.

overlap between them in terms of both the latent BI factor and the item errors. The results obtained through the BIS scores were all similar and in the same direction that the results obtained through the second part of the Behavioral Inhibition Instrument (BII) – which provides the categorization of respondents into low, middle and high behavioral inhibition (BI) categories – giving support to the validity of the BII as a whole for measuring BI features. In addition, BII was strongly associated with SCARED and its subscales and have shown a higher association with social phobia scores.

Our findings are in accordance to previous studies that relied on the BII measure (Muris et al. 1999, 2001, 2003, 2011). For instance, regarding (sub)clinical cases of AD, participants high on BI exhibited higher chances of also presenting different AD symptoms in the (sub)clinical range (Muris et al. 1999). This association was again stronger for social phobia symptoms. Besides that, our study also reported sex differences in the self-report of BI which is in agreement to previous research that have identified females as more likely to report higher levels of behavioral inhibition than males in childhood (Gest 1997; Muris et al. 1999) and adolescence (Muris et al. 2001, 2003). A further result from our study was the relevant prevalence in this community area of participants in the high BI category (16.6%) with no relevant differences found between the BI report in children and adolescents.

Research focusing on BI features is important given the current focus of mental health professionals in preventive strategies against AD in childhood and adolescence. BI has been consistently described as a temperamental trait that is considered a risk factor for AD and more strongly for social anxiety disorder in youth (see Hirshfeld-Becker et al. 2008, for a comprehensive review). It seems that behaviorally inhibited children have elevated rates of anxiety

symptoms AD symptoms and prospective studies suggested that these behaviorally inhibited children tend to become more introverted, restrained, with less-active social lives in adulthood (Gest 1997; Hirshfeld-Becker et al. 2008). Considering this, a standardized instrument that easily measures BI among children and adolescents can be used as an effective tool for identifying vulnerable individuals and children at risk that can benefit from preventive interventions.

The major limitation of our study concerns the fact that the anxiety and BI characteristics were assessed only throughout self-report data of the children and adolescents. Previous studies have also relied on other sources for data collection, for instance, the report of parents (Ballespí et al. 2012; Muris and Meesters 2002; Muris et al. 2003; van Brakel et al. 2004), teachers (Ballespí et al. 2012; van Brakel et al. 2004), and also the evaluation of clinicians/researchers through observations (Ballespí et al. 2012; van Brakel et al. 2004). Nonetheless, one can hypothesize that children and adolescents might be better informants in the report of internalizing characteristics such as the BI. The major strength of our study concerns the investigation of a community sample of children and adolescents that permitted comparisons of both groups in terms of BI features and their associations with psychopathological symptoms.

In our study, we were able to provide further evidence of the validity of the BII, demonstrating that the assessment of BI through the BII was significantly associated to higher depression and AD symptoms, and distinctly associated with social phobia symptoms in a community sample of children and adolescents. Brief instruments such as BII may be more cost and time effective ways of measuring BI in children and adolescents, and in the future, help the advance of preventive research in AD in childhood.

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