Article

Measuring Self-Serving Cognitive Distortions with Special Reference to Juvenile Delinquency: A Validation of the "How I Think" Questionnaire in a Sample of Portuguese Adolescents

Hugo S. Gomes[1] iD, Joana Andrade[1], Marcos Ferreira[1],
Maria Manuela Peixoto[2], David P. Farrington[3],
and Angela Maia[1]

Abstract

The present study aims to test the psychometric properties of the Portuguese version of the "How I Think" (HIT) questionnaire. The HIT questionnaire is a self-report measure of self-serving cognitive distortions. Our sample was comprised of 442 Portuguese-speaking adolescents and young adults (254 males and 188 females), aged between 12 and 20 years. Of the total 442 participants, 351 were recruited from a Portuguese school and 91 from four Portuguese detention centers for juvenile delinquents. Data analysis provided evidence supporting the original six-factor model solution, composed of a four-category typology of self-serving cognitive distortions (i.e., Selfcentered, Blaming Others, Minimizing/Mislabeling, and Assuming the Worst), an Anomalous responding, and one Positive filler factor. Further, results showed satisfactory internal consistency, convergent validity, and discriminant validity. In conclusion, this article provides Portuguese researchers and practitioners with a valid measure of self-serving cognitive distortions.

[1]University of Minho, Braga, Portugal
[2]North Lusíada University (Oporto), Portugal
[3]Cambridge University, UK

Corresponding Author:
Hugo S. Gomes, Research Centre on Psychology (CIPsi), University of Minho, Escola de Psicologia—Campus de Gualtar, Braga 4710-057, Portugal.
Email: hugo.santos.gomes@gmail.com

Introduction

Human behavior is largely influenced by the way people interpret their own experiences (e.g., Bandura, 1991). As a consequence, a biased processing of social experiences may lead to inappropriate emotional and behavioral reactions (Dodge, 2011). These biased processing tendencies have been described as cognitive distortions (see Barriga et al., 2001). Research in this field has extensively linked cognitive distortions to multiple types of psychopathology, such as depression (e.g., Beck, 1963) and anxiety (e.g., Epkins, 1996), as well as different types of deviant behavior, such as gambling (e.g., Fortune & Goodie, 2012), school bullying (e.g., Dragone et al., 2020), and sexual offending (e.g., Ward et al., 1997).

Barriga et al. (2000) first described self-serving cognitive distortions and showed how these specific distortions related to offending behavior. It is theorized that self-serving cognitive distortions, by allowing people misattribute blame to others or minimize the consequences of their own antisocial behavior, limit the person's capacity for empathy and guilt which, in turn, facilitates offensive and aggressive behaviors (Barriga et al., 2008). The association between self-serving cognitive distortions and offending behavior has been demonstrated by multiple studies (Demeter & Rusu, 2019; Helmond et al., 2014; Liau et al., 1998). Furthermore, some studies have shown the importance of targeting cognitive distortions in interventions with juvenile delinquents (Gibbs et al., 1995; Lardén et al., 2006; Nas et al., 2005).

Within the study of self-serving cognitive distortions, Barriga et al. (2001) developed the How I Think (HIT) questionnaire, a self-report measure that provides an assessment of people's self-serving cognitive distortions based on the Gibbs et al. (1995; Gibbs, 2014) four-category typology. According to these authors, self-serving cognitive distortions could be divided into primary and secondary cognitive distortions. The primary distortions are described as Self-Centered attitudes and beliefs, an egocentric bias defined by the lack of ability to consider other people's views, expectations, needs, rights, and feelings due to an extreme focus on the self. The secondary cognitive distortions are rationalizations that act to reduce empathy and preserve a person's self-centered attitudes and self-esteem. The three secondary distortions are Blaming Others (i.e., misattributing blame to outside sources), Minimizing/Mislabeling (i.e., depicting antisocial behavior as causing no real harm), and Assuming the Worst (i.e., gratuitously attributing hostile intentions to others) (Gibbs, 2014).

The HIT questionnaire was designed to assess the four-category typology of self-serving cognitive distortions, that is, Self-Centered, Blaming Others, Minimizing/Mislabeling, and Assuming the Worst. Furthermore, this instrument also provides assessments of four categories of antisocial behavior (i.e., Opposition-Defiance, Physical Aggression, Lying, and Stealing) derived from Conduct Disorder and Oppositional Defiant Disorder in DSM-IV (American Psychiatric Association [APA],

1994). Also, the HIT questionnaire allows for the calculation of three summary scales. The combination of the Opposition-Defiance and Physical Aggression subscales comprise the Overt Scale (i.e., antisocial behaviors involving a direct confrontation with a victim), the combination of the Lying and Stealing subscales constitute the Covert Scale (i.e., antisocial behaviors that do not imply a direct confrontation), and the combination of the total eight subscales comprise the overall HIT scale.

Validation studies of the HIT questionnaire have been conducted in multiple countries, namely in the Netherlands (Nas et al., 2008), Sweden (Wallinius et al., 2011), French-speaking Canada (Plante et al., 2012), Spain (Fernández et al., 2013), and Italy (Bacchini et al., 2015). These studies reveal that the HIT is a reliable and valid measure of adolescents' and young adults' self-serving cognitive distortions in multiple cultural backgrounds.

The present study aims to further test the psychometric properties of the HIT questionnaire using a Portuguese sample of community and delinquent adolescents. In order to do so, we will investigate the HIT construct validity through confirmatory factor analyses and correlational analyses with delinquency variables, internal consistency, and discriminant validity between offenders and non-offenders. Furthermore, taking into account the theoretical relevance of the study of cognitive distortions, both in the understanding of antisocial behavior and in the evaluation of interventions with juvenile delinquents (Liau et al., 1998; Nas et al., 2005), this study seeks to provide a useful, valid and reliable measure of self-serving cognitive distortions that can be used with Portuguese speaking youth.

Method

Participants and Procedure

A total of 492 subjects participated in the present study. From this total, 28 participants were removed for reading difficulties, apparent response patterns (e.g., the same response for every question), and an excessive number of missing values. Furthermore, 22 participants were removed for showing scores higher than the threshold in the HIT subscale Anomalous Responding (see the Data and Statistical Analysis section). The final sample was composed of 442 adolescents and young adults, mainly Portuguese nationals (95.9%, $n=421$), 254 males (57.5%), and 188 females (42.5%), aged between 12 and 20 years ($M=15.19$, $SD=1.67$). Participants were recruited from a public school in the center of Portugal (i.e., community group; 79.4%, $n=351$) and from four Portuguese detention centers for juvenile delinquents (i.e., detention group; 20.6%, $n=91$). As Table 1 illustrates, participants in the detention group were mostly composed of male participants (81.3%) and significantly older ($M=15.94$, $SD=1.20$) than participants in the community group ($M=15.01$, $SD=1.72$). Moreover, detainee participants reported a much higher number of offenses ($M=7.11$, $SD=4.28$) compared to community group participants ($M=0.62$, $SD=1.27$).

Regarding the community group, a school from the Center of Portugal agreed to participate in the data collection process and a convenience sample of students was

Table 1. Descriptive Statistics for Gender, Age, Education, and Self-Reported Delinquency by Community versus Detention Groups.

	Total	Community group	Detention group	
	(n = 442) n (%)	(n = 351) n (%)	(n = 91) n (%)	χ^2
Gender				26.67***
Male	254 (57.5)	180 (51.3)	74 (81.3)	
Female	188 (42.5)	171 (48.7)	17 (18.7)	
Age				28.96***
12–14 years	156 (36.1)	147 (41.9)	9 (11.1)	
15–16 years	167 (38.7)	119 (33.9)	48 (59.3)	
17–20 years	109 (25.2)	85 (24.2)	24 (29.6)	
Education				263.62***
Regular	311 (70.4)	310 (88.3)	1 (1.1)	
Professional	131 (29.6)	41 (11.7)	90 (98.9)	
Grade				220.83***
6th grade	42 (9.5)	–	42 (46.2)	
7th–9th grade	187 (42.3)	138 (39.3)	49 (53.8)	
10th–12th grade	213 (48.2)	213 (60.7)	–	
SR delinquency				112.14***
Non-offenders	245 (55.8)	240 (68.4)	5 (5.7)	
Offenders	194 (44.2)	111 (31.6)	83 (94.3)	

SR = self-reported.
***Significant at the .001 level.

invited to participate. Parental consent forms were provided for all underage students. Regarding the detention group, four Portuguese detention centers from the Center and North of Portugal agreed to participate in the data collection process. All detainees were invited to voluntarily participate in this study. Ethical approval for this study was granted by the University of Minho's Ethics Committee, the Portuguese General Education Directorate of the Ministry of Education and Science, and the General Directorate of Reintegration and Prison Services (DGRSP) of the Ministry of Justice. Furthermore, permission to translate the HIT questionnaire into the Portuguese language was granted by Research Press Publishers. The translation and back-translation processes were carried out independently by two researchers and the two versions of the questionnaire were compared and discussed within the research team, to achieve the final version of the Portuguese HIT questionnaire.

Data and Statistical Analysis

The HIT includes an Anomalous Responding (AR) subscale for which the authors recommend that participants scoring higher than 4.25 should be considered invalid and the protocol disregarded. This typically invalidates less than 5% of protocols

(Barriga et al., 2001). In the present study, the AR cutoff of 4.25 invalidated 33.6% (n = 156) of participants. Also, results showed that this threshold mainly excluded the community ($\chi^2_{(1)}$ = 43.32, p < .001), female ($\chi^2_{(1)}$ = 19.16, p < .001), and younger ($t_{(452)}$ = 2.79, p < .01) participants. Therefore, we have considered the 95th percentile in order to exclude only the AR's top 5% of participants. The cutoff score was 5.375. A discriminant analysis showed that the social desirability scale correctly predicted both thresholds of 4.25 (Λ = .84, $\chi^2_{(1)}$ = 80.97, p < .001) and 5.375 (Λ = .85, $\chi^2_{(1)}$ = 76.28, p < .001), though the correct placement for the 5.375 cutoff was higher (85.7%) than for the 4.25 cutoff (69.0%). Therefore, we decided to exclude 22 participants (5%) based on the 5.375 AR cutoff.

Regarding the statistical analysis of the psychometric qualities of the HIT questionnaire, the Cognitive distortion and Antisocial Behavior factorial structures were assessed through multiple Confirmatory Factor Analysis (CFA). Construct validity was tested through correlational analyses between the HIT subscales and the self-reported delinquency variables. Internal consistency was assessed by Cronbach's alphas. Finally, discriminant analyses were carried out to determine the HIT subscales' discriminant validity. Statistical analysis was carried out using SPSS v26 and Amos™ 26.

Considering the HIT items' violation of the assumption of normal distributions (Cognitive Distortion kuMult = 114.50; Antisocial Behavior kuMult = 109.79), the CFAs were carried out using the Unweighted Least Squares (ULS) method. In order to do so, we have carried out a missing value imputation. The present sample showed a mean of 1.24 missing values per HIT item (.28%). Little's MCAR test showed that these missing values were at random (MCAR $\chi^2_{(2000)}$ = 2144.49, p < .05) and the imputation of missing values was carried out using the Bayesian Estimation. CFAs were carried out considering the following fit indexes: Standardized Root Mean Square Residual (SRMR > .80 indicating good fit), Goodness-of-Fit Index (GFI > .95), Parsimony Goodness-of-Fit Index (PGFI > .60), and Normal Fit Index (NFI > .90) (Arbuckle, 2019; Blunch, 2012; Kline, 2015).

Measures

How I Think questionnaire (HIT; Barriga et al., 2001). This is a self-report questionnaire composed of 54 items with a six-point Likert scale response format, varying from "strongly agree" to "strongly disagree." A total of 39 items were included to assess four categories of self-serving cognitive distortions (i.e., Self-Centered, Blaming Others, Minimizing/Mislabeling, and Assuming the Worst) as well as four types of antisocial behavior (Opposition-Defiance, Physical Aggression, Lying, and Stealing). The antisocial behavior subscales may also be divided into Overt antisocial (i.e., Opposition-Defiance and Physical Aggression) and Covert antisocial (i.e., Lying and Stealing) behavior categories. Out of the remaining 15 items, eight comprise the Anomalous responding subscale (assessing disingenuous and otherwise suspect reports) and seven were Positive filler items (prosocial statements acting as camouflage/to counterbalance the negative content of the other items).

Socially Desirable Response Set 5 (SDRS-5; Hays et al., 1989; Portuguese version by Pechorro et al., 2016). This is a brief five-item self-report measure of social desirability. Responses to social desirability questions are provided on a five-point Likert scale from "definitely true" to "definitely false." These items were dichotomized ("definitely true"=1; all other options=0) and the sum provides a measure of social desirability, where higher values represent higher desirability.

International Self-Report Delinquency 3 questionnaire (ISRD3; Enzmann et al., 2018; Portuguese version by Martins et al., 2015). The ISRD3 questionnaire is a multi-measure standardized self-report questionnaire. For the present study, we focused on the socio-demographic and offending modules of the ISRD3 questionnaire. The offending module included 15 questions on offending, that is, graffiti, vandalism, shoplifting, burglary, bike theft, car theft, illegal downloading, stealing from a car, stealing from a person, carrying a weapon, robbery, group fight, assault, drug sales, and animal cruelty. These offending items asked about lifetime and last year involvement in offending. For the purposes of this study, we have only focused on the lifetime prevalence of offending, and the illegal downloading item was discarded. Further, we have clustered the offending items into Minor offenses (i.e., shoplifting, carrying a weapon, vandalism, group fight, graffiti, and animal cruelty), Property offenses (i.e., stealing from a person, bike theft, car theft, stealing from a car, burglary), and Violent offenses (i.e., assault and robbery) (Siegmunt & Lukash, 2019).

Results

Confirmatory Factor Analysis

Similar to previous studies (e.g., Bacchini et al., 2015; Nas et al., 2008), we have carried out CFAs in order to test the six-factor structure proposed by Barriga et al. (2001), in contrast to the three-factor, four-factor, and higher-order seven-factor solutions. The original six-factor solution for Cognitive distortions includes four cognitive distortion factors (i.e., Self-Centered, Blaming Others, Minimizing/Mislabeling, and Assuming the Worst), one Anomalous responding factor, and one Positive filler factor. The Antisocial behavior solution is composed of four antisocial factors (i.e., Opposition-Defiance, Physical Aggression, Lying, and Stealing), one Anomalous responding factor, and one Positive filler. The three-factor solutions include one global cognitive distortion or antisocial behavior factor, one Anomalous responding factor, and one Positive filler. Regarding the four-factor solutions, the Cognitive Distortions model includes Self-Centered distortion as a primary factor and the remaining subscales (i.e., Blaming Others, Minimizing/Mislabeling, and Assuming the Worst) as the secondary cognitive distortion factor, one Anomalous responding factor, and one Positive filler factor; the Antisocial Behavior model includes the Overt and Covert scales as the two primary factors, one Anomalous responding factor, and one Positive filler. The higher-order seven-factor solutions are similar to the six-factor solution, except for including a global cognitive distortion or antisocial behavior factor underlying the four cognitive/behavioral factors.

Table 2. Confirmatory Factor Analysis Goodness-of-fit indices for HIT models.

	SRMR	GFI	PGFI	NFI
Cognitive distortions				
6-factor model	.058	.97	.89	.96
3-factor model	.058	.97	.90	.96
4-factor model	.058	.97	.90	.96
Higher-order 7-factor model	.058	.97	.90	.96
Antisocial behavior				
6-factor model	.054	.97	.89	.97
3-factor model	.058	.97	.90	.96
4-factor model	.057	.97	.90	.96
Higher-order 7-factor model	.055	.97	.90	.97

SRMR = standardized root mean square residual; GFI = goodness-of-fit index; PGFI = parsimony goodness-of-fit index; NFI = normal fit index.

As illustrated in Table 2, analyses for all factorial solutions, both Cognitive distortions and Antisocial behavior, revealed indices suggesting good model fits. In regarding to Cognitive distortions, the four model solutions presented very similar results. Regarding the Antisocial behavior models, despite the close similarity of results, the original six-factor model presented the lowest SRMR, showing a slightly better fit.

Internal Consistency

Reliability analysis for the HIT subscales showed general good internal consistency results. The four Cognitive distortions subscales had Cronbach's alphas ranging from .77 to .85 (Table 3). Similarly, the four Antisocial behavior subscales had alphas between .77 and .90 (Table 4). The Anomalous responding subscale also had acceptable reliability (α = .77), while the Positive filler had low consistency (α = .63). Further, the cumulative scales of Overt behavior (α = .90), and Covert behavior (α = .90), as well as the Total HIT score based on the 39 items (α = .95) showed very good internal consistency.

Convergent Validity

In order to test HIT convergent validity, we have considered the inter-correlations between the HIT subscales, as well as the correlations between the HIT subscales and offending behavior measures. As shown in Table 3, the four Cognitive distortions subscales had large positive intercorrelations (ranging from .79 to .83). Similarly, as shown in Table 4, the four Antisocial behavior subscales also had large positive intercorrelations (from .60 to .80). Furthermore, all Cognitive distortion and Antisocial behavior subscales had negative correlations with both Anomalous responding and Positive filler subscales. The last two subscales had a small but statistically significant positive correlation.

Table 3. Correlations between the HIT Subscales of Cognitive Distortions, and Cronbach's Alphas.

	1	2	3	4	5	M	SD	α
1. Self-centered	–					2.37	.88	.85
2. Blaming others	.80***	–				2.33	.72	.77
3. Minimizing/mislabeling	.81***	.79***	–			2.25	.82	.81
4. Assuming the worst	.82***	.83***	.80***	–		2.32	.77	.84
5. Anomalous responding	−.63***	−.60***	−.62***	−.62***	–	3.74	.92	.77
6. Positive fillers	−.37***	−.36***	−.35***	−.32***	.14**	5.41	.44	.63

α = Cronbach's alpha.
**Significant at the .01 level.
***Significant at the .001 level.

Table 4. Correlations between the HIT Subscales of Antisocial Behavior and Cronbach's Alphas.

	1	2	3	4	5	M	SD	α
1. Opposition-defiance	–					2.70	.78	.77
2. Physical aggression	.80***	–				2.14	.85	.87
3. Lying	.70***	.68***	–			2.61	.82	.78
4. Stealing	.73***	.79***	.60***	–		1.92	.83	.90
5. Anomalous responding	−.66***	−.62***	−.60***	−.51***	–	3.74	.92	.77
6. Positive fillers	−.25***	−.40***	−.27***	−.39***	.14**	5.41	.44	.63

α = Cronbach's alpha.
**Significant at the .01 level.
***Significant at the .001 level.

Table 5 shows the correlations between the HIT subscales and the offending measures. All four Cognitive distortions subscales were correlated with delinquent behavior (r ranging from .41 to .50) as were the four Antisocial behavior subscales (r ranging from .26 to .55). Considering offending severity, all Cognitive distortions and Antisocial behavior subscales presented similar patterns, with positive correlations with Minor, Property, and Violent offenses, with the exception of the Lying subscale where the correlations were smaller. Further, the HIT subscales revealed higher correlations for Minor offenses (r from .27 to .49), followed by Property offenses (r from .21 to .52), and lower correlations for Violent offenses (r from .14 to .38). The Anomalous Responding and Positive Filler subscales correlated negatively with the offending measures. Finally, the HIT summary scales showed positive correlations with all offending measures.

Discriminant Validity

Taking into account the association between HIT measures and offending behavior, we have tested the ability of the Portuguese version of this questionnaire to discriminate

Table 5. Correlations between the HIT Subscales and the Offending Measures.

	Delinquent behavior	Minor offenses	Property offenses	Violent offenses
Cognitive distortions				
Self-centered	.50***	.47***	.44***	.32***
Blaming others	.42***	.40***	.38***	.26***
Minimizing/Mislabeling	.44***	.42***	.39***	.29***
Assuming the worst	.48***	.46***	.39***	.36***
Antisocial behavior				
Opposition-defiance	.44***	.45***	.35***	.29***
Physical aggression	.48***	.46***	.41***	.34***
Lying	.26***	.27***	.21***	.14**
Stealing	.55***	.49***	.52***	.38***
Anomalous responding	−.49***	−.53***	−.37***	−.33***
Positive fillers	−.14**	−.11*	−.13**	−.12*
Summary scales				
Overt scale	.49***	.48***	.40***	.34***
Covert scale	.45***	.42***	.41***	.29***
HIT score	.49***	.47***	.43***	.33***

*Significant at the .05 level.
**Significant at the .01 level.
***Significant at the .001 level.

between offending and non-offending youth. In order to do so, we have considered two dichotomous offending variables (i.e., Official delinquency and Self-reported delinquency). Official delinquency compares the community group and the detention group (i.e., convicted offenders in a detention center). Regarding self-reported delinquency, we have created two groups, the non-offender group and the offender group (i.e., those who reported, at least, one delinquent behavior).

As shown in Table 6, all HIT subscales were able to significantly discriminate between official and self-reported offenders. The correct placement ranged from 66.3% to 73.3% for the Cognitive distortion subscales, and from 64.3% to 77.1% for Antisocial behavior subscales. The Overall HIT score showed a predictive accuracy of 73.8% for official delinquency groups ($\Lambda = .83$, $\chi^2_{(1)} = 81.67$, $p < .001$) and of 69.5% for self-reported delinquency groups ($\Lambda = .80$, $\chi^2_{(1)} = 97.37$, $p < .001$).

Gender and Age Differences for HIT Subscales

Finally, we have carried out a HIT subscales comparison analysis for gender and age (i.e., 12–14, 15–16, 17–20) groups (Table 7). All Cognitive distortions and Antisocial behavior subscales, as well as the summary scales (i.e., Overt scale, Covert scale, and HIT score), presented very similar patterns where the main effect for gender was found, while no significant age effect was present for the age groups considered. Male

Table 6. Discriminant Analysis of the HIT Subscales.

Subscales	Official delinquency (%)	Self-reported delinquency (%)
	Community = 351	Non-offenders = 245
n for each group	Detention = 91	Offenders = 194
Cognitive distortions		
Self-centered	73.3***	71.8***
Blaming others	71.0***	66.5***
Minimizing/mislabeling	71.7***	66.3***
Assuming the worst	71.7***	67.4***
Antisocial behavior		
Opposition-defiance	72.4***	68.8***
Physical aggression	72.4***	68.8***
Lying	64.3***	66.7***
Stealing	77.1***	67.2***
Anomalous responding	74.0***	71.5***
Positive fillers	56.1*	54.0*
Summary scales		
Overt scale	74.4***	68.6***
Covert scale	71.9***	70.6***
HIT score	73.8***	69.5***

*Significant at the .05 level.
***Significant at the .001 level.

participants scored higher than females in all measures of Cognitive distortions and Antisocial behavior. As for the Anomalous responding and Positive fillers subscales, female participants scored higher than males, and only in the case of Anomalous responding a main effect for age was found, in which the 15 to 16 year old group scored significantly lower than the remaining age groups.

Discussion

The present study aimed to examine the psychometric properties of the How I Think (HIT; Barriga et al., 2001) questionnaire among Portuguese adolescents. The HIT is a self-report questionnaire comprised of 54 items developed to evaluate self-serving cognitive distortions. The Portuguese version of the HIT questionnaire was validated using a community sample of young students and a delinquent sample of juvenile offenders in Portuguese detention centers. We have assessed the instrument's psychometric qualities through factor analysis, internal consistency, convergent validity, and discriminant validity. The present validation study had an added value of considering not only officially recorded offending in the comparison between community and detention groups, but also self-reported offenders in comparison to non-offenders.

Table 7. Gender and Age Differences for the HIT Subscales.

Subscales	Gender			Age			
	Male (n = 245) M (SD)	Female (n = 187) M (SD)	F	12–14 (n = 156) M (SD)	15–16 (n = 167) M (SD)	17–20 (n = 109) M (SD)	F
Cognitive distortions							
Self-centered	2.56 (.92)	2.09 (.73)	30.41***	2.24[a] (.85)	2.42[a] (.89)	2.43[a] (.88)	n.s.
Blaming others	2.49 (.75)	2.11 (.64)	28.32***	2.31[a] (.71)	2.32[a] (.75)	2.34[a] (.73)	n.s.
Minimizing/Mislabeling	2.49 (.86)	1.94 (.66)	53.15***	2.16[a] (.76)	2.31[a] (.89)	2.29[a] (.82)	n.s.
Assuming the worst	2.45 (.83)	2.13 (.65)	17.27***	2.28[a] (.71)	2.34[a] (.82)	2.32[a] (.78)	n.s.
Antisocial behavior							
Opposition-defiance	2.84 (.79)	2.51 (.75)	16.84***	2.60[a] (.76)	2.75[a] (.82)	2.74[a] (.77)	n.s.
Physical aggression	2.37 (.89)	1.81 (.69)	48.37***	2.09[a] (.82)	2.14[a] (.90)	2.17[a] (.83)	n.s.
Lying	2.75 (.85)	2.42 (.74)	16.46***	2.65[a] (.80)	2.76[a] (.83)	2.61[a] (.88)	n.s.
Stealing	2.11 (.92)	1.65 (.60)	33.03***	1.83[a] (.71)	1.94[a] (.91)	1.99[a] (.85)	n.s.
Anomalous responding	3.56 (.92)	4.02 (.84)	24.07***	3.93[a] (.91)	3.63[b] (.93)	3.72[a,b] (.87)	3.38*
Positive fillers	5.32 (.45)	5.52 (.40)	24.33***	5.39[a] (.43)	5.42[a] (.43)	5.42[a] (.47)	n.s.
Summary scales							
Overt scale	5.21 (1.59)	4.32 (1.37)	34.48***	4.69[a] (1.51)	4.89[a] (1.64)	4.91[a] (1.52)	n.s.
Covert scale	4.84 (1.60)	4.08 (1.21)	29.56***	4.42[a] (1.37)	4.60[a] (1.54)	4.54[a] (1.59)	n.s.
HIT score	10.06 (3.08)	8.40 (2.46)	34.73***	9.11[a] (2.78)	9.49[a] (3.08)	9.45[a] (2.98)	n.s.

Note. The subscript letters represents the results of the post hoc tests for the mean comparison by age groups; different letters in the same row denotes statistically significant differences at the .05 level.

n.s. = statistically non-significant.

*Significant at the .05 level.

***Significant at the .001 level.

Results were in line with previous validation studies for other languages (e.g., Bacchini et al., 2015; Fernández et al., 2013; Nas et al., 2008; Plante et al., 2012; Wallinius et al., 2011), which provided support for the psychometric qualities of the Portuguese version of the HIT for the adolescent population.

The factorial analysis carried out in this study compared the original six-factor model with other commonly tested models (i.e., the three-factor model, the four-factor model, and the higher-order seven-factor model) for both Cognitive distortions and Antisocial behavior subscales. Despite the overall similarity between the tested factorial models, the CFA results provided evidence supporting the goodness of fit of the original six-factor model for both Cognitive distortions (i.e., four self-serving cognitive distortions, one Anomalous responding, and one Positive filler factor) and Antisocial behavior (i.e., four antisocial behavior subscales, one Anomalous responding, and one Positive filler factor).

Regarding the reliability analysis for the Portuguese version of the HIT questionnaire, results showed satisfactory to very good internal consistency for all Cognitive distortion and Antisocial behaviors subscales. In conformity with the original validation of the questionnaire, the Anomalous responding and, especially, the Positive filler subscales had lower internal consistency. However, since these are not scored items, with the purpose of encouraging the full use of the response scale and to camouflage the distortion items, this low reliability does not affect the psychometric qualities of the HIT questionnaire.

The correlational analyses provided evidence supporting the convergent validity of the Portuguese version of the HIT questionnaire. In line with the original study, the HIT subscales for Cognitive distortions and Antisocial behavior were positively intercorrelated and were negatively correlated with both Anomalous responding and Positive filler subscales. Furthermore, the HIT subscales were correlated with the self-reported offending measures in the expected direction (i.e., increased scores of Cognitive distortions and Antisocial behavior were associated with higher scores on the offending measures). This significant association between the HIT subscales and delinquent behavior was maintained over different levels of offending seriousness (i.e., Minor offenses, Property offenses, and Violent offenses). Furthermore, discriminant validity tests showed good results, where all HIT subscales were able to accurately distinguish between offenders and non-offenders, both when considering officially recorded delinquency (i.e., community vs. detention group) and self-reported delinquency.

Comparisons between genders revealed that cognitive distortions occurred more often among male participants than females. Males scored higher in all types of cognitive distortion, as well as in antisocial behavior subscales. These differences across gender were also found in validation studies carried out in other languages (e.g., Fernández et al., 2013), though the original study (Barriga et al., 2001) and other validation studies found no significant gender differences in cognitive distortions (e.g., Bacchini et al., 2015). As for the participants' age, no significant effects on cognitive distortions were found in the present study, which is in line with some previous studies (e.g., Barriga et al., 2000). On the other hand, some studies found significant age

effects on cognitive distortions. Wallinius et al. (2011) found a negative correlation between age and HIT scores. Bacchini et al. (2015), considered grade class (9th grade vs. 12th grade) and found a negative correlation between age and secondary cognitive distortions, suggesting that, as adolescents grow older, their tendency to have secondary cognitive distortions decreases. More research on gender and age effects on self-serving cognitive distortions is needed to better understand their impact on delinquent behavior.

As for the limitations, we would like to highlight potential concerns regarding the generalizability of the present results. Participants were selected based on convenience sampling and may not accurately represent the Portuguese adolescent population. This issue is more relevant in the community sample, where participants came from a public school in the center of Portugal. As for the detention group, participants were selected from four out of the six Portuguese detention centers for juvenile delinquents, both from the center and the north of the country, and represent the large majority of the total number of detained juveniles in Portugal. A further potential limitation relates to the cutoff value of the Anomalous Responding subscale. Because the originally proposed cutoff of 4.25 was found to be very low and excluding a large part of our sample (33.6%), we estimated a new cutoff value based on excluding the top 5% of protocols. While this decision may have resulted in the inclusion of disingenuous reports, our analysis showed that the cutoff score of 5.375 better discriminated the socially desirable reports. On the other hand, the use of paper-and-pencil self-administered questionnaires may have affected participants' responses, especially those with more reading difficulties (see Gomes et al., 2019; Tourangeau & Smith, 1996).

In conclusion, the psychometric analyses carried out in this study provided evidence of satisfactory validity and reliability for the Portuguese version of the HIT questionnaire. Thus, the present article provides Portuguese researchers and practitioners with a valid measure of self-serving cognitive distortions. Within the research field, the HIT questionnaire is a very useful instrument that may be used in the study of cognitive distortions as risk factors for offending, as well as mediating factors between adverse childhood experiences and delinquency (e.g., Ferreira, 2020). As for clinical/practice implications, interventions targeting self-serving cognitive distortions have shown effectiveness in preventing criminal recidivism of juvenile delinquents (e.g., Gibbs et al., 1995). Furthermore, the HIT questionnaire is a frequently used instrument in Portuguese forensic reports elaborated by the DGRSP (Ferreira, 2015). Therefore, this version of the HIT questionnaire is advantageous in the assessment and intervention programs with Portuguese juvenile delinquents.

Declaration of Conflicting Interests

Funding

ORCID iD

Hugo S. Gomes   https://orcid.org/0000-0001-7778-6409

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual for mental disorders* (4th ed.). American Psychiatric Association.

Arbuckle, J. L. (2019). *IBM® SPSS® Amos™ 26 user's guide*. Amos Development Corporation. https://www.ibm.com/support/pages/spss-amos-26-documentation

Bacchini, D., Angelis, G., Affuso, G., & Brugman, D. (2015). The structure of self-serving cognitive distortions: A validation of the "How I Think" Questionnaire in a sample of Italian adolescents. *Measurement and Evaluation in Counseling and Development*, *49*, 163–180. https://doi.org/10.1177/0748175615596779

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*, 248–287. https://doi.org/10.1016/0749-5978(91)90022-L

Barriga, A. Q., Gibbs, J. C., Potter, G. B., & Liau, A. K. (2001). *How I Think (HIT). Questionnaire manual*. Research Press.

Barriga, A. Q., Hawkins, M. A., & Camelia, C. T. (2008). Specificity of cognitive distortions to antisocial behaviours. *Criminal Behaviour and Mental Health*, *18*, 104–116. https://doi.org/10.1002/cbm.683

Barriga, A., Landau, J. R., Stinson, B. L., Liau, A. K., & Gibbs, J. C. (2000). Cognitive distortion and problem behaviors in adolescents. *Criminal Justice Behavior*, *27*, 36–56. https://doi.org/10.1177/0093854800027001003

Beck, A. T. (1963). Thinking and depression: I. Idiosyncratic content and cognitive distortions. *Archives of General Psychiatry*, *9*, 324–333. https://doi.org/10.1001/archpsyc.1963.01720160014002

Blunch, N. (2012). *Introduction to structural equation modeling using IBM SPSS statistics and AMOS*. Sage.

Demeter, E., & Rusu, A. S. (2019). The relationship between the criminal offence and self serving cognitive distortions. *Journal Plus Education*, *23*, 81–86.

Dodge, K. A. (2011). Social information processing patterns as mediators of the interaction between genetic factors and life experiences in the development of aggressive behavior. In P. R. Shaver & M. Mikulincer (Eds.), *Human aggression and violence: Causes, manifestations, and consequences* (pp. 165–185). American Psychological Association.

Dragone, M., Esposito, C., Angelis, G., Affuso, G., & Bacchini, D. (2020). Pathways linking exposure to community violence, self-serving cognitive distortions and school bullying perpetration: A three-wave study. *International Journal of Environmental Research and Public Health*, *17*, 188–207. https://doi.org/10.3390/ijerph17010188

Enzmann, D., Kivivuori, J., Marshall, I. H., Steketee, M., Hough, M., & Killias, M. (2018). *A global perspective on young people as offenders and victims: First results from the ISRD3 study*. Springer.

Epkins, C. C. (1996). Cognitive specificity and affective confounding in social anxiety and dysphoria in children. *Journal of Psychopathology and Behavioral Assessment*, *18*, 83–101. https://doi.org/10.1007/BF02229104

Fernández, M., Rodríguez, J., Barriga, A., & Gibbs, J. (2013). Psychometrical properties of the "How I Think" questionnaire (HIT-Q) in adolescents. *Psicothema*, *25*, 542–548. https://doi.org/10.7334/psicothema2013.38

Ferreira, I. O. (2015). *Psychological reports in forensic context: Reports analysis developed in general direction of rehabilitation and prison services (DGRSP)* [Master's thesis]. Scientific Repository of the University of Coimbra. (Accession No 201448041)

Ferreira, M. (2020). *Relationship between adverse childhood experiences, cognitive distortions and delinquency in a youth community sample* [Unpublished master's thesis]. University of Minho.

Fortune, E. E., & Goodie, A. S. (2012). Cognitive distortions as a component and treatment focus of pathological gambling: A review. *Psychology of Addictive Behaviors*, *26*, 298–310. https://doi.org/10.1037/a0026422

Gibbs, J. C. (2014). *Moral development and reality: Beyond the theories of Kohlberg, Hoffman, and Haidt* (3rd ed.). Oxford University Press.

Gibbs, J. C., Potter, G. B., & Goldstein, A. P. (1995). *The EQUIP program: Teaching youth to think and act responsibly through a peer-helping approach*. Research Press.

Gomes, H. S., Farrington, D. P., Maia, Â., & Krohn, M. D. (2019). Measurement bias in self-reports of offending: A systematic review of experiments. *Journal of Experimental Criminology*, *15*, 313–339. https://doi.org/10.1007/s11292-019-09379-w

Hays, R. D., Hayashi, T., & Stewart, A. L. (1989). A five-item measure of socially desirable response set. *Educational and Psychological Measurement*, *49*, 629–636. https://doi.org/10.1177/001316448904900315

Helmond, P., Overbeek, G., Brugman, D., & Gibbs, J. C. (2014). A meta-analysis on cognitive distortions and externalizing problem behavior: Associations, moderators, and treatment effectiveness. *Criminal Justice and Behavior*, *42*, 245–262. https://doi.org/10.1177/0093854814552842

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford.

Lardén, M., Melin, L., Holst, U., & Långström, N. (2006). Moral judgement, cognitive distortions and empathy in incarcerated delinquent and community control adolescents. *Psychology, Crime and Law*, *12*, 453–462. https://doi.org/10.1080/10683160500036855

Liau, A. K., Barriga, A. Q., & Gibbs, J. C. (1998). Relations between self-serving cognitive distortions and overt vs. covert antisocial behavior in adolescents. *Aggressive Behavior*, *24*, 335–346. https://doi.org/10.1002/(SICI)1098-2337(1998)24:5<335::AID-AB1>3.0.CO;2-G

Martins, P., Mendes, S., & Fernandez-Pacheco, G. (2015, September). *Cross-cultural adaptation and online administration of the Portuguese version of ISRD3* [Conference session]. Paper presented at the 15th Annual Conference of the European Society of Criminology, Porto.

Nas, C. N., Brugman, D., & Koops, W. (2005). Effects of the EQUIP programme on the moral judgement, cognitive distortions, and social skills of juvenile delinquents. *Psychology, Crime & Law*, *11*, 421–434. https://doi.org/10.1080/10683160500255703

Nas, C. N., Brugman, D., & Koops, W. (2008). Measuring self-serving cognitive distortions with the "How I Think" questionnaire. *European Journal of Psychological Assessment*, *24*, 181–189. https://doi.org/10.1027/1015-5759.24.3.181

Pechorro, P., Barroso, R., Silva, I., Marôco, J., & Gonçalves, R. A. (2016). Propriedades psi-cométricas da Escala de Respostas Socialmente Desejáveis-5 (SDRS-5) em jovens institu-cionalizados [Psychometric properties of the Socially Desirable Response Set 5 (SDRS-5) with institutionalized youth]. *Psicologia*, *30*, 29–36. https://doi.org/10.17575/rpsicol.v30i1.1065

Plante, N., Daigle, M. S., Gaumont, C., Charbonneau, L., Gibbs, J., & Barriga, A. (2012). Validation of the "How I Think questionnaire" in a population of French-speaking adoles-cents with externalizing behaviors. *Behavior Sciences and Law*, *30*, 196–210. https://doi.org/10.1002/bsl.2001

Siegmunt, O., & Lukash, A. (2019). Classroom heterogeneity, immigration background, and juvenile delinquency in Switzerland: An exploratory study. *Journal of Contemporary Criminal Justice*, *35*, 484–505. https://doi.org/10.1177/1043986219883447

Tourangeau, R., & Smith, T. W. (1996). Asking sensitive questions: The impact of data collec-tion mode, question format, and question context. *Public Opinion Quarterly*, *60*, 275–304. https://doi.org/10.1086/297751

Wallinius, M., Johansson, P., Larden, M., & Dernevik, M. (2011). Self-serving cognitive distor-tions and antisocial behavior among adults and adolescents. *Criminal Justice and Behavior*, *38*, 286–301. https://doi.org/10.1177/0093854810396139

Ward, T., Hudson, S. M., Johnston, L., & Marshall, W. L. (1997). Cognitive distortions in sex offenders: An integrative review. *Clinical Psychology Review*, *17*, 479–507. https://doi.org/10.1016/S0272-7358(97)81034-3