Coming on strong: Is Responsive Aggression Regulation Therapy (Re-ART) a promising intervention?

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Chapter 3

A validation study of the Brief Irrational Thoughts Inventory[8]

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ABTRACT: This study examines the reliability and validity of the “Brief Irrational Thoughts Inventory" (BITI) in a sample of 256 justice-involved youths. The BITI is a questionnaire used to determine the nature and severity of irrational thoughts related to aggressive (externalizing), sub-assertive (internalizing), and distrust-related behavior in adolescents with conduct problems. The results of this study demonstrated adequate internal consistency reliability and supported validity of the BITI in terms of construct, convergent, concurrent and divergent validity. Construct validity was assessed using a confirmatory factor analysis. The BITI proved to be measurement invariant for sex and ethnic origin, i.e., the results indicated that items were interpreted in a similar way by boys and girls as well as native and non-native Dutch respondents. The BITI also proved to be insensitive to intelligence, education, and age (divergent validity). However, weak to moderate correlations were found between the degree of social desirability and irrational thoughts related to aggressive (externalizing) and distrust-related behavior (BITI). Finally, concurrent validity was satisfactory, with the exception of thoughts related to sub-assertive (internalizing) behavior.

Introduction

The role of cognitive factors in human experiences is widely recognized (Ellis, 1994, DiGiuseppe, Doyle, Dryden, & Backx, 2013). Research has shown that there is an association between irrational thoughts and both internalizing problems (e.g., anxiety and depression) and externalizing problems (e.g., aggression, antisocial and delinquency) in adolescents depending on whether these thoughts are self-debasing or self-serving, respectively (Barriga, Hawkins, & Camelia, 2008). Self-debasing thoughts can lead to self-harm, while self-serving thoughts, which are used to justify deviant behavior and reduce cognitive dissonance, can result in harm done to others (Barriga et al., 2008). In adolescents with conduct problems, cognitive distortions often derive from a deep-rooted distrust in other people (Lochman & Lenhart, 2000; Nas, Brugman, & Koops, 2008).

There is empirical evidence showing that irrational thoughts positively correlate with conduct problems (Nas et al., 2008; Van der Put, Deković, Stams, Hoeve, & Van der Laan, 2012; Wallinius, Johansson, Lardén, & Dernevik, 2011). The treatment of irrational thoughts is an important component of many behavioral interventions aimed at reducing externalizing problems in at-risk youth (Maruna & Mann, 2006). Moreover, the identification of specific irrational thoughts associated with psychopathology can contribute to the effectiveness of treatment (Beck, 2005), in particular because treatment success partly comes about by reframing irrational thoughts (Maruna & Mann, 2006).

A (brief) questionnaire may be useful to quickly and easily assess and monitor (through repeated assessments) irrational thoughts in young people with externalizing behavioral problems. The central aim of this study was therefore to investigate the reliability and validity of the Brief Irrational Thoughts Inventory (BITI) in a sample of Dutch adolescents with externalizing behavioral problems.

The BITI purports to assess irrational thoughts regularly expressed by young people with conduct problems residing in (secure) residential settings. The BITI is based on a general definition of irrational thoughts, which means that irrational thoughts refer to beliefs that are illogical, and/or do not have empirical support, and/or are not pragmatic. Other terms to designate these beliefs are dysfunctional thoughts (David, Lynn, & Ellis, 2010) or cognitive distortions (Liau, Barriga, & Gibbs, 1998).

One important issue in the study of irrational thoughts is the distinction between cold and hot cognitions (David, Lynn, & Ellis, 2010). Hot cognitions are strongly involved in the generation of our feelings, whereas cold cognitions do not generate feelings if they are not further appraised by a hot cognition (David et al., 2010). Notably, irrational thoughts have mostly been related to hot cognitions and dysfunctional cognitions or cognitive distortions to cold cognitions (i.e., automatic thoughts, core beliefs or schemas; David, Lynn, & Ellis, 2010). The BITI identifies hot cognitions (e.g., "I think it's really bad if someone doesn't like me") and cold cognitions (e.g., "I believe attack is the best form of defense").

Externalizing and internalizing behavior problems are two empirically derived dimensional constructs (Deković, Buist, & Reitz, 2004). It is often suggested that only self-serving distortions need to be reduced in the treatment of (severe) externalizing behavior problems (Barriga, Gibbs, Potter, & Liau, 2001; Brugman et al., 2011). However, Kazemian and Maruna (2009) found that self-debasing and self-serving thoughts are not necessary mutually exclusive. Notably, adolescents often exhibit co-occurring internalizing and externalizing problems (Achenbach, 1993; Youngstrom, Findling, & Calabrese, 2003).

Goodwin and Hamilton (2003) demonstrated that depression was diagnosed in 19% of the adolescents and adults with antisocial behavioral or personality disorders. In addition, there is evidence showing that irrational thoughts combined with low levels of self-confidence are associated with conduct problems, such as aggression and (other) antisocial

behaviors (Donnellan, Trzeniewsky, Robins, Moffitt, & Caspi, 2005; Mason, 2000). Furthermore, it is evident from previous research by Hoogsteder (2012) that 41% of adolescents and young adults appearing before court with severe aggression problems and a high risk of recidivism rated high on both self-debasing and self-serving thoughts related to sub-assertive (internalizing) as well as to aggressive (externalizing) behavior. In addition, Dodge (2006) showed that past experiences of insecurity, such as long-term exposure to violent environments, can lead to heightened vigilance, and hostile and distrustful thoughts (e.g. "A lot of people are against me"), which can evoke conduct problems (McKnight & Chervany, 2001).

These results imply that it is relevant for the diagnosis and subsequent treatment of adolescents with externalizing (severe) behavioral problems to record (and to reduce) both self-debasing thoughts related to sub-assertive (internalizing) behavior and self-serving thoughts related to aggressive (externalizing) behavior problems, but also distrustful thoughts related to conduct problems.

The Brief Irrational Thoughts Inventory (BITI) is a self-report questionnaire that assesses and monitors irrational thoughts related to aggressive (externalizing), sub-assertive (internalizing), and distrust-related behavior. The BITI is intended for adolescents and young adults between 12 and 24 years of age with (severe) conduct problems.

Irrational thoughts related to aggressive (externalizing) behavior include beliefs or justifications of antisocial behavior that may evoke aggressive feelings or behaviors. Feelings of anger, frustration and a sense of injustice often play a role here. The items of this scale describe self-serving cognitive distortions, like *blaming others* (e.g., "If someone insults my family I have the right to use violence"). A large part of the thoughts of this scale also refer to the "Code of Honor". This means that these thoughts (e.g., "I have the right to retaliate if someone harms me") are related to aggressive behavior to prevent others from

attacking you (Barash & Lipton, 2011). Barash and Lipton assumed that victims of violence may respond to their pain by inflicting pain on someone else (via retaliation, revenge or redirected aggression).

Irrational thoughts related to sub-assertive (internalizing) behavior may stem from beliefs of inferiority, such as doubt and uncertainty or anxiety about rejection and the need to be valued. Most of the items of this scale refer to self-debasing thoughts: some hot cognitions refers to *awfulizing/catastrophizing* (e.g., "I think it's really bad if someone is angry with me").

Finally, distrustful thoughts related to distrust-related behavior pertain to beliefs that the motives and intentions of others are hostile or negative. Such thoughts can evoke indirect aggression, retribution, hostile behavior, passivity, lack of cooperation, and false interpretation of events (McKnight & Chervany, 2001). It primarily indicates lack of trust in others (including the therapist or youth care worker), which hampers treatment motivation. The items of this scale consist of some self-serving distortions designated as *assuming the worst* (i.e., believes that others' intentions are hostile; e.g., "A lot of people are against me").

The BITI is based on Dodge's theory (2006) of (inadequate) social information-processing. The theory of social information-processing assumes that adolescents with behavioral problems often display disordered information-processing throughout all phases: observation, interpretation, goal-selection, thinking of solutions, making choices and implementation of these choices. In terms of analyzing the cognitive processes and investigating irrational thoughts, this involves exploring how these develop in each phase and in what way this ultimately influences behavior (Matthys, 2011). The underlying idea here is that an event evokes thoughts and that these thoughts have an influence on the emotions experienced and the responses to this event (De Lange & Albrecht, 2006). The

manner in which a situation is interpreted and evaluated can be influenced by irrational thoughts. Evaluations that do not link up (in part) to reality or are non-pragmatic or dysfunctional enhance the risk of an inappropriate response to the event, and this may lead to sub-assertive or aggressive behavior depending on the type of irrational thoughts (Bandura, 1997; Jacobs, Muller, & Ten Brink, 2001).

Little is known about the relations between intelligence, gender, ethnicity and irrational thoughts. The limited number of studies into the relation between intelligence and irrational thoughts have yielded equivocal results. For instance, in a study by Barriga et al. (2001) no relation was found between intelligence and irrational thoughts in adolescents with conduct problems. However, Nas (2005) found that adolescents with a lower level of intelligence displayed more cognitive distortions compared to adolescents with higher levels of intelligence. Regarding gender, it appears that girls report fewer irrational thoughts than boys (Barriga et al., 2001; Lardén et al., 2006). According to Barriga and Landau (2000) there is no association between ethnic origin and the degree of cognitive bias. However, it is possible that studies did not find ethnic differences in the extent and type of irrational thoughts, because various small ethnic samples were collapsed into one larger group (Kotchick & Grover, 2008; Stevens et al., 2003).

The original Irrational Thoughts Inventory (ITI) consisted of 37 items and four scales (Aggression, Justification, Sub-assertiveness, and Distrust). This inventory was developed in clinical practice based on experiences in working with young people in a (secure) residential setting. Irrational thoughts that were regularly expressed by young people in a (secure) residential setting served as the starting point for the statements used in the questionnaire. A pilot study (N = 87) demonstrated that the reliability and construct validity (principal component analysis) of the original (ITI) version (of 37 items) were promising (Swart, 2009). The BITI arose when the number of items was reduced to create

a shorter inventory and when the Aggression and Justification scales were combined. The first step in reducing the number of items of the original ITI involved an assessment by expert practitioners to determine which items were most important. Subsequently, the items that showed too much overlap with other items were removed, including those items with a factor loading below .40 and/or low corrected item total correlations, using principal component analysis.

The present study examined the reliability and validity of the resulting BITI in terms of construct, convergent, concurrent and divergent validity. A confirmatory factor analysis was conducted in order to examine construct validity. Subsequently, it was tested whether or not the BITI is measurement invariant for different gender groups and groups that differ in ethnic origin (native versus non-native Dutch respondents). Measurement invariance ensures an equal definition of a construct across groups and is an important prerequisite for making any inferences from differences between groups (Cheung & Rensvold, 1998). If measurement invariance does not hold, it is not clear whether differences between gender and ethnic groups are caused by differences in measurement or whether they should be considered as real differences between groups. In order to determine convergent validity, we calculated the correlations between an instrument measuring theoretically comparable concepts, namely the Dutch version of the How I Think (HIT) questionnaire. To examine concurrent validity, we used the Utrecht Coping List (UCL) and the Buss-Durkee Hostility Inventory – Dutch (BDHI-D). It was examined whether or not the presence of sub-assertive (internalizing) thoughts (BITI) showed an association with concurrent avoidance of problematic situations (coping skills). Finally, in order to determine divergent validity it was assessed whether the BITI was related to intelligence, level of education, age and social desirability.

Method

Study sample

The sample consisted of male and female adolescents and young adults, between 12 and 23 years of age, who resided either in residential facilities (two secure juvenile justice institutions and a semi-secure residential youth healthcare facility) or received ambulant care within a forensic setting. A total of 351 adolescents and/or young adults were approached to participate in the study, and ultimately $N = 256$ subjects were included. A total of 13 young people refused to participate, possibly due to mistrust and/or demotivation, and 82 adolescents did not meet the inclusion criteria because they did not have sufficient knowledge of the Dutch language (i.e., it was not possible to communicate with these youths in Dutch) or had an IQ score below 70.

The sample consisted of 80.5% males ($n = 206$). The average age was 16.6 years ($SD = 1.3$, range 13-22 years). The average IQ level was 83.8 ($SD = 8.2$, range 70 to 120). The adolescents differed in terms of their educational level from special education (3.3%), pre-vocational education and secondary vocational education (91%) to senior secondary vocational education (5.7%). A high percentage (68%) of the adolescents and young adults were not native Dutch. In this study adolescents were defined as not being native Dutch if at least one of their parents was born in a country other than the Netherlands. The demographic details of the study population are included in Table 1.

Table 1.
Demographic Details for the Study Sample

	Study sample *(n = 256)*
Average age	16.6 (1.3)
Boys	80.5% (*n* = 206)
Girls	19.5% (*n* = 50)
Ambulant treatment setting	18% (*n* = 46)
Stay at residential setting	82% (*n* = 210)
Stay due to criminal sanction	*84.8 % (n = 178)*
Stay due to civil sanction	*15.2% (n = 32)*
Intelligence score	83.5 (8.4)
In education	81.6% (*n* = 209)
Special Education	3.3% (*n* = 7)
Pre-vocational Education	43.1% (*n* = 90)
Secondary Vocational Education level 1	18.7% (*n* = 39)
Secondary Vocational Education level 2	29.2% (*n* = 61)
Senior Secondary Education	5.7% (*n* = 12)
Non-native Dutch	68% (*n* = 174)
Native Dutch	32% (*n* = 82)

Procedure

The subjects (*N = 256*) participated voluntarily in the study and the data were processed anonymously. Participation was linked to the intake procedure, that all young people had to undergo. Completion of the questionnaires was also part of the client registration system (Routine Outcome Monitoring). The intake procedure took place within the young offenders' (residential) facilities within ten days after arrival, and within the ambulatory care during the second intake-session. In order to prevent non-response, the young people (residential) were allowed to complete the questionnaires at moments during which they would otherwise have to sit in their rooms. The researcher was present while the youngsters completed the questionnaires (both in the residential and ambulatory care), so that the young people were able to ask questions if they did not understand an item.

Instruments

Irrational Thoughts

BITI

As previously described, the Brief Irrational Thoughts Inventory (BITI; Hoogsteder, 2012) is a questionnaire containing three subscales: Aggression and Justification (9 items), Sub-assertiveness (5 items) and Distrust (4 items). The BITI can be used for adolescents and young adults between 12 and 24 years of age with (severe) conduct problems (see Results section for more psychometric information).

How I Think Questionnaire

The Dutch version of the How I Think Questionnaire (HIT; Barriga et al., 2001) was used to measure four categories of self-serving cognitive distortions (thinking errors). The HIT consists of items that are to be answered on a scale of 1 (*I totally agree*) to 6 (*I totally disagree*). A high score on the HIT indicates a high degree of cognitive distortions. The Dutch version of the HIT demonstrated acceptable reliability and validity (Nas et al., 2008). The following cognitive distortions were assessed in the present study: Self-Centered (9 items; α = .79), Blaming Others (10 items; α = .78), Minimizing/Mislabeling (9 items; α = .82), and Assuming the Worst (11 items; α = .80). The same items can also be applied to four behavioral referent subscales: Opposition-Defiance (10 items; α = .80), Physical Aggression (10 item; α = .82), and Lying and Stealing. Lying and Stealing were not used in the present study.

Intelligence

Intelligence was assessed with a shortened version of the Groninger Intelligence Test (GIT-2; Luteijn & Barelds, 2004), which contains six subtests: Vocabulary (verbal

comprehension α = .61), Visualization (α = .73), Mental Arithmetic (numbers), Analogies (induction/deduction; α = .76), Closure (α = .69), and Word Fluency. The psychometric properties of the GIT-2 short form are sufficient (Luteijn & Barolds, 2004), with an average internal consistency (shortened version) of .92.

Aggressive behavior

The Buss-Durkee Hostility Inventory-Dutch (BDHI-D; Lange, Hoogendorn, Wiederspahn, & De Beurs, 2005) was used to assess aggression. The BDHI-D is a self-rating scale with 40 true-false items for adolescents and (young) adults. The BDHI-D contains three subscales: Direct Aggression (DA; 16 item; α = .81), Indirect Aggression (CA; 19 items; α = .85) and Social Desirability (SD; 5 items; α = .57). The Direct Aggression scale assesses physical and verbal aggression, whereas anger and hostility were the main concepts from the Indirect Aggression scale. Lange, Dehghani, and Beurs (1995) demonstrated reliability and convergent and divergent validity of the BDHI-D.

Coping skills

The Utrecht Coping List (UCL; Schreurs, Van de Willige, Brosschot, Tellegen, & Graus, 1993) was used to measure coping behaviors. The UCL is a 47-item Dutch self-report questionnaire that assesses coping using seven scales, namely Active Handling, Palliative Coping, Avoidance, Social Support, Passive Coping, Expression of Emotions and Reassuring Thoughts. Each item is rated on a four-point Likert scale ranging from 1 (never) to 4 (very often). The UCL has sufficient reliability (Schreurs, Willige, Van de Brosschot, Tellegen, & Graus, 1993), construct validity, and predictive validity (Schaufeli & Van Dierendonck, 1992). Only two coping styles be used for measuring concurrent validity and were assessed in the present study: Avoidance (8 items; α = .68) and Expression of Emotions (3 items: α = .70).

Statistical analysis

Missing values were replaced using an expectation-maximization procedure, which is a generalized ML estimation procedure (Do & Batzoglou, 2008). The pilot study of the BITI demonstrated by means of exploratory principal component analysis that a 3 factor solution was optimal. In the presents study, a confirmatory factor analysis was used to test whether the 3 factor model produced a good fit to the data using AMOS (Arbuckle, 2011). Various fit indices were used in the confirmatory factor analysis. For instance, a ratio between χ^2 and the degrees of freedom (d.f.) less than 2.5 would indicate acceptable fit to the data (Hu & Bentler, 1999). A root mean-square error (RMSEA) less than .08 in combination with a comparative fit index (CFI) over .90 would indicate acceptable fit (Hu & Bentler, 1999), whilea good fit is demonstrated when the CFI is larger than .95 and RMSEA is lower than .05.

Measurement invariance was investigated for different gender and ethnic origin groups. Measurement invariance can be established at several levels with increasing restrictions (Meredith, 1993). According to Cheung and Rensvold (1998) the second level (metric invariance) is sufficient for validating questionnaires. For metric invariance the factor loadings are not allowed to be significantly different across groups (Cheung & Rensvold, 1998). This indicates that a significant difference in chi-square between a model in which factor loadings are allowed to differ and a model in which factor loadings are constrained to be equal would signal that there is no metric invariance.

Internal consistencies were determined in a reliability analysis, where a Cronbach's alpha of .60 was the minimum requirement (Bijleveld, 2009; Streiner, 2003). Convergent and concurrent validity were assessed by computing correlations between the three BITI scales and the scales of the HIT, BDHI-D and UCL (see Table 2). Additionally, Pearson correlation coefficients were calculated. A correlation of .10 was considered to represent a

small correlation, .30 a moderate correlation and .50 or higher a strong correlation (Cohen, 1992).

Table 2.
Scales from the HIT, UCL and BDHI_D used to Assess Convergent and Divergent Validity

BITI+	HIT	UCL	BDHI-D
	Convergent validity		
AJ	Physical aggression Egocentrism Blaming others Mislabeling		
D	Assuming the worst		
	Concurrent validity		
AJ	Opposition-Defiance	Expression of emotions	Direct aggression Indirect aggression
S		Avoidance	
D			Indirect aggression

+AJ = Aggression and Justification, D = Distrust, S = Sub-assertiveness

Results

The results are reported in two sections. The first section reports on the construct validity on the basis of the factorial validity (confirmatory factor analysis) and internal consistency. In the second section, results are reported on the convergent, concurrent and divergent validity.

Construct validity

Content validity, measurement invariance and reliability

The results of the 3-factor solution are presented in Table 3. The 3-factor solution explained 51.8% of the variance; the factor loadings varied between .47 and .79.

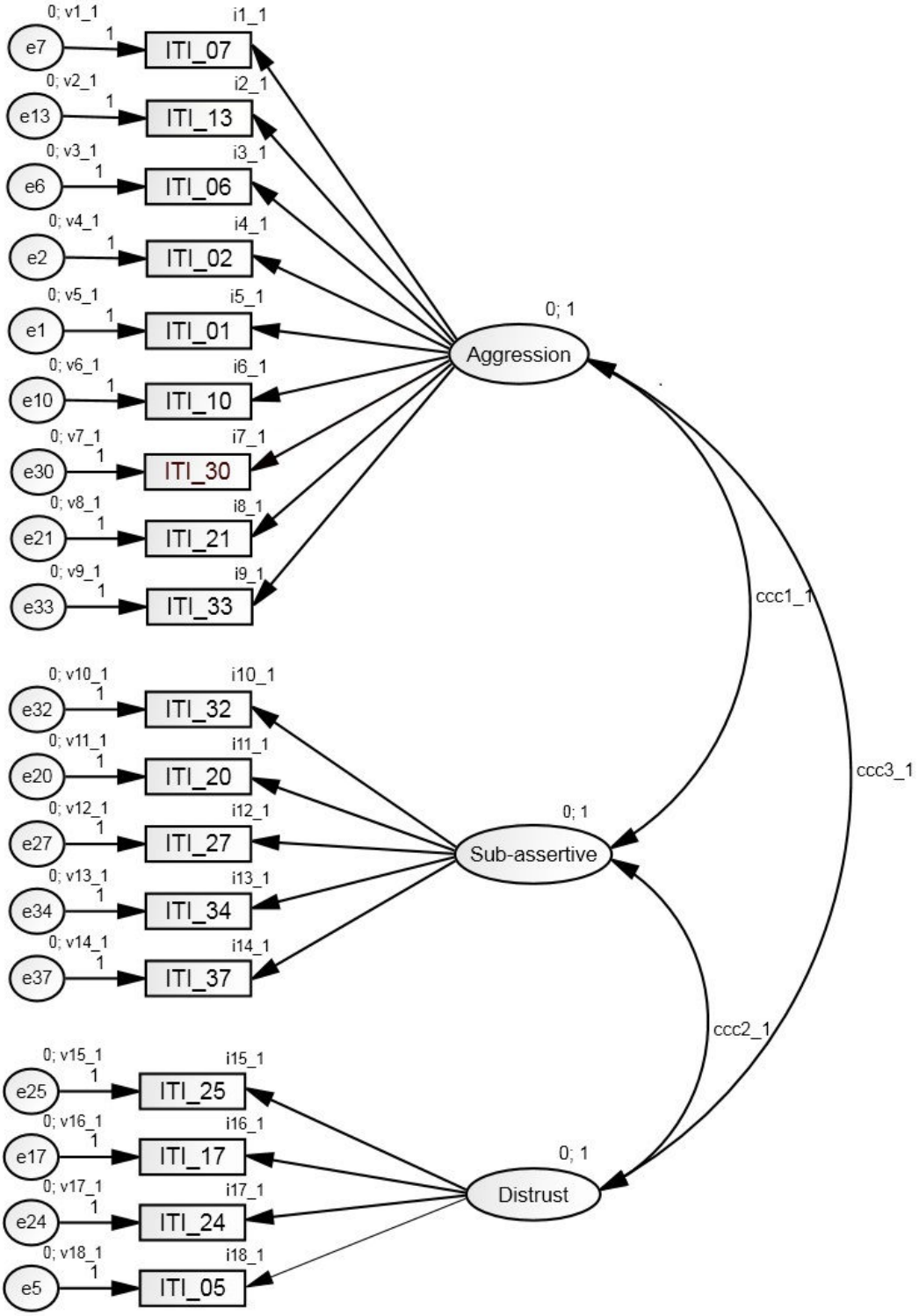
Table 3.
BITI Factor Solution

	BITI Items	Factor loadings		
		AJ	***S***	***D***
1.	I have the right to retaliate if someone harms me.	.79		
2.	If someone is aggressive towards me, I have to show them who's the strongest.	.78		
3.	I believe attack is the best form of defense.	.78		
4.	If someone insults my family I have the right to use violence.	.77		
5.	If someone looks threatening, I often can't do anything else but hit them.	.73		
6.	If someone touches me I have to hit them.	.71		
7.	It is logical for me to become angry if people criticize me.	.58		
8.	I'll never become less aggressive.	.51		
9.	Nearly everyone's dishonest, so I'm dishonest too sometimes.	.50		
10.	I think it's really bad if someone doesn't like me.		.78	
11.	I think it's really bad if someone is angry with me.		.68	
11.	I worry about what people think of me.		.68	
12.	I think people will be angry with me if I often say no.		.62	
14.	It's difficult for me to give an opinion.		.47	
15.	Nobody can be trusted.			.73
16.	I'm all on my own.			.70
17.	A lot of people are against me.			.58
18.	There are a lot of people who don't like me.			.50

It was apparent from the confirmatory factor analysis that the factorial model had an acceptable fit: RMSEA = .062, CFI = .91, $\chi^2_{(132)} = 263$, $p < .001$. The ratio between χ^2 and the degrees of freedom was < 2.5, namely, 1.99. The full factorial model is presented in Figure 1. Internal consistency reliabilities were adequate. The Cronbach's alpha's for the three scales of the BITI were all higher than *.60*, i.e., Aggression and Justification $\alpha = .88$, Sub-assertiveness $\alpha = .70$, and Distrust $\alpha = .67$.

Figure 1

BITI Factor Model from the Confirmatory Factor Analysis



The next step was to determine whether the basic structure of the model was the same for different gender groups and for groups that differed in ethnic origin (native versus non-native Dutch) by assessing measurement (metric) invariance between these groups. Accordingly, the factor loadings for the various groups were set to be equal for each item across the groups that were compared. The fit of this model was then compared to that of the baseline model.

The difference in χ^2 ($\Delta\chi^2 = 18.99$, Δ *df* = 15) had a *p*-value of *.214* (gender group). In other words, the difference in chi-square was non-significant, which indicates that the discrepancies are negligible and that it is legitimate to accept the specified model with equal factor loadings. The constrained (configuration) model indicated the following fit: RMSEA = .061, CFI = .84, $\chi^2_{(279)} = 544$, $p < .001$. The ratio between χ^2 and the degrees of freedom was 1.94. The same applied (measurement invariance) for the comparison between native and non-native Dutch respondents. The difference in χ^2 ($\Delta\chi^2 = 22.52$, Δ *df=15*) had a p-value .095. The fit indices of the constrained model were: RMSEA = .054, CFI = .88, $\chi^2_{(279)} = 482$, $p < .001$. The ratio between χ^2 and the degrees of freedom was 1.73. For both groups the CFI of the constrained models were below .90. However, this is not surprising given that Elosua (2011) demonstrated that the CFI may be lower in small samples (*n* = 300). The results concerning the comparison between the unconstrained and constrained model indicate measurement invariance.

Convergent, concurrent and divergent validity

Convergent validity proved to be good (see Table 4). The correlations between the Aggression and Justification scale (BITI) and Physical Aggression, Blaming Others and

Egocentrism (HIT) were strong. This was also the case for the correlation between Distrust (BITI) and Assuming the Worst (HIT).

Table 4.
Convergent Validity: Pearson Correlation Measured between Scales from the BITI and Scales from the HIT en UCL.

	BITI	
Scales	**AJ**	**D**
HIT		
Physical aggression	.79**	
Egocentrism	.67**	
Blaming others	.74**	
Mislabeling	.72**	
Assuming the worst		.58**

**p = < .001

Concurrent validity was adequate for the Aggression and Justification and Distrust scales (see Table 5). A strong association was found between Aggression and Justification (BITI) and Indirect Aggression and Defiant Behavior, as well as a moderate to strong association between Aggression and Justification, and Direct Aggression and Expression of Emotions. There was a moderate association between Distrust and Indirect Aggression (including an association with the degree of hostility). The correlation between Sub-assertiveness and Avoidance, however, was poor.

Table 5.
Concurrent Validity : Pearson Correlations Measured between Scales from the BITI and Scales from the HIT, UCL en BDHI-D.

	BITI		
	AJ	**S**	**D**
HIT			
Opposition-Defiance	.71**	.	
UCL			
Avoidance		.15**	
Expression of emotions	.46**		
BDHI-D			
Indirect aggression	.44**		.40**
Direct aggression	.55**		

**$p < .001$

The results for divergent validity are shown in Table 6. Divergent validity was established for intelligence and gender, which did not reveal any association. Furthermore, there was no association between Sub-assertiveness and Distrust, although there was a small association between age and Aggression and Justification: These scores increased with age (marginally). In addition to this there was a moderate association between Social Desirability and Aggression and Justification and a small association with Distrust.

Table 6.
Divergent validity: Pearson Correlations Measured between Scales form the BITI and Intelligence, Education, Social desirability and Age.

	BITI		
	AJ	**S**	**D**
Intelligence	-.03	-.01	-.02
Education	-.03	-.02	.05
Social desirability	-.33**	-.07	-.16*
Age	-.16*	-.05	-.02

** $p < .001$, * $p < .05$

Discussion

This study investigated the reliability and validity of the BITI. The results support validity and reliability of the BITI (18 items). A confirmatory factor analysis showed that construct validity was satisfactory; the factorial model had an acceptable fit and seemed to be measurement invariant for gender and ethnic origin (native and non-native Dutch respondents). The convergent validity varied from sufficient to good. Furthermore, the BITI was insensitive to age (the Sub-assertive and Distrust scale) and verbal intelligence, yet was sensitive to social desirability where this involved thoughts that are related to aggression. Finally, concurrent validity was satisfactory, with the exception of thoughts related to sub-assertive (internalizing) behavior. However, these 'sub-assertive thoughts' showed a small correlation with (concurrent) avoidance of difficult situations.

Given that the results indicate that the BITI is measurement invariant for different gender groups, it may be assumed, despite the relatively small sample of girls, that the questions are interpreted in the same way by girls and boys. Any potential difference in outcome between girls and boys are therefore probably not caused by the specific way the BITI measures irrational thoughts, but by real gender differences in these thoughts. Additionally, if measurement invariance holds, this means that average scores on the BITI can be used to compare boys and girls. The results also indicate that the BITI is measurement invariant across different ethnic origin groups (native and non-native Dutch). However, this result was marginal and therefore less convincing. Given that there was much differentiation within the group of non-native Dutch respondents, it is possible that young people from specific ethnic backgrounds interpret questions differently. However, it was not possible to assess measurement invariance between all specific ethnic groups due to the relatively small sample size.

This study sheds some light on the validity of the assessment of irrational thoughts related to sub-assertive (internalizing) behavior with the BITI. The construct validity was satisfactory. However, it was not possible to assess convergent validity (not assessed due to the absence of an appropriate instrument), and no evidence was found to support concurrent validity. Only a small but positive correlation was found between thoughts related to sub-assertive behavior and avoiding difficult situations, which provides weak support for the concurrent validity of the BITI scale for sub-assertiveness. However, it is plausible to suggest that young people with severe conduct problems live in a subculture where the avoidance of threatening situations is deemed unacceptable (De Jong, 2007). Consequently, these young people will try to comply with the expectations of their peer group. It is therefore likely that they deny avoidance, showing under-reporting of avoidance when responding to questions such as "giving in to avoid difficult situations" and "avoiding difficult situations as much as possible". This could especially be the case when competition in a secure setting leads to positioning behavior, and when refraining from action is seen as a sign of weakness to be exploited (Van der Helm & Stams, 2012).

The results showed that the extent in which young people reported to have irrational thoughts related to aggressive behavior was negatively correlated with the extent in which the youngsters provided socially desirable answers. This is not surprising, because the questionnaire that was used to measure the extent in which the youngsters provided socially desirable answers specifically contained irrational thoughts that (may) lead to behavior that is generally viewed as unacceptable. Sensitivity to social desirability on the scale Aggression and Justification may lead to a systematic bias in evaluation research as well as under-reporting. On the other hand, research has shown that social desirability may be viewed as a personality trait, which means that socially desirable answers are not determined by the situation and therefore do not undermine the validity of self-reporting of irrational

thoughts (Mills, Loza, & Kroner, 2003). Nevertheless, the possibility of systematic bias and under-reporting should be taken into consideration when interpreting irrational thoughts related to aggressive behavior.

There are a number of limitations of this study. Firstly, measurement invariance may be tested at various levels. The second level, metric invariance, was selected in this study. However, there exists a higher (stronger) level, which is scalar invariance (Chen, Sousa, & West, 2005), although according to Cheung and Rensvold (1998) the second level is sufficient for validating questionnaires. Furthermore, Chen et al. (2005) have stated that implementing the third level is extremely difficult and often impossible to execute.

Secondly, the young people were not selected randomly to participate in the study. Although the original places of residence for the youths (residential and ambulant) were distributed nationwide, it cannot be determined with certainty whether the included youngsters are an adequate representation of the population of young people in residential institutions in the Netherlands.

Thirdly, in this study the abbreviated GIT-2 (Groninger Intelligence Test) was used to measure intelligence. It is a drawback that the guidelines for the GIT-2 (Luteijn et al., 2004) indicate that the scores of adolescents from families where the Dutch language was not spoken were lower. The Dutch Centre for Scientific Research and Documentation (WODC, 2011) therefore recommends that the SON (Snijders-Oomen non-verbal intelligence test) should be used with non-native Dutch youths. However, it was apparent during a pilot study that the SON led to some resistance due to its length. Therefore, the GIT-2 was used in order to prevent dropout. This means that the intelligence score may be biased for a proportion of the young people (the intelligence level is perhaps higher than indicated by the score). Shortcomings of the GIT-2 were partly compensated for by additionally register the level of education.

A fourth limitation is that the reliability of the social desirability scale was relatively low (α =. 57). Finally, one item of the scale for thoughts related to sub-assertive behavior directly refers to an emotion (e.g. "I worry about what people think of me"), and one item describes lack of assertive behavior (e.g., "It's difficult for me to give an opinion). Correlations with measures of emotions and assertiveness can therefore be expected (Smith, 1989), indicating some degree of contamination. These two items limit the utility of the scale to test cognitive theories, but the items might nevertheless help distinguish the target group.

Despite several limitations of this study, the BITI has ecological validity given that the instrument was developed from daily practice. The instrument offers the opportunity to measure the extent to which various irrational thoughts related to aggressive (externalizing), sub-assertive (internalizing) and distrust-related behaviors are present in the minds of people who might improve after receiving help. The instrument may also contribute to the indexation, diagnosis, treatment and evaluation of irrational thoughts related to conduct problems in adolescents. Knowing what specific irrational thoughts are linked to the conduct problems may directly affect the focus of treatment (Sudak, 2006). In terms of future research it is advisable to conduct a study in a representative general population sample to establish norm scores, and a study to investigate whether the BITI sufficiently predicts externalizing behavior in adolescents and young adults. The application of the BITI complies with current needs given that the treatment of irrational thoughts is an important component of various behavioral interventions aimed at reducing externalizing behavioral problems in young people (Maruna & Mann, 2006).

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