A Short Form of the Ambiguous Scenarios Test for Depression in Adolescents: Development and validation.

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Abstract

The Ambiguous Scenarios Test for Depression in Adolescents (AST-DA) is a 20-item measure of depressive interpretation bias. It has good face and construct validity and discriminates between clinical and non-clinical samples. However, a shorter measure would reduce burden on young people and make the instrument more useful in clinical settings. The aim of this study was to develop a valid and reliable short-form of the AST-DA. Adolescents recruited from the community (N = 206) completed the 20 item measure. Based on theoretical considerations and statistical analyses we selected 9 items to create a short form of the AST. This 9-item version was tested on a clinical sample of 69 young people referred for depression to a child and adolescent mental health service in the UK. The validity and internal reliability of the Short-AST-DA were confirmed. These data suggest that the Short-AST-DA is a robust measure of depressive interpretation bias in young people. Future work should investigate the measure's test-retest reliability, sensitivity to change and convergent validity.

Keywords: depression; adolescence; interpretation bias; measure; short-form

Depression is associated with significant negative biases in thinking and reasoning. Adults and adolescents who are depressed interpret situations as significantly more negative than people who are not depressed (Gotlib & Joorman, 2010; Orchard, Pass, & Reynolds, 2016b). There is also evidence that interpretation biases are demonstrated by individuals who are healthy but 'at risk' of depression (Chan, Goodwin, & Harmer, 2007; Dearing & Gotlib, 2009). These cognitive biases are pervasive, strongly hypothesised to maintain depression, and are targeted in Cognitive Behaviour Therapy (CBT) for depression (Beck, Rush, Shaw, & Emery, 1979). Direct interventions to modify cognitive biases have also been developed. Cognitive bias modification (CBM) targets automatic negative biases using computerised programmes that train individuals to respond to ambiguous scenarios in a positive or neutral manner (Mathews & Mackintosh, 2000) and have been adapted for use in adolescents (Chan, Lau, & Reynolds, 2015; Lothmann, Holmes, Chan, & Lau, 2011; Salemink & Wiers, 2011).

The role of cognitive bias as a risk factor for depression is of particular importance in adolescents. Depression that emerges during adolescence strongly predicts recurrent depressive episodes later in life (Thapar, Collishaw, Pine, & Thapar, 2012), and is associated with a range of long-term negative implications, such as educational underachievement, low income levels and unemployment (Fergusson, Boden, & Horwood, 2007), and an increased risk of suicidal behaviour (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001). Therefore any intervention that can modify cognitive biases before the onset of depression could potentially play an important role in early detection and prevention of illness as well as having a direct effect on alleviating current symptoms of depression.

A range of methods have been developed to measure various types of cognitive bias. Interpretation bias is typically measured using ambiguous stimuli including scrambled sentences or imaginary scenarios. Berna, Lang, Goodwin & Holmes (2011) adapted a measure of interpretation bias, the Ambiguous Scenarios Test (AST), composed of 24

depression related ambiguous scenarios, requiring participants to generate an imagined outcome, rating the pleasantness on a 9-point Likert scale. The AST discriminates between individuals with high and low levels of dysphoria (Berna et al., 2011), and has been adapted for adolescents (AST-DA; Orchard, Pass, & Reynolds, 2016a). However, the AST is lengthy and this restricts its use within research and clinical settings.

The aim of this research was to develop and validate a shortened version of the ambiguous scenarios test for depression in adolescents to provide a brief and reliable measure of interpretation bias, whilst retaining the psychometric properties of the full measure as far as possible. Secondly, the study aimed to validate the Short-AST-DA, using a clinical sample of adolescents.

Method

Sample

To develop the Short-AST-DA, we recruited two samples of young people. Sample 1 includes 206 adolescents, aged 12-18 years, recruited from schools across the South East of England. The study was advertised in schools and adolescents who wished to take part volunteered. Sample 1 was used to conduct an initial exploratory analysis of the AST-DA and to identify a subset of items to comprise a short form of the measure. Sample 2 was used to validate the short form of the AST-DA and included 69 adolescents aged 13-17 who were recruited through referrals for depression to the local child and adolescent mental health service. Details regarding age, gender and depression symptoms can be seen in Table 1.

Ethical Approval

Ethical approval was granted by the University of Reading Research Ethics Committee (Sample 1 and 2) and a local NHS Research Ethics Committee (Sample 2). Participants aged 16-17 years provided informed written consent to take part in the research,

adolescents aged 13-15 years provided informed assent, their parents provided written informed consent for them to take part.

Table 1. Descriptive statistics of community and clinical samples of young people

Mean (SD) [range]	Community (N = 206)	Clinic (N = 69)
Age (years)	16.06 (1.21)	15.78 (1.12)
	12-18	13-17
Gender (% female)	67	84
MFQ-C	18.03 (12.82)	37.95 (12.56)
	[0-59]	[11-60]

NB. MFQ-C: Mood and Feelings Questionnaire-Child Version; SD: Standard Deviation

Measures

Mood and Feelings Questionnaire (MFQ; Costello & Angold, 1988).

The MFQ is a 33-item self-report measure designed to assess the symptoms of depression in young people. Each symptom is rated on a 3-point scale from 0 (*not true*) to 2 (*true*). The MFQ has good psychometric properties (Burleson Daviss et al., 2006). In the current study the MFQ had excellent internal consistency in Samples 1 and 2 (α=0.94; α=0.92, respectively).

Ambiguous Scenarios Test for Depression in Adolescents (AST-DA; Orchard et al., 2016a).

The AST-DA was adapted for use with adolescents from the original ambiguous scenarios test for depression (AST-D; Berna et al., 2011) which has 24 items. The AST-DA has 20-items that are relevant to adolescents, each item consists of a scenario (e.g. "Your best friend convinces you to go on a blind date and as you sit in the bar waiting to meet your date,

you think about how it will go"). Participants are instructed to (a) generate and describe an imagined outcome to each scenario and (b) rate the imagined outcome for pleasantness on a 9 point Likert scale (from 1= *Extremely unpleasant*; to 9= *Extremely pleasant*).

A mean pleasantness rating across the 20 scenarios was calculated for each participant. To determine interpretation bias each written response was coded into one of four dichotomous categories; positive, negative, neutral and mixed responses. Coding was conducted by two independent raters, inter-rater reliability was assessed on 10% of the sample and was excellent (k = 0.89).

For details of the psychometric properties of the AST-DA in Sample 1, see Orchard et al. (2016a). The AST-DA was shown to have good internal consistency, and pleasantness ratings were correlated with participants' positive and negative written responses with large effect sizes. As such, Orchard et al. (2016a) suggested that both scores may not be necessary, therefore only pleasantness rating scores were used in subsequent analyses.

Data Analysis

The primary aim of this study was to create a short version of the AST-DA through theoretical and statistical item selection. Each item was checked for clarity and meaning, and was then assessed for normality, and item-total correlations. Once the shortened scale was identified, psychometric properties were tested first in Sample 1, then in Sample 2.

Results

Development of the Short-AST-DA using Sample 1

Item Selection Steps.

Step 1. Consideration of Construct Validity. The content of each item was assessed for clarity and meaning. As is standard in anxiety research (e.g. Creswell, Murray, & Cooper, 2014), the authors wanted to consider the theme of each scenario. The adult AST-D (Berna et al., 2011), and the adapted adolescent version AST-DA (Orchard et al., 2016a) did not code

and balance scenarios by theme. In the current study, each of the 20 items of the AST-DA were coded to classify the theme of each scenario into one of three categories; 'social', 'self' and 'performance' scenarios. This was in keeping with previous interpretation bias work (in the anxiety literature e.g. Creswell et al., 2014) and the cognitive theory of depression which highlights a role for negative evaluation of self, social situations and performance (e.g. Beck, 1967; Coyne & Gotlib, 1983). Coding was conducted by two independent raters using the same criteria. Inter-rater reliability indicated substantial agreement between the raters (k = 0.70); remaining discrepancies were resolved by discussions with an additional rater. Four items were identified by the raters as not being able to be assigned any of the categories (items 6, 11, 16 & 17). These items were removed as there was no clear theoretical rationale for inclusion. Furthermore, item 17 was deemed to be related to threat, and hence better associated with anxiety than depression (Eysenck, Mogg, May, Richards, & Mathews, 1991).

Step 2. Normality Checks. Four items were removed because the distribution of scores was not normal, indicated by a bimodal distribution (item 8), negative skew (items 1 and 14) and a positive skew (item 10).

Step 3. Item-Total Correlations. The remaining items in the questionnaire consisted of three self (4, 5 & 15), five social (2, 3, 7, 12 & 13) and four performance (9, 18, 19 & 20) related scenarios. To ensure an even distribution of scenario themes across the shortened version of the questionnaire, three items with the best statistical properties from the social and performance categories were selected.

Of the four performance items, item 19 had the lowest corrected item total correlation (.32). Of the five social items, items 3 & 7 had the lowest corrected item correlations (respectively; r = .24, .23); the remaining items had correlations >.3. These three items were also the only cause of disagreement during the coding process. As such, items 3, 7 & 19 were removed on both a statistical and theoretical basis.

This left a final 9-item scale (see Table 2) of three self items (4, 5 & 15), three social items (2, 12, & 13) and three performance items (9, 18 & 20).

Table 2. Short AST-DA and item number from AST-DA 20

Item Number	Scenario Description
2	Your best friend convinces you to go on a blind date and as you sit and wait to meet your date, you think about how it will go.
4	You wake up, get out of bed, stretch and really notice how you feel today.
5	You go to a place you visited as a child. Walking around makes you feel emotional.
9	You join the hockey team and before long you are asked to play in a match. It's a tough match and afterwards you talk about your performance with your team.
12	You go to a party where you know very few other guests. After the party, you think about how the other guests behaved.
13	You are organising the school prom on a small budget. On the night of the party, you look around to see if people are enjoying themselves.
15	It's New Year's Eve. You think about the year ahead of you. You are in a thoughtful mood and think back at past achievements and disappointments that you have experienced during your life. Overall, your main feelings so far emerge.
18	Your friend is very keen on skating and persuades you to try it out. At the rink you put on the skates and step on the ice. You glide forward slowly at first, then faster.
20	Some important people are visiting your school and you are asked at the last minute to present a project to them. Afterwards you get feedback on your performance.

Psychometric properties of the Short-AST-DA.

Psychometric testing of the Short-AST-DA was conducted on Sample 1. Adolescents with substantial missing data (more than 25%) on the AST (n = 18) were excluded from analysis resulting in a final sample of N = 188. The internal consistency of the shortened measure was acceptable ($\alpha = 0.75$) and was expected to be lower than the full measure, due to having fewer items (Field, 2013; Wardenaar et al., 2010). The measure showed concurrent

validity with the 20-item questionnaire, through evidence of a highly significant correlation between the 9-item and the 20-item questionnaire, $r = 0.89$, $p < 0.001$. Pleasantness ratings of the 9-item questionnaire were significantly correlated with the MFQ, $r = -0.50$, $p < 0.001$, demonstrating that the measure is associated with depressive symptomatology as predicted by cognitive theories of depression. This result is similar to the effect size of the correlation between the original 20-item questionnaire and MFQ total, $r = -0.48$, $p < 0.001$.

A logistic regression was also conducted to explore whether the 9-item scale was able to distinguish between community participants with MFQ scores above and below the clinical cut-off of 27 and above. The Short-AST-DA correctly classified 80% of the group; $R^2 = .12$ (Cox & Snell), .18 (Nagelkerke), $\chi^2 (1) = 25.61$, $p < .001$. The coefficients of the model are as follows, $B = -.79$, SE = .17, $p < .001$, 95% bootstrap confidence intervals based on 1000 samples [-1.21 (lower), -.49 (upper)].

An independent samples t-test revealed a significant difference in pleasantness ratings between genders, $t(191) = -4.40$, $p < 0.001$; females reported lower pleasantness ratings (M = 5.19) than males (M = 5.98). There was no significant relationship between pleasantness ratings on the 9-item questionnaire and age, $r = - 0.03$, $p = .65$.

Validation of the Short AST-DA - Sample 2

The psychometric properties of the Short-AST-DA were further assessed using a clinical sample (Sample 2) of adolescents referred for depression to a local child and adolescent mental health clinic. Adolescents with substantial missing data (more than 25%) on the 9 item Short AST-DA ($n = 3$) were removed from the analysis, resulting in a sample of $n = 66$. The internal consistency of the measure was acceptable ($\alpha = 0.73$). As in Sample 1, there was a significant negative correlation between pleasantness ratings on the Short AST-DA and MFQ total, $r = -0.44$, $p < 0.001$, demonstrating the presence of construct validity.

Pleasantness ratings were not significantly correlated with age, $r = .10$, $p = .45$ and there was no significant gender difference $t(64) = -0.64$, $p = .52$.

Discussion

Negative interpretation bias is believed to contribute to the development and maintenance of depression (Beck, 1967). Cognitive behaviour therapy aims to identify and target negative interpretations, yet little research has measured interpretation bias in depression in adults or young people. It is important for research to measure interpretations in both adults and adolescents given the changes that occur in cognitive and social development during adolescence.

The aim of this research was to develop and validate a short measure to assess depressive interpretation bias in adolescents. There is an existing measure which is reliable and valid but it is too lengthy and time consuming to be useful clinically. In stage 1, the measure was completed by 206 adolescents recruited from the community. Statistical methods and theoretical considerations were used to remove 11 items. This resulted in a measure with 9 items. This new measure has acceptable reliability and demonstrates validity with the previous 20-item measure and with the theoretical concepts of the cognitive models of depression, i.e. higher pleasantness ratings were associated with fewer symptoms of depression. Females reported significantly lower pleasantness ratings than males in Sample 1, a finding which was unsurprising, given that adolescent females report more severe symptoms of depression than males (Costello, Erkanli, & Angold, 2006). In stage 2 the Short-AST-DA was tested on a clinical sample of adolescents, internal consistency and construct validity were comparable to Sample 1 findings, except that a gender difference was not found. This may be due to the very low number of males in this sample ($n = 11$).

The current research validated the shortened measure using a clinical sample of adolescents, increasing the applicability of the measure to the adolescent population. The

analysis indicated that the measure was able to distinguish different levels of dysphoria in the community sample, but future research should ensure that the tool is able to differentiate between clinically-referred depressed adolescents, and non-depressed clinic and community participants, as in Orchard et al. (2016b). As the community sample in the present study was used to create the measure, it would not be appropriate to conduct this analysis here.

Recent work on interpretation biases in adolescent depression has started investigating the use of cognitive bias modification (CBM). This has been conducted with healthy participants (Lothmann et al., 2011; Chan et al., 2015) and participants with mild depression (Micco, Henin & Hirshfeld-Becker, 2014), with some promising results. However, CBM research is often limited by the measures used to test pre- and post-treatment interpretation biases. The Short-AST-DA will provide an additional, brief research tool for future intervention studies. Furthermore, the addition of a new tool will enable more research to easily report on the presence of interpretation biases as part of studies on the phenomenology, causes and treatments of depression in young people.

The short version of the AST-DA is advantageous since the administration will be less time consuming, which is beneficial in both clinical and research settings, as well as reducing burden to the respondent (Dillman, Sinclair, & Clark, 1993). The shortened version also extends previous measures of interpretation bias (e.g. Berna et al., 2011; Orchard et al., 2016a) by balancing the theme of the scenarios in the questionnaire, thus increasing the validity of the measure. It is however worth noting that the categories are designed to capture the range of possible biases, and do not represent subscales.

The shortened measure was developed and validated using participants from the South East of England, limiting the external validity of the questionnaire. The measure would benefit from additional psychometric testing in a geographically diverse sample of adolescents. Furthermore, the analysis of the clinical sample included just 66 adolescents.

Future work should test the measure in a larger sample of clinical and community adolescents.

Conclusion

The results of the current research suggest the potential utility of the shortened version of the AST-DA as a brief and reliable tool to assess depressive interpretation biases in the adolescent population. The development of such tools may be of particular use in cognitive bias modification research, due to the increased interest in targeting negative interpretation biases in the adolescent population.

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