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‘It was all my fault’: negative interpretation bias in depressed adolescents

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‘It Was All My Fault’; Negative Interpretation Bias in Depressed Adolescents

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Abstract

The extent to which cognitive models of development and maintenance of depression apply to adolescents is largely untested, despite the widespread application of Cognitive Behavior Therapy (CBT) for depressed adolescents. Cognitive models suggest that negative cognitions, including interpretation bias, play a role in etiology and maintenance of depression. Given that cognitive development is incomplete by the teenage years and that CBT is not superior to non-cognitive treatments in the treatment of adolescent depression, it is important to test the underlying model. The primary aim of this study was to test the hypothesis that interpretation biases are exhibited by depressed adolescents. Four groups of adolescents were recruited: clinically-referred depressed (n = 27), clinically-referred non-depressed (n = 24), community with elevated depression symptoms (n = 42) and healthy community (n = 150). Participants completed a 20 item ambiguous scenarios questionnaire. Clinically-referred depressed adolescents made significantly more negative interpretations and rated scenarios as less pleasant than all other groups. The results suggest that this element of the cognitive model of depression is applicable to adolescents. Other aspects of the model should be tested so that cognitive treatment can be modified or adapted if necessary.

‘It Was All My Fault'; Negative Interpretation Bias in Depressed Adolescents

The cognitive theory of depression (Beck, 1967) proposes that depression is characterized by biased processing of emotional information that maintains low mood. This theory has received substantial empirical support in adults (Joormann, Yoon, & Zetsche, 2007) and is the basis of Cognitive Behavior Therapy (CBT). Although CBT is currently recommended as a treatment for adolescents who are depressed (APA, 2010; NICE, 2015), clinical trials suggest that outcomes are, at best, moderately successful and are not significantly more effective than non-cognitive psychological treatments (Weisz, McCarty, & Valeri, 2006). Depression often emerges during adolescence and is highly prevalent in this age group, with nearly 6 % of adolescents meeting criteria for a depressive disorder at any given time (Costello, Erkanli, & Angold, 2006), and up to 20% experiencing at least one major depressive episode before adulthood (Thapar, Collishaw, Pine, & Thapar, 2012). Depression in this age group can also have long-term negative impacts (e.g., Bridge, Goldstein, & Brent, 2006; Fergusson, Boden, & Horwood, 2007; Halperin, Rucklidge, Powers, Miller, & Newcorn, 2011; Rudolph & Klein, 2009). It is therefore crucial to critically evaluate the applicability of the cognitive model of depression to adolescents.

Depression in adolescents is not well understood. For example, why adolescence is the peak age of onset, or why depression in adolescents leads to such long-term negative outcomes. Furthermore, the extent to which cognitive variables interact with biological vulnerability and environmental factors in the aetiology of depression is not clear. This is of particular note because adolescence is marked by the development of cognitive architecture (i.e., the brain structure and functioning associated with cognitions; Paus, Keshavan, & Giedd, 2008; Steinberg, 2005). The development of the frontal cortex is marked during

adolescence and early adulthood is associated with higher cognitive functioning (e.g., decision making, judgement, planning) and emotion regulation. During adolescence, brain structures associated with cognitive biases may therefore emerge and contribute to low mood and depression. To understand depression and improve treatment for this age group it is important to identify cognitive mechanisms that increase vulnerability and maintain depression, and can be targeted in therapy. This approach has been helpful in developing disorder specific treatments for OCD (Reynolds et al., 2013), PTSD (Meiser-Stedman, 2002), and social phobia (Clark & Wells, 1995).

Cognitive models of depression suggest that depression impairs the information-processing system (Clark, Beck, & Alford, 1999), specifically attention, memory and interpretation. The depressed individual tends to attend to and recall mood congruent negative information and to ignore or filter out positive information. Interpretation biases are a part of the information-processing system and are well established as a common feature of anxiety disorders, whereby individuals interpret ambiguous stimuli or events as negative or threatening. The standard method of assessing interpretation bias in anxiety is to ask participants to resolve ambiguous scenarios. For example, ‘Not long after starting your new job, your boss asks to see you.’ (Orchard, Cooper, & Creswell, 2015, p. 102). Participants are asked to describe how they would think and feel in this situation. This method has been widely used with adults (e.g., Mathews & MacLeod, 2005; Ouimet, Gawronski, & Dozois, 2009), and to a limited extent with anxious adolescents (Miers, Blöte, Bögels, & Westenberg, 2008; Waite, Codd, & Creswell, 2015). Berna, Lang, Goodwin and Holmes (2011) adapted the ambiguous scenario method to assess interpretation biases associated with depressed mood. They used pilot work to create the measure, by presenting a large number of scenarios to participants and selecting the scenarios which showed the largest effects when comparing

participants with high and low depression scores. Participants were asked to describe the likely outcome of the scenario and rate it's 'pleasantness'. Scenarios were also coded as negative, neutral and positive by the researchers. Participants 'pleasantness' ratings were correlated with severity of depression symptoms and the coding of responses as neutral, negative and positive distinguished between dysphoric and non-dysphoric participants. The measure also demonstrated good psychometric properties (Berna et al., 2011).

Few studies have investigated interpretation bias in depression in adolescents. Haley, Moretti and Freeman (1985) compared 8 to 16 year olds who were diagnosed with major depressive disorder or dysthymic disorder, to a group with other psychiatric disorders (e.g., conduct, anxiety, attention deficit). Particpants were asked to respond to 10 brief vignettes describing school, home or social situations e.g., 'A girl notices a boy with a frown on his face'. Depressed distorted outcomes were rated e.g., 'I feel bad because he must think I look pretty awful'. The depressed and dysthymic group chose more 'depressed distorted' options than the non-depressed clinical group and, participants with depression chose more depressed distorted responses than dysthymic participants.

There is also evidence that children who are 'at risk' of depression show an interpretation bias. Dearing and Gotlib (2009) compared girls with mothers who had recurrent depression to a control group of girls who had mothers with no history of depression. Following a negative mood induction, participants completed a forced choice ambiguous words task and self-referent ambiguous stories task. In the forced choice ambiguous words task, participants heard a blend of neutral words with positive or negative words, and had to identify the word that they had heard. As predicted, the at-risk group identified more negative words than the control group, for example, 'sad' rather than 'sand'. In the ambiguous stories task, participants heard short stories which were either ambiguously

positive or negative. The final word of the story determined whether it was positive or negative. Participants heard the story and were then required to respond to a comprehension question relating to the positive or negative outcome. The authors found that the at-risk group were quicker to respond to the comprehension question following a negative outcome. Orchard, Pass and Reynolds (2015) recently adapted the ambiguous scenarios test for depression (Berna et al., 2011) for an adolescent population and found that amongst community recruited adolescents, depression symptoms were significantly associated with negative interpretation biases.

These few studies provide some support for the cognitive model of depression in adolescents. However, they have either recruited samples that include children as well as adolescents (Haley et al., 1985), or recruited non clinical participants (Orchard et al., 2015), or who were at risk of depression (Dearing & Gotlib, 2009). Without comparing adolescents with depression to those who do not have depression adolescents without depression it is not possible to infer that interpretation baises are characteristic of depressed adolescents. The current study compared interpretation biases in two clinically referred adolescent groups and two community adolescent groups, using a measure of ambiguous scenarios adapted specifically for an adolescent population (Orchard et al., 2015).

On the basis of the cognitive theory of depression we hypothesized that there would be significant between group differences in interpretation bias. Specifically we hypothesized that clinically referred depressed adolescents would make significantly more negative and fewer positive interpretations than the other 3 groups and that the healthy community adolescents would make the most positive and fewest negative interpretations. It was expected that the interpretations of community adolescents with elevated depression

symptoms, and clinically referred adolescents that did not meet criteria for depression, would fall between the depressed clinic and healthy community groups.

Method

Participants

Clinic sample. Adolescents, aged 12-18, were recruited through consecutive referrals for depression to the specialist Anxiety and Depression pathway of a local Child and Adolescent Mental Health Service in the UK. Thirty one adolescents met criteria for major depressive disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) of whom 16 also had a diagnosis of at least one anxiety disorder. They did not meet criteria for any other mental health disorder. Four depressed participants had more than 25% of data missing on the ambiguous scenario measure and were excluded from analysis, leaving a final *depressed clinic* group of 27. Twenty four of the participants who were referred for depression did not meet criteria for any current Axis 1 disorder (n = 24) and formed the *non-depressed clinic* group. The clinical groups were not significantly different on age, $t(49) = .84$, $p = .40$, or gender, $\chi^2(1) = .33$, $p = .57$ (see Table 1). The ethnicity of the clinic sample was 90% White British.

Community sample. Two hundred and six adolescents, aged 12-18, were recruited. Participants with substantial missing data (more than 25% missing) on a measure of depression (Mood and Feelings Questionniare, MFQ; Costello & Angold, 1988) or on the measure of ambiguous scenarios were excluded (n = 14). MFQ score was used to identify adolescents as ‘healthy’ or ‘elevated’ (Wood, Kroll, Moore, & Harrington, 1995). Final participant numbers for the community sample were n = 42 in the *elevated community* group and n = 150 in the *healthy community* group. There was no significant difference in age between the elevated and healthy groups, $t(190) = .19$, $p = .85$; there was a significant gender

difference with more boys in the healthy group and more girls in the elevated group, $\chi^2(1) = 8.62$, $p = .003$ (see Table 1). The ethnicity of children attending the schools included in the community sample was 69% White British.

Procedure

The study was approved by the Berkshire Local Research Ethics Committee and the University of Reading Research Ethics Committee. Adolescents aged 16-18 years provided consent for themselves, while adolescents aged 12-15 years required parental consent as well as providing assent themselves.

In the clinical groups (depressed clinic and non depressed clinic), adolescents and their parent(s) attended an initial assessment at the clinic where they completed separate diagnostic interviews and self-report measures of mood and anxiety (see below). In a subsequent research assessment which immediately followed the clinic appointment, adolescents completed an ambiguous scenarios questionnaire (see below). A member of the research team was present whilst they completed the questionnaire to answer any questions.

Adolescents in the community sample completed self-report measures of mood and anxiety (see below) and the ambiguous scenarios questionnaire during the same time period. This was conducted in schools, at home or at the University, in the presence of one or more members of the research team. The community sample did not complete a diagnostic interview.

Measures

Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS; Kaufman et al., 1997). Adolescents referred to the clinic were assigned diagnoses on the basis of the K-SADS, a structured diagnostic interview for DSM-IV affective disorders and schizophrenia, with well-established psychometric properties (Kaufman et al., 1997). As is conventional, the

interview was conducted with adolescents and parents separately, and diagnoses were based on the information obtained from both interviews. Assessors (psychology graduates) were trained on the standard administation and scoring of the K-SADS through verbal instruction, listening to assessment audio-recordings and participating in diagnostic consensus discussions. Competence was evaluated with reference to the assessors' ratings of a standard assessment recording. Once trained, all diagnoses were double-rated by both the assessor and a clinical psychologist. Inter-rater reliability for K-SADS diagnoses overall was $\kappa = .97$ and reliability for depression diagnosis specifically was $\kappa = 1.00$.

Mood and Feelings Questionnaire (MFQ) (Costello & Angold, 1988). This is a 33 item self-report scale for adolescents which has good psychometric properties and has been shown to distinguish between young people with and without a diagnosis of depression (Burleson Daviss et al., 2006). Each symptom is rated on a 3 point scale from 0 (*not true*) to 2 (*true*). A cut off of 27 and above was used to identify clinically significant levels of depression (Wood et al., 1995). Internal consistency was high (MFQ $\alpha = .92$).

Revised Child Anxiety and Depression Scale (RCADS) (Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000). The RCADS Total Anxiety subscale (37 items) was used to assess anxiety symptoms. The RCADS has good construct validity and test-retest reliability (Chorpita et al., 2000), and has been shown to distinguish between young people with and without an anxiety disorder (Chorpita, Moffitt, & Gray, 2005). The Total Anxiety subscale had good internal consistency in the current sample (RCADS-Total Anxiety $\alpha = .96$; George & Mallery, 2003).

Hypothetical Ambiguous Scenarios. Adolescents completed the Ambiguous Scenarios Test for Depression in Adolescents (AST-DA; Orchard et al., 2015). The measure was adapted from the adult version (Berna et al., 2011) and has good reliability and validity

(Orchard et al., 2015). Adolescents were presented with 20 scenarios (e.g., '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'). They were asked to (a) rate the scenario for pleasantness (1 = *Not at all pleasant;* 9 = *Very pleasant*) and (b) give a written description of their imagined outcome of the situation. There was no time limit for completion.

Mean pleasantness rating across the scenarios was calculated for each participant. Responses to each scenario were coded into one of four categories: 'positive' (e.g., 'Everyone was pleased with me'); 'negative' (e.g., 'It was all my fault'); 'mixed' if answers included both positive and negative ideas (e.g., 'We won, but I let in a goal'); or 'neutral' if the response did not include an emotive outcome (e.g., 'We discussed what was good and bad'). All scenarios were rated blind to diagnoses and MFQ and RCADS scores. Inter-rater reliability was assessed on responses from 10% of the sample (N = 20) and was excellent (κ =.89; Landis & Koch, 1977).

Results

Preliminary analyses and analytic plan

Continuous data were screened in relation to the assumptions of parametric tests (Tabachnick & Fidell, 2007).Where assumptions were violated, confirmatory analyses were conducted by running analyses with 1000 bootstrap samples. All results were consistent, suggesting that the original analyses were robust to the violations of assumptions, so results based on the original (non-bootstrapped) analyses are presented for simplicity.

Each adolescent gave one response to each ambiguous scenario. Across all groups 42% of scenarios were coded as positive, 37% negative, 10% mixed and 9% neutral. There was no between group difference in mixed or neutral categories so further analyses focused

only on positive and negative interpretations. The pleasantness ratings were highly correlated with the proportion of coded positive ratings (r = .78) and coded negative ratings (r = -.84). A measure of interpretation bias for each participant was calculated by subtracting the proportion of their negative interpretations away from the proportion of their positive responses. Therefore a positive value indicated a positive interpretation bias and a negative value indicated a negative interpretation bias, with zero indicating no bias in either direction. As groups differed on self-reported anxiety, analyses were re-run with total anxiety scores entered as a covariate. The majority of results did not change; the original analyses are reported below. Where results differed, this is indicated in the text.

Between-groups differences in symptoms of anxiety and depression

There was a significant multivariate between groups difference on self reported levels of anxiety and depression symptoms, $V = .74$, $F(6, 498) = 48.31$, $p < .001$, $\eta_p^2 = .37$; see Table 1. There were significant univariate between groups effects on depression symptoms, $F(3, 249) = 208.83$, $p < .001$; $\eta_p^2 = .72$, and anxiety symptoms, $F(3, 249) = 67.22$, $p < .001$; $\eta_p^2 = .45$. Corrected pairwise comparisons showed that healthy community adolescents had fewer symptoms of anxiety and depression than all other groups ($p < .001$). The remaining groups did not differ on symptoms of anxiety. The depressed clinic group had significantly higher depressive symptom scores than the non-depressed clinic group ($p < .001$) and the elevated community group ($p < .01$). The elevated community group had higher depressive symptom scores than the non-depressed clinic group ($p < .01$).

Hypothesis Testing

The hypothesis stated that there will be significant between groups differences in interpretation and pleasantness ratings, whereby the depressed clinic group will demonstrate the most negative interpretation bias and lowest pleasantness ratings, and the healthy

community group will demonstrate the most positive interpretation bias and highest pleasantness ratings. This hypothesis was tested with a two-tailed multivariate analysis of variance (MANOVA) with group (depressed clinic vs. non-depressed clinic vs. elevated community vs. healthy community) as the independent variable, and responses to ambiguous scenarios (mean pleasantness ratings and the interpretation bias score) as the dependent variables. Follow up between subjects effects were tested with Bonferroni corrections. There was a significant multivariate effect of group on responses to ambiguous scenarios, $V = .35$, $F(6, 474) = 16.6$, $p < .001$; $\eta_p^2 = .17$. Univariate tests were used to identify between group differences in pleasantness ratings and in interpretation bias.

Pleasantness Ratings. There was a significant effect of group on participants' mean pleasantness ratings of the ambiguous scenarios, $F(3, 237) = 28.43$, $p < .001$; $\eta_p^2 = .27$. Corrected pairwise comparisons showed significant differences between all groups ($p < .01$), except in the comparison of the elevated community group and the non-depressed clinic group ($p > .05$), such that pleasantness scores were highest for the healthy community group and lowest for the depressed clinic group (See Table 1).

When self-reported anxiety scores were entered as a covariate, the depressed clinic group remained significantly different from all other groups ($p < .05$). There were no significant differences between the healthy community group, the elevated community group and the non-depressed clinic group ($p > .05$).

Interpretation Bias. There was also a significant effect of group on interpretation bias, $F(3, 237) = 38.09$, $p < .001$; $\eta_p^2 = .33$; Figure 1. Corrected pairwise comparisons showed significant differences between all groups ($p < .01$), except in the comparison of the elevated community group and the non-depressed clinic group ($p > .05$), such that interpretation bias was most negative for the depressed clinic group, and most positive for the healthy

community group. The healthy community group were the only group to show a positive interpretation bias – all other groups had a negative interpretation bias.

When self-reported anxiety scores were entered as a covariate, the depressed clinic group remained significantly different from all other groups ($p < .05$). There were no significant differences between the healthy community group, the elevated community group and the non-depressed clinic group ($p > .05$).

To provide further support for a group's positive or negative bias, one sample t-tests were conducted for each group to see whether bias scores were significantly different from zero. The healthy community group showed a positive bias that was significantly different from zero, $t(149) = 5.04$, $p < .001$. The elevated community group and the depressed clinic group both showed a negative bias that was significantly different from zero, *respectively*, $t(40) = -4.78$, $p < .001$; $t(26) = -8.83$, $p < .001$. The bias score of the non-depressed clinic group did not differ from zero, $t(23) = -1.58$, $p = .13$.

Discussion

This is the first study to directly compare interpretation bias in clinically referred depressed adolescents to a non depressed clinically referred group of adolescents and to adolescents recruited from the community. There were significant differences between the depressed clinic group and non clinical groups, and between those adolescents diagnosed with major depression and the other clinically referred adolescents. The differences between the depressed clinic group and the other groups were robust to the effect of anxiety symptoms. The results suggest that adolescents who are clinically depressed make more negatively biased interpretations than other young people, including other clinically referred adolescents who do not have depression, and that negative interpretation biases in depression are largely independent of anxiety. Interpretation biases in depression are a central element of

the cognitive model and therefore these results suggest that this specific part of the model is applicable to adolescents. They might also imply that the focus of CBT on modifying interpretation biases associated with depression is an appropriate target when treating adolescents.

A positive interpretation bias was observed in the healthy community group. This means that when presented with ambiguous scenarios young people who report low levels of depression are more likely to interpret the information as positive than negative, for example, ‘I played really well in the hockey match’. The reverse, i.e., a negative interpretation biases were observed in 3 of the groups; the elevated community group, the non depressed clinically referred group and the depressed clinical group, for example, ‘I let everyone down’. In these groups, ambiguous information was more likely to been interpreted as negative. All three of these groups had elevated symptoms of depression and anxiety and therefore negative interpretation bias could be attributed to a general factor of ‘negative affect’. This is partly supported in that some of the between group differences were lost when symptoms of anxiety were controlled. However, after controlling for anxiety symptoms, the depressed clinical group had a negative interpretation bias.

The participants in this study who reported elevated symptoms of depression and who presented to the clinic were largely female. This is not surprising given that females commonly report higher levels of depression symptoms (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Costello et al., 1996). As a result this study lacked power to examine gender effects. Particpants were adolescents aged 12 to 17 years, with a mean of around 15 years. This sample reflects the demographic profile of clients referred to the clinical service. However, this age range also reflects a very wide spread of development and our sample size does not allow further examination of developmental change between 12 and 17 years.

The ambiguous scenarios tool used in this study was recently adapted for adolescents (Orchard et al., 2015). The psychometric properties are reasonably good but it may benefit from further refinement. For example, there was a high association between particpants' ratings of 'pleasasntness' and researchers' codings of the ambiguous scenarios suggesting that the latter is maybe redundant.

Our data suggest that, as predicted by the cognitive theory of depression, negative interpretation biases are characteristic of adolescents with depression. Furthermore, the data also suggest that healthy adolescents have a positive interpretation bias. This is consistent with the much more extensive empirical research that supports the applicability of the cognitive model for adults who are depressed. Despite these findings there is a growing body of research that suggest that treatment for depression based on the cognitive model of depression (i.e., CBT) may not be as effective as previously thought and may not be more effective than alternative psychological therapies that do not target cognition in either adults (e.g., Cuijpers, van Straten, Bohlmeijer, Hollon, & Andersson, 2010) or adolescents (Weisz et al., 2006). Also of interest is the finding that effective treatments for depression, including SSRI medication and other psychological therapies are assocatied with a reduction in cognitive biases (Clark & Beck, 2010; Harmer et al., 2009). Thus the causal and maintaining role of cognitive biases in depression requires further and closer scrutiny.

There are a number of important limitations in this study. The clinical and community groups were not perfectly matched in relation to both gender and ethnicity. In the community group ethnicity was estimated on the basis of the school population. It was not feasible to conduct diagnostic interviews with the community sample. Therefore some of the adolescents recruited from the community may have met criteria for a diagnosis of depression or for other disorders and may therefore overlap with the clinical groups. However, if so, this would be

likely to under-estimate differences between depressed adolescents and those who do not meet criteria for a depressive diagnosis, so the results may be a conservative reflection of interpretation biases in depression. Finally, the cross-sectional nature of the study means that conclusions cannot be drawn with regards to the direction of the effects; it is not possible to determine if the interpretation biases noted in the depressed clinic group are a consequence of low mood and depression, or if they play a role in the development of depression.

Conclusion

Negative interpretation bias was associated with depression status in adolescents aged 12 to 18 years and was independent of anxiety symptoms. Clinically referred depressed adolescents interpreted ambiguous scenarios more negatively than other young people recruited from the clinic and community. The findings suggest that depression in adolescents is characterized by interpretation biases as proposed in the cognitive model of depression.

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Table 1

Sample Characteristics and Responses to Ambiguous Scenarios

Mean (*SD*)	Depressed Clinic *N* = 27	Non Depressed Clinic *N* = 24	Elevated Community *N* = 42	Healthy Community *N* = 150
Age (years)	15.65 (1.05)[a]	15.91 (1.17)[a]	16.08 (1.27)[a]	16.12 (1.24)[a]
Gender (% female)	89[a]	83[a]	88[a]	63[b]
MFQ	45.08 (10.55)[a]	32.92 (11.91)[b]	36.93 (8.18)[b]	12.19 (6.47)[c]
RCADS-*Anx*	59.08 (21.84)[a]	51.46 (13.45)[a]	54.95 (20.59)[a]	25.67 (13.68)[b]
Pleasantness Ratings	3.90 (0.92)[a]	4.85 (0.94)[b]	4.79 (1.00)[b]	5.64 (1.01)[c]
Positive Interpretations (%)	18.54 (12.22)[a]	35.0 (13.99)[b]	30.17 (14.49)[b]	46.28 (16.89)[c]
Negative Interpretations (%)	64.96 (17.34)[a]	43.75 (15.34)[b]	52.49 (16.65)[b]	33.45 (16.81)[c]

Note. MFQ: Mood and Feelings Questionnaire- child report; RCADS-*Anx*: Revised Child Anxiety and Depression Scale-Total Anxiety Subscale; SD: standard deviation.

Superscripts indicate significant differences after Bonferroni corrections ($p < .05$).

Figure 1. *Interpretation Bias Scores in Depressed and Non-Depressed Clinic groups and Healthy and Elevated Community Groups*