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Over-general Autobiographical Memory in Depressed Adolescents
with versus without a Reported History of Trauma

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Abstract

Autobiographical memory retrieval is fundamental to the developing self-concept in adolescence, to emotion regulation and to social problem solving and has been shown to be compromised in adolescents diagnosed with depression (Park, Goodyer, & Teasdale, 2002). The current study assessed autobiographical memory over-generality in a sample of depressed adolescent participants with vs. without a reported history of trauma and never-depressed controls, using an emotion word cueing paradigm. Our analyses showed for the first time that adolescents with major depression and no reported history of trauma exhibited an over-general memory bias. They also revealed that depressed adolescents reporting a history of trauma retrieved fewer over-general memories than depressed adolescents reporting no history of trauma. Among depressed adolescents reporting a history of trauma, more severe post-traumatic stress symptoms were associated with less over-generality. Possible accounts of these findings are suggested.

A tendency to be over-general in retrieving autobiographical emotional memories (e.g., in response to the word “happy”, responding “when I am with my daughter” rather than with “I was happy when I went to the beach with my daughter last Saturday”) is a robust phenomenon among people diagnosed with depression (van Vreeswijk & de Wilde, 2004). Such over-generality appears to be more than simply a cognitive epiphenomenon of being depressed. For example, degree of generality independently predicts the future course of depression (e.g. Brittlebank, Scott, Williams & Ferrier, 1993; Dalgleish, Spinks, Yiend, & Kuyken, 2001; Mackinger, Loschin, & Leibetseder, 2000). Furthermore, individuals remitted from depression, and presumably vulnerable to future episodes, are more over-general than never-depressed controls (Mackinger, Pachinger, Leibetseder, & Fartacek, 2000). Finally, in terms of everyday clinical implications, over-general autobiographical memory is associated with poor problem-solving and difficulties imagining the future (Goddard, Dritschel, & Burton, 2001; Williams et al., 1996).

As well as being a correlate of acute and remitted clinical depression, over-general memory functioning has also been observed in a variety of samples exposed to trauma. The initial study was among adult women diagnosed with depression and reporting childhood sexual abuse (CSA) (Kuyken & Brewin, 1995). Later studies examined survivors of road traffic accidents, combat veterans, people reporting childhood physical abuse, people diagnosed with eating disorders reporting abusive parenting and undergraduates reporting CSA (Dalgleish et al., 2003; Harvey, Bryant, & Dang, 1998; Henderson, Hargreaves, Gregory, & Williams, 2002; Hermans et al., 2004; McNally, Lasko, Macklin, & Pitman, 1995). It is particularly noteworthy that in clinical samples the presence of negative

psychological reactions to trauma, most notably elevated post-traumatic stress symptoms, have also been associated with greater over-general memory retrieval (e.g. Kuyken & Brewin, 1995).

There are a number of explanations for the over-general memory effect in adults reporting depression and trauma. A dominant view is that, because depression is frequently associated with a history of early adversity (Kessler, Davis, & Kendler, 1997), an over-general memory style may be learned in a context of such adversity as a form of affect regulation (Williams, 1996). In such adverse contexts, specific memories are likely to be associated with strong and unpleasant emotional arousal. Consequently, learning not to access these specific memories could avoid such arousal. Truncated retrieval enables the person to cope with the memories in an abstract form before the affectively-laden sensory and perceptual information comes on line. This view is consistent with the finding noted above that over-general memory is more marked among those people reporting a history of trauma who have higher levels of post-traumatic stress symptoms (Kuyken & Brewin, 1995; Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Raes, Hermans, de Decker, Eelen, & Williams, 2003). In a recent analogue experimental test of this hypothesis, individuals tending to report higher baseline levels of specificity in their autobiographical memories reported more anxiety following a stressful manipulation than those with lower baseline levels of autobiographical memory specificity (Raes et al., 2003). This intriguing hypothesised affect regulation mechanism in depression clearly requires further investigation.

Adolescence is a crucial developmental period in terms of the etiology and onset of depression (Reinherz et al., 1993; Reinherz, Giaconia, Hauf, Wasserman, & Silverman, 1999). It involves the development and strengthening of the self-concept, the accumulation of important life experiences and the learning of social problem solving skills (Conway &

Haque, 1999; Habermas & Bluck, 2000). Adolescence is increasingly recognized as a period of high risk for first onset of depression (Lewinsohn, Rohde, & Seeley, 1998), and early onset of depression is associated with more life problems in adulthood, a more chronic lifetime course of depression and an increased risk of eventual suicide (Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001a; Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001b; Rao et al., 1995; Rao, Hammen, & Daley, 1999). There is therefore a compelling case to examine if the tendency in depressed individuals to produce over-general autobiographical memories is already present in this key developmental window and whether reports of significant trauma are associated with this tendency, as they are in adults.

Three studies to date have pursued these issues by extending autobiographical memory research to adolescents with psychopathology (de Decker, Hermans, Raes, & Eelen, 2003; Park et al., 2002; Swales, Williams, & Wood, 2001). The first study showed that a diagnostically mixed adolescent sample from a residential psychiatric unit (with a mixture of conduct disorders and emotional disorders, including depression) were more over-general in their responses to emotion cue words, than were community controls (Swales et al., 2001). Although this study is somewhat illuminating as regards the over-general memory effect in younger samples, it tells us little about the relationship between over-general memory, trauma, and depression in adolescents because trauma history was not assessed and clinical diagnoses were mixed.

The second clinical study narrowed the research focus to adolescents with a depression diagnosis and examined never-depressed controls, adolescents diagnosed with first episode depression, and those with depression in remission (Park et al., 2002). The adolescents experiencing a first episode of depression retrieved more over-general memories to positive and negative word cues than never depressed controls, with similar though less

marked effects in the remitted depression sample. As with the Swales et al. (2001) study, Park et al. (2004) reported no information about the adolescents' history of trauma.

The third clinical study examined the relationship between the experience of trauma and over-general memory, though unfortunately this was again in a diagnostically mixed inpatient sample (specific diagnoses were not reported). The results showed that higher scores on a self-report trauma measure that indexed both total number of traumas and degree of trauma-related distress were associated with more over-general memory retrieval (de Decker et al., 2003). Importantly, however, in this study levels of trauma-related symptoms (i.e., degree of intrusion and avoidance of the trauma), other than simple distress, were seemingly unrelated to memory over-generality, producing a correlation close to zero ($r(24) = -.03, ns$)¹. Although this study was the first to examine the effect of trauma on memory generality in adolescents, it appears that few (if any) of the participants had *no* reported history of trauma. The study is therefore best conceptualized as an examination of the relationship between trauma variables and over-generality in a mostly trauma-exposed adolescent population.

Two further *non-clinical* studies are also relevant here (Drummond, Astell, & Dritschel, 2005; Stokes, Dritschel, & Bekerian, 2004; though see also Meesters, Merckelbach, Muris & Wessel, 2000). Stokes et al. (2004) examined autobiographical memory in a sample of female adolescent burn victims, with no apparent psychopathology (only a minority scored above clinical cut-offs on self-report scales of depression, anxiety or posttraumatic stress, and similar numbers breached the cut-off thresholds among the control sample). The results revealed lower numbers of specific memories among those who had suffered burn trauma, compared to a matched control group with no exposure to burn trauma. In this study, in contrast to the findings of de Decker et al. (2003), higher levels of trauma-

related intrusions and avoidance in relation to the burn trauma were associated with lower memory specificity in the trauma-exposed participants.

Drummond et al. (2005), in an as yet unpublished study, reported data on memory over-generality in a sample of adolescents who had experienced significant trauma and who were under the care of social services. The data revealed that those adolescents who had experienced more severe objectively-documented traumatic life events exhibited *less* memory over-generality.

In summary, data from studies of over-general memory in adolescents have in certain key respects mirrored the adult data discussed earlier, in showing *in separate studies* that either a diagnosis of clinical depression (Park et al., 2002) or a reported history of psychological trauma (Stokes et al., 2004) are associated with greater over-generality (the data pertaining to trauma-related symptoms are more equivocal - see below). Critically, however, no study to our knowledge has looked at both depression (indeed, any clinical diagnosis) and presence or absence of a trauma history in the same population of adolescents (cf. Kuyken & Brewin, 1995). Consequently, the question of whether over-generality in adolescent depression is a form of affect regulation born specifically from a history of early trauma (as discussed above) cannot be addressed on the basis of the extant data.

In fact, when formulating this research question about adolescent depression our analysis of the adult research indicated surprisingly that, to date, no published study in *any* age group has established whether individuals with depression, *but with no reported history of trauma*, tend towards over-generality in autobiographical memory. Addressing this issue seems essential in terms of the affect regulation hypothesis outlined earlier (Williams, 1996). If clinically depressed individuals with no apparent trauma history do exhibit over-generality then it suggests that something about clinical depression *per se* is important in terms of

autobiographical memory style, over and above any effects of trauma history. There are both empirical and theoretical reasons to suggest that clinical depression, in the absence of trauma, may be associated with elevated over-general memory. Degree of over-generality seems to relate to levels of depressed mood in some studies with sub-clinical adult populations (e.g. Dalgleish et al., 2005; Ramponi, Barnard & Nimmo-Smith, 2004). Furthermore, over-generality effects can be induced using mood induction procedures in healthy volunteers (Au Yeung, Dalgleish, Golden & Schartau, in press; Maccallum, McConkey, Bryant & Barnier, 2000; McBride & Cappeliez, 2004; Svaldi & Mackinger, 2003). It seems reasonable to assume that relatively few participants will have experienced significant trauma in these sub-clinical and induction studies, suggesting that the effect can occur independent of trauma. Critically, however, trauma was not actually measured in these studies so this remains no more than informed speculation.

In theoretical terms, a putative over-general memory effect in clinical depression in the absence of a history of trauma could stem from more generic difficulties with cognitive task performance due to executive functioning deficits in depressed samples (see Dalgleish et al., 2005). Within this contextualization, the cued-recall method for eliciting specific autobiographical memories that has traditionally been used in studies of over-generality (The Autobiographical Memory Test [AMT]; see Method section) is conceptualized as an executively demanding-task on which participants can make errors. Accordingly, specific memory responses represent correct task performance (as the AMT explicitly requests specific memory responses) and over-general memories represent task errors. On this basis, one would predict that deficits in executive control, which we know to be associated with depression (e.g. Hartlage, Alloy, Vazquez & Dykman, 1993), would lead to greater over-generality (i.e more task errors) on the AMT, even in the absence of a history of trauma.

Another theoretical possibility is that over-general memory is indeed a function of some form of affect regulation, but is one that arises out of circumstances other than significant early trauma. For instance, over-general memory style may develop within social milieux (e.g. families, peer-groups) characterized by emotional avoidance, where such an emotionally avoidant cognitive style then confers a risk for later depression. 1.

Notwithstanding these various empirical and theoretical arguments, it remains the case that degree of memory over-generality in depressed individuals with no reported trauma has yet to be assessed empirically. The first aim of this study was therefore to examine the degree of over-general memory in clinically depressed adolescents with no reported history of trauma compared with never-depressed adolescents with no reported history of trauma. Our experimental hypothesis (Hypothesis 1) was that this depressed group would be more over-general than the never-depressed controls.

The second aim of the present study was to examine the role of reported trauma history in depressed adolescents. Specifically, we sought to compare memory over-generality in clinically depressed adolescents with and without a reported history of trauma. Our second hypothesis was derived from the existing work reviewed above in both diagnostically mixed (de Decker et al., 2003), and non-clinical samples of adolescents (Stokes et al., 2004) as well as from our own previous work with adults (Kuyken & Brewin, 1995). The hypothesis stated that depressed adolescents reporting a history of trauma would be more over-general than those reporting no history of trauma, even after co-varying for current levels of depression severity.

The third aim of the present study was to examine the association between trauma-related *symptoms* (intrusion and avoidance) and over-generality in depressed, traumatized adolescents. Although the majority of the relevant adult studies have shown that higher levels

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of posttraumatic symptoms relate to more over-generality (e.g., Kuyken & Brewin, 1995), as already noted the data reviewed above collected from adolescent samples (albeit not samples with a primary depression diagnosis) are equivocal. To recap, the de Decker et al. (2003) study found *no* relationship between trauma-related intrusion and avoidance and over-general memory. In addition, Drummond et al. (2005) reported that adolescents whose traumatic experiences were more severe were in fact *less* over-general. In contrast, the non-clinical data reported by Stokes et al. (2004) mirrored the adult findings. We therefore formulated a non-directional hypothesis (Hypothesis 3) that, within a depressed adolescent group reporting a history of trauma, both levels of trauma-related intrusion and avoidance and presence of probable PTSD caseness (based on cut-off scores on a self-report measure) would be significantly associated with degree of memory over-generality, independent of current levels of depression symptoms.

Method

Participants

Sixty-two adolescents (aged 12-18) were recruited through schools, child and adolescent mental health services, children's homes, advertisements placed in libraries, youth centers, coffee houses and local media (newspapers, radio and television)². Depression status was assessed using the modules for mood disorders from the *Structured Clinical Interview (SCID) for the Diagnostic Statistical Manual for Mental Disorders, 4th edition* (DSM-IV: American Psychiatric Association, 1994; First, Spitzer, Gibbon, & Williams, 1995). SCID interviewers were psychology graduates trained by doctoral level psychologists. The Beck Depression Inventory, Second Edition (BDI-II; Beck, Steer, & Brown, 1996) assessed depression severity. Exclusion criteria were: substance abuse within the past 12 hours and incapacity to participate because of an acute, unstable or severe mental or physical health

problem.

Participants' reports of trauma were screened using the *Trauma History Questionnaire* (THQ; Green, 1996) and endorsed events were then explored through follow up questioning during a clinical interview. A self-reported history of significant trauma was judged present if the event(s) met the DSM-IV Criterion A for posttraumatic stress disorder (PTSD): i.e., "the person experienced, witnessed or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others and the response involved intense fear, helplessness, or horror" (American Psychiatric Association, 1994; p. 424). Following Kuyken and Brewin (1995), reports of sexual assault were defined following clinical interview as direct physical contact between a perpetrator and the sexual parts of the respondent or between the respondent and genitalia of the perpetrator for sexual gratification of the perpetrator on several occasions unless the abuse on a single occasion was of an extremely intrusive or traumatizing nature; for example, rape. The sexual assault was defined as childhood sexual abuse (CSA) if the perpetrator was at least 5 years older.

On the basis of these different assessments, the sample was divided into three groups: adolescents who had never been depressed and reported no significant trauma history ($N = 28$; never depressed); adolescents who currently met DSM-IV criteria for Major Depressive Disorder (MDD) but reported no significant trauma history ($N = 12$; depressed no trauma) and adolescents who currently met criteria for MDD and who also reported a significant trauma history ($N = 22$; depressed plus trauma)^{3,4}.

Materials and measures

The *Beck Depression Inventory* (BDI-II; Beck et al., 1996) is a 21-item self-report instrument developed to measure severity of depression in adults and adolescents. Higher

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scores represent greater depression severity (range 0-63), and minimal (0-13), mild (14-19), moderate (20-28) and severe (29-63) symptom severity ranges have been specified.

The *Trauma History Questionnaire* (THQ; Green, 1996) lists 23 traumatic events in three categories. For each event, participants indicate lifetime occurrence, frequency, and age at first occurrence and, where appropriate, relationship to the perpetrator. Psychometric data on the THQ have shown high test-retest reliability of items (mean 0.70) (Green, 1996; Mueser et al., 2001), good inter-rater reliability (Kappas: 0.76 - 1.00) (Brunet et al., 2001; Mueser et al., 2001), construct validity with other self-report measures of trauma history (e.g., Sprang, 1997) and indicate that the THQ is a significant predictor of PTSD (e.g., Najavits et al., 1998). The THQ was used as an initial screen for traumatic stressors. However, as recommended in the guidelines for the instrument (Green, 1996), items endorsed on the THQ were then followed up using clinical interview (see Procedure section) to determine whether the trauma(s) met Criterion A for PTSD (American Psychiatric Association, 1994) and to explore and classify and reports of sexual assault. Reliability of ratings of Criterion A trauma between the assessors' and the first author (Willem Kuyken) for a random sample of participants ($N = 10$) was 90%, translating to a Cohen's Kappa of 0.8. Where discrepancies were identified these were resolved through discussion of the event with reference to the DSM-IV definition of Criterion A. Examples of trauma meeting Criterion A were involvement in serious car accidents, being physical assaulted, sexual abuse, witnessing deaths, accidents, and severe violence.

The *Children's Impact of Event Scale* (CIES-8; Smith, Perrin, Dyregrov, & Yule, 2003; Yule, Tenbruggencate, & Joseph, 1994) is an 8 item self-report measure of intrusion and avoidance of traumatic events for children and adolescents. The CIES-8 was adapted from the original 15-item Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979). Each

item is scored on a 4-point scale: high scores indicate higher levels of intrusion and avoidance of the traumatic event, within the past week. The scale has a two factor structure giving rise to separate intrusion and avoidance sub-scales (see Perrin, Meiser-Stedman & Smith, 2005, for a review). The CIES-8 has been found to have criterion validity with the diagnosis of PTSD, acceptable internal reliability (Cronbach's alphas for both sub-scales > 0.73) and has been used successfully with children as young as nine (Perrin et al., 2005; Stallard, Velleman & Baldwin, 1999; Yule, 1997). Participants completed the CIES-8 in relation to the event specified in the THQ that continued to be most troubling. A cut-off score of 17 has been found to work efficiently at discriminating PTSD cases, with up to 90% of children correctly classified (Perrin et al., 2005; Smith et al., 2003; Stallard et al., 1998). Internal consistency of the two sub-scales in the present depressed plus trauma sample was substantial: Intrusions - Cronbach's alpha = .86; Avoidance - Cronbach's alpha = .87.

Autobiographical Memory Test (AMT: Williams, 2000). Over-generality of autobiographical memory was assessed using the AMT. The procedure and coding were in line with previous studies on trauma-exposed populations (e.g., Kuyken & Brewin, 1995). Participants were asked to retrieve autobiographical memories in response to 10 emotional cue words: five positive (happy, hopeful, excited, proud and loved) and five negative (lonely, frightened, sad, angry and ashamed). To ensure cues were appropriately positive and negative and suitable for adolescents the words were selected from the list of cues used in previous autobiographical memory research (Williams, 2000) and emotion words previously generated by children and adolescents (Neshat-Doost, Moradi, Taghavi, Yule, & Dalgleish, 1998). This version of the AMT has been successfully used with adolescent clinical populations (Dalgleish et al., 2001; de Decker et al., 2003; Swales et al., 2001).

Participants were shown the word on printed flash cards (black print on white paper) and given thirty seconds to retrieve a specific autobiographical memory (a time and place when something happened to them in one day). Words were presented with positive and negative words alternating. The latency to the first word of each recalled memory was recorded and the participants' responses were taped, and then transcribed and coded. If participants did not retrieve a specific memory they were prompted ("can you think of a specific time – one particular event"). If participants did not retrieve a specific memory in the time available (30 seconds), an omission was recorded and the experimenter proceeded to the next cue word. To ensure that participants understood the instructions, two practice cues were given (relieved and tired).

Memories were coded as specific, over-general (either extended or categorical) or as 'no memory' (either utterances that did not refer to remembered experiences or non-responses). Over-general memories are the focus of the present analyses, though specific memory data are also reported.⁵ Previous research (Williams & Broadbent, 1986) has found that the distinction between over-general and specific memories can be rated reliably (inter-rater reliabilities between 0.87 and 0.93). Based on two raters rating the memories from ten participants (100 memories), rates of agreement in this study were comparable to previous studies (Kappa = 0.83). Discrepancies were resolved through reference to the coding protocol (above) and discussion.

The *Verbal Fluency Task* (VFT; Benton, 1968; Tombaugh, Kozac, & Rees, 1999) was used as a measure of generative fluency to ensure that effects on the AMT were not simply a proxy for differences in the ability to generate any material from memory. Participants were asked to generate as many words as possible beginning with the letter "B" in 60 seconds.

Names and word variations (e.g., belonging, belongings) and repeated words were not included in the final count.

Procedure

Invitations to participate were made directly to young people as well as through parents and workers in health and social care. Following informed consent and assent procedures to a broader study of “Adolescents at Risk for Depression,” adolescents completed the face-to-face interviews either at the University or at their homes. Interviews lasted between 1½ to 2 hours and participants were remunerated approximately \$10. After demographic and background information was collected, the AMT was administered. The THQ was then completed and, where participants had screened positive for any traumatic stressors, clarification / follow-up questions were asked when appropriate to establish if these events met PTSD Criterion A from the DSM-IV. If the participant screened positive for a Criterion A trauma, then the CIES was completed in relation to this trauma. If there were several such traumas, participants completed the CIES in relation to the event that still distressed them the most. Next the BDI-II was completed, followed by an interview to establish the presence/absence of current and past MDD according to the DSM-IV. Questions were also asked about past number of psychiatric hospital admissions, past suicide attempts and past self-injury. The procedure concluded with the VFT.

Results

Descriptive statistics for the demographic, trauma and psychiatric variables across the three groups (never depressed, depressed no trauma and depressed plus trauma) are shown in Table 1. As would be expected, the depressed groups reported significantly more psychiatric symptoms and history than the never depressed group. The severity of depressive symptoms in the depressed sample as a whole was on the borderline between the “moderate” and

“severe” range of scores (Beck et al., 1996) and there was a balanced mix of first onset and recurrent depression. Among the depressed plus trauma participants, the levels of trauma symptoms were marked, with the mean CIES-8 score falling significantly above the recommended cut-off of 17 for probable PTSD (Perrin et al., 2005). Age, gender and verbal fluency were not significantly different across groups. The two depressed groups (no trauma vs. plus trauma) were not significantly different on number of previous episodes of depression (Chi-square = 2.06, $DF = 1$) or psychiatric hospitalizations (Chi-square = .21, $DF = 1$). However, compared to the depressed no trauma participants, those reporting trauma were more severely depressed ($F(1, 33) = 6.31, p < 0.05$) and were more likely to have self-injured (Chi-square = 9.67, $DF = 1, p < .01$) or made a suicide attempt (Chi-square = 3.62, $DF = 1, p < .05$).

INSERT TABLE 1 ABOUT HERE

The autobiographical memory functioning data are presented in Table 2. The levels of over-generality on the AMT are comparable to those from other studies with adults (van Vreeswijk & de Wilde, 2004) and adolescents (Swales et al., 2001). There were no significant relationships between autobiographical memory functioning and age, sex or verbal fluency, all absolute values of $r_s(64) < .11, ps > .40$.

INSERT TABLE 2 ABOUT HERE

Depression, trauma history and over-general autobiographical memory retrieval

Our first hypothesis was that depressed adolescents reporting no history of trauma would generate more over-general memories than the never-depressed individuals with no reported trauma history. Our second hypothesis was that, within our depressed sample, those with a reported history of trauma would show more memory over-generality than those with no reported trauma history. To examine these two hypotheses we first conducted an omnibus

mixed-model ANOVA of Cue Valence (positive vs. negative) and Group (never depressed vs. depressed no trauma vs. depressed plus trauma) with number of over-general memories as the dependent variable. There was no significant effect for Cue Valence, $F < 1$, a significant effect for Group, $F(2, 59) = 5.66, p < .01$, and no significant Group by Cue Valence interaction, $F(2, 59) = 2.25, p > .1$. Our specific hypotheses were examined using planned contrasts that deconstructed the overall effect of Group. In support of Hypothesis 1, the depressed no trauma group was significantly more over-general than the never-depressed group, $p < .001$, Cohen's $d = 1.26$. With respect to Hypothesis 2, there was a significant difference for memory over-generality between the depressed plus trauma group and the depressed no trauma group (with depression severity on the BDI-II co-varied), $p < .05$, uncorrected Cohen's $d = 0.62$. However, intriguingly, it was in the opposite-to-predicted direction, with a reported history of trauma being associated with *less* over-generality. Finally, the depressed plus trauma participants were not significantly different from the never depressed controls, $p = .12$, Cohen's $d = .45$, although the means were in the expected direction with greater over-generality in the depressed plus trauma sample. Repeating the above analyses with over-general memories computed as proportions of all autobiographical memories recalled, instead of as absolute scores, produced an identical pattern of findings.

Next, we analysed the data to examine the replicability of previous key findings in the literature. First, in the Park et al. (2002) study of depressed adolescents (who were not divided according to reported trauma history), the finding of more over-general memory in the depressed group rested solely on analyses involving categorical memories. Among the present sample the pooled group of depressed participants (plus trauma and no trauma, combined) also generated significantly more categoric memories ($M = 1.24, SD = 1.76$) than

the never-depressed controls ($M = 0.42$, $SD = 0.56$), $t(41.20) = 2.52$, $p < .02$, thus replicating the Park et al. finding.

Second, in the Stokes et al. (2004) study, trauma-exposed burn victims retrieved fewer *specific* memories than non-burn-trauma-exposed controls. In the above analyses, we reported that our depressed plus trauma group was not significantly more *overgeneral* than the never-depressed controls (with no reported trauma). We therefore repeated this analysis, this time using numbers of *specific* memories. The results indicated that, as with the Stokes et al. data, the depressed plus trauma group did indeed report fewer specific memories than the controls, $t(48) = 2.43$, $p < .02$. Interestingly, as in the present study, there was no significant difference in memory over-generality (as indexed by categorical memories) across groups in the Stokes et al. (2004) data.

In the present data the depressed plus trauma group and the depressed no trauma group differed on other clinical metrics (histories of suicide attempts and of self harm), in addition to a history of trauma. Data in adults indicate that variables relating to suicidality influence over-general memory (Williams, Barnhofer, Crane & Beck, in press; Williams et al., 2005; Williams & Broadbent, 1986). We therefore wanted to examine whether these other clinical variables in the present study could account for the unpredicted reversed finding reported above where the depressed plus trauma group were less overgeneral than the depressed no trauma group. To examine this possibility we split the depressed participants, first, into those with ($N = 16$) and without ($N = 18$) a history of suicide attempts, and secondly into those with ($N = 25$) and without ($N = 9$) a history of self-harm. We performed independent sample *t*-tests on the over-general memory data for these new groupings. In neither case was there a significant effect, both t values < 1 , $ps > .41$, Cohen's d s $< .30$.

Trauma symptoms, probable PTSD, and autobiographical memory retrieval

Our third hypothesis proposed that degree of post-traumatic distress would be significantly associated with more memory over-generality in the depressed plus trauma participants ($N = 22$). First, to examine if over-generality was associated with levels of intrusion and avoidance on the CIES-8 (with depression controlled for), partial correlations were computed (see Table 3). Echoing the trauma history results reported above, higher levels of trauma-related avoidance were associated with *less* over-general memory. That is to say, depressed adolescents who were working hard to avoid reported trauma were evidencing less over-general autobiographical memory retrieval.

INSERT TABLE 3 ABOUT HERE

Second, an ANCOVA using probable PTSD (above vs. below the CIES-8 recommended cut-off of 17; Perrin et al., 2005) as the independent variable and BDI-II scores as the covariate showed that those depressed plus trauma participants with probable PTSD were significantly less over-general ($M = 2.87, SD = 2.13$) than those without probable PTSD ($M = 5.20, SD = 1.48$), $F(1, 21) = 4.65, p < 0.05$.

Discussion

This is the first study to examine the effects of trauma and post-traumatic stress symptoms on autobiographical memory over-generality in depressed adolescents. Indeed, to the best of our knowledge, the present study is the first *in any age group* to examine whether depressed individuals reporting no history of trauma exhibit over-general autobiographical memory relative to controls.

The study had three central hypotheses. The first hypothesis was that adolescents with MDD (but no reported history of trauma) would produce more over-general memories than never-depressed adolescents with no reported trauma history. The data supported this

hypothesis with a very large effect size (Cohen's $d = 1.26$). The second hypothesis was that MDD adolescents reporting a history of trauma would be more over-general than MDD adolescents reporting no trauma history. The data did not support this hypothesis and in fact indicated the *reverse* relationship, with a medium effect size, Cohen's $d = 0.62$. The third hypothesis was that, among MDD adolescents reporting a history of trauma, levels of trauma-related symptoms (intrusion and avoidance) would be significantly associated with memory over-generality. The data supported this hypothesis, indicating a *negative* relationship between over-generality and avoidance symptoms, $r(19) = -.49$. This finding was consolidated by analyses showing that probable PTSD in the MDD adolescents reporting a trauma history also related to less memory over-generality. We discuss each of these results in turn.

The finding pertaining to the first hypothesis, that depressed adolescents reporting no trauma history were more over-general than controls, strongly suggests that memory over-generality in adolescents can be a function of depression, over and above any influence of a reported history of early trauma. This is in line with the corpus of data with clinically depressed adults (van Vreeswijk & de Wilde, 2004), although to date no study in any age group has directly examined this issue. Our findings therefore seem inconsistent with an explanation of over-general memory that relies *wholly* on cognitive avoidance or affect regulation associated with significant early adversity (Williams, 1996). Rather, the data suggest that additional routes to over-generality may be operating in depression; for example, via deficits in executive functioning (e.g., Dalgleish et al., 2005), or as a form of affect regulation with a non-trauma etiology (see Introduction). It is of course important to stress that the present data do not mean that the affect regulation hypothesis regarding over-general memory needs to be abandoned. Affect-regulation following significant early trauma may

still represent a very significant route to over-generality in depression. Alternatively, affect-regulation in the form of over-generality may arise through circumstances other than early trauma. The challenge would now seem to be to elucidate the different routes to over-generality in clinical groups and how these putatively interact with one another.

The finding pertaining to our second hypothesis, that MDD adolescents with a history of trauma are *less* over-general than those with no such history, on first pass, seem at odds with the one other group study in this age group (Stokes et al., 2004). To recall, Stokes et al. found that their trauma-exposed group of burn victims produced fewer specific memories than non-burn trauma controls. However, in the Stokes et al. study, the non-trauma control group was recruited from a local school. The difference across the two studies may therefore rest on the fact that our analyses involved *clinical* controls diagnosed with MDD. In line with this, when we examined the present data using the never-depressed group as the controls, our findings mirrored those of Stokes et al. The pertinent question therefore seems to be why, *among adolescents with a diagnosis of MDD*, are those who report having experienced a significant trauma less over-general than those reporting no trauma history? This question clearly relates to the data pertaining to our third hypothesis which showed that among this traumatized MDD group, both a probable diagnosis of PTSD and higher levels of trauma-related *avoidance symptoms* were associated with *less* over-generality. This latter finding also reflects those of both de Decker et al. (2003), who found no relationships between trauma symptoms and over-generality in a clinical adolescent sample, and of Drummond et al. (2005), who in an unpublished study found that more severe adversity was associated with less over-generality in a socially disadvantaged adolescent sample.

The pattern of these findings regarding trauma-related distress and over-general memory in adolescent samples is different to the usual profile reported in adults (see

Williams et al., 2005, for a review). For example, Kuyken and Brewin (1995) found that trauma-related distress was associated with *greater* over-generality in their sample of depressed women. Furthermore, studies of trauma-exposed samples with PTSD vs. without PTSD (McNally et al., 1995; McNally, Litz, Prassas, Shin, & Weathers, 1994) indicate *greater* over-generality in the PTSD participants. As there are no obvious systematic methodological differences between the adult and adolescent research, it is important to consider substantive psychological explanations of the pattern of findings.

To this end, it is interesting to note that the overall pattern of the adolescent data (including the present findings) is more redolent of an emerging profile of data from adults with Borderline Personality Disorder (BPD) (e.g., Arntz, Meeren & Wessel, 2002; Kremers, Spinhoven, & van der Does, 2004; Renneberg, Theobald, Nobs, & Weisbrod, 2005; Startup et al., 2001). For example, Arntz et al. (2002) found that the presence of a BPD diagnosis was associated with *greater* memory specificity (though see Jones et al., 1999) and, more importantly, that a measure of childhood adversity was not significantly associated with memory style. Furthermore, Kremers et al. (2004) also found no relationship between measures of intrusion and avoidance of earlier trauma and over-generality in their BPD sample, while Startup et al. (2001) found that those BPD patients with a greater number of previous suicide attempts were *less* over-general.

Based on their similarity to the adult BPD data, one possible account of the present results (alongside those from other studies on adolescents; de Decker et al., 2003, Drummond et al., 2005) is that some traumatized adolescent samples (including perhaps sub-samples from the present study's cohort) contain significant numbers of individuals vulnerable to later BPD (e.g., Kasen et al., 2001) and that this vulnerability has effects on over-generality of memory. Clearly, in light of the data that are currently available, such an account must

remain speculative. Given this, the most appropriate conclusion at the present time is that we do not yet fully understand why both trauma history and trauma-related distress were associated with less over-generality in the current dataset and therefore that further research into this issue is clearly warranted (see below).

This study has some limitations. First, we relied on a self-report measure of post-traumatic intrusion and avoidance. This was to ensure comparability with the existing literature (e.g. Kuyken & Brewin, 1995; Stokes et al., 2004). However, the study would have been improved if this rating had been complemented by structured interview data. Second, we had a relatively small non-trauma MDD sample, though our power analysis and the eventual data both suggested that the sample size was adequate. Third, our clinical sample was recruited from somewhat heterogeneous sources and it is unclear what the implications of this for the pattern of findings might be. Fourth, we would have been able to elucidate more clearly the relative contributions of reported trauma and depression to over-general memory in adolescents if we had recruited a non-depressed, trauma-exposed sample, matched on degree of reported trauma exposure with our depressed plus trauma group. Such a sample would be difficult to recruit but its putative value means that it should be a clear research focus for future studies. Finally, a more comprehensive assessment of both nascent and co-morbid personality disorder in our sample (with due regard for the attendant nosological complexities; e.g. Westen, Shedler, Durrett, Glass, & Martens, 2003) would have allowed to us to shed more light on the question of why the depressed group reporting trauma were less over-general than their reportedly non-trauma-exposed, depressed counterparts.

As this is the first study to examine both history of trauma and depression in adolescents, a number of important research questions remain. For example, does the extent of over-general memory bias predict the course of depression in adolescents as it does in

adults (e.g. Brittlebank et al., 1993)? Also, do adolescents (or indeed adults) with remitted depression show an over-general memory bias? To what extent do such putative effects interact with reported history of trauma? Finally, as already highlighted, do trauma-exposed depressed adolescents who have relatively low levels of over-general memory go on to develop an over-general memory style and/or are they vulnerable to later personality disorder?

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Table 1

Demographics, Verbal Fluency and Psychiatric Status in Never Depressed, Depressed No Trauma and Depressed Plus Trauma Groups

	Never depressed (<i>N</i> = 28)	Depressed, no trauma (<i>N</i> = 12)	Depressed, plus trauma (<i>N</i> = 22)
Age	<i>M</i> 15.68 (<i>SD</i> 1.59)	<i>M</i> 15.92 (<i>SD</i> 1.51)	<i>M</i> 16.23 (<i>SD</i> 1.38)
Gender	Male 7 (25%) Female 21 (75%)	Male 3 (25%) Female 9 (75%)	Male 2 (9%) Female 20 (91%)
Verbal fluency	<i>M</i> 11.29 (<i>SD</i> 3.93)	<i>M</i> 12.08 (<i>SD</i> 2.61)	<i>M</i> 10.77 (<i>SD</i> 4.29)
Trauma History:			
Any sexual assault	0	0	11 (50%)
Childhood sexual abuse	0	0	9 (41%)
Trauma Symptoms:			
CIES-8 Intrusions	-	-	<i>M</i> 13.38 (<i>SD</i> 6.25)
CIES-8 Avoidance	-	-	<i>M</i> 13.00 (<i>SD</i> 7.12)
Psychiatric Status and History			
Episodes of depression ^a	0	One: 4 (33%) Two: 5 (42%) Three or more: 2 (25%)	One: 7 (35%) Two: 4 (20%) Three or more: 9 (45%)
Co-morbid probable PTSD	0	0	16 (76%)
Psychiatric hospitalisations	0	1 (8%)	3 (14%)
Suicide attempts	0	3 (25%)	13 (59%)
Self-injury	2 (7%)	5 (42%)	20 (91%)
BDI-II	<i>M</i> 4.50 (<i>SD</i> 3.92)	<i>M</i> 21.92 (<i>SD</i> 10.72)	<i>M</i> 32.36 (<i>SD</i> 12.02)

Note. BDI-II = Beck Depression Inventory II; CIES-8 = Children's Impact of Event Scale.

The CIES-8 was not applicable for participants without a reported history of trauma; Co-morbid probable PTSD refers to a recognised CIES-8 cut-off, see Method section.

^a *N*=60, as two SCID interviews could not be completed for full histories of depression.

Table 2

Mean (SD) Autobiographical Memory Functioning Data in Never Depressed, Depressed No Trauma and Depressed Plus Trauma Groups

	Never depressed (<i>N</i> = 28)	Depressed, no trauma (<i>N</i> = 12)	Depressed plus trauma (<i>N</i> =22)
Specific memories			
Total	7.71 (1.46)	5.58 (1.98)	6.41 (2.32)
Positive cues	4.00 (.90)	2.5 (1.09)	3.18 (1.37)
Negative cues	3.71 (.94)	3.08 (1.56)	3.23 (.90)
Over-general memories			
Total	2.14 (1.41)	4.25 (2.09)	2.95 (2.13)
Positive cues	.96 (.92)	2.42 (1.17)	1.27 (1.20)
Negative cues	1.18 (.86)	1.83 (1.52)	1.68 (1.32)

Table 3

Partial Correlations between Trauma Symptoms and Autobiographical Memory Functioning in the Depressed Plus Trauma group (N = 22), Partialling out Depression Severity (BDI-II)

CIES-8	OGM	OGM		no memory
		positive cues	negative cues	
CIES-8 intrusions	-.01	-.06	.01	-.28
CIES-8 avoidance	-.49*	-.50*	-.41 ^{p=.07}	-.18

Note. OGM = Number of first memories recalled that were over-general; BDI-II = Beck Depression Inventory II; CIES-8 = Children's Impact of Event Scale.

* $p < .05$ (2-tailed).

Footnotes

¹ It is important to note that the measure of trauma symptoms used in the De Decker et al. study was not adapted for young people nor anchored to a particular significant trauma, and it is possible that the absence of any association between trauma symptoms (avoidance and intrusions) and memory over-generality was therefore an artefact of the methodology.

² A power analysis based on the most comparable existing study (Park et al., 2002) with 80% power, a directional alpha of 0.05, and using the interpolated effect size for the comparison of MDD adolescents and community controls from the Park et al. data, indicated a sample size of 11 per group. This is comparable to the only other group study in this age group (Stokes et al., 2004; $N = 12$ per group).

³ With respect to these group labels, the word trauma always refers to *reported* trauma.

⁴ Three never depressed participants reported a history of significant trauma and were excluded from the study.

⁵ The distinction between over-general and specific memories can be rated reliably (inter-rater reliabilities between 0.87 and 0.93). Based on two raters, rates of agreement in this study were comparable to previous studies (Kappa = 0.83). Previous research has varied as to whether analysis of AMT data has focused on specific memories (e.g. Hermans et al., 2004), over-general memories (i.e. categoric plus extended) (e.g. Kuyken & Brewin, 1995), or on categoric memories in particular (e.g. Park et al., 2002). In the present study we focused on over-general memories in the analyses (though also reported data on specific memories) as this has been the approach taken by almost all of the existing studies examining trauma. (though see Stokes et al., 2004).