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Memory specificity as a risk factor for suicidality in non-affective psychosis: The ability to recall specific autobiographical memories is related to greater suicidality

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ABSTRACT

A difficulty in recalling specific autobiographical memories has been noted as a risk factor for suicidal behaviour. However, the relationship between memory specificity and suicide has not previously been investigated in those with non-affective psychosis. It was predicted that in this group, more specific memory recall would be associated with an increased risk of suicide. This is because such specific memories are likely to be associated with greater levels of distress and negative affect than less specific memories. This prediction contradicts the prevailing belief that lower memory specificity is associated with greater suicidality. Sixty participants with schizophrenia spectrum disorders were recruited, 40 of whom reported past suicide attempts. Analyses showed suicide attempters recalled a greater proportion of specific memories, whilst controlling for trait anxiety and depressive symptoms. These results supported the main hypothesis, and suggest non-specific memory may have adaptive qualities in individuals with psychosis.

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Introduction

Specific autobiographical memories have been defined as memories of personal events or experiences located within a particular time and place and lasting less than a day (e.g., recalling a particular conversation with a friend) and can be distinguished from overgeneral types of memory (i.e., Memories summarising repeated events or extended periods of time) (Williams et al., 2007). The ability to recall such memories, rather than overgeneral responses in cued-recall tasks (i.e., the Autobiographical Memory Task, AMT; Williams & Broadbent, 1986) has been shown to be a robust indicator of depressive and emotional disorders (see review by Williams et al., 2007). Memory specificity may also be related to borderline personality disorder (Renneberg, Theobald, Nobs, & Weisbrod, 2005). Non-specific, or overgeneral memory has also been noted in parasuicidal individuals (Kaviani, Rahimi-Darabad, & Naghavi, 2005; Williams & Broadbent, 1986) and does not seem attributable to co-morbid depression alone (Leibetseder, Rohrer, Mackinger, & Fartacek, 2006). Individuals with non-affective psychosis are at high risk of suicidal ideation and behaviour (Palmer, Pankratz, & Bostwick, 2005). Memory specificity in psychosis has already been studied (e.g., Neumann, Blairy, Lecompte, & Philippot, 2007; Wood, Brewin, & McLeod, 2006). However, no research to date has tested whether memory specificity is associated with suicidality in this population. The current study represents the first investigation of this possibility.

The typical finding has been that overgeneral memory is a risk factor for suicidality. However, this result has largely emerged from studies comparing parasuicidal groups to non-psychiatric controls (e.g., Kaviani et al., 2005; Williams & Broadbent, 1986). Other studies exploring memory specificity within particular clinical groups have demonstrated the opposite result, with those individuals recalling more specific memories having greater levels of suicidality, selfharm and depression. This pattern of results has been reported in clinical groups of adolescence, borderline personality patients and formerly abused adults (Burnside, Startup, Byatt, Rollinson, & Hill, 2004; Startup et al., 2001; Swales, Williams, & Wood, 2001). It is possible therefore that within particular clinical groups reduced memory specificity may serve an adaptive function. One empirically supported function of reduced memory specificity is to limit access to the negative affect and distress that can be associated with more specific autobiographical memories (Raes, Hermans, Williams, & Eelen, 2006; Williams et al., 2007). Memories of traumatic and

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unpleasant experiences are especially likely to be associated with negative affect, accounting for the finding that overgeneral memory has been associated with a history of trauma and abuse (Williams et al., 2007). Thus, within clinical groups exposed to higher levels of distressing experiences and trauma, a more overgeneral style of memory retrieval may be associated with a reduced suicide risk, as it blocks access to distressing mnemonic material. Simultaneously memory should be more overgeneral in these clinical groups when compared to non-psychiatric control groups (Swales et al., 2001). Overgeneral memory is less likely to serve any adaptive role within the non-psychiatric control groups, and so is less likely to be routinely employed as a retrieval style.

Consequently, a case can be made that greater memory specificity would also be predictive of suicidality within the non-affective psychosis population. Traumatic and aversive experiences are common in psychosis (Morrison, Frame, & Larkin, 2003). Overall poorer memory specificity would therefore be expected in individuals with psychosis compared to non-psychotic controls, as has been demonstrated (Neumann et al., 2007; Wood et al., 2006). However, it can also be predicted that individuals with psychosis who are less able to maintain an overgeneral style of memory retrieval may be more prone to recalling specific distressing memories, which may contribute to a heightened risk of suicide in such individuals.

Perceptions of being psychologically defeated and trapped have also been associated with suicidality in individuals with psychosis (Iqbal & Birchwood, 2006; Taylor et al., in press). Autobiographical memories associated with themes of defeat and entrapment may therefore be especially accessible in individuals with psychosis who are also suicidal. Thus, it can be predicted in this group that within a cued-recall paradigm, suicidal participants would show an improved recall of specific memories to cues related to themes of defeat and entrapment, compared to standard positive and negative cues. This effect would not, however, be expected in non-suicidal participants as they have fewer entrapment-related memories for the cues to map onto.

The aim of the current study was to investigate the link between autobiographical memory specificity, assessed via a cued-recall paradigm (AMT), and suicidality within a sample of individuals with non-affective psychosis. It was hypothesised that suicidal behaviour would be associated with greater memory specificity in this group, and furthermore, that this effect would be especially pronounced for defeat and entrapment-related cues. As both depressive symptoms and trait anxiety could confound the relationship between suicidal behaviour and performance on the AMT task, they were controlled for in the analyses. Finally, as it is assumed that it is the ability to avoid *distressing* specific memories that makes overgeneral memory adaptive in some situations, an exploratory analysis was undertaken investigating the numbers of specific memories recalled in the AMT that were associated with current distress.

Method

Participants and procedure

Participants were outpatients living in the Greater Manchester area referred to the studies by their keyworkers or other appropriate healthcare professional. All participants were required to meet the following inclusion criteria: 1) a clinical diagnosis based on ICD-10 criteria of a schizophrenia spectrum disorders (e.g., schizophrenia, schizoaffective disorder, psychosis not otherwise specified); 2) aged 18 years or over; 3) currently not at very high risk of suicide as judged by their keyworker or other appropriate healthcare professional; 4) English-speaking; 5) capable of

providing informed consent as judged by their keyworker or other appropriate healthcare professional.

Suicide risk was determined by community mental health teams using standardized risk assessment tools and procedures. These include a clinical risk assessment form completed through structured interview, which assesses multiple forms of self-harm and suicidality and provides an overall likelihood rating, and the Manchester Care Assessment Schedule (ManCAS), which rates the severity of risk to self (Firth, 1999). Use of these tools is supported by training and manual guidance. Clients identified as being at high risk through these procedures were not referred to the study.

The sample consisted of 60 outpatients (12 female; $M_{\rm age} = 43.4$; SD = 11.4). The majority had a diagnosis of schizophrenia (n = 53; 88.3%), then schizoaffective disorder (n = 4; 6.7%), atypical psychosis (n = 1, 1.7%) and psychosis not otherwise specified (n = 2; 3.33%). Participants were predominantly white (n = 51; 85.0%), the remainder being mixed British (n = 4; 6.7%), Asian (n = 2; 3.3%) and other (n = 3; 5.0%). Participants completed all tasks and measures in a single session. Ethical approval was obtained from a national research ethics committee prior to commencing the study.

Measures

Suicidal behaviour

Past suicidal behaviour was assessed using a question derived from the Revised Suicidal Behaviours Questionnaire (Osman et al., 2001). In response to the question, 'Have you ever thought about, or attempted to kill yourself?' participants were asked to select one of six possible answers, covering no previous suicidality, mild ideation, planning and suicide attempts. Past suicidal behaviour was recorded where participants stated that they had previously attempted to kill themselves. It was, therefore, the behaviour (engagement in an act designed to result in death) rather than the intent (strength of desire to die) that was the focus in the present study. Participant's reporting past attempts were asked to indicate the exact number of previous attempts.

Depressive symptoms

The Beck Depression Inventory second edition (BDI; Beck, Steer, & Brown, 1996) is a widely used 21-item self-report measure assessing depressive symptoms over the past two-weeks. This measure had an alpha coefficient of .88 in a population diagnosed with schizophrenia and has been associated with clinician-rated depression in this group (Chemerinski, Bowie, Anderson, & Harvey, 2008).

Trait anxiety

The trait scale of the State-Trait Anxiety Inventory (STAI-T; Spielberger, Gorsuch, & Lushene, 1970) is a 20-item self-report measure assessing generalised experiences of anxious emotion and cognition. This measure was found to have an alpha coefficient of .91 in individuals diagnosed with schizophrenia spectrum disorders (Docherty, St-Hilaire, Aakre, & Seghers, 2009).

Autobiographical memory specificity

The Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) assesses the ability to recall specific autobiographical memories in response to a series of cue-words. This task has been widely used to assess autobiographical memory specificity and has been found to be relatively robust across variations in the cueing procedure (Williams et al., 2007). For each word, participants are asked to describe a related, specific memory, occurring anytime in their lives except the last week.

In the current study participants were first provided with up to three practice words to ensure they understood the task (*Rain, Milk*,

Newspaper). Cue-words were presented verbally and included five positive (Tender, Excited, Friendly, Peaceful, Pleasant), five negative (Tragic, Upset, Hurt, Bad, Fault) and five defeat/entrapment-related words (Trapped, Escape, Loser, Get-away, Given-up) in a fixed alternating order. The positive and negative words were taken from previous research using the AMT (Brittlebank, Scott, Williams, & Ferrier, 1993). The defeat/entrapment-related words were derived from high loading items (>.75) on the defeat and entrapment self-report scales (Gilbert & Allan, 1998). Consistent with previous research sampling those with psychosis, participants were allowed up to 30 s to respond to each cue (Wood et al., 2006). If initial responses were non-specific, a single prompt was provided by the researcher (e.g., 'can you think of a specific instance/a particular moment?').

Responses were audio recorded with participant's consent in order to facilitate the coding of responses. All responses were classified either as specific (e.g., 'meeting an old friend for a drink'), extended (e.g., 'A weekend away'), categoric (e.g., 'going shopping'), a semantic associate (associated ideas or concepts not linked to a particular memory, e.g., 'my brother is friendly') or no response. All coding was undertaken by the first author. A second, independent judge coded responses for a subset of participants (n = 21; 35.0%), showing high inter-rater agreement, $\kappa = .72$. Illustrative examples of participant responses on the AMT falling into each category are presented in Table 1. An additional feature of the AMT in the current study was that for each specific memory recalled, participants were asked to rate the degree of distress currently associated with that memory on a scale from 0 ('no distress') to 3 ('very distressing').

The main outcome of interest was the proportion of specific responses recalled. Although previous studies have focussed on other indices of performance in the AMT, such as the number of overgeneral or categoric responses (e.g., Hermans, Defranc, Raes, Williams, & Eelen, 2005; Startup et al., 2001), it was felt such responses were too infrequent to use in the current study (see Table 3), and would likely have resulted in floor effects. It is likely that the number of overgeneral responses was higher in the studies by Hermans et al. (2005) and Startup et al. (2001), as these authors based AMT scores on participant's first responses only. In the current study, in-line with previous research in this population (Wood et al., 2006), no such restriction was made so that responses made following prompts were included. This likely reduced the level of overgeneral responding in the present study. The proportion of specific responses included instances where participants made no response within the time limit in the denominator. The reasoning for this is that non-responding may have been due to participants recalling only inappropriately general memories and being unwilling to report these due to the instructions of the task to

Table 1 Illustrative examples of participant responses on the AMT.

Classification	Cue	Response
Specific	Peaceful	C: About a month ago, near the crematorium, me and me family at me Grandma's plot, and it was nice and peaceful.
Categoric	Tender	C: When I looked after my mother I was tender towards her. *prompt* C: God, looking after her basically, looking after her basically, she needed help like cleaning clothes, she was paralysed neck downwards.
Extended	Excited	C: Yeah I've been excited, last, last two week, last couple of week. *prompt* C: Yeah, just going to(location) and spending time with me father and me family.

recall only specific responses. A number of participants anecdotally reported this reason for non-responses. As such, removing non-responses from the denominator may have inappropriately inflated the proportion of specific responses.

Results

Participant characteristics

Twenty participants (33.3%) reported no previous suicide attempts. Of the remaining 40, 12 (20.0%) reported one previous attempt and 25 (41.7%) reported multiple previous attempts, ranging in number between two to five. A further three participants engaged in at least one suicide attempt, but data on the exact number was missing, due to error on the part of the researcher (frequency of attempts were not recorded). Attempters and nonattempters were compared on demographics (age, gender), illnessrelated variables (medication, previous ECT, duration of illness) and self-reported psychopathology (depressive symptoms, trait anxiety). The results of these comparisons and associated descriptive statistics are reported in Table 2. As can be seen, there were no significant differences between attempters and nonattempters, except for trait anxiety and depressive symptoms. Participants with past suicide attempts reported significantly higher levels of both depressive symptoms and trait anxiety. A break-down of the average proportions of different memories recalled for each type of cue-word are reported in Table 3.

Memory specificity across cue-type

An analysis was undertaken to test whether suicide attempters would be more likely to recall specific autobiographical memories than non-attempters, and test whether this relationship varied across the three different cue-types. The outcome variable in this analysis was the proportion of specific autobiographical memories recalled in the AMT, with a larger value indicating greater specificity. All variables were standardized to improve interpretability.

A 2 (parasuicide: attempter vs. non-attempter) × 3 (cue-word: positive, negative, entrapment) random-effects linear regression was conducted using Maximum-Likelihood estimation with STATA version 10 (xi: xtreg command; Stata Corporation, College Park, Texas, USA). Depressive symptoms and trait anxiety were included in this analysis as covariates, controlling for their relationship with memory specificity. This analysis was used instead of a standard repeated-measures ANCOVA, as ANCOVA can be inappropriate in cases where covariates and factors are related (Miller & Chapman, 2001), as is the case in the current study (i.e., depressive symptoms and trait anxiety are associated with suicide attempts). The results can, however, be interpreted in a similar way to ANCOVA.

A main effect of suicide attempt was observed, $\beta=.54$, p=.04. However, the interactions between suicide attempt and cue-type were non-significant, $\beta=-.09$, p=.76, $\beta=.07$, p=.79, suggesting the relationship between suicide attempt and memory specificity did not vary across cue-type. Trait anxiety, $\beta=-.38$, p=.01, was significantly related to memory specificity, as were depressive symptoms, $\beta=.28$, p=.04, supporting the decision to control for their effects. In summary, suicide attempters were more likely to recall specific autobiographical memories, and this effect was equivalent across the three different cue-types.

In this analysis all variables were standardized around the grand-mean (i.e., the mean memory specificity across all individuals and cue-types). It has been suggested that when looking for cross-level interactions in random-effects regression models, group-mean centering (i.e., centering around the mean memory specificity across cue-types for that particular individual) may be

 Table 2

 Comparison between suicide attempters and non-attempters on demographics, illness-related variables and psychopathology.

	Total sample	Total sample $(n = 60)$		Attempters $(n=40)$		oters (n = 20)	Comparison statistic
	M	SD	M	SD	M	SD	
Age	43.42	11.41	44.20	10.64	41.85	12.96	t(58) = -0.75, p = .46
Trait anxiety	46.05	9.16	48.18	9.09	41.80	7.93	t(58) = -2.67, p = .01
Depression	10.90	7.38	12.15	7.49	8.40	6.63	t(58) = -1.90, p = .06
DOI ^a	18.7	10.9	19.83	10.04	16.32	12.57	t(57) = -1.16, p = .25
	n	%	n	%	n	%	
Gender (female)	12	20.0	6	15.0	6	30.0	Fisher's exact $p = .19$
Anti-psychotics ^b	53	93.0	35	89.7	18	100.0	Fisher's exact $p = .30$
Anti-depressants ^b	25	44.6	17	44.7	8	44.4	Fisher's exact $p = .99$
Tranquilisers ^b	5	8.9	5	13.2	0	0.00	Fisher's exact $p = .16$
Mood stabilisers ^b	8	14.3	5	13.2	3	20.0	Fisher's exact $p = .70$
Previous ECT ^b	13	21.7	11	27.5	2	10.0	Fisher's exact $p = .19$

Note: Some percentages for medication variables adjusted to take into account missing data (n = 3 for anti-psychotic; n = 4 for anti-depressants, tranquilisers and mood stabilisers).

more appropriate (Enders & Tofighi, 2007). The analysis was repeated with group-mean centering, but the interaction effects remained non-significant.

Memory distress

An exploratory analysis was undertaken looking at the proportion of specific memories recalled by participants in the AMT that were associated with current distress. Memories were classified as distressing if rated by participants as either 'somewhat distressing' or 'very distressing'. It was found that participants with previous suicide attempts rated a substantially larger proportion of specific memories as currently distressing (M=0.29, SD=0.21), compared to non-attempters (M=0.07, SD=0.10). This difference was significant, Mann—Whitney U=141.50, p<.001, with a large effect size, d=1.34. Negative cue-words were associated with the highest proportion of distressing memories (M=0.36, SD=0.36), followed by entrapment words (M=0.22, SD=0.33) and positive words (M=0.07, SD=0.18). These differences between the three types of cue-word were significant using a Friedman's test, $\chi^2=30.45$, p<.001, and pairwise Wilcoxon tests (p<.05).

Discussion

The current study is the first to investigate the link between autobiographical memory specificity and suicidality within a sample of individuals with non-affective psychosis. The results showed that greater memory specificity was positively associated with suicidal behaviour in this group, supporting the main hypothesis. This was observed whilst adjusting for the effect of

Table 3 Descriptive statistics for variables in the study.

Responses on AMT ^a	Total sample $(n = 60)$			Attempters $(n=40)$		Non- attempters $(n=20)$	
	Mean	SD	Mean	SD	Mean	SD	
1. Positive specific	0.53	0.27	0.57	0.27	0.45	0.28	
2. Positive categoric	0.19	0.21	0.18	0.20	0.23	0.22	
3. Positive extended	0.07	0.14	0.08	0.13	0.05	0.16	
4. Negative specific	0.59	0.28	0.62	0.30	0.53	0.23	
5. Negative categoric	0.12	0.17	0.13	0.18	0.09	0.15	
6. Negative extended	0.09	0.14	0.08	0.15	0.11	0.12	
7. Entrapment specific	0.48	0.28	0.53	0.28	0.39	0.27	
8. Entrapment categoric	0.12	0.15	0.11	0.14	0.14	0.16	
9. Entrapment extended	0.11	0.14	0.10	0.13	0.15	0.17	

^a AMT responses reported as proportions of total responses for the particular cuetype.

depressive symptoms and trait anxiety. This effect was not more pronounced for entrapment-related cue-words, however, disconfirming the second hypothesis.

The results suggest that for individuals with non-affective psychosis, a less specific style of retrieval for autobiographical memories may be associated with a reduced risk of suicidal behaviour. It is suggested this is because such a retrieval style blocks access to potentially distressing specific memories, including those of traumatic and aversive experiences, and their associated negative affect. Traumatic and aversive events and experiences are common in individuals with psychosis (Morrison et al., 2003), so that such a retrieval style may have adaptive qualities for these individuals. The present study supports similar results in other clinical groups, including clinical samples of adolescents, borderline personality patients and adults with a history of abuse (Burnside et al., 2004; Startup et al., 2001; Swales et al., 2001). An additional finding in the current study was that suicide attempters also reported that a greater proportion of specific memories were currently distressing, compared to non-attempters. This result is further in-line with the view that overgeneral memory in the non-attempters may serve to block out such distressing memories.

Negative and entrapment-related cue-words were associated with higher proportions of currently distressing memories than positive cue-words, suggesting that these different cue-words were priming different types of memories. There was no indication that the association between memory specificity and suicidal behaviour was moderated by cue-type, though, suggesting that overgeneral memory may develop as a generalised retrieval style, rather than a tailored approach to avoiding certain distressing memories.

These results could be interpreted in terms of the self-memory system model (Conway & Pleydell-Pearce, 2000). This model emphasises how access to mnemonic information is closely tied up with an individual's personal goals and self-identity. This model implies that the memory system may disrupt access to memories that are particularly aversive or ego-dystonic, so that only general mnemonic information is available. This premature termination of memory retrieval may be adaptive in some circumstances, by avoiding a major de-stabilisation of personal goals and identity (Conway & Pleydell-Pearce, 2000). Consequently, individuals less able to avoid the retrieval of these specific distressing memories may be more prone to the aversive consequences associated with the disruption of the self-memory system. Williams et al. (2007) have argued that the repeated truncation of memory retrieval may develop into a more entrenched and generalised, overgeneral retrieval style.

The present study may appear to conflict with the results of case—control studies, which show lower memory specificity in

a DOI = duration of illness (years).

b Medication and previous ECT were recorded as the number of participants receiving that particular treatment.

parasuicidal groups, compared to controls (e.g., Kaviani et al., 2005; Williams & Broadbent, 1986). However, in these studies the control groups frequently consist of individuals free of any marked psychopathology (e.g., individuals mostly hospitalised for physical conditions in Williams & Broadbent, 1986), for whom avoiding specific memories is less likely to have any systematic adaptive consequences. It should be noted that overgeneral memory has also be shown to lead to downstream impairments in social problem-solving, which are known to increase suicide risk (Williams et al., 2007). Clearly, more research is required to untangle the potential adaptive and maladaptive consequences of overgeneral memory. One suggestion has been that whilst recalling fewer specific memories may be adaptive (this was the outcome in the present study), increases in particular types of overgeneral responses, namely categoric memories could have more maladaptive consequences (Raes et al., 2006).¹

Trait anxiety seemed to be acting as a suppressor variable in the current study, considering the negative relationship between trait anxiety and memory specificity alongside the positive relationship between trait anxiety and parasuicide (Table 2). Failing to include trait anxiety as a covariate in the model may have therefore resulted in an underestimation of the relationship between suicidal behaviour and memory specificity. It is understandable that trait anxiety would interfere with performance in the AMT task as it is known to bias attention and memory recall around current worry related themes (Harvey, Watkins, Mansell, & Shafron, 2004).

The results of this study have implications for clinical practice. It may be beneficial for therapists and psychiatrists to be aware that for some psychotic patients reduced memory specificity may have adaptive qualities, and interventions that serve to improve memory specificity should be undertaken with caution. Further, the presence of readily accessible, distressing specific memories could indicate heightened suicide risk in some individuals with nonaffective psychosis. It is possible that therapeutic approaches developed in the context of post-traumatic stress disorder, which emphasise the integration of intrusive trauma memories into the autobiographical memory base would be useful in these cases (e.g., Ehlers & Clark, 2000). Therapeutic techniques designed to enhance access to positive and life-affirming autobiographical memories may also be beneficial (e.g., Tarrier, 2010). It would be interesting in future research to examine how the association between memory specificity and suicidality in individuals with psychosis compares to other clinical groups where suicide represents a substantial problem, such as individuals with borderline personality disorder (Startup et al., 2001). Such research would help to determine whether these results are disorder specific or generalise across clinical phenomenon.

The conclusions that can be drawn from the current study are restricted by a number of limitations. First, it should be noted that numerous alternate causes of overgeneral memory have been suggested, which imply other explanations of the present results. For example, memory specificity has been associated with difficulties in executive processing (e.g., Williams et al., 2007). Impaired executive processing may also reduce suicide risk (Kim, Jayathilake, & Meltzer, 2003), thus accounting for the association between memory specificity and suicidality observed in the current study. The absence of a comprehensive assessment of executive functioning in the present study is therefore a limitation. This explanation does not account, however, for the result that suicidal participants in the current study also recalled a greater proportion of distressing specific memories.

Second, the study featured a cross-sectional design, and as such it is not possible to make inferences about the direction of causality. That is, although it is suggested that memory specificity leads to heightened suicide risk, it is equally possible that earlier suicide attempts result in more specific memory retrieval. In particular, a confounded relationship might be expected between previous suicide attempts and the recall of distressing specific memories, as the attempt itself might feature as one of these memories. In the current study only three memories explicitly involved a past attempt, so this confound seems unlikely to have had a substantial effect. A reciprocal relationship can be also be conceived of, whereby early attempts sensitise an individual to specific memory recall, which then increases the risk of future suicidal behaviour. Prospective research is necessary to resolve these issues.

Third, the study had a small sample size, which may have minimised the power to find differences between the parasuicidal and non-suicidal participants. However, such a loss of power would have worked against the results observed in the current study. It should also be noted the current sample size was typical of that in other studies investigating autobiographical memory in psychosis (e.g., Neumann et al., 2007; Wood et al., 2006).

Fourth, no attempt was made to check the veracity of self-reported suicide attempts against participant medical records or mental health teams. The measure of suicidal behaviour may therefore be affected by respondent bias. The attempter group did report greater depressive symptoms, which may have biased self-reports, for example. However, it has been noted that medical records can also be inaccurate, and so do not necessarily represent an ideal standard against which to compare self-reports (Cradock, Young, & Sullivan, 2001). Moreover, recent qualitative research has highlighted how participant's perceptions of clinical, treatment-related environments may hamper the quality of information obtained in these contexts, but may pose less of a problem in research contexts (Taylor et al., 2010).

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¹ The analysis of AMT performance in the present study was repeated with the proportion of categoric, rather than specific responses as the dependent variable. No significant results were identified.

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