

BRIEF REPORT

Autobiographical memory specificity and the persistence of depressive symptoms in HIV-positive patients: Rumination and social problem-solving skills as mediators

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Individuals infected with human immunodeficiency virus (HIV) are at elevated risk for depressive conditions, which in turn can negatively impact health-related behaviours and the course of illness. The present study tested the role of autobiographical memory specificity and its interaction with perceived stress in the persistence of depressive symptoms among dysphoric HIV-positive individuals. Additionally, we examined whether rumination and social problem solving mediated these effects. Results indicated that memory specificity moderated the impact of perceived stress, such that perceived stress was more strongly associated with follow-up depressive symptoms among those with greater memory specificity. Rumination, but not social problem solving, mediated this effect. Implications of these findings are discussed.

Keywords: Overgeneral autobiographical memory; Depression; Stress; HIV/AIDS; Rumination; Problem solving.

Living with the human immunodeficiency virus (HIV) often means dealing with psychosocial factors such as stigma, social isolation, discrimination, family rejection, bereavement, and other life

stressors (Heckman et al., 2004; Leserman, 2003), and difficulty coping with these can contribute to depression (Jia et al., 2004; Milan et al., 2005; Song & Ingram, 2002). Indeed, it is estimated that

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HIV-positive individuals have a two-fold risk for major depressive disorder compared to HIV-negative individuals (Ciesla & Roberts, 2001).

Although a variety of cognitive variables have been posited to act as diatheses that increase risk for depression subsequent to life stress, there has been considerable recent interest in the role of autobiographical memory specificity (see Williams et al., 2007, for a review). Specific autobiographical memories refer to memories of a single event that took place in a single day, whereas over-general autobiographical memories (OGMs) refer to memories of events lasting longer than a day, e.g., "When I was in high school" (extended memories) or those that refer to a series of events, e.g., "When I go camping" (categoric memories). Though a considerable amount of research has demonstrated that a variety of clinical populations have difficulty retrieving specific memories, including individuals with depressive disorders (e.g., Brittlebank, Scott, Williams, & Ferrier, 1993; Peeters, Wessel, Merkelbach, & Boon-Vermeeren, 2002; Williams & Scott, 1988), acute stress disorder (ASD; Harvey, Bryant, & Dang, 1998), post-traumatic stress disorder (PTSD; Kuyken & Brewin, 1995; McNally, Lasko, Macklin, & Pitman, 1995), and schizophrenia (Wood, Brewin, & McLeod, 2006), memory specificity has yet to be examined among HIV-positive individuals and may shed new light on the cognitive functioning of these individuals and their predisposition to depressive symptoms.

Williams (1996) posited that OGM acts as a form of affect regulation that prevents painful memories from being retrieved with detail and clarity. For example, an individual who experiences traumatic events may learn to abort a memory search if the mnemonic cue is connected to a specific negative memory; this process allows the individual to avoid re-experiencing the negative event, but with the consequence that the memory search becomes locked at a general level. Therefore, according to this affect regulation hypothesis, OGM acts as a protective mechanism that helps regulate negative affect in the short term, but the persistent use of OGM eventually would interfere with other cognitive processes (e.g., effective social

problem solving) and become maladaptive. Consistent with this model, studies have shown that greater memory specificity is associated with acute negative affect following laboratory stressors (Raes, Hermans, de Decker, Eelen, & Williams, 2003; Raes, Hermans, Williams, & Eelen, 2006) but predicts the remission of depressive episodes (Brittlebank et al., 1993; Peeters et al., 2002) and buffers against the development of future depressive symptoms following life stress (e.g., Gibbs & Rude, 2004; van Minnen, Wessel, Verhaak, & Smeenk, 2005), perhaps in part because memory specificity facilitates effective problem solving (Goddard, Dritschel, & Burton, 2001). Therefore, the present research examined whether memory specificity predicts the persistence of depressive symptoms among depressed individuals with HIV when experiencing high levels of perceived stress.

The present research also explored two potential mediators of these effects on the persistence of depressive symptoms: social problem solving and depressive rumination. Not only are poor problem-solving skills associated with depression (Marx, Williams, & Claridge, 1992), perhaps because these skills are needed for effectively coping with stressful situations encountered in everyday life (D'Zurilla & Nezu, 2001), but they may in part result from an overgeneral retrieval style (Pollock & Williams, 2001). Williams and colleagues speculated that retrieval of specific memories is often necessary to solve social problems (Williams & Broadbent, 1986; Williams & Dritschel, 1988; Williams & Scott, 1988) because access to specific problems allows more concrete and effective strategies to be formulated (Goddard et al., 2001). For example, an HIV-positive patient who is having an interpersonal conflict with the medical team may be more successful at resolving the conflict by recalling specific memories of how a similar conflict was resolved in the past, or specific memories of how various medical staff reacted in the past. However, if this individual is depressed and has poor memory specificity, access to concrete memories will be blocked, making it difficult to generate effective solutions, leading to prolonged stress and perhaps exacerbations of depressive symptoms.

Depressive rumination, which involves a repetitive focus on one's depressive symptoms and the potential causes and consequences of those symptoms (Nolen-Hoeksema, 1991), also could serve as mediator. Rumination is amplified by OGM retrieval in non-clinical participants and contributes to the onset and maintenance of depression (see Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008, for a review). As mentioned previously, OGM keeps an individual locked at a general level of memory recall. Therefore, if an individual begins to search for a specific cause for one's mood, they will continually arrive at general descriptions requiring several iterative searches through memory. These repetitive searches are essentially the act of rumination; thus, poor memory specificity may directly encourage ruminative processes, suggesting that rumination may mediate the relationship between OGM and depressive symptoms. Raes, Hermans, Williams, Beyers et al. (2006) offered support for this model, finding that rumination significantly mediated the relationship between OGM and depressive symptoms measured seven months later among depressed adults (see also Kleim & Ehlers, 2008). Therefore, the present study tested whether rumination mediates the relationship between OGM and depressive symptoms in the face of life stress.

In summary, the present study tested the interaction between perceived stress and memory specificity in predicting the persistence of depressive symptoms among HIV-positive individuals, and in addition examined whether rumination and social problem-solving skills mediated this moderated relationship. In other words, we tested whether the impact of perceived stress on future depressive symptoms depended on level of memory specificity, and, if so, if rumination and/or social problem-solving skills were responsible for this relationship.

METHOD

Participants

Sixty-five HIV-positive patients (43 male) at the Erie County Medical Center's Immunodeficiency

Services Clinic in Buffalo, New York participated in this study. Inclusion criteria were meeting criteria for mild depression (determined by a score greater than 10 on the depression subscale of the 21-item Depression and Anxiety Stress Scales; DASS-21, Lovibond & Lovibond, 1995) and a reading level of at least 6th grade. Individuals with psychotic disorders were excluded. Due to difficulties contacting participants for final interviews, five participants were lost to follow-up. A further 14 participants experienced reductions in depressive symptoms between the screening session and Time 1 session such that DASS-21 depression scores dropped to less than 10. These participants were excluded from analyses, leaving a final sample of 46 participants (30 male). There were no significant differences in age, gender, sexual orientation, employment status, or income between those who were lost to follow-up or excluded and the remaining sample. The remaining 46 participants had an average age of 45 years ($SD = 9.9$), and ethnicity was divided as follows: 47.8% African American, 39.1% Caucasian, 6.5% Hispanic, 2.2% Native American, and 4.3% of mixed race. With regards to sexual orientation, 39.1% reported being purely heterosexual, 13.0% reported being heterosexual with some homosexual experience, 6.5% reported being bisexual, 10.9% reported being homosexual with heterosexual experience, and 28.3% reported being purely homosexual (one participant declined to answer the question). The majority of the sample (89.1%) reported a yearly income of less than \$30,000, with 82.6% of the sample being unemployed and receiving governmental assistance. All but two participants were being prescribed antiretroviral medications.

Measures

Depressive symptoms. The 7-item subscale from the 21-item Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) was used to assess severity of depressive symptoms. The DASS-21 is a self-report measure that has three 7-item subscales assessing depression, anxiety, and stress in the past week. Responses are

scored on a 4-point Likert scale ranging from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much*). Depressive symptom severity was calculated by summing the score on the 7-item depression subscale and multiplying the total by 2, with total scores ranging from 0 to 42. To meet criteria for mild depression, and thus inclusion criteria for the study, participants had to score at least 10 on the depression subscale. The 7-item depression subscale for the DASS-21 has demonstrated good reliability ($\alpha = .94$; Antony, Bieling, Cox, Enns, & Swinson, 1998) and good convergent and discriminant validity (Henry & Crawford, 2005). Coefficient alpha for the present sample was .81 at Time 1 and .89 at Time 2 and there was adequate test–retest reliability over the three-month interval ($r = .44, p < .01$).

Autobiographical memory specificity. The Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), was used to assess memory specificity. Participants were asked to recall a specific personal memory to six positive (e.g., sunny), six negative (e.g., hopeless), and six neutral (e.g., grass) cue words, which were counterbalanced. They were instructed that the memory must be at least one day old, and a different memory must be given for each cue word. Three practice cues were given prior to beginning testing. Participants were allowed 30 seconds per cue word to provide a memory, and if 30 seconds were exceeded, the trial was scored as an omission. Responses were coded as either specific (memories lasting less than 24 hours with a distinct time and place), extended (memories that lasted over a day), categoric (memories that were not a distinct time or place, or were a summary of many similar events), not a memory (for example, a semantic associate), an incorrect specific (a memory from within the last 24 hours), same event (repetition of a memory previously mentioned), or an omission. The primary investigator administered the AMT to each participant to ensure consistency, and a trained independent rater coded 10% of the responses with good inter-rater reliability (kappa of .82). Coefficient alpha for the present sample

was .78 (based on coding responses as either specific or not).

Problem solving. The 4-story version (Marx et al., 1992) of the Means–Ends Problem-Solving Procedure (MEPS; Platt & Spivack, 1975) was used to measure social problem-solving skills. The MEPS consists of stories that present the beginning of a problem followed by a successful solution and requires that the participant comes up with the step-by-step strategy in between. Participants were given each story on a piece of paper and were asked to write the middle part of the story that connected the beginning with the end. The effectiveness of the responses were rated on a scale of 1 (*Not at all effective*) to 7 (*Extremely effective*) based on how well responses minimised negative consequences and maximised positive consequences in both short-term and long-term social and personal situations (D’Zurilla & Goldfried, 1971). The MEPS has demonstrated high inter-rater reliability (.86; Marx et al., 1992) and internal consistency (Platt & Spivack, 1975). The primary investigator administered the MEPS to each participant to ensure consistency, and a trained independent rater coded the effectiveness of 10% of the responses selected randomly with good inter-rater reliability (kappa of .80). Coefficient alpha for the present sample was .85 at Time 1 and .83 at Time 2, and there was adequate test–retest reliability over the three-month interval ($r = .59, p < .001$).

Rumination. The Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991) was used to measure rumination. The RRS is a 22-item self-report measure that rates the frequency of which an individual ruminates (i.e., focuses on the causes, symptoms, and consequences of being depressed) when in a depressed mood. Responses are rated on a 4-point Likert scale from 1 (*Almost never*) to 4 (*Almost always*). The RRS has demonstrated good internal consistency ($\alpha = .89$; Nolen-Hoeksema & Morrow, 1991) and good predictive validity (Just & Alloy, 1997). Coefficient alpha for the present sample was .88 at Time 1 and .94 at Time 2, and there

was good test–retest reliability over the three-month interval ($r = .72, p < .001$).

Perceived stress. The 4-item version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was used to measure perceived stress. The PSS is a self-report questionnaire that rates the frequency at which an individual perceives situations in his/her life to be stressful in the past month (e.g., feels unable to control important things in life, not feeling as if he/she could confidently handle personal problems). Responses are scored on a 4-point Likert scale ranging from 0 (*Never*) to 4 (*Very often*). The PSS has demonstrated good internal consistency ($\alpha = .72$) and good test–retest reliability (.72; Cohen et al., 1983). Coefficient alpha for the present sample was .72 at Time 1 and .65 at Time 2, and there was adequate test–retest reliability over the three-month interval ($r = .57, p < .001$).

Procedure

Participants were asked during their medical appointment whether they would be interested in participating in a research study examining memory and mood. They consented to complete a memory task and a packet of psychological measures on two separate occasions and to have information gathered from their medical records. Once participants consented to participate, they were administered the depression subscale from the DASS-21. Participants who scored at least a 10 on the DASS-21 depression subscale, screened negatively for psychotic disorders, and scored at a minimum of a 6th grade reading comprehension level were scheduled for the first testing session. During this session (Time 1) participants were first instructed to complete a demographic and locator form. Next, they were administered the AMT. Finally, they were administered self-report questionnaires that included the DASS-21, the RRS, the PSS, and the MEPS. Each participant

was seen individually and given enough time as needed to complete the questionnaires. These same procedures were used in the follow-up appointment approximately four months later (Time 2), except participants were not re-administered the AMT and they were debriefed at the end of the session. Participants were financially compensated at the end of each testing session.

RESULTS

Descriptive statistics

Analyses were conducted using the R 2.13.1 statistical package (R Core Development Team, 2011). For all analyses, memory specificity was based on the total number of specific memories,¹ and both memory specificity and perceived stress were measured at Time 1. Each variable was centred and, based on the residuals, the assumption of normality was met for each model. Pearson correlations, means, and standard deviations for study variables are presented in Table 1. Although there was rank order stability in depression scores over the 3-month prospective interval, $r = .44, p < .01$, the sample as a whole experienced decreases in depressive symptoms, $t = 3.94, p < .001$. The average number of total specific memories was 5.5 ($SD = 4.1$), with scores ranging from 0 to 15. As none of the demographic variables (i.e., ethnicity, sexual orientation, income, education, gender) significantly correlated with memory specificity, perceived stress, or depressive symptoms, they were not statistically controlled for in the analyses below.

Prediction of change in depressive symptoms over time

In order to test whether the interaction between memory specificity and perceived stress measured at Time 1 predicted change in depressive

¹Analyses were also conducted using general memories (defined as total number of categoric and extended memories), with the same pattern of results found. Likewise, the same pattern of results was found when examining each valence of cue words (negative, neutral, positive) separately.

Table 1. Pearson correlations, means, and standard deviations for study variables

	AMT	MEPS T1	MEPS T2	RRS T1	RRS T2	PSS T1	DASS T1	DASS T2
<i>AMT</i>	1.00							
<i>MEPS T1</i>	.44**	1.00						
<i>MEPS T2</i>	.53***	.59***	1.00					
<i>RRS T1</i>	.04	.04	.06	1.00				
<i>RRS T2</i>	-.01	-.08	-.07	.72***	1.00			
<i>PSS T1</i>	.32*	.07	.07	.39**	.33*	1.00		
<i>DASS T1</i>	.27	.06	.10	.44**	.38**	.71***	1.00	
<i>DASS T2</i>	.19	.10	.04	.37*	.68***	.42**	.44**	1.00
<i>Mean</i>	5.5	17.3	18.2	55.9	52.2	9.0	22.4	15.0
<i>SD</i>	4.1	5.6	5.0	10.9	13.4	3.3	8.0	9.7

Notes: AMT = Autobiographical Memory Test; MEPS T1 = Means-Ends Problem-Solving Procedure at Time 1; MEPS T2 = Means-Ends Problem-Solving Procedure at Time 2; RRS T1 = Ruminative Response Scale at Time 1; RRS T2 = Ruminative Response Scale at Time 2; PSS T1 = Perceived Stress Scale at Time 1; DASS T1 = Depression and Anxiety Stress Scales, 21-item version at Time 1; DASS T2 = Depression and Anxiety Stress Scales, 21-item version at Time 2. * $p < .05$; ** $p < .01$; *** $p < .001$.

symptomatology, a stepwise hierarchical multiple regression was conducted where baseline depression severity was entered in Step 1, the main effects of memory specificity and perceived stress at Time 1 were entered in Step 2, and the memory specificity by perceived stress interaction was entered in Step 3. As expected, Time 1 depression severity significantly predicted Time 2 depression severity, $b = 0.53$, $t = 3.21$, $p < .005$, accounting for 19% of the variance. In Step 2, the main effects of memory specificity, $b = 0.06$, $t = 0.33$, $p = .74$, and perceived stress, $b = 0.32$, $t = 1.10$, $p = .28$, $\Delta R^2 = .03$, were not statistically significant. However, in Step 3 the interaction between memory specificity and perceived stress was significant, $b = 0.09$, $t = 2.10$, $p < .05$, $\Delta R^2 = .08$.

In order to probe this interaction, we conducted simple slopes analyses (Aiken & West, 1991) that examined the relationship between perceived stress and change in depression severity at high (i.e., one standard deviation above the mean) and low (i.e., one standard deviation below the mean) levels of memory specificity. Results suggested that life stress significantly predicted increases in depressive symptoms at high levels of memory specificity, $b = 0.76$, $t = 2.17$, $p < .05$, but not at low levels of specificity, $b = -0.01$, $t = -0.02$, $p = .98$ (see Figure 1).

Rumination and social problem-solving skills as mediators

In order to test whether rumination and social problem-solving skills mediated the moderated effect of perceived stress and memory specificity on depressive symptoms, we first estimated three multiple linear regression models according to Muller, Judd, and Yzerbyt's (2005) causal step

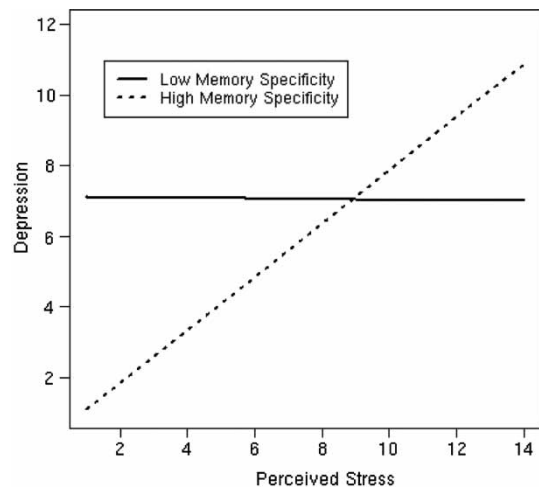


Figure 1. Graph of simple slopes demonstrating the relationship between perceived stress and change in depressive symptoms at high and low levels of memory specificity.

test. In order to demonstrate mediated moderation, four conditions must be met: (1) in Equation 1 memory specificity must moderate the relationship between perceived stress and change in depressive symptoms (Figure 2A and 2B, path c); (2) in Equation 2 memory specificity must moderate the relationship between perceived stress and the mediator (rumination or social problem-solving skills; Figure 2A and 2B, path a); (3) in Equation 3, the relationship between the mediator (rumination or social problem-solving skills) and change in depressive symptoms must be significant controlling for the interaction between memory specificity and perceived stress (Figure 2A and 2B, path b); and (4) in Equation 3, the regression coefficient for the effect of the interaction between memory

specificity and perceived stress on change in depressive symptoms should be reduced compared to the overall effect in Equation 1. Analyses that included rumination and social problems solving examined the change in scores over time by examining Time 2 scores controlling for Time 1 scores.

Results examining rumination as mediator are presented first. As mentioned above, the first condition was satisfied with Equation 1 as the interaction between perceived stress and memory specificity significantly predicted change in depressive symptoms, $b = 0.09$, $t = 2.10$, $p < .05$. The second condition was also satisfied as the memory specificity by perceived stress interaction in Equation 2 significantly predicted change in rumination, $b = 0.22$, $t = 2.33$, $p < .05$.²

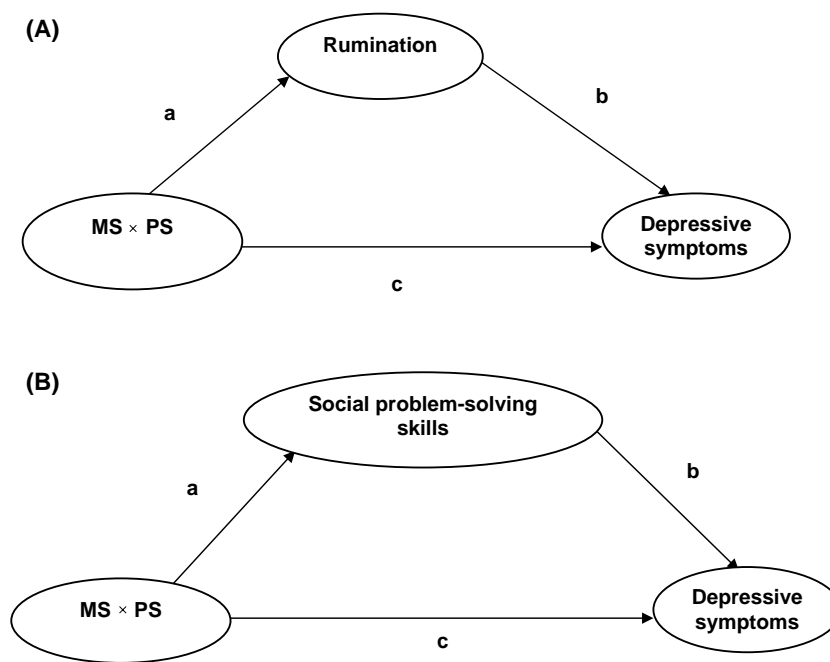


Figure 2. Mediated moderation path diagrams of social problem-solving skills and rumination mediating the moderated effect of memory specificity on the relationship between perceived stress and depressive symptoms. (A) Rumination mediating the moderated effect of memory specificity (MS) on the relationship between perceived stress (PS) and depressive symptoms. (B) Social problem-solving skills mediating the moderated effect of memory specificity (MS) on the relationship between perceived stress (PS) and depressive symptoms.

²The form of this interaction was the same as that with depressive symptoms as the dependent variable: perceived stress prospectively predicted increases in rumination at high, $b = 1.36$, $t = 2.11$, $p < .05$, but not low, $b = -0.45$, $t = 0.76$, $p = .45$, memory specificity.

Equation 3 demonstrated that the third and fourth conditions were satisfied as change in rumination predicted change in depressive symptoms controlling for the interaction term, $b = 0.28$, $t = 4.84$, $p < .001$, and the regression coefficient for the effect of the interaction between memory specificity and perceived stress on change in depressive symptoms was no longer significant, $b = 0.03$, $t = 0.91$, $p = .37$. These results suggest that the relationship between perceived stress and change in depressive symptoms is moderated by level of memory specificity, and that this effect is mediated by change in rumination.

Because this stepwise approach is underpowered in small samples (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), we also examined the indirect effect of the mediation model by testing the product of the coefficients of the indirect paths (Figure 2A and 2B, path $a \times b$) using a bootstrap analysis with 5000 resamples and a 95% confidence interval. Results also suggested that rumination significantly mediated the moderated effect of memory specificity on perceived stress predicting change in depressive symptoms as the confidence interval did not contain 0, indirect effect = .06, $CI = (0.01; 0.11)$.³

Results examining social problem-solving skills as mediator are presented next. As mentioned above, the first condition was satisfied with Equation 1 as the interaction between perceived stress and memory specificity significantly predicted change in depressive symptoms, $b = 0.09$, $t = 2.10$, $p < .05$. However, the second condition was not satisfied as the memory specificity by perceived stress interaction in Equation 2 did not significantly predict change in social problem-solving skills, $b = -0.06$, $t = 1.24$, $p = .22$. Therefore, based on the stepwise approach, social problem-solving skills failed to mediate the

moderated relationship of perceived stress and memory specificity predicting change in depressive symptoms. To confirm this result by testing the indirect effect of the mediation model, we ran a bootstrap analysis with 5000 resamples and a 95% confidence interval. Results confirmed that social problem-solving skills failed to significantly mediate the moderated effect of memory specificity on perceived stress predicting change in depressive symptoms as the confidence interval contained 0, indirect effect = .002, $CI = (-0.03; 0.04)$.

DISCUSSION

The present study was conducted to determine whether memory specificity moderated the impact of perceived stress on the persistence of depressive symptoms over four months among HIV-positive individuals, and whether rumination and social problem-solving skills mediated this relationship. Although memory specificity and perceived stress failed to predict change in depressive symptoms on their own, perceived stress significantly predicted the maintenance of depressive symptoms among individuals with greater memory specificity, but not those with poor memory specificity. These results suggest that among depressed HIV-positive patients, memory specificity acts as a diathesis that increases the depressive impact of perceived stress. Although social problem solving failed to mediate the effect of the Memory Specificity \times Perceived stress interaction on depressive symptoms, our data suggest that increases in rumination account for this effect. In other words, when HIV-positive patients with greater memory specificity are faced with life stress, they experience increases in rumination, which in turn contributes to the persistence of their depressive symptoms over time.

³Because rumination and depressive symptoms were both assessed at Time 2, it is possible that depressive symptoms acted as the mediator for the relationship between the interaction of perceived stress and memory specificity and rumination (instead of rumination acting as the mediator as presented above). Using a bootstrap analysis with 5000 resamples and a 95% confidence interval, we examined the indirect effect of this "reverse" mediation model. In this analysis, depressive symptoms failed to significantly mediate the moderated effect in predicting change in rumination; the confidence interval contained 0, indirect effect = .13, $CI = (-0.03; 0.32)$.

In contrast to past studies demonstrating that persons with poor memory specificity are more susceptible to the impact of life stress on depressive symptoms (e.g., Anderson, Goddard, & Powell, 2010; Gibbs & Rude, 2004; Sumner et al., 2010), our results suggest the opposite among HIV-positive patients: perceived stress had a stronger association with elevated future depressive symptoms among HIV-positive patients with better memory specificity; among those with poor memory specificity, there was no association between stress and depressive symptoms. Interestingly, we found the same pattern in an earlier study examining cognitive-personality diatheses (involving neuroticism, dysfunctional attitudes and low self-esteem) among HIV-positive patients. Specifically, stressful life events predicted elevations in depressive symptoms among patients who were low in the diathesis, but not among those who were high in the diathesis (Roberts, Ciesla, Drenfeld, & Hewitt, 2001).

Why would memory specificity be counterproductive among HIV-positive patients experiencing the highest levels of perceived stress? In the general population, greater specificity contributes to acute negative affect following stress (Raes et al., 2003; Raes, Hermans, Williams, & Eelen, 2006), but decreases risk for depression in the long term (e.g., Gibbs & Rude, 2004; van Minnen et al., 2005), perhaps because it enables effective problem solving and the resolution of life stressors (e.g., Goddard et al., 2001). In other words, although there is a short-term cost in terms of acute emotional distress, memory specificity facilitates the amelioration of potentially resolvable life problems and thereby reduces risk for depressive symptoms in the long term. In contrast to past research, our sample consisted of individuals who not only were dealing with an incurable and stigmatising medical condition, the management of which is extremely complicated and burdensome, but in addition the majority of these individuals faced additional forms of stigma, discrimination and adversity that were likely

chronic and not readily resolvable through personal actions: 67% reported a family income less than \$20,000 (US dollars), 83% were unemployed, 61% were ethnic minorities, and nearly 50% were primarily homosexual or bisexual. Of course these individuals will be faced with various obstacles that are resolvable through their problem-solving skills. However, we suspect that participants with the highest levels of perceived stress in our sample likely faced some combination of a deteriorating medical condition, severe economic hardship, violence, and stigma/discrimination surrounding their status as an HIV-positive, sexual, and/or racial minority. Enhanced problem solving conferred by memory specificity would have little impact on many of the stressors arising within this context. Instead, greater memory specificity would facilitate detailed recollections of situations entailing hopelessness leading to amplification of acute emotional distress, while the enhanced problem solving associated with memory specificity would not necessarily ameliorate these life difficulties. Consequently, highly stressed HIV-positive patients would experience the downside of memory specificity (amplification of acute emotional distress) with less benefit from its upside (enhanced problem-solving skills).⁴

Our results suggest that rumination significantly mediated the moderated effect of memory specificity on the relationship between perceived stress and future depressive symptoms. Perceived stress was associated with increases in rumination among those with high, but not low, memory specificity, and this heightened rumination was responsible for the persistence of depressive symptoms. While research in the general population suggests that poor memory specificity is associated with greater rumination (Raes, Hermans, Williams, Beyers, et al., 2006), our data suggest that memory specificity can lead to increases in rumination among individuals experiencing elevated stress. Consistent with our discussion above, it may be that memory specificity

⁴ We should note that it is also possible that the specific memories experienced by participants with the highest level of perceived stress were intrusive memories that were emotionally distressing. We thank Filip Raes for suggesting this possibility to us.

leads to greater rumination in populations experiencing severe ongoing stressors that are difficult to resolve through problem-solving efforts. In the case of HIV, this population is constantly reminded of their health status through daily medication use, frequent doctor visits, and chronic health problems, and, as a result, may be prone to negative thought patterns such as rumination.

There were several limitations with this study. First, our ideas concerning the role of unresolvable life stressors are speculative and unfortunately cannot be directly tested with the present data. It would be useful for future studies to include a measure of life events that could parse stressors into those that were potentially resolvable through problem-solving efforts and those that were not resolvable. Likewise, it would be valuable for future studies to include control groups that vary in terms of both the likelihood of experiencing unresolvable stressors and HIV status; for example, does greater memory specificity act as a diathesis in other populations with potentially unresolvable stressors (e.g., HIV-negative terminally ill medical patients, prisoners)? Additionally, we relied on a dimensional measure of depressive symptom severity rather than evaluating DSM-IV criteria for major depressive disorder. It is possible that memory specificity plays a different role in individuals who meet diagnostic criteria for depression compared to those with elevated symptoms. Also, as criteria for previous major depressive episodes were not assessed, we were not able to control for the effects that previous episodes may have had on future depressive symptoms. As the rumination measure used was a trait measure, it may not have been adequate to measure state functioning. Future studies may want to use an adapted version of this measure to focus on the more immediate time period in order to accurately measure state rumination. Finally, the study was limited by a small sample, measurement of key variables at only two time points, and use of a self-report measure of perceived stress. Future studies should test this mediation model with three or more time periods in larger samples and with more objective interview-based measures of life stress. Despite these limitations, this study

raises the possibility that memory specificity increases the risk for prolonged depressive symptoms among HIV-positive individuals by increasing their susceptibility to stress and raises several issues for future research to address.

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