Adaptive autobiographical memory in younger and older adults: The indirect association of integrative and instrumental reminiscence with depressive symptoms.

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Abstract

Despite the established effectiveness of reminiscence-based interventions for depression, little research exists into the pathways through which specific reminiscence functions are related to depressive symptoms. Drawing on theory of the mechanisms of change in cognitive-reminiscence therapy, the current study tests the hypothesised indirect associations of adaptive integrative and instrumental reminiscence functions with depressive symptoms and whether these relationships might differ among younger and older adults. Questionnaires were completed by a large community sample of the Australian population. Multiple mediation models were tested in two groups: younger adults ($n = 730$, M age = 52.24, $SD = 9.84$) and older adults ($n = 725$, M age = 73.59, $SD = 6.29$). Results were consistent across age groups, indicating that there was no direct relationship between these reminiscence functions and depressive symptoms, but that integrative reminiscence is indirectly associated with depressive symptoms through meaning in life, self-esteem, and optimism, and that instrumental reminiscence is indirectly associated with depressive symptoms through primary control and self-efficacy. This study provides support for the relationships between constructs underlying the proposed mechanisms of change in cognitive-reminiscence therapy for the treatment of depression, and suggests these relationships are similar for younger and older adults.

Reminiscence refers to the recall of autobiographical memories such as experiences, events, and relationships. It has been proposed that these memories play an important role in the maintenance of depression, as indicated by clinically-depressed individuals' tendency to remember relatively more emotionally-negative events than non-depressed individuals (Fromholt, Larsen, & Larsen, 1995) and to use a more depressive explanatory style when recalling life narratives (Habermas, Ott, Schubert, Schneider, & Pate, 2008). Furthermore, depressed individuals exhibit an over-general style of autobiographical memory retrieval, which has been associated with impaired problem-solving, a reduced ability to use past events and experiences to accurately predict future events, and delayed recovery from episodes of affective disorders (Williams et al. 2007).

In older adult populations, reminiscence-based therapies have been found to be effective in reducing depressive symptomatology, and are now considered an evidence-based treatment (Bohlmeijer, Smit, & Cuijpers, 2003; Scogin, 2006). Central to these interventions is the recall and integration of positive and adaptive memories, along with the reinterpretation of negative or maladaptive memories. Although the ability of earlier reminiscence-based interventions to produce reductions in depressive symptomatology was inconsistent (e.g. Cook, 1991; Stevens-Ratchford, 1993; Youssef, 1990), this has been attributed primarily to the absence of a theoretically-guided application (Webster, Bohlmeijer, & Westerhof, 2010). Bolstered by ongoing research that has clarified the functions and correlates of autobiographical memory, contemporary interventions have improved, with structured and theory-guided approaches proving to be highly effective (for a recent meta-analytic review see Pinquart & Forstmeier, 2012).

A recent trend has been to incorporate structured reminiscence into existing therapeutic frameworks for the treatment of depression. One such approach, cognitive-reminiscence therapy, has been developed by Watt and Cappeliez (1995, 2000), who specify frameworks for the use of reminiscence within a Beckian cognitive therapy model of depression (Beck, Rush, Shaw, & Emery, 1979) and stress and coping model of depression (Billings & Moos, 1982, 1985). Clinical outcome trials that have evaluated this approach have consistently reported clinically and statistically significant reductions in symptoms, with large effect sizes (e.g. Cappeliez, 2002; Karimi et al., 2010; Watt & Cappeliez, 2000).

In cognitive-reminiscence therapy, depressive symptoms are alleviated through the guided use of adaptive integrative and instrumental reminiscence functions to promote positive appraisals of oneself and one's life, and to increase adaptive coping (Cappeliez, 2002). Integrative reminiscence involves constructively reappraising the past through the remembering of values and goals that have provided a sense of meaning and purpose, identifying continuity between the past and present, and working through negative feelings related to past conflict or failure (Wong, 1995). The function of integrative reminiscence is therefore to achieve a sense of meaning and positive self-esteem, as well as an optimistic future-orientation, by building coherence between past and present, and challenging negative feelings and beliefs related to past events and experiences. Instrumental reminiscence involves remembering past activities involving coping, plans that were developed to resolve difficult situations, activities that were goal-directed, and instances of when one's own goals were met or other's goals were helped to be met (Wong, 1995). Instrumental reminiscence therefore functions as a means to invoke a sense of self-

efficacy and primary control over stressors through the review of past achievements and problem-focused coping strategies.

Watt and Cappeliez's (1995) theory of therapeutic change in cognitive-remembrance therapy implicitly denotes the involvement of indirect relationships between thinking about the past and changes in the experience of depression. That is, rather than being directly associated with depressive symptoms, adaptive remembrance functions affect well-being through mediating psychological variables, which in turn serve to decrease depressive symptoms. In support of this hypothesis, some studies have found that the frequency of use of integrative and instrumental remembrance functions is not directly correlated with self-reported depressive symptoms (Cully, LaVoie, & Gfeller, 2001; Korte, Bohlmeijer, Westerhof, & Pot, 2011) but is correlated with psychological variables such as meaning in life (Bohlmeijer, Westerhof, & de Jong, 2008; Westerhof, Bohlmeijer, & Valenkamp, 2004) and self-esteem (Pinquart, 2012), which themselves are related to depressive symptoms. Other evidence of these indirect effects comes from a longitudinal study showing that integrative and instrumental functions (when combined with remembrance for the purpose of death preparation to form a latent self-positive remembrance variable) predict psychological well-being through coping variables (Cappeliez & Robitaille, 2010). Finally, a randomised trial of remembrance-based therapy (incorporating elements of creative therapy and problem-solving therapy) has demonstrated that changes in meaning in life following treatment fully predicted the variance of depressive symptom reduction at follow-up (Westerhof, Bohlmeijer, van Beljouw, & Pot, 2010). To date, however, little systematic empirical research has been conducted to test the hypothesised multiple-mediated indirect processes that underlie the hypothesised framework of cognitive-remembrance therapy.

Further examination of the relationships between these reminiscence functions and depressive symptoms should assist our understanding of the relative direct or indirect strength of associations between these variables, and provide information to help improve the specificity of cognitive-reminiscence therapy. Whilst other delineated reminiscence functions (such as for purposes of escapism, or teaching and informing others; Webster & Haight, 1995) may also be related to depression, the increased and effective use of memory for integrative and instrumental purposes is a central therapeutic aim of cognitive-reminiscence therapy. The aim of this current study is therefore to test the hypothesised indirect relationships between these types of reminiscence and depressive symptoms. On the basis of the therapeutic framework proposed by Watt and Cappeliez (1995, 2000) and past research into the correlated and causal relationships of reminiscence functions discussed above, integrative reminiscence is proposed to be associated with an increased sense of personal meaning, self-esteem, and optimism about the future. Instrumental reminiscence is proposed to be associated with adaptive perceptions of primary control and self-efficacy.

A further aim of this study is to investigate whether these associations are similar or different among older and younger adults. Despite reminiscence being recognised as a lifespan process (Webster et al., 2010; Westerhof, Bohlmeijer, & Webster, 2010), the majority of work in this field has focussed on older adults, with a paucity of research into reminiscence functions and correlates, and reminiscence-based interventions, in young and middle-aged adults (Hallford & Mellor, submitted). Given that young adults report reminiscing significantly more than older adults for adaptive integrative and instrumental purposes (e.g. Webster 1994, 1997; Webster & Gould, 2007), and that no age differences in the correlates of these reminiscence

functions have been reported, it is likely that these indirect relationships are similar across the adult lifespan. Indeed, reminiscence is understood to be an important process in psychological functioning over the adult lifespan (Staudinger, 2001; Pasupathi, Weeks, & Rice, 2006). Therefore, identifying associations between adaptive reminiscence and positive psychological functioning in samples other than older adults would point to the potential utility of reminiscence-based approaches in the alleviation of depressive symptoms in this age group.

In summary, it is hypothesised that integrative and instrumental reminiscence functions will have no direct association with depressive symptoms, but that integrative reminiscence will have an indirect association with depressive symptoms through the mediating variables of meaning in life, self-esteem, and optimism, while instrumental reminiscence will have an indirect association with depressive symptoms through the mediating variables of primary control and self-efficacy. Further, it is expected that these associations will be similar across younger and older adults.

Method

Participants and Procedure

To achieve the aims of the study, a cross-sectional, survey-based design was used. After ethics approval was granted, the relevant measures were included as part of one of the 2011 longitudinal follow-up surveys of the Australian Unity Well-Being Index (AUWI). The AUWI is an annual survey that monitors the subjective wellbeing of the Australian population. At the time of the initial surveys, each sample is representative of the geographic distribution of the population and gender

composition of Australia. All reports and raw data from these surveys are available from http://www.deakin.edu.au/research/acqol/index_wellbeing/index.htm. At the end of an initial telephone interview, participants are asked whether they would be willing to be involved with the project on a future occasion. Those who reply 'yes' are then followed-up with a paper questionnaire and re-contacted on an annual basis thereafter. At each follow-up longitudinal survey, some 40% of participant attrition occurs, which causes the remaining samples to become progressively older, dominated by females, and no longer systematically stratified by geographic location. Despite this imbalance, there is no reason to expect that the results of the current study will be systematically biased due to this sample composition. The current sample was derived from a mail out of 3,000 agreeable participants from previous surveys. A package consisting of a plain language statement detailing the aims of the current study, as well the paper based questionnaire is mailed out to participants. Consent is implied by return of the completed questionnaire. Of the 3,000 questionnaires that were mailed out, 1,653 were returned completed, giving a response rate of 55.1%. This sample was then split into younger adults (below 65 years of age) and older adults (65 years of age and above) based on the commonly adopted definition of older adults given in Erikson's (1980) theory of psychosocial life stages of development. Considering the mean age of participants in studies of reminiscence processes and reminiscence-based interventions is commonly above 65 years (Bohlemeijer et al., 2003, 2007; Westerhof et al., 2010) this was viewed as an appropriate cut-off to test for age group differences. The resulting groups differed in sample size (younger adults, $n = 896$ vs. older adults, $n = 757$), and so 757 participants were randomly sampled from the younger adult group to create equal group sizes. Following data cleaning, the final sample consisted of 1455 participants

(younger adults, $n = 730$; older adults, $n = 725$). The age range of participants was 19-64 years in the younger adult group ($M = 52.24$, $SD = 9.84$) and 65-92 in the older adult group ($M = 73.59$, $SD = 6.29$). The proportion of females was 58.1% in the younger adult group and 50.1% in the older adult group.

In the younger adult group, the breakdown of relationship status was: 13.4% never being married, 2.9% separated but not divorced, 63.7% married, 8.4% divorced, 8.1% defacto or living with a partner, 3.3% widowed, and 0.3% did not respond to the question. In the older adult group, it was reported as: 5% never being married, 2.1% separated but not divorced, 57.9% married, 9.8% divorced, 2.6% defacto or living with a partner, and 22.6% widowed.

In terms of work circumstances of participants in the younger adult group: 51.5% were in full-time paid employment, 9% full-time home or family care, 14.7% retired, 2.3% full-time study, 10.8% semi-retired, 4.1% unemployed, 0.4% full-time volunteers, and 15.3% did not respond to the question. In the older adult group work circumstance were as such: 2.8% were in full-time paid employment, 1.7% full-time home or family care, 81.9% retired, 0.3% full-time study, 9.2% semi-retired, 1.3% unemployed, 0.6% full-time volunteers, and 2.6% did not respond to the question

Materials

Among other items included as part of the AUWI, the questionnaire included self-report measures that were relevant to the current study. Participants responded to all items using 11 point, end-defined scales, a format utilised in the Australian Unity Well-Being Index that produces increased scale sensitivity (Cummins & Gullone, 2000).

Depressive symptoms

Depressive symptoms were measured using the seven-item depression subscale of the 21-item short-form Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995), a valid and reliable method of assessing depressive symptoms that has shown good psychometric properties (Antony, Bieling, Cox, Enns, & Swinson, 1998). Higher scores indicate higher severity of depressive symptoms. Previously reported Cronbach's alphas are $\alpha = 0.94$ (Antony et al., 1998) and $\alpha = 0.88$ (Henry & Crawford, 2005).

Reminiscence functions

The six-item Identity and Problem-Solving subscales from the Reminiscence Functions Scale (Webster, 1997) were used to measure the frequency of integrative and instrumental reminiscence, respectively. These scales are widely used and are considered to measure the use of integrative and instrumental functions of autobiographical memory, respectively (Webster & Haight, 1995; Westerhof et al., 2010). Higher scores indicate more frequent use of autobiographical memory for the specified purposes. These scales have shown good psychometric properties (Webster, 1997), with previously reported Cronbach's alphas of $\alpha = 0.94$ for Identity and $\alpha = 0.94$ for Problem-Solving (Webster, 1999).

Meaning in life

The existential concept of meaning in life refers to how people comprehend, understand, or see significance in their lives, as well as perceiving themselves as having a purpose, mission, or over-arching aim (Steger, 2009). The five-item Presence subscale of the Meaning in Life Questionnaire was used to assess the extent to which participants felt that their lives were meaningful (Steger, Frazier, Oishi, & Kaler, 2006). This measure has shown good psychometric properties (Steger et al., 2006) and measures meaning in life as a distinct psychological construct. Higher scores on this scale indicate a stronger sense of personal meaning in life. Previous studies have reported Cronbach's alphas ranging from $\alpha = 0.82$ to $\alpha = 0.86$ (Steger et al., 2006).

Self-esteem

In the current study, a shortened version of the Rosenberg Self-Esteem Scale (Rosenberg, 1965) utilising the five positively-worded items was used to assess self-esteem. The decision to shorten this scale was made so as to lessen the time burden on participants, and is consistent with previous reports of the relatively weaker psychometric qualities of the negatively-worded items and low likelihood of compromising measurement fidelity as a result of reducing the number of items (Gray-Little, Williams, & Hancock, 1997). Higher scores on this scale indicate higher levels of perceived self-worth. Previous studies have reported full-scale Cronbach's alphas ranging from $\alpha = 0.88$ to $\alpha = 0.90$ (Robins, Hendin, & Trzesniewski, 2001).

Optimism

Optimism refers to the extent to which people hold favourable expectancies for the future. Again, to reduce burden on participants the present study used a shortened version of The Life Orientation Test - Revised (LOT-R; Carver & Scheier, 2003), which consisted of the three positively-worded items relating to optimism. and excluding the three items that measure pessimism and four ‘filler’ items. Higher scores on this scale indicate more positive generalised outcome expectancies. The LOT-R has demonstrated good psychometric properties (Carver & Scheier, 2003), with previous research reporting a Cronbach’s alpha of $\alpha = 0.85$ for the three-item shortened version (Lai & Cummins, 2012).

Primary control

Perceived control refers generally to the belief in one’s ability to influence important outcomes in life (Folkman, 1984), with primary control, relating to changing the environment to achieved desired outcomes (Rothbaum, Weisz, & Synder, 1981), particularly relevant to instrumental reminiscence. Primary control was measured with a six-item scale using questions developed by Holloway (2003). Higher scores on this scale reflect higher levels of perceived primary control. Previous studies have reported acceptable reliability for these primary control items ($\alpha = 0.82$; Lai & Cummins, 2012).

General self-efficacy

General self-efficacy refers to perceived personal competence to deal effectively with a variety of stressful situations (Sherer et al., 1982), and is a uni-dimensional construct that underlies notions of task or domain-specific self-efficacy (Scholz, Doña, Sud, & Schwarzer, 2002). To measure this, the eight-item New General Self-Efficacy Scale (NGSE; Chen, Gully, & Eden, 2001) was used. The NGSE has demonstrated psychometric superiority over other measures of general self-efficacy (Scherbaum, Cohen-Charash, & Kern, 2006). Higher scores on this scale indicate a stronger sense of general self-efficacy. Studies have previously reported Cronbach's alphas between $\alpha = 0.85$ and $\alpha = 0.88$ (Chen et al. 2001).

Data cleaning

All data were converted to a standardised Percentage of Scale Maximum score, which recodes all responses onto a 0-100 scale. Missing data analyses revealed that no variables were missing more than 1.6% of responses, and estimation maximization was used to replace missing values in accordance with Tabachnick and Fidell (2001). Within groups, univariate outliers were assessed for by examining standardised z-scores and scatter plots, whereby 24 cases were found to be in excess of 3.29 standard deviations from the mean. Multivariate outliers were assessed using Mahalanobis distance (critical $\chi^2 = 26.13$, $p < 0.001$). Thirty-five cases were found to be multivariate outliers, with subsequent iterations finding no further outliers. As the influence of outliers may distort analyses, they were deleted as recommended by Tabachnick and Fidell (2001). Upon inspection of histograms and Q-Q plots, all variables appeared to be distributed normally, with skewness statistics between -0.89 and +1.1 and kurtosis statistics between -0.90 and +0.81.

Although Kolmogorov-Smirnoff tests for normality indicated all variables were distributed non-normally ($p < 0.001$), the high statistical power resulting from large sample sizes make formal tests of normality such as this extremely sensitive to any deviation from normal distribution. Further, the Central Limit Theorem states that large numbers of independent random variables will generally be distributed normally around the true population mean, with regression analyses such as these not requiring any assumption of normal distribution in samples over $N = 100$ (Lumley, Diehr, Emerson, & Chen, 2002). On this basis, no data transformations were conducted. Statistical power was high for all analyses ($> .80$).

Data analytic strategy

The Statistical Package for the Social Sciences 20.0 (SPSS) was used to conduct all statistical analyses. Pearson correlation coefficients were used to examine zero-order correlations between variables. A one-way (younger adults; older adults) multivariate analysis of variance (MANOVA) was used to test for group differences on the variables being studied. In regards to analyses of indirect associations, contemporary approaches to mediation propose that the total effect of an IV on a DV is the sum of its direct paths, as well as its indirect paths through other variables. Therefore, IV's may exert their effect on a DV indirectly through intervening variables, and thus do not require a significant direct relationship to estimate and test hypotheses about indirect effects (for a more in-depth discussion see Hayes, 2009). Indirect effects are quantified as the product of the effect of the IV on a mediator, a , and the effect of a mediator on the DV, b , partialling out the direct effect of the IV, c' . Given the hypothesis of no significant direct relationship between reminiscence

functions and depressive symptoms, indirect effects were assessed using bootstrapping methods in conjunction with multiple mediation regression models, so as to test the significance of the indirect effect of the independent variable on the dependent variable through the proposed mediators. Bootstrapping is a nonparametric approach to effect size estimation that computes indirect effects by using sampling with replacement to generate repeated observations using the study sample as a basis. After a set number of bootstrap samples have been generated (5,000 in the current study, as recommended by Hayes, 2009), a bias-corrected and accelerated 95% confidence interval (CI) is provided which is suitable for non-normally distributed variables (Efron, 1987). If the indirect effect is statistically different from zero (i.e. if zero does not lie between the lower and upper CI) then it can be inferred as significant at the $p < 0.05$ level. Studies have demonstrated that bootstrapping is the most statistically powerful approach available for testing for indirect effects (MacKinnon et al., 2004; Williams & MacKinnon, 2008). An SPSS macro provided by Preacher, Rucker, and Hayes (2007) was used to test for indirect effects with multiple mediators, with formal tests to assess for moderated mediation where these relationships differed across age groups. The hypothesised multiple mediation models are depicted in Figure 1 and 2.

As suggested by Courville and Thompson (2001), structure coefficients were interpreted alongside standardised regression coefficients (β). Structure coefficients are correlations between observed predictors and predicted variance in the dependent variable, and represent the portion of the total variance explained by predictors in a regression model. They provide information about the observed effect of each predictor without the influence of other predictors, and thus are particularly useful for interpreting results in the context of multicollinearity or suppressor variables.

Insert Figure 1 about here →

Insert Figure 2 about here →

Results

Preliminary analysis

Table 1 shows the mean scores, standard deviations, Cronbach alpha's and zero-order correlations between variables for each age group. For both age groups, high levels of multicollinearity were evident between the two reminiscence functions (younger adults, $r = 0.83, p < 0.01$; older adults, $r = 0.88, p < 0.01$), and self-esteem and self-efficacy (younger adults, $r = 0.85, p < 0.01$; older adults, $r = 0.86, p < 0.01$). In regards to the reminiscence subscales, although statistically associated, they are conceptualised as being qualitatively different in various taxonomies of memory functions (Webster & Haight, 1995; Westerhof et al., 2010), and prior empirical research has provided evidence that they have divergent relationships with various psychological constructs (e.g. Westerhof et al., 2010). Therefore, to test for the hypothesised mediation models, and retain continuity with prior studies, these subscales were kept separate. It is also notable that these high interrelations contraindicate the test of a full model of mediation including both functions, as this shared variance is likely to result in a loss of precision in regression estimates, and erroneously exclude otherwise significant relationships. In regards to self-esteem and

self-efficacy, again evidence strongly suggests they are conceptually and empirically distinguishable (Chen, Gully, & Eden, 2004), with self-esteem more strongly related to affective-laden evaluations of the self, and self-efficacy to evaluations about one's task abilities and competency. On this basis, they were also retained as separate variables.

As hypothesised, there was no apparent relationship between reminiscence functions and depressive symptoms in either age group, with correlations close to or at zero, and not statistically significant ($p > 0.05$). In both age groups there were significant correlations between reminiscence functions and the proposed mediating variables, as well as between the mediating variables and depressive symptoms, thereby satisfying the necessary requirements for possible indirect effects.

A MANOVA of group differences on the variables showed a significant multivariate effect, ($F = 12.14$ (8, 1446), $p < 0.001$), with follow-up univariate tests indicating the older adult group had significantly higher scores on all variables except for self-efficacy (See Table 1).

Insert Table 1 about here →

Indirect effects of integrative reminiscence on depressive symptoms

The results of the bootstrapped multiple-mediation analyses for integrative reminiscence are reported in Table 2. Integrative reminiscence was found to be significantly associated with meaning in life, self-esteem, and optimism in both age groups ($p < 0.001$). With all variables entered simultaneously in the multiple mediation models, thus controlling for the shared effects of mediators, meaning in

life, self-esteem, and optimism were all found to be significant predictors of depressive symptoms in both age groups ($p < 0.001$). Bootstrapping results showed that integrative reminiscence indirectly predicted depressive symptoms through all three mediators, for both younger and older adults ($p < 0.05$).

Contrasts of indirect effects showed that in both age groups meaning in life and self-esteem were significantly stronger mediators than optimism ($p < 0.05$). No difference was found between the strength of indirect effects through meaning in life and self-esteem ($p > 0.05$).

Contrary to prediction, the direct effect of integrative reminiscence on depressive symptoms was observed to be significant in the mediation model in both groups ($p < 0.01$). Given that the zero-order correlation between integrative reminiscence and depressive symptoms approximated zero, and was non-significant in both groups, these findings suggest a statistical suppression effect. A suppressor is an independent variable that is unrelated to the dependent variable, but increases the regression coefficient between another independent variable (or set of independent variables) and a dependent variable by its inclusion in a regression equation (Conger, 1974). That is, a suppressor variable may not explain variance in a dependent variable, but ‘cleanses’ other independent variables that it is related to of irrelevant variance, thereby making their relative association with the dependent variable stronger. Once the shared variance between the suppressor and non-suppressor independent variables is accounted for, the remaining variance in the suppressor may indicate a significant relationship with the dependent variable, despite a non-significant zero-order correlation. Therefore standardised beta-weights may not be representative of a variable’s true contribution to a regression equation. It is noteworthy also that the combined direct and indirect effects of integrative

reminiscence on depressive symptoms lead to a non-significant total effect approximating zero, a common occurrence when suppression is present (MacKinnon, Krull, & Lockwood, 2000). Shrout and Bolger (2002) discuss how spurious suppression effects occur often when associations are completely mediated, and warn that in these cases the total effect must be interpreted with caution.

Table 4 shows the standardised beta-weights of the direct effects in the regression models alongside their corresponding structure coefficients. When standardised beta-weights have a proportionately small structure coefficient, the presence of a suppression effect is indicated (Courville & Thompson, 2001). Although the standardised beta-weight of integrative reminiscence was positive and significant in both age groups, it contributed very little to the explained variance in depressive symptoms. In this case integrative reminiscence appears to be acting as a suppressor variable, increasing the association of the mediating variables with the dependent variable by removing extraneous variance. In summary, integrative reminiscence appears to have no direct association with depressive symptoms, but has indirect associations that are fully mediated by meaning in life, self-esteem, and optimism.

Insert Table 2 about here →

Indirect effects of instrumental reminiscence on depressive symptoms

The results of the bootstrapped mediation analyses for instrumental reminiscence are reported in Table 3. Instrumental reminiscence was found to be significantly associated with primary control and self-efficacy in both age groups ($p <$

0.001). Again, controlling for their effects, primary control and self-efficacy were both found to be significant predictors of depressive symptoms in both age groups ($p < 0.001$). Bootstrapping results showed that instrumental reminiscence indirectly predicted depressive symptoms through both mediators, for both younger and older adults ($p < 0.05$).

Contrasts of indirect effects showed that in the younger adult group self-efficacy was a significantly stronger mediator than primary control ($p < 0.05$). No difference between the strength of these mediators was found in the older adult group ($p > 0.05$). Following procedures outlined by Preacher and Hayes (2008), formal tests of moderated mediation were carried out to assess if age was a moderator of differences in the mediation pathways relating to primary control and self-efficacy. Although there were differences in the strength of indirect effects within the younger adult group, the results indicated age was not a moderator for the strength of indirect effects between groups ($p > 0.05$).

A statistical suppression effect was also apparent in these multiple mediation models, with instrumental reminiscence having a statistically significant positive direct effect on depressive symptoms ($p < 0.01$), with a non-significant total effect approximating zero ($p > 0.05$). Again, as demonstrated by low structure coefficients and variance explained, instrumental reminiscence directly predicted very little of the explained variance in depressive symptoms and appears to have acted as a suppressor variable (see Table 4).

Insert Table 3 about here →

Insert Table 4 about here →

Discussion

This study tested relationships between adaptive functions of autobiographical memory and depressive symptoms. As hypothesised, the results showed that both integrative and instrumental reminiscence were not directly associated with depressive symptoms, but did have indirect associations through the proposed mediating variables. These findings are the first to demonstrate that these reminiscence functions predict depressive symptoms through multiple mediation pathways, and that these relationships are similar for younger and older adult groups.

The finding that no direct association exists between integrative and instrumental reminiscence functions and depressive symptoms replicates those of previous studies (e.g. Cully et al., 2011; Korte et al., 2011), and further supports the notion that the use of autobiographical memory for these adaptive purposes does not itself directly predict levels of depressive symptoms. Rather, these associations are indirect and are influenced by changes in other psychological variables.

The reported frequency of integrative reminiscence was found to predict higher levels of meaning in life, which is consistent with prior findings (Cappeliez & O'Rourke, 2002), and higher levels of self-esteem and optimism, as postulated in prior literature (Watt & Cappeliez, 1995; Wong, 1995). Moreover, increased use of integrative reminiscence was found to indirectly predict lower levels of depressive symptoms through these mediating variables. Although interrelated, these mediators were shown to have unique associations with depression, and to be distinct mediators of the effects of integrative reminiscence. That these mediation paths are unique suggests that changes in the frequency of integrative reminiscence are distinguishably

associated with a sense of meaning in life, self-esteem, and expectancies of the future, and that these changes subsequently have a distinctive influence on depressive symptoms. This may not be altogether surprising considering the diverse range of content and experiences that are likely to be represented in personal memories, and which may be recalled for the purpose of integrative reminiscence (Watt & Wong, 1991). These indirect effects were found to be significantly stronger through meaning in life and self-esteem compared to optimism. This suggest that using personal memories as a means to increase self-continuity and coherence may predict stronger decreases in depressive symptoms through the mechanisms of increased existential meaning and perceived self-worth, rather than more positive outcome expectancies for the future.

Instrumental reminiscence was found to predict higher levels of primary control and self-efficacy, and indirectly predict levels of depressive symptoms through these mediating variables. Again, these mediators were found to be uniquely related to depressive symptoms, and to mediate distinct indirect pathways from instrumental reminiscence to depressive symptoms. These results build on previous findings that coping mediates the effect of adaptive functions on psychological well-being over time (Cappeliez & Robitaille, 2010), by also providing evidence of mediated associations through generalised self-efficacy and perceptions of primary control. Given previous findings that the demonstrably reduced specificity of depressed individual's autobiographical memories can impair their problem-solving ability (Williams et al., 2007), these findings suggest increased use of reminiscence for remembering coping situations and solutions to previous problems is associated with increases in adaptive coping and decreased depressive symptoms. This model supports the use of instrumentally-oriented approaches in reminiscence-based

interventions to psychologically buffer stress (e.g. Pot et al., 2010), and helps to delineate their effect on depressive symptoms.

In the younger adult group, self-efficacy was found to be a stronger mediator of the effects from instrumental reminiscence to depressive symptoms than primary control. For these adults, thinking about past coping experiences may influence depressive symptoms more strongly through increases in self-appraisals of generalised competence rather than increases in beliefs regarding one's ability to manipulate environmental circumstances to influence outcomes. Watt and Cappeliez (1995) discuss the positive contribution of instrumental reminiscence to coping and self-efficacy in the context of a feedback loop. They suggest that the explicit recall of examples of past effective coping strategies may serve to increase one's sense of self-efficacy and past mastery which, in turn, promotes the future use of problem-focussed coping strategies. Prior research has shown that when individuals believe they are able to manage stressful or negative events in their lives they are more likely to view them as challenges with which they can cope (Bandura & Locke, 2003; Lazarus & Folkman, 1984). Although outside of the scope of the current study, future research may benefit from further investigating this proposed feedback loop in the context of instrumental reminiscence.

Contrary to expectation, the older adult group reported higher frequencies of reminiscence compared to the younger group. Despite this, the direct associations between reminiscence functions and mediating variables, and indirect associations with depressive symptoms, were consistent across groups. This finding, although correlational, supports prior research (Cappeliez & Robitaille, 2010), and also indicates that relationships between the frequency of adaptive reminiscence functions,

these psychological well-being variables, and depressive symptoms, are similar across the adult lifespan.

Limitations and Future Directions

The current study utilised a cross-sectional design, which, by its nature, cannot provide evidence of causal associations. However, these findings are discussed in the context of numerous prior demonstrations of relationships between the use of adaptive autobiographical memory and subsequent reductions in psychiatric distress such as depressive symptoms (e.g. Cappeliez & Robitaille, 2010; Karimi et al., 2010; Watt & Cappeliez, 2000; Westerhof et al., 2010). It may also be hypothesised that increases in psychological well-being, such as the experience of more meaning in life or a stronger sense of self-efficacy, could also cause increases in the frequency with which individuals use adaptive reminiscence. Whilst it is likely that there is indeed a bi-directional causal relationship between psychological well-being and adaptive reminiscence, the current study indicates that any effect on depressive symptoms is still likely to occur through these well-being variables, as no relationship between these reminiscence functions and depressive symptoms is apparent (Cully et al., 2001; Korte et al., 2011). Nonetheless, future studies should seek to employ research designs to further test for the possibility of these feedback loops, and further clarify the temporal relationships of these mediated pathways.

Whilst the current study focussed on those memory functions more closely aligned with the theoretical underpinnings of cognitive-reminiscence therapy, future studies would benefit from incorporating broader measurement of reminiscence functions to further test for differential mediation pathways, and any interaction

effects (Takano & Tanno, 2009). This could include measurements of maladaptive functions of autobiographical memory, such as for ruminating over unpleasant past events and failures. Studies could also sample adults younger than those in the current study to build upon these findings and further elucidate whether these associations are age-variant or age-invariant over the adult lifespan.

Evaluations of reminiscence-based therapies for depression have previously focused solely on older adults. On the basis of these findings and other lines of evidence (Hallford & Mellor, submitted), it is suggested that the proposed mechanisms of change underlying reminiscence-based interventions may also be relevant for non-elderly adults, and therefore these interventions could represent useful approaches to the reduction of depressive symptoms across the adult life-span. Future trials of these interventions with young or middle-aged adults could test this hypothesis. Further, including measurements of the mediating variables examined in the current study in future outcome trials of reminiscence-based therapies for depression would provide further clarification of how these interventions affect individual's view of themselves and the world, and in turn, whether these mediators explain changes in depressive symptoms as a result of treatment. It is also important to note that given the suppression effects found in the current study, future researchers should ensure structure coefficients are examined when conducting regression analyses with reminiscence functions, lest erroneous conclusions be drawn.

Conclusion

This study supports prior assertions that the use of autobiographical memory for integrative and instrumental functions is associated with psychological well-being

and lower levels of depressive symptoms (Wong, 1995; Watt & Cappeliez, 1995). It also builds on current understandings of the direct and indirect associations of these functions and points to the multifaceted and mediated nature of these relationships. These findings increase confidence in the proposed mechanisms of change underlying cognitive-remembrance interventions (Watt & Cappeliez (1995, 2000), and suggest that they apply to non-elderly adults also.

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Figure 1. Hypothesised multiple mediation model depicting the direct (weight c') and indirect effects (sum of all $a \times b$ weights) of integrative reminiscence on depression.

Figure 2. Hypothesised multiple mediation model depicting the direct (weight c') and indirect effects (sum of all $a \times b$ weights) of instrumental reminiscence on depression.

Table 1

Means, standard deviations, Cronbach alpha's, and zero-order correlations of variables for younger and older adult groups

Measure	1	2	3	4	5	6	7	8	Younger <i>M (SD)</i>	α	Older <i>M (SD)</i>	α
1. MLQ Presence	-	-.01	-.03	-.41	-.44	-.38	-.32	-.40	19.02 (20.10)	.90	21.40 (22.01)*	.92
2. MLQ Search	.00	-	.88	.31	.25	.29	.29	.26	59.69 (20.48)	.91	63.71 (21.89)***	.91
3. GLS	-.01	.83	-	.33	.28	.31	.35	.32	61.28 (19.43)	.95	64.76 (20.56)***	.95
4. PWI – living standard	-.46	.25	.26	-	.56	.58	.48	.56	66.71 (18.97)	.88	71.75 (20.38)***	.89
5. PWI – health	-.54	.15	.19	.54	-	.68	.56	.86	72.14 (13.34)	.91	73.98 (14.66)*	.91
6. PWI – achievement	-.47	.15	.15	.50	.64	-	.56	.69	69.51 (17.38)	.86	75.19 (16.22)***	.86
7. PWI – relationships	-.31	.29	.33	.58	.58	.45	-	.59	78.34 (13.16)	.84	80.31 (13.19)***	.85
8. PWI – safety	-.48	.14	.20	.52	.85	.65	.59	-	75.71 (13.89)	.95	76.85 (14.41)	.95
9. PWI – community												
10. PWI – future security												
11. Self-esteem												
12. Optimism												
13. Perceived control												
14. Neuroticism												
15. Extraversion												
16. Income before tax												

* $p < 0.05$, *** $p < 0.001$. Variable correlations for younger adults appear below the diagonal, $n = 730$, and above the diagonal for older adults $n = 725$. All bolded correlations are significant at the $p < 0.01$ level. MLQ = meaning in life questionnaire, GLS = global life satisfaction, PWI = personal wellbeing index

Table 2

Summary of bootstrap results for the hypothesised multiple mediation models of the indirect effects of integrative reminiscence on depressive symptoms

Group	Independent variable	Mediating variable	Dependent variable	Effect of IV on M (SE)	Effect of M on DV (SE)	Direct Effect (SE)	Indirect Effects (SE)	Total Indirect Effects	Total Effect (SE)	Total variance explained in DV
	(IV)	(M)	(DV)	(a)	(b)	(c')	(a x b) (95% CI)		(c)	
Younger adults	Integrative Reminiscence	Meaning in life	Depression	.23***(.03)	-.25***(.06)	.13**(.03)	-.06*(.01) (-.09, -.03)	-.13*(.03)	-.01(.04)	36***
		Self-esteem		.10***(.02)	-.51***(.06)		-.05*(.01) (-.08, -.03)			
		Optimism		.12***(.03)	-.18***(.05)		-.02*(.01) (-.04, -.01)			
Older adults	Integrative Reminiscence	Meaning in life	Depression	.29***(.03)	-.25***(.06)	.16**(.03)	-.08*(.02) (-.12, -.05)	-.18*(.03)	-.03(.04)	26***
		Self-esteem		.15***(.02)	-.45***(.08)		-.07*(.02) (-.10, -.04)			
		Optimism		.21***(.03)	-.13*(.06)		-.03*(.02) (-.06, -.01)			

* $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$

Table 3

Summary of bootstrap results for the hypothesised multiple mediation models of the indirect effects of instrumental reminiscence on depressive symptoms

Group	Independent variable	Mediating variable	Dependent variable	Effect of IV on M (SE)	Effect of M on DV (SE)	Direct Effect (SE)	Indirect Effects (SE)	Total Indirect Effects	Total Effect (SE)	Total Variance explained in DV
	(IV)	(M)	(DV)	(a)	(b)	(c*)	(a x b) (95% CI)		(c)	
Younger adults	Instrumental Reminiscence	Primary Control Self-efficacy	Depression	.22***(.03)	-.12* (.06)	.11**(.04)	-.03*(.01) (-.06, -.01)	-.12*(.02)	-.01(.04)	25***
				.14***(.03)	-.66***(.06)		-.10*(.02) (-.14, -.06)			
Older adults	Instrumental Reminiscence	Primary Control Self-efficacy	Depression	.25***(.03)	-.25***(.06)	.15**(.04)	-.06*(.02) (-.10, -.03)	-.18*(.03)	-.03(.04)	19***
				.22***(.03)	-.53***(.06)		-.12*(.02) (-.16, -.08)			

* $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$

Table 4

Standardised beta-weights and structure coefficients of direct effects, and proportion of variance explained in depressive symptoms

Group	IV	Standardised beta-weight (SE)	Structure coefficient	% of variance explained	Variance explained in DV (R^2)
Younger adults	Integrative reminiscence	.13** (.03)	.01	2.3%	.36***
	Meaning in life	-.23*** (.03)	-.76	29.2%	
	Self-esteem	-.10*** (.02)	-.90	42.1%	
	Optimism	-.12*** (.03)	-.78	26.4%	
Older adults	Integrative Reminiscence	.16** (.03)	-.03	4.1%	.26***
	Meaning in life	-.25*** (.06)	-.81	34.8%	
	Self-esteem	-.45*** (.08)	-.86	38.1%	
	Optimism	-.13* (.06)	-.75	23%	
Younger adults	Instrumental Reminiscence	.11** (.04)	-.02	2.3%	.25***
	Primary Control	-.12* (.06)	-.63	21.7%	
	Self-efficacy	-.66*** (.06)	-.98	76%	
Older adults	Instrumental Reminiscence	.15** (.04)	-.07	4%	.19***
	Primary Control	-.25*** (.06)	-.74	33%	
	Self-efficacy	-.53*** (.06)	-.92	63%	

* $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$