The Efficacy of Life-Review as Online-Guided Self-help for Adults: A Randomized Trial

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**Objectives.** The study used a randomized controlled trial to investigate the short-term and long-term effects of life-review as online-guided self-help in adults (40+) with moderate depressive symptomatology. We evaluated ego-integrity and ruminations as mediators and assessed whether the effects of the intervention did not differ across middle-aged and older adults.

**Method.** Effects of life-review ($n = 58$) were compared with a waiting list group ($n = 58$) and an expressive writing intervention ($n = 58$) on depressive symptoms (primary outcome), anxiety, and well-being (secondary outcomes). Mediator and moderator analyses were also applied.

**Results.** Compared with the waiting list, life-review reduced depressive symptoms ($d = 0.35$) and enhanced emotional ($d = 0.16$) and psychological well-being ($d = 0.27$). Life-review was not more effective than expressive writing. The effects on depressive symptoms were partly related with increases in ego-integrity and decreases in rumination. The intervention is applicable for middle-aged and older adults.

**Conclusion.** Life-review is effective as self-help for middle-aged and older adults with moderate depressive symptomatology compared with a waiting list group. Future research should investigate whether stimulating ego-integrity and reducing rumination enhance the effects of the intervention.

**Key Words:** Depression—Ego-integrity—Life-review—Randomized controlled trial—Rumination—Self-help.

Life-review has been defined as a structured evaluation of one’s past (Bluck & Levine, 1998; Butler, 1963; Westerhof, Bohlmeijer, & Webster, 2010), which aims to decrease depressive symptoms by integrating negative memories in a more meaningful life story and stimulating the retrieval of positive memories (Bohlmeijer, Westerhof, & Emmerik-de Jong, 2008). Scogin, Welsh, Hanson, Stump, and Coates (2005) concluded that life-review is an evidence-based intervention for depression in older adults. Several meta-analyses showed moderate to large effects of life-review in reducing depressive symptomatology (Bohlmeijer, Smit, & Cuijpers, 2003; Chin, 2007; Pinquart, Duberstein, & Lyness, 2007; Pinquart & Forstmeier, 2012).

However, a recent meta-analysis (Pinquart & Forstmeier, 2012) emphasized a lack of studies on (a) individual life-review, (b) long-term effects, (c) mediating processes such as ego-integrity, and (d) persons younger than 60 years. This study investigates the effects of individual life-review in a new mode of delivery, as online-guided self-help in adults (40+) with moderate depressive symptomatology. Our first hypothesis is that this form of life-review is more effective on depressive symptoms (primary outcome), anxiety symptoms, and well-being (secondary outcomes) than a waiting list control group.

Second, little is known about the effects of life-review in the long run. The use of waiting list groups restricts the study of long-term effects. We therefore used an active control group as well. The life-review intervention in this study was based on an effective group intervention (Korte, Bohlmeijer, Cappeliez, Smit, & Westerhof, 2011). To evaluate whether effects of the life-review intervention cannot be attributed to mere attention and writing about one’s life but also to the unique effects of the structured protocol of life-review, we compare the intervention not only to a waiting list but also to an intervention based on expressive writing (Pennebaker, 1997). Our second hypothesis is that life-review is more effective than expressive writing, also in the long run.

Third, few studies investigated how life-review is effective. Previous studies assessed meaning, mastery, and reminiscence styles as mediators of the effects of life-review interventions (Korte, Westerhof, & Bohlmeijer, 2012; Westerhof, Bohlmeijer, van Beljouw, & Pot, 2010). This study addresses ego-integrity and rumination. Ego-integrity refers to attaining a certain distance from one’s life and looking back with acceptance and grace. Ever since Butler’s seminar article on reminiscence and life-review (1963), it is assumed that developing an accepting attitude toward one’s own life and coming to terms with unresolved conflicts from the past are effective ingredients of life-review (Westerhof et al., 2010). Moreover, we address rumination as a possible mediator. Rumination can be seen as repetitive thoughts and behavior regarding depression symptoms. Studies show that depressive people have difficulties in retrieving specific...
memories (e.g., Williams et al., 2007) and that ruminating maintains the reduced specificity of memories (Watkins & Teasdale, 2001). Decreasing rumination is therefore a potential working mechanism of life-review. Although ego-integrity and rumination can be seen as outcomes, both are also seen as process variables that result in less depressive symptoms. Our third hypothesis is that increases in positive acceptance of one’s life as it has been (ego-integrity) and decreases in the need to think about negative events in the past and over again (rumination) mediate the effects of life-review on depressive symptoms.

Lastly, we investigate whether life-review is broadly applicable and effective for both middle-aged and older adults. As reminiscing takes place at all ages and not just in later life (Westerhof et al., 2010), it can be expected that life-review is applicable to adults in a broad age range. Our last hypothesis is that the effects of the intervention do not differ significantly across middle-aged (40 to 55) and older adults (55+).

**METHOD**

**Participants**

In February 2010, through advertisements in Dutch newspapers and websites, participants who felt depressed and were interested in writing about their life were recruited. Inclusion criteria were an age of 40 years and older and the presence of mild to moderate depressive symptoms (>10) on the Center of Epidemiological Studies-Depression scale (CES-D: Beekman et al., 1997). Because severe psychological pathologies require more intensive treatment, applicants were excluded and advised to contact their general practitioner when they had severe anxiety symptoms (>14 on the Hospital Anxiety and Depression scale—Anxiety, HADS-A; Zigmond & Snaith, 1983), a severe major depressive episode (eight or nine out of nine symptoms) or a moderate to high suicide risk on the MINI International Neuropsychiatric Interview (MINI; Sheehan et al., 1998; van Vliet, & de Beurs, 2007). Applicants were excluded if they currently received any psychological treatment or when they started medication for psychological symptoms in the past 3 months.

**Procedure**

This study was approved by an accredited Medical Research Ethics Committee in the Netherlands, covered by the Medical Research Involving Human Subjects Act (NL.34229.097.10), and registered in the Netherlands National Trial Register (2778). Figure 1 shows the participant flow. A total of 400 applicants responded to the advertisements and received an information sheet and informed consent form. This was signed by 274 respondents, who then received a screening questionnaire comprising demographic questions, the CES-D and HADS-A, which resulted in the exclusion of 55 participants. The remaining respondents were invited for a telephone interview (MINI), conducted by Bachelor students in Psychology, who were trained and supervised by a clinical psychologist. Thirty-eight participants were excluded, and 174 participants were randomly assigned to three conditions: life-review with e-mail guidance (n = 58), expressive writing with e-mail guidance (n = 58), or a waiting list (n = 58). Randomization was stratified by sex and age (40–55 or 55+) and was conducted by an independent researcher from the University of Twente using a computer-generated sequence of numbers. Table 1 shows an overview of the participants’ characteristics.

**Power Analysis**

To demonstrate an effect size of 0.60 (Cohen’s d) for depressive symptoms in the life-review intervention (Pinquart & Forstmeier, 2012), compared with a small effect of expressive writing (Cohen’s d = 0.07, Frattaroli, 2006) and with no effect in a waiting list control (Korte et al., 2011), with a statistical power of (1–β) = 0.80 in a one-tailed test (p < .05), a minimum of 45 participants in each condition was required at follow-up. Anticipating a drop-out rate of 20%, we needed 54 participants in each condition (162 in total).

**Measures**

Participants completed online measures at baseline (t0) and 3 months (t1; directly after the intervention). The life-review and expressive writing conditions completed additional measurements at 6 (t2) and 12 months (t3) after baseline. The waiting list group received life-review with e-mail guidance after the waiting list period, directly after t1.

The primary outcome was the level of depressive symptoms (CES-D; Beekman et al., 1997; Schroevers, Sanderman, van Sonderen, & Ranchor, 2000). Higher scores indicated more depressive symptoms (20 items, range 0–60, α = 0.78). Secondary outcomes were anxiety symptoms and well-being. Anxiety symptoms were measured with the HADS-A (Zigmond & Snaith, 1983). Higher scores indicate more anxiety symptoms (7 items, range 0–21, α = 0.58). Emotional, psychological, and social well-being were measured with the Mental Health Continuum-Short Form (MHC-SF; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). Higher mean scores (range 1–6) indicate better emotional (3 items, α = 0.81), psychological (6 items, α = 0.81), and social well-being (5 items, α = 0.68). The process variables were ego-integrity and rumination. The Northwestern Ego-Integrity scale (Janis et al., unpublished), assessed ego-despair (7 items, α = 0.72) and ego-integrity (8 items, α = 0.81), with higher mean scores indicating more ego-despair and ego-integrity (range 1–6). Rumination was measured with the Ruminative Response Scale (Roelofs, Muris, Huibers, Peeters, & Arntz, 2011).
Responded to advertisements \((n = 400)\)

Informed consent received and assessed with screening questionnaire \((n = 274)\)

Excluded \((n = 55)\)
- Currently receiving psychological treatment \((n = 14)\)
- Recently started with medication for depression \((n = 6)\)
- No/few depressive symptoms \((n = 21)\)
- Severe anxiety symptoms \((n = 14)\)

Assessed with diagnostic interview by telephone (MINI; Sheehan et al., 1998) \((n = 219)\)

Excluded \((n = 38)\)
- Severe depressive episode \((n = 9)\)
- Moderate to high suicide risk \((n = 10)\)
- Not available for interview or decided not to participate \((n = 19)\)
- Did not complete t0 questionnaire \((n = 7)\)

Completed t0 questionnaire and randomized over three conditions \((n = 174)\)

Allocated to life review intervention 'The stories we live by' with e-mail counseling \((n = 58)\)

Did not receive the intervention \((n = 5)\)
Reasons:
- Intervention did not meet expectations \((n = 2)\)
- No internet access \((n = 1)\)
- Reason unknown \((n = 2)\)

Discontinued the intervention \((n = 9)\)
Reasons:
- Intervention did not meet expectations \((n = 1)\)
- Too demanding \((n = 2)\)
- Medical illness or other life event \((n = 2)\)
- Reason unknown \((n = 4)\)

Allocated to expressive writing intervention with e-mail counseling \((n = 58)\)

Did not receive the intervention \((n = 3)\)
Reasons:
- Medical illness or other life event \((n = 1)\)
- Reason unknown \((n = 2)\)

Discontinued the intervention \((n = 9)\)
Reasons:
- Intervention did not meet expectations \((n = 2)\)
- Needs more intensive help \((n = 1)\)
- Too demanding \((n = 1)\)
- Medical illness or other life event \((n = 1)\)
- Reason unknown \((n = 4)\)

Allocated to waiting list \((n = 58)\)

Completed t1 \((n = 49)\)

Completed t2 \((n = 45)\)

Completed t3 \((n = 48)\)

Analyzed ITT sample \((n = 58)\)

Allocated to the life review intervention 'The stories we live by' with e-mail counseling \((n = 58)\)

Completed t1 \((n = 52)\)

Completed t2 \((n = 49)\)

Completed t3 \((n = 42)\)

Analyzed ITT sample \((n = 58)\)

Allocated to waiting list \((n = 58)\)

Completed t1 \((n = 55)\)

Completed t2 \((n = 49)\)

Completed t3 \((n = 42)\)

Analyzed ITT sample \((n = 58)\)

Analyzed ITT sample \((n = 58)\)

Figure 1. Participant flow.
Efficacy of LifE-REviEw as onLinE-GuidEd sELf-hELp

2006). Higher mean scores indicated more rumination (26 items; range 1–4, α = 0.92). To evaluate the satisfaction of the participants after the life-review and expressive writing intervention, the Client Satisfaction Questionnaire (CSQ-8; Attkisson & Zwick, 1982; de Brey, 1983) was used (8 items; range 1–4; α = 0.94). A question was included on how the participants rated the interventions (scale 1–10).

Life-Review
The intervention “The stories we live by” is based on insights from autobiographical memory (Brewin, 2006; Serrano, Latourre, Gatz, & Montanes, 2004; Williams et al., 2007), life-review (Birren & Deutschman, 1991; Haight & Clum, 1993), and narrative therapy (White, 2007; White & Epston, 1990). Participants received the self-help book (Bohlmeijer & Westerhof, 2010), comprising seven modules that had to be finished in 10 weeks. The first four modules focused on different life themes, such as childhood and family, and love and friendships. In each module, participants answered questions about these themes and described a specific positive memory and a difficult memory they were struggling with. They answered questions directed at developing alternative life stories that would help to integrate this memory. The last three modules focused on creating an overview and on the near future. Each of the modules also included a well-being exercise on an audio-CD in the book.

Because several meta-analyses show that self-help is more effective when it is guided (e.g., Gould & Clum, 1993), participants received e-mail guidance by a counselor. Participants were asked to weekly send their texts and questions, up to a maximum of one page, to their counselor. Within 2 days, the participants received feedback by e-mail from their counselor. Counselors were instructed to respond to the participants’ e-mails from a narrative therapeutic framework, using questions to help participants in constructing alternative, agentic stories about negative life events and periods (e.g., How were you able to cope with this situation? Were there any pleasant moments in this difficult time?) and to provide positive and encouraging feedback and instructions.

Expressive Writing Intervention
The “Expressive writing” intervention was based on the method of expressive writing by Pennebaker (1997). This method consists of daily writing about emotional experiences, for 15–30 min on 3–4 consecutive days during 1 week. We extended and adapted this method to an intervention with seven modules, to make it a comparable and acceptable intervention to compare the life-review intervention. Every module started with a psychoeducational text on emotion regulation and was followed by instructions in expressive writing. The first three modules focused on expressive writing about negative experiences, the fourth module asked participants to look back at their experiences during the first three modules, the fifth and sixth module focused on positive experiences, and the last module encouraged participants to write a letter to a dear person. The participants received each module by e-mail from their counselor. Although the life-review intervention was structured, focused on memories, and was accompanied by structured and narrative counseling, expressive writing was based on open and unstructured writing, included no specific instructions with regard to the written material, and was accompanied by positive and encouraging counseling on the process of the intervention.

Waiting List Control Condition
The participants on the waiting list had unrestricted access to care as usual (e.g., they may start psychological treatment). They received life-review with e-mail guidance directly after 3 months (t1; Figure 1).

Treatment Integrity
Five Psychology Bachelor students (University of Twente) provided e-mail support. They received a 1-day
training from a clinical psychologist with experience in counseling, life-review, and narrative therapy. They practiced writing e-mails in the role of participant and counselor. Each student provided 23 participants (divided over both interventions) with e-mail support. A licensed clinical psychologist supervised the counselors and checked their e-mails.

Statistical Analyses

Statistical analyses were conducted with SPSS 20. At baseline, there were no significant differences between the three conditions on the primary, secondary, and process variables and age \( F(18,326) = 0.65; p > .05 \), nor on sex \( \chi^2(2, N = 174) = 0.07; p > .05 \), education \( \chi^2(12, N = 174) = 11.68; p > .05 \), and main daily activity \( \chi^2(10, N = 174) = 5.90; p > .05 \), indicating a successful randomization.

Intention-to-treat analyses were conducted with the use of SPSS Missing Value Analysis to impute all missing data on the continuous measures with the expectation-maximization method. This method computes missing values based on maximum likelihood estimates using observed data in an iterative process (Dempster, Laird, & Rubin, 1977). The percentage of missing data varied from 10.3% (t1) to 24.7% (t3). Because the outcomes were similar \( p > .05 \) for the imputed intention-to-treat data and the observed data, only the results from the intention-to-treat analyses are reported.

We first evaluated drop-out, adherence, and participant satisfaction. Next, a 2(group) × 2(time) analysis of variance (ANOVA) was used to investigate our first hypothesis that life-review is more effective at 3 months (t1) than a waiting list on the primary and secondary variables. Similarly, a 2(group) × 4(time) ANOVA was used to evaluate the second hypothesis that life-review is more effective than expressive writing on the primary and secondary variables at 3 (t1), 6 (t2), and 12 months (t3). In the case of significant Time × Group effects, paired t tests were used to examine the statistical significance between the measurements in each condition. Effect sizes were calculated with Cohen’s d using the means and pooled standard deviations (SD) of the measurements of the conditions. Effect sizes of d = 0.80 were considered large, d = 0.50 moderate, and d = 0.20 small (Cohen, 1988).

Next, we assessed our third hypothesis that ego-integrity and rumination mediated the effects of the life-review on the primary outcome of depressive symptoms. We first examined changes in ego-integrity, ego-despair, and rumination before conducting stepwise regression analyses. These were conducted, separately for each process variable, with baseline depressive symptoms (t0) and condition (life-review vs. waiting list) in the first block; baseline ego-despair, ego-integrity, or rumination (t0) in the second block; and change in ego-despair, ego-integrity, or rumination between baseline and 3 months (t1–t0) in the third block. A bootstrapping procedure \( (n = 5,000 \text{ bootstrap resamples}) \) was performed to determine the significance of the indirect effect. Bootstrapping is the recommended test of mediation to overcome limitations of statistical methods that make assumptions about the shape of the sampling distribution, such as symmetry or normality (Preacher & Hayes, 2004).

Last, to examine our fourth hypothesis that the effects of life-review do not differ significantly across middle-aged and older adults, a moderator analysis was conducted. To investigate age (40–55 and 55+) as a moderator of the effects on the change of depressive symptoms between baseline (t0) and 3 months (t1), age group was added to the repeated measures ANOVA, examining the three-way interaction of age group (2) × experimental group (2) × time (2). Because we expected no differences between middle-aged and older adults, we applied a two-tailed \( p \) value.

RESULTS

Drop-out, Adherence, and Participant Satisfaction

Of the 174 eligible participants that completed the baseline measurement (t0), data were available of 156 participants (all three conditions) at 3 months (t1; drop-out rate 10.3%), 94 participants (life-review and expressive writing) at 6 months (t2; drop-out rate 19.0%), and of 90 participants (life-review and expressive writing) at 12 months (t3; drop-out rate 22.4%). Dropout was similar for the three conditions \( \chi^2(2, N = 174) = 2.66 – 3.35; p > .05 \) and there were no significant differences at baseline on the primary, secondary, and process variables between participants who did or did not complete the measurements at 3 months \( F(8,165) = 0.84; p > .05 \), 6 months \( F(8,165) = 1.53; p > .05 \), and 12 months \( F(8,165) = 0.76; p > .05 \).

There were 14 participants (24.1%) in the life-review and 12 participants (20.7%) in the expressive writing intervention who did not fully adhere (Figure 1). The main reasons were the occurrences of a medical illness or life event that the intervention did not meet the expectations or was too demanding. There were no significant differences between the participants in the life-review and expressive writing condition in the average number of weeks completed, but participants in the life-review condition spent more hours weekly \( M = 5.25; SD = 6.85 \) than participants in the expressive writing condition \( M = 2.29; SD = 1.46; F(1,95) = 8.78; p < .01 \). On the CSQ, the participants evaluated the life-review intervention with 3.02 on a scale from 1 to 4 \( (SD = 0.53; n = 51) \), and the expressive writing intervention with 2.99 \( (SD = 0.71; n = 53) \). On a scale from 1 to 10, the overall life-review intervention was evaluated with a 7.3 \( (SD = 1.27; n = 53) \), as was the overall expressive writing intervention \( M = 7.3; SD = 1.59; n = 49 \).

Primary and Secondary Outcomes

The results are presented in Table 2. First, we compared the life-review and waiting list condition on the primary
outcome of depressive symptoms between baseline (t0) and 3 months (t1). There was a main effect of time on depressive symptoms. The life-review condition decreased 8.43 points in depressive symptoms between baseline (t0) and 3 months (t1; $d_{change} = -0.99$) and the waiting list condition 4.15 points ($d_{change} = -0.48$). The significant group × time interaction revealed that the life-review condition decreased more in depressive symptoms from baseline (t0) to 3 months (t1) than the waiting list (d = 0.35). At baseline, 22% of the participants in each condition scored below the cutoff of 16 for clinical relevant depressive symptoms (Beekman et al., 1997; Schroevers et al., 2000). At 3 months, 52% in the life-review condition and 40% in the waiting list condition scored below the cutoff.

Results also showed a significant decrease in anxiety symptoms and a significant increase in emotional, psychological, and social well-being between baseline (t0) and 3 months (t1) in both conditions. Significant group × time interactions were found for emotional and psychological well-being: life-review resulted in a stronger increase in emotional ($d = 0.16$) and psychological well-being ($d = 0.27$) than the waiting list condition. We can conclude that our first hypothesis was confirmed for depressive symptoms and emotional and psychological well-being but not for anxiety symptoms or social well-being.

Second, we compared life-review with expressive writing on depressive symptoms at 3 (t1), 6 (t2), and 12 months (t3) (Table 2). There was a significant main effect of time on depressive symptoms. Both the life-review and expressive writing intervention decreased on depressive symptoms between baseline (t0) and 3 months (t1; $d_{change}$ life-review = –0.99, $d_{change}$ expressive writing = –1.04), and showed only small fluctuations between 3 (t1), 6 (t2), and 12 months (t3). No interaction effect was found, indicating that both conditions had a similar course of depressive symptoms over time. There were also no significant differences ($p > .05$) between life-review and expressive writing in the percentage of participants scoring below the cutoff of 16 for clinical relevant depressive symptoms at baseline (life-review 22% and expressive writing 14%), 3 months (52% and 66%), 6 months (47% and 55%), and 12 months (45% and 40%).

We also compared life-review with expressive writing on the secondary outcomes between all four measurement occasions. Significant time effects were found, showing an increase in emotional, psychological, and social well-being, and a decrease in anxiety between baseline (t0) and 3 months (t1). These effects remained stable at 6 and 12 months, with an exception for a decrease in psychological well-being between 3 (t1) and 6 months (t2; $t = 3.27$; $p < .01$) and in anxiety between 6 (t2) and 12 months (t3; $t = 2.42$; $p < .05$) in the life-review condition. There was a significant group × time interaction effect for psychological well-being. Post hoc tests revealed that the increase in psychological well-being in the life-review condition was larger than in the expressive writing condition from baseline (t0) to 3 months (t1; $d = 0.22$), but from 3 months (t1) to 6 months (t2), the life-review condition decreased in psychological well-being, whereas the expressive writing condition increased ($d = -0.29$). We can conclude that the second hypothesis is not confirmed. However, the effects of both life-review and expressive writing were maintained in the long run.

**Mediation Analyses: Ego-Integrity and Rumination**

To investigate our third hypothesis on ego-integrity and rumination as mediators of the effects of life-review on the primary outcome of depressive symptoms, we first compared life-review with the waiting list on ego-integrity, ego-despair, and rumination between baseline (t0) and 3 months (t1). Results (Table 2) showed significant group × time interactions for ego-integrity and rumination: the life-review condition improved more in ego-integrity ($d = 0.26$) and declined more in rumination ($d = 0.18$) between baseline (t0) and 3 months (t1) than the waiting list. In addition, we compared life-review to expressive writing on the process variables between all four measurement occasions (t0, t1, t2, and t3). A group × time interaction effect was found for ego-despair, showing a greater decrease in ego-despair in the expressive writing than in the life-review intervention ($t1$, $d = -0.06$; $t2$, $d = -0.24$; $t3$, $d = -0.15$). Interaction effects were not significant for ego-integrity and rumination, indicating a similar change in both conditions.

We analyzed possible mediating effects for the process variables that differed between conditions. Thus, we examined only mediating effects for ego-integrity and rumination in the life-review versus waiting list condition. First, we investigated whether ego-integrity mediated the effects of the life-review on the primary outcome of depressive symptoms. The results of the regression analysis (Table 3) confirm our expectations. The significant result ($β = -0.22$; $p < .01$) for the life-review versus the waiting list condition on depressive symptoms at 3 months (t1) disappears ($p > .05$) when change in ego-integrity between baseline (t0) and postintervention (t1) was added to the analysis. Change in ego-integrity ($β = -0.29$; $p < .001$) explained 6% of the variance in depressive symptoms at 3 months (t1), controlled for condition and baseline levels of depressive symptoms and ego-integrity. Bootstrapping analysis demonstrated that the indirect effect of changes in ego-integrity was significant (95% confidence interval –3.41 to –0.59).

Similarly, we investigated whether rumination mediated the effects of life-review on depressive symptoms (Table 4). The significant result ($β = -0.23$; $p < .01$) for the life-review intervention versus the waiting list on depressive symptoms at 3 months (t1) decreases to $β = -0.16$; $p < .05$ when change in rumination between baseline (t0) and postintervention (t1) was added to the analysis. Controlled for condition and baseline levels of depressive symptoms
Table 2. Means, Standard Deviations (SD), and the Results for the Primary and Secondary Outcomes, and Process Variables

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group</th>
<th>Baseline (t0)</th>
<th>3 months (t1)</th>
<th>6 months (t2)</th>
<th>12 months (t3)</th>
<th>Analysis of variance (group) × (time)</th>
<th>Time</th>
<th>LR vs. WL (t1)</th>
<th>LR vs. ES (t2)</th>
<th>LR vs. ES (t3)</th>
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<tbody>
<tr>
<td><strong>Primary outcome</strong></td>
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<tr>
<td>CES-D</td>
<td>LR</td>
<td>24.31 (9.17)</td>
<td>15.88 (7.73)</td>
<td>17.59 (10.46)</td>
<td>15.83 (9.69)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>72.97***</td>
<td>0.27</td>
<td>8.47**</td>
<td>0.35**</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>23.91 (8.48)</td>
<td>14.55 (9.51)</td>
<td>15.62 (7.33)</td>
<td>17.37 (9.67)</td>
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<td></td>
<td>WL</td>
<td>22.90 (8.61)</td>
<td>18.75 (8.82)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>48.74***</td>
<td>0.16</td>
<td>1.75</td>
<td>−0.15</td>
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<td><strong>Secondary outcomes</strong></td>
<td></td>
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<tr>
<td>MHC-SF emo</td>
<td>LR</td>
<td>3.44 (1.02)</td>
<td>4.02 (1.05)</td>
<td>3.90 (0.95)</td>
<td>4.07 (1.10)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>26.46***</td>
<td>0.01</td>
<td>4.77*</td>
<td>0.16*</td>
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<tr>
<td></td>
<td>ES</td>
<td>3.60 (1.06)</td>
<td>4.02 (1.04)</td>
<td>4.02 (1.07)</td>
<td>4.06 (1.10)</td>
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<tr>
<td></td>
<td>WL</td>
<td>3.63 (0.94)</td>
<td>3.86 (0.97)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>16.76***</td>
<td>0.18</td>
<td>0.39</td>
<td>0.00</td>
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<tr>
<td>MHC-SF psy</td>
<td>LR</td>
<td>3.27 (0.98)</td>
<td>3.93 (1.04)</td>
<td>3.49 (0.99)</td>
<td>3.55 (1.14)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>24.40***</td>
<td>0.11</td>
<td>6.83*</td>
<td>0.27*</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>3.49 (0.92)</td>
<td>3.71 (0.94)</td>
<td>3.83 (1.16)</td>
<td>3.87 (1.09)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>WL</td>
<td>3.44 (0.96)</td>
<td>3.65 (1.03)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>8.79***</td>
<td>1.12</td>
<td>3.78*</td>
<td>0.22*</td>
</tr>
<tr>
<td>MHC-SF soc</td>
<td>LR</td>
<td>2.78 (0.75)</td>
<td>3.12 (0.95)</td>
<td>2.97 (0.92)</td>
<td>2.95 (0.98)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>7.35**</td>
<td>1.37</td>
<td>1.64</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>2.97 (1.01)</td>
<td>3.08 (1.00)</td>
<td>3.21 (1.03)</td>
<td>3.21 (1.13)</td>
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<tr>
<td></td>
<td>WL</td>
<td>2.80 (0.91)</td>
<td>2.92 (1.07)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>3.11*</td>
<td>1.37</td>
<td>1.39</td>
<td>0.04</td>
</tr>
<tr>
<td>HADS-A</td>
<td>LR</td>
<td>8.52 (2.93)</td>
<td>6.48 (3.25)</td>
<td>7.33 (3.83)</td>
<td>6.31 (3.74)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>52.51***</td>
<td>2.31</td>
<td>1.07</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>8.76 (2.53)</td>
<td>6.28 (3.63)</td>
<td>6.34 (3.13)</td>
<td>6.53 (3.55)</td>
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<tr>
<td></td>
<td>WL</td>
<td>9.05 (2.64)</td>
<td>7.52 (3.50)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>28.00***</td>
<td>3.80</td>
<td>1.52</td>
<td>−0.06</td>
</tr>
<tr>
<td><strong>Process variables</strong></td>
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<tr>
<td>NEIS</td>
<td>LR</td>
<td>3.95 (0.86)</td>
<td>3.73 (0.90)</td>
<td>3.83 (1.01)</td>
<td>3.71 (0.88)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>12.73***</td>
<td>0.05</td>
<td>0.04</td>
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<tr>
<td></td>
<td>ES</td>
<td>4.11 (0.80)</td>
<td>3.68 (0.85)</td>
<td>3.61 (0.80)</td>
<td>3.58 (0.88)</td>
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<tr>
<td></td>
<td>WL</td>
<td>3.97 (0.77)</td>
<td>3.77 (0.89)</td>
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<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>14.23***</td>
<td>0.33</td>
<td>2.80*</td>
<td>−0.24</td>
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<tr>
<td>NEIS</td>
<td>LR</td>
<td>3.92 (0.90)</td>
<td>4.36 (0.82)</td>
<td>4.03 (0.88)</td>
<td>4.09 (1.01)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>28.34***</td>
<td>0.00</td>
<td>20.37***</td>
<td>0.26***</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>4.17 (0.85)</td>
<td>4.41 (0.83)</td>
<td>4.33 (0.84)</td>
<td>4.34 (0.88)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>4.12 (0.71)</td>
<td>4.16 (0.71)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>13.30***</td>
<td>5.20</td>
<td>1.98</td>
<td>−0.35</td>
</tr>
<tr>
<td>RRS</td>
<td>LR</td>
<td>2.03 (0.48)</td>
<td>1.78 (0.48)</td>
<td>1.85 (0.49)</td>
<td>1.79 (0.49)</td>
<td>2 (LR, WL) × 2 (t0, t1)</td>
<td>32.84***</td>
<td>0.00</td>
<td>6.53*</td>
<td>0.18*</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>2.02 (0.51)</td>
<td>1.86 (0.47)</td>
<td>1.78 (0.43)</td>
<td>1.79 (0.46)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>1.95 (0.48)</td>
<td>1.86 (0.42)</td>
<td></td>
<td></td>
<td>2 (LR, ES) × 4 (t0, t1, t2, t3)</td>
<td>13.58***</td>
<td>0.00</td>
<td>1.51</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Notes: LR = life-review; ES = expressive writing intervention; WL = waiting list; CES-D = Center for Epidemiologic Studies Depression scale; MHC-SF = Mental Health Continuum-Short Form; emo = emotional well-being; psy = psychological well-being; soc = social well-being; HADS-A = Hospital Anxiety and Depression scale—Anxiety subscale; NEIS = Northwestern Ego-Integrity scale; RRS = Ruminative Response scale; d = Cohen’s d effect size; positive = life-review in favor of waiting list or expressive writing; negative (−) = waiting list or expressive writing in favor of life-review.

* p < .05; ** p < .01; *** p < .001 (one-tailed).
Efficacy of Life-REviEw as online-guidEd self-help

between age group and condition (life-review versus expressive writing) on change in depressive symptoms between all four measurement occasions. No significant interactions (p > .05) were found, indicating that effects on depressive symptoms did not differ significantly across middle-aged (d = 0.31) and older adults (d = 0.36). These results confirm our fourth hypothesis.

**Discussion**

This study was innovative by aiming to fill in some important gaps in research on life-review by (a) investigating the effects of individual life-review as online-guided self-help on depressive symptoms (primary outcome) and on anxiety and well-being (secondary outcomes); (b) measuring not only at 3 months but also at 6 and 12 months after baseline; (c) examining changes in ego-integrity and rumination as mediators of the effects of life-review on depressive symptoms; and (d) investigating whether life-review could be applied to both middle-aged and older adults.

The main finding is that our first hypothesis is confirmed for the primary outcome: life-review is effective as online-guided self-help on depressive symptoms in comparison to a waiting list (d = 0.35). We found smaller, but significant effects for emotional and psychological well-being, ego-integrity, and rumination. These findings nicely fit the dual goal of life-review to alleviate depressive symptoms by reducing negative forms of reminiscence and to enhance well-being by increasing positive reminiscence (Cappeliez & O’Rourke, 2006; Korte, Bohlmeijer, Westerhof, & Pot, 2011). This study broadens meta-analytic findings (Pinquart & Forstmeier, 2012) by adding that life-review is also effective as online-guided self-help. Although participants in the life-review intervention on average score below the cutoff for clinical relevant depressive symptoms after the intervention (Beekman et al., 1997; Schroevers et al., 2000), the effect sizes are smaller than shown in several meta-analyses (Bohlmeijer et al., 2003; Bohlmeijer, Roemer, Cuijpers, & Smit, 2007; Pinquart & Forstmeier, 2012). This may have several reasons. First, the waiting list group shows a substantial change between baseline and 3 month follow-up, which may have biased the effect size. It is noteworthy that the participants that received self-help life-review showed similar reductions of depressive symptoms as participants that received life-review in a group format (Korte et al., 2011). Second, the counselors were Bachelor students in Psychology. Although the students received training in life-review and were supervised by a clinical psychologist, the e-mail guidance may be less effective than guidance by experienced therapists. Third, the effects of the intervention may be smaller because of the exclusion of individuals with a severe depressive disorder, who might be more likely to benefit from an intervention. Fourth, self-help therapies may be somewhat less effective than group or individual face-to-face therapies because personality aspects such

| Table 3. Change in Ego-Integrity as Mediator of the Effects of Life-Review on Depressive Symptoms at 3 Months (t1) |
|----------------------------------|---------------|---------------|---------------|
|                                  | Beta          | Beta          | Beta          |
| Block 1                          |               |               |               |
| Baseline depressive symptoms     | 0.57***       | 0.39***       | 0.39***       |
| Life-review (1) vs. waiting list  | -0.22**       | -0.23**       | -0.16*        |
| condition (0)                    |               |               |               |
| Block 2                          |               |               |               |
| Baseline ego-integrity           | —             | -0.10         | -0.20**       |
| Block 3                          |               |               |               |
| Change in ego-integrity (t1 − t0)| —             | —             | -0.29**       |
| Adjusted R²                      | 0.34          | 0.34          | 0.40          |
| R² change                        | —             | 0.01          | 0.06***       |

*Bootstrapping test p < .05.
*p < .05; **p < .01; ***p < .001 (one-tailed).

and rumination, change in rumination (β = −0.29; p < .001) explained 8% of the variance in depressive symptoms at 3 months (t1). Bootstrapping analysis demonstrated that the indirect effect of changes in rumination was significant (95% confidence interval −2.54 to −1.9). We conclude that our third hypothesis is confirmed for the mediating role of ego-integrity and rumination in the effects of life-review compared with the waiting list condition.

**Moderator Analyses: Age Group**

To investigate our last hypothesis that the effects of life-review do not differ significantly across middle-aged and older adults, we first we examined whether the age groups (40–55; 55+) differed on depressive symptoms at the four time points. The age groups differed significantly on the baseline level of depressive symptoms (t = 2.03; p < .05), with middle-aged adults scoring higher (M = 25.37; SD = 9.27) than older adults (M = 22.64; SD = 8.23). There were no age group differences at the other measurement occasions. Second, we investigated whether age group functioned as a moderator, by investigating the interaction effect between age group and condition (life-review versus waiting list) on change in depressive symptoms between baseline (t0) and 3 months (t1) and the interaction effect

| Table 4. Change in Rumination as Mediator of the Effects of Life-Review on Depressive Symptoms at 3 Months (t1) |
|----------------------------------|---------------|---------------|---------------|
|                                  | Beta          | Beta          | Beta          |
| Block 1                          |               |               |               |
| Baseline depressive symptoms     | 0.57***       | 0.39***       | 0.39***       |
| Life-review (1) vs. waiting list  | -0.22**       | -0.23**       | -0.16*        |
| condition (0)                    |               |               |               |
| Block 2                          |               |               |               |
| Baseline rumination              | —             | 0.30**        | 0.45*         |
| Block 3                          |               |               |               |
| Change in rumination (t1 − t0)   | —             | —             | 0.34***       |
| Adjusted R²                      | 0.34          | 0.40          | 0.48          |
| R² change                        | —             | 0.06***       | 0.09***       |

*Bootstrapping test p < .05.
*p < .05; **p < .01; ***p < .001 (one-tailed).
as self-motivation may play a greater role. However, self-help therapies show many advantages over group therapies. Participants are relatively anonymous compared with group interventions, and they complete the intervention at any preferred time and location. The present intervention was indeed well-evaluated by the participants. Additionally, it was found that the effects in the life-review intervention were maintained at 6 and 12 months follow-up.

The effects of life-review were compared with not only a waiting list control condition but also an expressive writing intervention. With some smaller exceptions for psychological well-being and ego-despair, the effects on all outcomes are similar between both interventions. There are several explanations. First, in order to develop a control intervention that was plausible and acceptable to participants, expressive writing was adapted into a 7-week intervention (Frattaroli, 2006; Pennebaker & Chung, 2007). Although the intervention was less intensive than the life-review intervention, it was more intensive and included additional components such as psychoeducation on emotion regulation and instructions to write about positive emotions than the original expressive writing exercise. Second, preliminary analyses of the participants’ exercises indicate that participants in the expressive writing intervention underwent a similar development from writing about one’s past to one’s future as participants in the life-review intervention. This indicates that expressive writing may have enhanced similar processes as life-review. Third, there may be spillover effects in the methods used in e-mail guidance since every counselor provided feedback on participants from both conditions. Our expressive writing method may have been too intensive for a control intervention. However, we emphasize the importance to incorporate active control interventions in addition to a waiting list group. These are necessary to be able to evaluate the unique effects of life-review, besides attention and counseling effects, and to study long-term effects. We suggest future studies to seek for a plausible and convincing control intervention instead of the expressive writing intervention.

By confirming our third and fourth hypotheses, this study gained more insight into how and for whom life-review is effective. Partly in line with earlier suggestions that life-review is aimed at developing an accepting attitude toward one’s own life and coming to terms with unresolved conflicts from the past (Westerhof et al., 2010), the self-help life-review enhances ego-integrity. These results strengthen the meta-analytic findings on ego-integrity by Pinquart and Forstmeier (2012). Although Erikson (1959) formulated ego-integrity as the task of the last stage of life, this study shows that ego-integrity can be enhanced in adults aged 40 and older. Future research into other psychosocial issues, such as generativity (Cheng, 2009), gratitude, and wisdom (König & Glück, 2013), may be of interest. Moreover, participants that received life-review ruminated less 3 months after baseline than participants on the waiting list, disproving the criticism that participating in a life-review intervention would stimulate bitterness and rumination in people with depression (Coleman, 2005; Cully, LaVoie, & Gelfer, 2001). More importantly, increases in ego-integrity and decreases in rumination partly mediate the effects of life-review on depressive symptoms. In addition to processes of change such as negative reminiscence styles, mastery, positive thoughts (Korte et al., 2012), personal meaning (Bohmeier et al., 2008; Westerhof et al., 2010), and the retrieval of specific positive memories (Williams et al., 2007), the effectiveness of life-review on depressive symptoms is partly reached by increased levels of ego-integrity and decreased levels of rumination.

Last, we found no moderating effect of age, suggesting that life-review is broadly applicable and effective for both middle-aged and older adults. This is in line with findings that reminiscing takes place at all ages (Westerhof et al., 2010) and other interventions that found effects for middle-aged adults (Pinquart & Forstmeier, 2012). These findings underline the importance of involving middle-aged adults in life-review and offering life-review throughout the life course (Alwin, 2012).

Some limitations must be acknowledged. First, there may be a comorbidity of depressive symptoms with other mental illnesses and symptoms, resulting in a heterogeneous sample with more than merely mild to moderate depressive symptoms. Moreover, this study measured the decrease in symptoms of depression, but the presence or absence of depressive disorders was only measured at baseline. We recommend future research to evaluate whether life-review is also effective in preventing the development of depressive disorders. Furthermore, the mediation and moderation analyses have to be interpreted with care. Our findings indicate that changes in rumination and ego-integrity correlate with decreases in depressive symptoms, but mediation analyses do not allow for causal conclusions (Kazdin, 2007). For example, decreases in depressive symptoms may also lead to less rumination and more ego-integrity. The power in the moderator analyses may have been insufficient to detect age differences in the effects. However, the small differences in the effect sizes between middle-aged and older adults indicate that results would be similar in a larger sample.

**Conclusion**

Life-review is effective as online-guided self-help in comparison to a waiting list group on depressive symptoms and emotional and psychological well-being in adults with moderate depressive symptoms. Because the effects of life-review on depressive symptoms are partly related to changes in ego-integrity and rumination, future research should investigate the possibilities of stimulating the development of ego-integrity and reduction of rumination in more explicit ways. Life-review is broadly applicable to both middle-aged and older adults. Future research
should apply active control groups that do not resemble life-review methods to gain insight in the unique effects of life-review.

Correspondence

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