

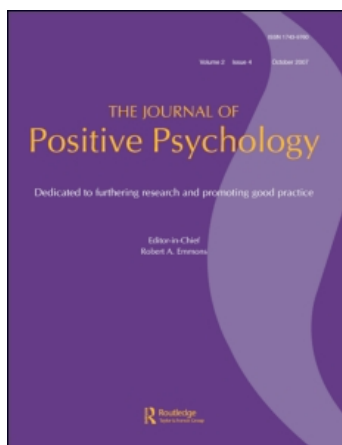
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### The benefits of self-compassion and optimism exercises for individuals vulnerable to depression

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## RESEARCH ARTICLE

### The benefits of self-compassion and optimism exercises for individuals vulnerable to depression

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The effectiveness of two online exercises intended to help individuals experience (1) self-compassion ( $n = 63$ ) and (2) optimism ( $n = 55$ ) were compared to a control intervention where participants wrote about an early memory ( $n = 70$ ). A battery of tests was completed at 1 week following the exercise period, and at 1-, 3-, and 6-month follow-ups. Both active interventions resulted in significant increases in happiness observable at 6 months and significant decreases in depression sustained up to 3 months. The interventions were examined in relationship to dependency and self-criticism, both related to vulnerability to depression. Individuals high in self-criticism became happier at 1 week and at 1 month in the optimism condition in the repeated measures analysis. A sensitivity test using multi-level modeling failed to replicate this effect. More mature levels of dependence (connectedness) were related to improvements in mood up to 6 months in the self-compassion condition. This study suggests that different personality orientations may show greater gains from particular types of positive psychology interventions.

**Keywords:** positive-psychology exercises; self-compassion; optimism; mature and immature dependence; self-criticism

#### Introduction

A call has been made by proponents of positive psychology to empirically study human strengths and positive emotional well-being, rather than focusing exclusively on experiences of suffering (Rashid, 2009; Seligman & Csikszentmihalyi, 2000; Seligman, Steen, Park, & Peterson, 2005). Previous research has highlighted the beneficial effects of positive psychology exercises, including a recent meta-analysis indicating that these interventions, overall, increase well-being and reduce depressive symptoms (Sin & Lyubomirsky, 2009). Mitchell, Stanimirovic, Klein, and Vella-Brodrick (2009) investigated three positive psychology interventions disseminated *via* the internet, and despite mixed results, reported increased well-being as a result of a strength-based online exercise. This study examined the efficacy of two online self-help interventions that have not been empirically studied to date, intended to teach individuals to utilize their own resources in order to enhance emotional well-being, which we defined as an increase in happiness and decrease in depression. We were also interested in determining whether those at risk for depression may profit from these exercises and whether there may be differential responses based on the depressive personality variables tested.

Numerous studies using both clinical and non-clinical samples have established a solid foundation for the vulnerability to depression entailed by dependent and self-critical personality styles (Mongrain & Leather, 2006; Nietzel & Harris, 1990; Zuroff, Mongrain, & Santor, 2004). Specifically, dependency and self-criticism have been associated with both dysphoria and severity of depression in cross-sectional and longitudinal studies (Luyten et al., 2007; Mongrain & Leather, 2006; Mongrain, Lubbers, & Struthers, 2004). Santor and Patterson (2004) found that these personality orientations were prospectively related to both the number and duration of mood disturbances, and Mongrain and Leather (2006) found neediness and self-criticism to prospectively predict future episodes of depression.

Self-critical individuals have a self-evaluative and self-abating nature and often feel extreme guilt and shame for not living up to the demanding standards they set for themselves (Blatt, 1974). When self-critics perceive that they have failed, they criticize themselves in a hostile manner, generating feelings of worthlessness and perpetuating negative affect.

Dependent individuals are characterized by significant concerns about abandonment and the dissolution of interpersonal relationships (Blatt, 1974). Their main

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goal is to be nurtured, loved, and protected (Bornstein, 1992). Two facets of the dependency factor on the Depressive Experiences Questionnaire (DEQ; Blatt, d'Afflitti, & Quinlan, 1976) have been further identified. One facet of dependency is an immature form involving intense fears of abandonment and rejection, a sense of helplessness, and extreme anxiety surrounding the loss of interpersonal relationships (Blatt, Zohar, Quinlan, Zuroff, & Mongrain, 1995; Rude & Burnham, 1995). This form of dependency, coined as 'neediness' (Rude & Burnham, 1995), has been associated with more severe pathology and a greater risk for depressive recurrences (Schulte, Mongrain, & Flora, 2008). Mature dependency, referred to as 'connectedness,' (Rude & Burnham, 1995) involves more adaptive correlates, but is associated with an inordinate need to please others (Schulte et al., 2008). Connected individuals can attain positive and trusting interactions with others, although they still experience anxiety around specific relationships (Blatt et al., 1995; Whiffen, Aube, Thompson, & Campbell, 2000).

Finding therapeutic interventions that enhance well-being for those at risk to depression is integral, in efforts to prevent distress from escalating to clinical levels. Recently, self-compassion has been proposed as an important tool to improve mood and well-being, and has been incorporated within the therapy setting (Gilbert & Irons, 2005; Neff, 2003). Self-compassion has a long historical tradition in Eastern healing practices and has been described by Neff (2003) as a perspective in which one espouses a positive view of himself and his emotional experiences. Self-compassionate persons, accepting both suffering and loss, allow themselves to non-judgmentally engage in self-appraisals rooted in warmth and kindness.

Being compassionate toward the self has been correlated with positive mental health outcomes, including lower levels of depression, less self-evaluative anxiety, less rumination, lowered negative affect, and higher life satisfaction (Leary, Tate, Adams, Allen, & Hancock, 2007; Neff, 2003). In a correlational study, Neff, Rude, and Kirkpatrick (2007) also reported that self-compassion was linked to a variety of indicators of emotional well-being, ranging from positive emotions and optimism to greater ambition and inquisitiveness. Given these promising findings, further empirical research into the benefits of self-compassion as a tool to increase emotional well-being is necessary.

Optimism has also been lauded as important to enhance emotional well-being. Essentially, optimists are individuals who generally have positive expectations about what will happen to them in their lives (Scheier & Carver, 1985). In addition to numerous health benefits that accompany being optimistic, a plethora of studies indicate that optimists are better able to cope with adversity across a variety of life domains, using more active and problem-focused

coping techniques (Aspinwall & Taylor, 1992; Nes & Segerstrom, 2006). Importantly, optimism has also been associated with lowered psychological distress, including lower levels of anxiety and depressive symptoms, and greater subjective well-being (Scheier, Carver, & Bridges, 2001). Therefore, an intervention that teaches individuals to visualize a better future should thus be particularly helpful.

Recently, exercises involving the cultivation of optimism through the visualization of a positive potential future were empirically investigated. King (2001), for example, found that compared to other control writing interventions, undergraduates who wrote about their future from a positive perspective for 4 days, increased in subjective well-being after 3 weeks and evidenced fewer incidences of illnesses at 5 months post-test. Given these encouraging findings, further research is needed into the effectiveness of such future-oriented exercises, albeit with a more diversified sample.

O'Hanlon (2006, 2007) described a letter writing exercise to be utilized in therapy that also focuses on visualizing a better future. In this intervention, individuals imagine their future in which issues that are bothering them at the moment have been resolved, opening up the possibility that change in their current situation is attainable, and helping individuals coach themselves in attaining their goals. Individuals then write a letter from their future self where these issues have been settled, describing in detail how they achieved this positive outcome, and provide themselves with compassionate advice. To our knowledge, no study has yet directly examined the effectiveness of this exercise involving letter writing from a future self.

### *The current study*

This research examined the effect of two interventions delivered over the internet and designed to develop self-compassion and optimistic thinking. The intervention consisted of daily exercises delivered over a 7-day period. Participants in the 'self-compassion' condition wrote a letter about a distressing event that happened during the day, providing compassion to themselves. Those in the 'optimism' condition visualized a future where current issues were resolved and gave themselves advice on how to get there, also in the form of a letter. These two experimental groups were compared to a control condition, where participants wrote freely about an early memory (based on Seligman et al., 2005). This condition was utilized to control for positive expectancies for change or demand characteristics of the study, and to rule out that any improvements in well-being were merely due to the act of writing or the passage of time. Participants completed baseline measures of mood and personality and were

followed for a period of 6 months to determine sustained improvements in emotional well-being.

It was expected that at the conclusion of the 1 week study period, participants in the self-compassion condition and optimism condition would show greater increases in emotional well-being, that is, increases in happiness and decreases in depressive symptoms, compared to the control condition. These gains were expected to remain throughout follow-ups at 1-, 3-, and 6-month post-test. These hypotheses are supported by previous research examining similar interventions (Leary et al., 2007; Seligman et al., 2005; Sheldon & Lyubomirsky, 2006).

This study also explored the possibility that these interventions would address problematic inner dynamics experienced by individuals presenting with a vulnerability to depression. We hypothesized that therapeutic techniques intended to engender self-compassion would advantageously target documented deficiencies associated with self-criticism. Self-compassion mitigates negative reactions to distressing events, particularly when coping with failure and rejection (Leary et al., 2007), two salient issues for self-critical and dependent individuals, respectively. More specifically, self-critics harbor perfectionistic dysfunctional beliefs (Mongrain & Zuroff, 1989) and have difficulties engendering feelings of self-compassion (Gilbert, Baldwin, Irons, Baccus, & Palmer, 2006), both of which were specifically targeted in the self-compassion exercise. Thus, a non-judgmental and self-compassionate stance toward oneself should be particularly valuable for self-critics.

The predictions for dependency incorporated the distinction made between mature and immature levels of this trait. Connected individuals are high in communion (Zuroff, Moskowitz, & Cote, 1999) and are related to both exploitable and loving traits (Pincus & Wilson, 2001). Consequently, one would expect that connected individuals should have the ability to engender self-compassion and profit from its associated benefits. Developing the ability to soothe oneself should be helpful for needy individuals who tend to rely excessively on obtaining reassurance from others (Mongrain, 1998). The ability to self-soothe could also improve the relationships of needy individuals (Coyne, 1976; Joiner, Metalsky, F. Gencoz & T. Gencoz, 2001). However, the self-compassion exercise could be very difficult for those high on neediness as they may not have the inner resources necessary to abandon their reassurance-seeking strategies. Furthermore, since needy individuals require the presence of others to maintain emotional well-being (Bornstein, 1992), an exercise that does not address this need may be minimally therapeutically relevant to needy individuals. Therefore, we expected a self-compassion-focused exercise to be particularly relevant for those exhibiting

connected or self-critical traits, while the potential benefits for needy individuals were more exploratory.

The second intervention aimed at imagining a more positive future and giving oneself advice and support should also be particularly helpful for individuals vulnerable to depression given the negative view of one's self, world and future associated with this condition (Beck, Rush, Shaw, & Emery, 1979). Such optimistic thinking would be expected to be particularly beneficial for self-critics who emphasize and focus on their flaws, teaching these individuals more constructive ways of construing current issues in their lives, while still preserving their autonomy. Self-critical people also typically engage in avoidant coping (Dunkley, Zuroff, & Blankstein, 2003), and the optimism exercise could teach these individuals more active coping strategies for currently distressing events.

For connected individuals, we theorized that they would have the inner resources necessary to engage in and benefit from the optimism exercise, as this personality style has been associated with less psychopathology than neediness (McBride, Zuroff, Bacchiochi, & Bagby, 2006). Theoretically, this type of exercise could also be useful for needy individuals, who tend to feel helpless, by teaching them active coping skills to deal with difficult life situations (Mongrain, 1998). However, given their heightened levels of psychopathology and anxious attachment style (Whiffen et al., 2000), needy individuals may find it too difficult or anxiety provoking to move away from the typical reassurance-seeking strategies that they utilize.

## Method

### Participants

The internet sample was recruited primarily through advertisements placed on Facebook and was open to all Canadians. Participants ( $n = 1002$ ) were primarily female ( $n = 817$ ), male ( $n = 164$ ), Caucasian (79.4%), and earned an average yearly income between \$30,000 and \$40,000. The age of participants ranged from 18 to 72 ( $M = 34$  years). There was no exclusionary criterion for the study except for being at least 18 years of age and Canadian. Baseline mean scores for depressive symptoms and happiness were 21.5 and 2.62, respectively, with the former suggesting a moderately distressed sample.

### Participant remuneration

Upon completion of the 1 week exercise and post-test measures, participants registering in the first phase of the study received 30 dollars as remuneration ( $n = 324$ ). In order to increase sample size, data continued to be collected but subsequent participants were instead



entered into a \$1000 draw ( $n = 678$ ). All participants regardless of date of entry into the study were asked to complete follow-up assessments at 1-week post-test, and 1, 3, and 6 months later. After each completed follow-up, participants were entered into a \$1000 raffle.

### Measures

#### *Depressive Experiences Questionnaire* (Blatt et al., 1976)

The DEQ is a 66-item questionnaire that is a well known, reliable, and valid measure of self-criticism and dependency (Zuroff et al., 2004). The dependency subscale has been further distinguished at two levels, a mature subtype ('connectedness') and a more immature form ('neediness'; Blatt et al., 1995; Rude & Burnham, 1995). Previous research has found strong test-retest reliability (Bagby, Parker, Joffe, & Buis, 1994), and considerable internal consistency, with Cronbach's alphas ranging between 0.80 to 0.81 for dependency and 0.75 to 0.77 for self-criticism (Zuroff, Quinlan, & Blatt, 1990).

#### *Center for Epidemiological Studies Depression Scale* (Radloff, 1977)

This scale (shortly CES-D) is a widely used measure consisting of 20 items assessing the prevalence of depressive symptoms over the previous week. A 4-point scale was utilized, ranging from zero (less than 1 day) to four (most or all of the time). The CES-D has reportedly strong internal consistency (Schulte et al., 2008), as well as strong internal reliability (Radloff, 1977). The internal consistency for the CES-D in this study was 0.80. The baseline mean CES-D scores in our sample were in the moderate range ( $M = 21.5$ ).

#### *Steen Happiness Index* (Seligman et al., 2005)

This index (shortly SHI) is a new measure intending to measure changes in happiness, in particular, increases in happiness. The SHI is comprised of 20 items based on the structure of the Beck Depression Inventory (BDI), and taps into Seligman's definitions of happiness including an assessment of pleasure, engagement, and meaning in life (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Seligman et al., 2005). Participants were required to select one of five statements that best depicted their current states, ranging from a negative to a positive response (e.g., one = I am joyless; five = Almost everything about my life fills me with joy). Seligman et al. (2005) reported convergent validity with other happiness measures, including Lyubomirsky and Lepper's General Happiness Scale (1999) and Fordyce's (1977) Happiness Scale.

Peterson and Park (2009) reported that the SHI evidenced strong internal consistency and test-retest reliability over time (from the Seligman et al., 2005 data). In this research, internal consistency for the SHI was very high at 0.95.

### Procedure

This study was conducted online through a website designed by the research team ([www.projecthopecanada.com](http://www.projecthopecanada.com)). The exercises were part of a larger study of online self-help interventions called 'Project HOPE' (Harnessing One's Personal Excellence). A similar American research project (The Trustees of the University of Pennsylvania, 2006) was consulted for web-based design strategies.

After registering online and indicating informed consent, participants ( $n = 1002$ ) were asked to complete a battery of questionnaires before being randomly assigned *via* a computer program to one of the three conditions (self-compassion,  $n = 327$ ; optimism  $n = 322$ ; or control condition,  $n = 353$ ). Participants were briefly informed of their exercise and were told that (1) starting the next night, they would have to log on to the website every night for 7 days to complete their exercises, and (2) on the seventh day they would complete another battery of questionnaires.

Participants assigned to the self-compassion condition were provided with a rationale and instructions for engaging in a daily psychological exercise promoting a supportive, caring, and compassionate stance toward the self. Participants were asked to think about an event that occurred that day which was distressing and left them feeling upset. Next, they were asked to write a one paragraph letter to themselves in the first person about the situation. The following instructions were provided to participants:

To start writing your own letter, try to feel that part of you that can be kind and understanding of others. Think about what you would say to a friend in your position, or what a friend would say to you in this situation. Try to have understanding for your distress (e.g., I am sad you feel distressed . . .) and realize your distress makes sense. Try and be good to yourself. We would like you to write whatever comes to you, but make sure this letter provides you with what you think you need to hear in order to feel nurtured and soothed about your stressful situation or event. This letter may take about 5–15 min to write, and there is no 'right' or 'wrong' way of doing it.

Participants in the optimism condition were asked to imagine a positive future in a variety of domains, for example, one's life in general, family relationships, or work and school life. In writing, participants elaborated on this positive future, where current issues were resolved, and were asked to give themselves sage advice from their future self. Participants were provided with

a rationale and the following instructions for engaging in this daily exercise:

Imagine yourself in the future (6 months/1 year/2 years/5 years/10 years from now – Pick a time frame that makes sense to you). Imagine you are in a better place where you have resolved some of the issues that are concerning you now.

- (1) Describe where you are, what you are doing, and what is happening in your life. Enrich with as much detail as possible.
- (2) Tell yourself the crucial things you realized or the critical steps you took to get there. Give yourself some sage and compassionate advice from a better future.

Participants in the control early memory condition were asked to think about an early memory and write about it in as much detail as possible. It was explained to participants that early life experiences can be influential later in life, and that reflecting upon and writing about these experiences may help them gain insight and understanding into whom they are and contribute to overall well-being. The instructions for this exercise were explained:

Describe an early memory in as much detail as possible. What were you doing? What were you were feeling? Who else was with you? (If you cannot remember some of the details, that is OK. Just type down what you can remember).

Once participants completed the baseline and 1-week assessments, they were sent e-mails at 1-, 3-, and 6-month post-test encouraging them to return to the website for a follow-up assessment. Follow-up questionnaires included the CES-D and SHI. E-mails were sent at 2 and 4 months post-test with a copy of their exercise instructions, encouraging participants to continue practicing the exercise if they found it beneficial.

### **Data-analytic strategy**

The first approach to the data analyses involved repeated measures analysis of variance (ANOVAs). This is in keeping with studies with a very similar design (e.g., Seligman et al., 2005) and appeared to be a legitimate first step in exploring the data. A drawback of this approach is that participants with missing data points are excluded. Those who drop out may not be a random subset of the full sample, compromising the generalizability of the results particularly in studies with high attrition rates. To address these limitations, a second statistical approach was employed and the results were contrasted to those obtained with the repeated measures ANOVA to determine the robustness of our findings.

Imputation methods (intent-to-treat analyses) have been widely used in controlled clinical trials to address issues with high attrition rates and missing data (Lachin, 2000). For example, Last Observation

Carried Forward (LOCF) is often used in clinical research where participants' missing values at follow-up are replaced with their last measurement scores. The main advantage of this approach is that no participant is eliminated. It is also one of the few options available for longitudinal studies with high attrition rates and small sample sizes (e.g., Mitchell et al., 2009). A drawback to this approach is the assumption that participants with only one observation at baseline would have been 'treatment failures' (i.e., their baseline values are carried forward). This is a conservative assumption given that those participants may have improved had they completed the study leading to an inflated likelihood of making a Type II error in the evaluation of a given intervention. To avoid *ad hoc* imputations and the restrictive assumptions of intent-to-treat analyses, we considered an alternative statistical approach.

A recent study compared intent-to-treat analysis to a mixed model approach in longitudinal clinical trials with missing data (Chakraborty & Gu, 2009). Based on a detailed investigation using simulation studies with different missing value scenarios, linear mixed models were found to be more powerful than *ad hoc* imputation methods. In the case of studies with a high percentage of missing values, mixed models were deemed superior. This technique uses all points in a data set and makes weighted projections for participants with missing values based on the sample's overall trajectory. Time is modeled more accurately, which is important when follow-up assessments are unevenly spaced over the study period. Mixed models also account for the variability among participants in their trajectories over time, providing more reliable estimates of change. For these reasons, a mixed model approach was adopted and the results were compared to those obtained using repeated measures ANOVAs.

## **Results**

### **Completers vs. non-completers across time**

A total of 1002 participants were randomized to one of the three conditions and they completed the baseline assessment. There were no baseline differences in depressive symptoms, happiness, self-criticism, connectedness, neediness, age, or income across the experimental groups. Of these, 653 (65.2%) individuals completed the 1-week assessment, rendering them eligible to complete the three follow-up assessments. Complete data at all five time points (baseline, 1 week, 1 month, 3 months, 6 months) was available for 203 participants on the CES-D, and for 197 participants on the SHI. These individuals were categorized as 'completers,' regardless of the number of days they engaged in the exercise over the active intervention

period. Thus, the drop-out rate for the study was high (79.7%; 799 out of 1002).

Independent sample *t*-tests were conducted at 6 months to discern whether there were differences between those who completed the study and those who did not, as our repeated measures analyses only included participants who completed questionnaires at all time points. Those who completed the 6-month follow-up were older,  $t(986) = -4.87$ ,  $p < 0.001$  (two-tailed), lower on neediness,  $t(345.24) = 2.73$ ,  $p = 0.01$  (two-tailed), and scored lower on the CES-D,  $t(361.01) = 1.99$ ,  $p = 0.05$  (two-tailed) at baseline. Thus, participants who adhered to the entire project and remained until the 6-month assessment were less needy, less depressed, and older at baseline. These findings suggest that there were systematic factors involved in the drop-out rate that require consideration in the interpretation of the study findings and generalizability of the results.<sup>1</sup>

### Correlations

As can be seen in Table 1, income was positively correlated with happiness but negatively correlated with depressive symptoms, neediness, connectedness, and self-criticism. Participant's age was negatively correlated with neediness and self-criticism. Whether or not participants were paid (32% of the sample received remuneration) was negatively associated with depressive symptoms at baseline, as well as connectedness. The extent to which participants adhered to their exercise, as measured by logging on to the website and electronically submitting an exercise (i.e.,

'0' = participant did not complete exercise on any night and '1' = participant completed the exercise on one or more nights) was also positively correlated with being paid. Thus, given the association between mood, personality, age, income, adherence, and payment status, the demographic variables were controlled for in subsequent analyses to remove these potential design and demographic confounds.

### Repeated measures ANOVAs

Repeated measures ANOVA's were conducted to investigate if well-being over time (baseline, 1-week, 1-month, 3-months, 6-months) was predicted by intervention (self-compassion, optimism, and early memories) and/or personality (neediness, connectedness, and self-criticism<sup>2</sup>). Separate repeated measures ANOVAs were performed for the CES-D and SHI at all time points. Self-criticism, neediness, and connectedness were split into high and low scores based on their median. All data were checked for normality and outliers were detected and removed on the SHI. To account for the numerous simple effect contrasts, alpha was set to 0.025. We also checked for homogeneity of slopes and no interactions were significant.

### Depressive symptoms

The repeated measures analysis with the CES-D as the outcome measure at all five time points indicated a significant Time by condition interaction,  $F(8, 370) = 2.15$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.04$ ,  $n = 203$ . This suggests that changes in depressive symptoms occurred over time depending on the condition assigned to

Table 1. Correlations among study variables at baseline for completers ( $n = 1002$ ).

	1	2	3	4	5	6	7	8	9	10
1. Condition	1.0									
2. Paid	-0.03	1.0								
3. Adherence <sup>a</sup>	-0.06	0.31**	1.0							
4. Income ( $n = 974$ )	-0.00	-0.04	-0.02	1.0						
5. Age ( $n = 988$ )	-0.01	-0.05	0.06	0.36**	1.0					
6. Neediness <sup>b</sup> ( $n = 999$ )	0.03	-0.06	-0.06*	-0.21**	-0.18**	1.0				
7. Connectedness <sup>c</sup> ( $n = 999$ )	0.06	-0.07*	-0.05	-0.07*	-0.04	0.40**	1.0			
8. Self-criticism <sup>d</sup> ( $n = 999$ )	0.03	-0.06	-0.03	-0.14**	-0.09**	0.50**	0.34**	1.0		
9. Depressive symptoms <sup>e</sup> (Baseline)	-0.00	-0.12**	-0.06	-0.15**	0.00	0.44**	0.27**	0.58**	1.0	
10. Happiness <sup>f</sup> (Baseline)	-0.02	0.08*	0.06	0.19**	0.01	-0.51**	-0.23**	-0.65*	-0.66**	1.0
Means and frequencies	5.52	32% paid	20.3% adhered	\$30,00–40,000 (3.84)	33.55	0.21	-0.33	0.33	21.5	2.62
SD	3.71		0.43		11.59	0.83	0.92	1.02	14.57	0.76

Notes: SD, Standard deviations.

<sup>a</sup>Coded '0' = did not complete any exercises or '1' = completed at least one daily exercise.

<sup>b,c,d</sup>Neediness, connectedness, and self-criticism scale from the DEQ (Blatt et al., 1976).

<sup>e</sup>From the CES-D (Radloff, 1977).

<sup>f</sup>From the SHI (Seligman et al., 2005).

\* $p < 0.05$ ; \*\* $p < 0.01$ .

participants (Figure 1). Simple effect contrasts indicated that at 1 month,  $t(186) = -3.10, p < 0.001$ , and 3 months,  $t(186) = -2.93, p < 0.001$ , individuals in the optimism condition were less depressed than those in the early memories condition (see Table 2 for means and standard errors (SEs) of each simple effect contrast for depressive symptoms).<sup>3</sup> At 3 months, those in the self-compassion condition were less depressed than individuals in the early memories condition,  $t(186) = -2.60, p = 0.01$ . This provides preliminary

evidence for the effectiveness of the active interventions.

The repeated measures analysis including the CES-D as the outcome measure also produced a significant interaction between Time, self-criticism, and connectedness,  $F(4, 184) = 2.43, p = 0.05, \eta_p^2 = 0.05$ . This suggests that self-criticism and connectedness predicted varying levels of change over time, regardless of condition. Simple effect contrasts revealed that from baseline to 3 months,  $t(186) = 3.64, p < 0.001$ ,

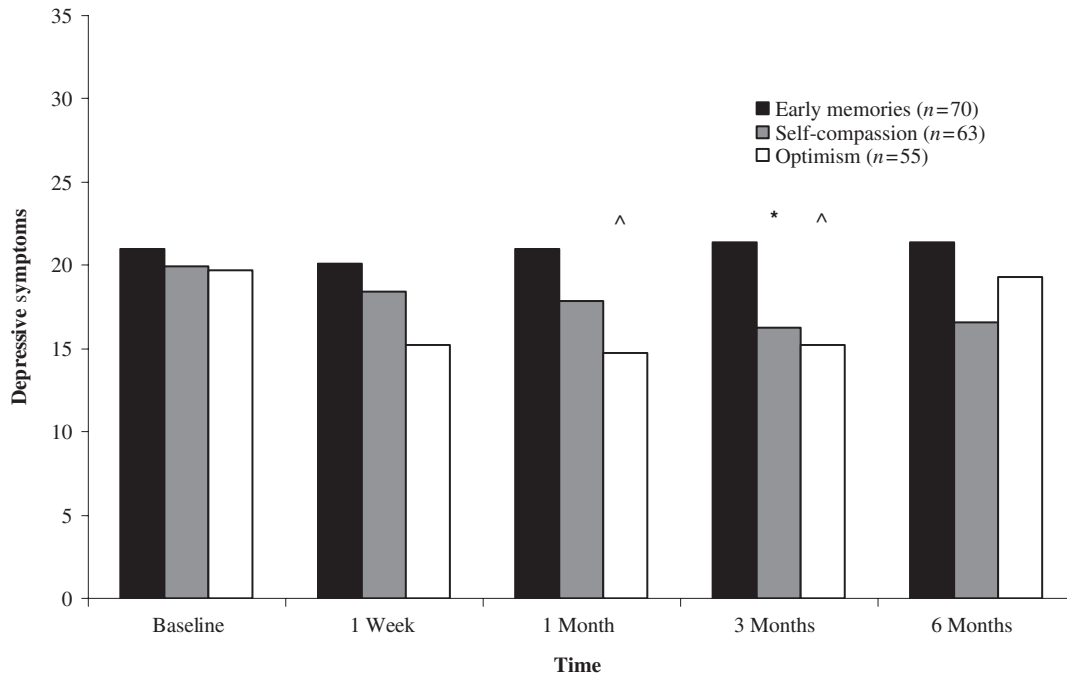


Figure 1. Bars represent the mean score on the CES-D (Radloff, 1977) for each condition at each time point. A significant time by condition effect was found,  $F(8, 370) = 2.15, p = 0.04$ . *Post hoc* simple effect contrasts showed that compared to the early memories condition, individuals in the optimism condition showed significantly greater reductions in depressive symptoms at 1 month and 3 months (^). Those in the self-compassion condition showed significantly greater reductions in depressive symptoms at 3 months compared to the control condition (\*).

Table 2. Means, SEs, and *p*-values of simple effect contrasts on the CES-D.

	Mean 1 (SE)	Mean 2 (SE)	<i>p</i>
<b>Time × Condition</b>			
(1) Optimism vs. (2) Early memories – 1 month	14.85 (1.36)	20.35 (1.12)	<0.001
(1) Optimism vs. (2) Early memories – 3 months	15.34 (1.44)	20.85 (1.19)	<0.001
(1) Self-compassion vs. (2) Early memories – 3 months	16.26 (1.30)	20.85 (1.19)	0.01
<b>Time × Self-criticism × Connectedness</b>			
(1) High CON/High SC vs. (2) High CON – 3 months	22.23 (1.56)	13.94 (1.55)	<0.001
(1) High CON/High SC vs. (2) High SC – 3 months	22.23 (1.56)	15.99 (1.71)	0.01
<b>Time × Condition × Connectedness</b>			
High CON: (1) Self-compassion vs. (2) Early memories – 3 months	14.41 (1.87)	20.25 (1.70)	0.02
High CON: (1) Self-compassion vs. (2) Optimism – 6 months	14.44 (2.00)	24.89 (2.25)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 1 month	12.88 (1.84)	20.39 (1.62)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 3 months	12.34 (1.98)	21.06 (1.74)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 6 months	14.19 (2.21)	21.58 (1.87)	0.01
Low CON: (1) Optimism vs. (2) Self-compassion – 1 month	12.88 (1.84)	20.08 (1.79)	0.01

Notes: CES-D values are taken from (Radloff, 1977); CON, connectedness; SC, self-criticism.



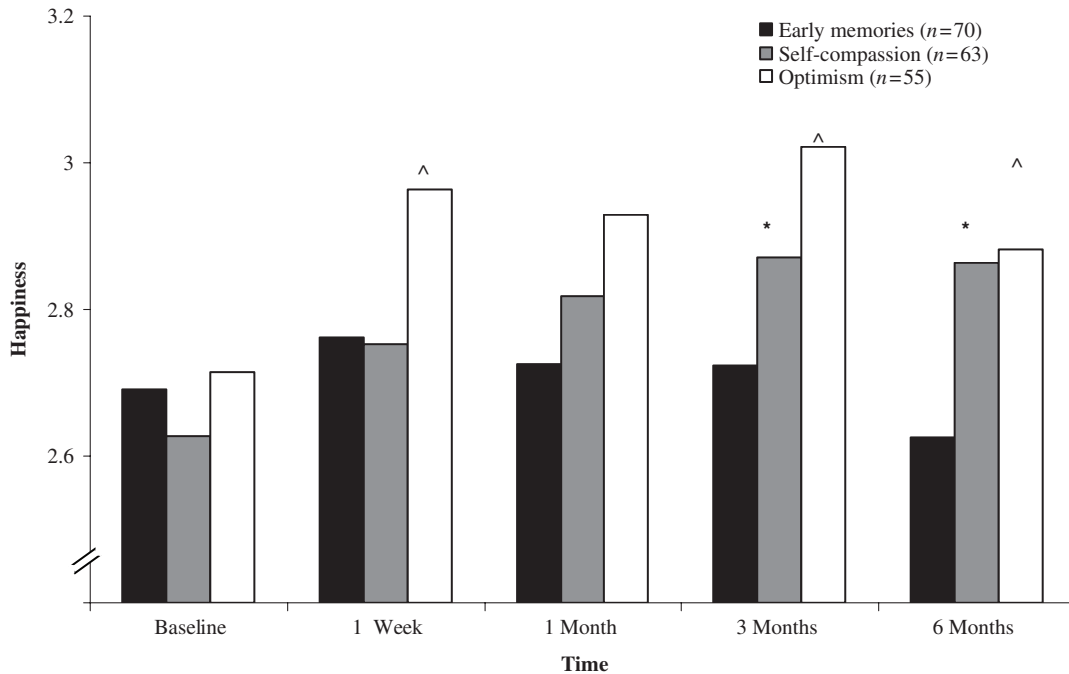


Figure 2. Bars represent the mean score on the SHI (Seligman et al., 2005) for each condition at each time point. A significant time by condition effect was evidenced,  $F(8, 358) = 2.56, p = 0.01$ . *Post hoc* simple effect contrasts showed that compared to the early memories condition, individuals in the optimism condition (<sup>^</sup>) showed significantly greater increases in happiness at 1 week, 3 months, and 6 months. Those in the self-compassion condition (<sup>\*</sup>) showed significantly greater increases in happiness at 3 months, and 6 months, compared to the control condition.

individuals high in both connectedness and self-criticism showed less change in terms of depressive symptoms than highly connected individuals. At 3 months, those high on both personality variables also showed less improvement than those who were self-critical,  $t(186) = 2.77, p = 0.01$ . In sum, across conditions, individuals high on both vulnerability measures had greater difficulty benefiting from the exercise interventions, and showed less positive change in terms of depressive symptoms than those low on one or both of these vulnerability markers.

Furthermore, a Time by condition by connectedness interaction was found for depressive symptoms,  $F(8, 370) = 2.12, p = 0.03, \eta_p^2 = 0.04$ . This indicated that the impact of the exercises on depression depended on whether an individual was high or low in connectedness. Simple effect contrasts revealed that compared to the early memories condition, participants high on connectedness profited more, or showed greater decreases in depressive symptoms in the self-compassion condition at 3 months,  $t(186) = -2.33, p = 0.02$ . Furthermore, those high in connectedness profited more from the self-compassion exercise compared to the optimism condition at 6 months,  $t(186) = -3.45, p < 0.001$ . In contrast, individuals who were low in connectedness profited more in the optimism condition compared to those in the early memories condition at 1 month,  $t(186) = -3.06, p < 0.001$ , 3 months,  $t(186) = -3.30, p < 0.001$ , and 6 months,

$t(186) = -2.61, p = 0.01$ . Moreover, those low on connectedness also showed greater decreases in depression in the optimism condition compared to the self-compassion condition at 1 month,  $t(186) = -2.81, p = 0.01$ . In summary, those high in connectedness profited most over time from the self-compassion exercise when compared to the optimism and control conditions. Conversely, those low on connectedness profited more from the optimism exercise compared to the early memories and self-compassion conditions. No significant main or interaction effects for neediness were found.

### Happiness

A Time by condition interaction was present,  $F(8, 358) = 2.56, p = 0.01, \eta_p^2 = 0.05, n = 197$ , indicating that changes in happiness over Time was predicted by exercise condition (Figure 2). Simple effect contrasts revealed that at 1 week,  $t(180) = 2.65, p = 0.01$ , 3 months,  $t(180) = 3.18, p < 0.001$ , and 6 months,  $t(180) = 2.45, p = 0.02$ , individuals in the optimism condition were happier than those in the early memories condition (see Table 3 for means and SEs of each simple effect contrast for happiness). At 3 months,  $t(180) = 2.45, p = 0.02$ , and 6 months,  $t(180) = 3.20, p < 0.001$ , those in the self-compassion condition were happier than those in the early memory condition,

Table 3. Means, SEs, and *p* values of simple effect contrasts on the SHI.<sup>a</sup>

	Mean 1 (SE)	Mean 2 (SE)	<i>p</i>
Time × Condition			
(1) Optimism vs. (2) Early memories – 1 week	2.96 (0.05)	2.78 (0.04)	0.01
(1) Optimism vs. (2) Early memories – 3 months	3.01 (0.07)	2.74 (0.06)	<0.001
(1) Optimism vs. (2) Early memories – 6 months	2.87 (0.07)	2.64 (0.06)	0.02
(1) Self-compassion vs. (2) Early memories – 3 months	2.94 (0.06)	2.74 (0.06)	0.02
(1) Self-compassion vs. (2) Early memories – 6 months	2.93 (0.07)	2.64 (0.06)	<0.001
Time × Condition × Self-criticism			
High SC <sup>b</sup> : (1) Optimism vs. (2) Early memories – 1 week	3.06 (0.08)	2.65 (0.07)	<0.001
High SC: (1) Optimism vs. (2) Early memories – 1 month	3.06 (0.10)	2.73 (0.08)	0.01
High SC: (1) Optimism vs. (2) Self-compassion – 1 week	3.06 (0.08)	2.75 (0.07)	<0.001
Time × Condition × Connectedness			
High CON <sup>c</sup> : (1) Self-compassion vs. (2) Early memories – 3 months	3.03 (0.08)	2.75 (0.08)	0.01
High CON: (1) Self-compassion vs. (2) Early memories – 6 months	3.11 (0.09)	2.67 (0.08)	<0.001
High CON: (1) Self-compassion vs. (2) Optimism – 6 months	3.11 (0.09)	2.66 (0.10)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 1 month	3.05 (0.09)	2.68 (0.07)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 3 months	3.17 (0.09)	2.73 (0.08)	<0.001
Low CON: (1) Optimism vs. (2) Early memories – 6 months	3.09 (0.10)	2.61 (0.09)	<0.001
Low CON: (1) Optimism vs. (2) Self-compassion – 3 months	3.17 (0.09)	2.84 (0.09)	0.01
Low CON: (1) Optimism vs. (2) Self-compassion – 6 months	3.09 (0.10)	2.75 (0.10)	0.02

Notes: <sup>a</sup>From the SHI (Seligman et al., 2005).

<sup>b</sup>SC, self-criticism.

<sup>c</sup>CON, connectedness.

again providing evidence for the effectiveness of the interventions.

A Time by condition by self-criticism interaction was also present,  $F(8, 358) = 2.00$ ,  $p = 0.05$ ,  $\eta_p^2 = 0.04$ , revealing that over time, changes in happiness depended on both the condition assigned in interaction with levels of self-criticism. Simple effect contrasts indicated that at 1 week,  $t(180) = 3.84$ ,  $p < 0.001$ , and 1 month,  $t(180) = 2.73$ ,  $p = 0.01$ , individuals high in self-criticism became happier in the optimism condition compared to the early memories condition. At 1 week, individuals high in self-criticism were happier in the optimism condition as opposed to the self-compassion condition,  $t(180) = 2.93$ ,  $p < 0.001$ .

A Time by condition by connectedness interaction was also found for happiness,  $F(8, 358) = 2.13$ ,  $p = 0.03$ ,  $\eta_p^2 = 0.05$ . This suggests that the changes over time depended on condition for high or low levels of connectedness. Simple effect contrasts showed that those who were high in connectedness were happier in the self-compassion condition than in the early memories condition at 3 months,  $t(180) = 2.33$ ,  $p = 0.01$ , and 6 months,  $t(180) = 3.59$ ,  $p < 0.001$ . Additionally, those who were high in connectedness were happier in the self-compassion condition compared to the optimism condition at 6 months,  $t(180) = 3.20$ ,  $p < 0.001$ . Conversely, at 1 month,  $t(180) = 3.21$ ,  $p < 0.001$ , 3 months,  $t(180) = 3.58$ ,  $p < 0.001$ , and 6 months,  $t(180) = 3.49$ ,  $p < 0.001$ , individuals who were low in connectedness were happier in the optimism condition compared to the early memories condition. Individuals who were low in connectedness were also happier in the

optimism condition compared to the self-compassion condition at 3 months,  $t(180) = 2.55$ ,  $p = 0.01$ , and 6 months,  $t(180) = 2.37$ ,  $p = 0.02$ . As with depressive symptoms, individuals high in connectedness showed a greater increase in happiness in the self-compassion intervention. Conversely, those low on this personality variable profited more from the optimism condition. As we found with depressive symptoms, immature dependence did not affect responses to the interventions.

### Sensitivity analysis using multi-level modeling

The previous results included completers only, or participants who had provided data at all time points. Given the high attrition rate in our sample, the generalizability of our findings is compromised. A sensitivity analysis involving multi-level modeling was conducted to determine the robustness and reliability of our previous findings. The multi-level models were run on participants who provided data at baseline and 1 week ( $n = 639$ ), in order to preserve a more balanced data set and produce reliable estimates. Maximum likelihood estimation was used to estimate parameters in the models.

### Depressive symptoms

The model tested included all of the predictors previously reported for the repeated measures analyses, and included as fixed effects: income, adherence, payment status, age, connectedness, self-criticism,

exercise condition, and higher order interaction effects between time, condition, and personality. Inspection of the random effects for this model revealed that the rate of change among participants, or the slope of the trajectories varied significantly (Estimate = 0.92, SE = 0.41,  $z = 2.23$ ,  $p < 0.05$ ), controlling for all variables in the model. As well, participants' initial status in terms of depression showed significant variability (Estimate = 62.38, SE = 5.21,  $z = 11.98$ ,  $p < 0.0001$ ). However, the rate of change for participants did not covary with their baseline levels of depression (Estimate = -0.59, SE = 1.25,  $z = -0.47$ ,  $p = 0.64$ ). This suggests that participants' depressive status at the outset of the study did not systematically impact their rate of change over time.

In terms of the fixed effects, a Time by connectedness interaction was obtained (Estimate = -0.51, SE = 0.25,  $t = -1.99$ ,  $p < 0.05$ ), and inspection of the estimates indicated that highly connected individuals showed greater decreases in depression than those low on connectedness. Those higher on mature dependency (connectedness) appear to profit more from the interventions overall. There was also a Time by connectedness by condition interaction effect that was marginal (Estimate = -0.66, SE = 0.37,  $t = 1.80$ ,  $p = 0.07$ ). Inspection of the estimates indicated that connected individuals showed greater decreases in depression in the self-compassion exercise compared to the optimism intervention. (The optimism condition was the reference group for interpreting the fixed effects.) The superiority of the self-compassion condition for connected individuals was also demonstrated with the repeated measures ANOVA.

### Happiness

The model for happiness included as fixed effects: income, adherence, payment status, age, connectedness, self-criticism, exercise condition, and higher order interaction effects between time, condition, and personality. Inspection of the random effects for this model revealed that the rate of change (Estimate = 0.003, SE = 0.0008,  $z = 3.67$ ,  $p < 0.0001$ ) and baseline values for happiness (Estimate = 0.28, SE = 0.02,  $z = 15.22$ ,  $p < 0.0001$ ) showed significant variability across participants. However, the rate of change for participants did not covary with their baseline levels of happiness (Estimate = 0.003, SE = 0.003,  $z = 0.82$ ,  $p = 0.41$ ). This indicates that participants' happiness scores at the outset of the study did not systematically impact their trajectories or rate of change over time.

A Time by condition interaction effect was obtained (Estimate = 0.05, SE = 0.01,  $t = 3.21$ ,  $p < 0.01$ ), and inspection of the estimates indicated that the self-compassion exercise produced greater increases in happiness than the control condition

(reference group). There was also a trend for the optimism condition to show greater improvements in happiness compared to the controls (Estimate = 0.03, SE = 0.02,  $t = 1.66$ ,  $p = 0.09$ ). A Time by connectedness effect was also obtained (Estimate = 0.03, SE = 0.01,  $t = 2.38$ ,  $p < 0.05$ ) and inspection of the estimates indicated that highly connected individuals showed greater increases in happiness overall. Those higher on mature dependency therefore appear to profit more from the interventions, overall both in terms of reduction of depressive symptoms, and improvements in happiness.

A significant Time by condition by connectedness interaction was also obtained (Estimate = 0.03, SE = 0.02,  $t = 1.93$ ,  $p = 0.05$ ). Using the control group as the reference point, connected individuals became happier in the self-compassion condition than in the control condition. Furthermore, connected individuals showed greater increases in happiness in the self-compassion condition compared to the optimism condition (Estimate = 0.05, SE = 0.02,  $t = 2.85$ ,  $p < 0.01$ ; reference group is the optimism condition). Echoing the findings previously reported using the repeated measures ANOVA, individuals with mature levels of dependency (high on connectedness) made greater gains in happiness when assigned to a self-compassion exercise, compared to a control or optimism exercise. No effects for self-criticism were obtained using the multi-level modeling.

### Discussion

This study demonstrated that two brief exercises practiced on a daily basis for 1 week can lead to increases in emotional well-being that are sustained over time. That is, in comparison to the early memories control intervention, repeated measures analyses revealed that individuals who practiced self-compassion were less depressed up to 3 months following the exercise period, and happier up to 6 months. Multi-level modeling confirmed the improvements in happiness, regardless of initial levels of happiness. Similarly, individuals who visualized a positive future showed reductions in depressive symptoms for up to 3 months and were happier up to 6 months later. Using multi-level modeling, the optimism condition also tended to lead to greater increases in happiness compared to the control condition. Overall, these results echo previous findings that optimistic thinking and being self-compassionate can have advantageous psychological benefits (King, 2001; Leary et al., 2007).

Common elements in both active interventions may have contributed to their efficacy. First, both the self-compassion and optimism exercises endeavored to engender hope by teaching individuals to think more positively about their current distress and their future,

respectively. In line with the 'broaden and build theory,' through generating positive mind states, the exercises likely increased one's capacity to counteract negative emotions and cope with problems when they arose, in turn further promoting emotional well-being (Fredrickson, 1998).

Specific therapeutic ingredients unique to each active intervention may also have contributed to their positive influence on well-being. In the self-compassion condition, individuals were asked to engage in expressive writing about a currently distressing topic. When compared to writing about neutral topics or events in the past, writing about a distressing issue has benefits on both physiological and psychological health (Smyth, 1998). Alternatively, in the optimism exercise, individuals were asked to imagine being in a place where they had resolved concerning issues, and to comment on the critical steps they took to achieve this resolution. This exercise may have helped participants engage in active coping by delineating the next steps they needed to take to achieve their ideal goal state. This is important as goals that are meaningful and have clarity are associated with psychological health (Emmons, 1986; King, 2001). Thus, both common elements in the interventions, as well as specific aspects inherent in each exercise, likely contributed to increases in emotional well-being.

We hypothesized that personality style would influence outcome depending on what exercise participants were assigned to. Specifically, we expected self-critics would benefit psychologically from the self-compassion and optimism condition. Our findings only partially support our predictions. That is, in our repeated measures analyses using completers only who were older and less depressed, we found some evidence for the superiority of the optimism condition for self-critical participants. The positive outcome for this intervention for completers could lie in its curtailing effect on rumination, that is, by teaching self-critics to move away from their tendency to ruminate on past failures or perceived inadequacies. Optimism is also associated with approach-oriented coping strategies (Nes & Segerstrom, 2006), and the optimism exercises may have been particularly helpful for self-critics by requiring them to engage in more adaptive coping strategies. However, our multi-level modeling findings failed to replicate the effects for self-criticism. Therefore, we remain tentative in our conclusions regarding the usefulness of an optimism exercise for those who are self-critical.

Both our data analytic strategies indicated that individuals who were high in connectedness profited most from the self-compassion exercise. Connected individuals enjoyed greater happiness and reductions in depression when they were assigned to the self-compassion condition compared to the early memories and optimism condition. Conversely, neediness was

not related to any incremental improvements in mood across both analytic approaches, indicating that the self-compassion intervention may not be particularly helpful for those with immature dependence. It is thus worth noting that a distinction between mature (connected) and immature (needy) dependence may lie in the ability to generate compassionate feelings toward the self. Connected individuals are able to nurture others, and have the capacity to establish reciprocal bonds. Hence, this ability could likely be extended to themselves, helping to explain the therapeutic effects of this intervention for both completers and non-completers, particularly in terms of happiness.

In summary, the current findings highlight the impact of individual differences on the success of various positive psychology interventions, and suggest that exercises could be matched to individuals according to certain parameters (e.g., achievement and goal-oriented exercises *vs.* relational exercises), in efforts to enhance emotional well-being and potentially bypass the downward spiral of depression. The results have practical implications for use in counseling, highlighting that it is possible to augment emotional well-being in moderately distressed individuals if they are willing to engage in positive psychology interventions.

### **Limitations**

Participant attrition is a common problem in web-based intervention studies (e.g., Mitchell et al., 2009, who report an 83% attrition rate at 3 months), and was an important limitation in our study. We endeavored to account for attrition by utilizing multi-level modeling in our analyses. Additionally, our sample was relatively distressed, with CES-D scores at baseline that were in the moderate range. Therefore, we may have lost participants because they suffered from the motivational deficits that often accompany depression. It is also important to note that with online self-help exercises, an impersonal internet interface may contribute to attrition. Looking forward, further research specifying what works best for whom and introducing greater variety in exercises assigned could help to increase compliance and motivation (Lyubomirsky, Sheldon, & Schkade, 2005; Mongrain, 2009).

### **Conclusions**

This study provides some evidence for the effectiveness of brief self-help online exercises based on the main tenets of positive psychology. The fact that these self-help techniques were online means they have the potential to easily access many people in need in a standardized and anonymous format for a greatly reduced cost, which is critical given the increasing burden on managed care. The extent to which a



positive self-help exercise matches the propensities of the person who engages in it is an important factor that influences well-being outcome (Dickerhoof, 2007; Mongrain, 2009). Future research should strive to identify which specific individual difference variables (such as an interpersonal vs. an achievement orientation) influence what types of self-help exercises, in order to further improve the 'fit' between the needs of an individual and a specific exercise.

## Notes

1. Seligman et al. (2005) reported a considerably lower drop-out rate (29%). It is important to note sample differences between the two studies. Participants in this project were moderately depressed at baseline while those in the Seligman et al. (2005) study were mildly depressed at baseline, as measured by the CES-D. Additionally, the current sample was poorer, younger, and less educated (Seligman et al., 2005). The average age of our sample was 34 years while in the Seligman et al. (2005) study 64% of participants were between 35 and 54 years of age. Given that age (being younger) and levels of depressed symptoms (more depressed) were systematically associated with a higher drop-out rate, these factors were against us in this project. Furthermore, since the sample for Seligman's project consisted of individuals who frequented the website designed for Seligman's book, we have reason to believe they may have been more motivated to comply and complete his study.
2. Neediness and connectedness were examined in separate repeated measures ANOVA models due to their considerable overlap (Table 1;  $r = 0.40$ ).
3. For each simple effect contrast, scores at baseline were entered as a covariate in order to detect changes in well-being from baseline to each point in time.

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