Efficacy of Positive Psychology Interventions to Increase Well-being: Examining the Role of Dispositional Mindfulness

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Kimberley H. Seear

Dianne A. Vella-Brodrick

School of Psychology and Psychiatry

Monash University, Melbourne.

Corresponding author: Email: dianne.vella-brodrick@monash.edu

Phone: +61 3 9903 2452, Fax: +61 3 9905 3948

Address: Monash University, School of Psychology and Psychiatry, Wellington Road, Clayton, Victoria, 3800. AUSTRALIA.

Abstract

There is increasing evidence that positive interventions enhance well-being, although benefits for individuals will partly depend on the congruence between their unique characteristics and the requirements of an intervention. In this study, dispositional mindfulness was examined as a potential moderator of the efficacy of two interventions: *three good things* and *best possible selves*. These interventions were expected to increase positive affect and mental well-being and decrease negative affect, and it was hypothesised that participants high on mindfulness would benefit most. In an online randomised controlled trial, 211 participants (159 women, 52 men, M_{age} = 34.00 years) completed baseline measures of well-being and mindfulness, and were randomly assigned into a seven-day intervention or a no-activity control group. Results from 73 participants who completed Time 2 indicated that best possible selves significantly

lowered negative affect, with a medium effect size. Follow-up data from 37 participants two weeks later indicated that for participants with lower initial mindfulness, those allocated to the best possible selves group experienced increased positive affect, with a large effect size. Motivation to do the assigned intervention was strongly and positively associated with practice, and both motivation and frequency were strongly related to increased mental well-being. These results provide additional support for the efficacy of the best possible selves intervention and indicate that it can be beneficial for individuals with low levels of dispositional mindfulness.

Efficacy of Positive Psychology Interventions to Increase Well-being: Examining the Role of Dispositional Mindfulness

While the highly pursued experience of happiness—or the more scholarly term of subjective well-being—involves pleasant feelings which are to be valued in their own right (Linley, Joseph, Harrington, & Wood, 2006), positive affect can also serve numerous other functions. For example, the empirically validated Broaden and Build Theory (Fredrickson, 2001; Fredrickson & Branigan, 2005) explicates functions related to broadening stimuli-response repertoires and openness to different experiences. Through this 'broadening' process, valuable social, physical and intellectual resources are accumulated and can be drawn on in later challenges to build resilience and overcome adversity (Tugade & Fredrickson, 2007).

Although most people report levels of happiness above neutral, which may reflect an adaptive function of positive emotions (Cummins, 2010; Diener, Lucas, & Scollon, 2006), this does not mean that most people are fulfilling their potential for well-being. For example, Keyes (2002) estimated that just over half of US adults reported moderate mental health and only around 17 per cent reported a high degree of well-being referred to as "flourishing" (positive feelings and functioning).

It is no surprise therefore, that there has been an increased interest in understanding factors that contribute to happiness. Initial studies, mostly correlational in nature, were useful in understanding key factors associated with subjective well-being (high levels of life satisfaction and positive affect and low levels of negative affect) (e.g., Diener, Suh, Lucas, & Smith, 1999). With increased interest in practical methods for enhancing happiness, scholars have more recently focused their attention on ways of enhancing well-being, sometimes referred to as *positive psychology interventions* (PPIs; Sin & Lyubomirsky, 2009). Some of these studies have provided important insights into ways of increasing well-being.

One of the first happiness studies which pre-dated positive psychology was undertaken by Fordyce (1977, 1983). He developed an information-based "14 Fundamentals for Happiness" program, which encouraged the development of characteristics typical of happy people, including being present-oriented and optimistic. Using a series of studies, Fordyce (1983) found that his program was effective in increasing happiness over periods of two weeks to four months, in comparison to control groups.

Over two decades later, Seligman, Steen, Park, and Peterson (2005) established the effectiveness of three interventions in an online randomised controlled trial with 577 participants. The interventions involved writing down *three good things*, conducting a *gratitude visit* (writing and personally delivering a letter of gratitude) and *using signature strengths in a new way*. Participants who completed the three good things or using signature

strengths in a new way interventions increased their happiness and decreased depressive symptoms at the one-month, three-month and six-month follow-ups, with most of these participants choosing to continue their activity beyond the specified period of one week. Benefits of the gratitude visit were evident directly after the intervention and at one-week and one-month follow-up. Similarly, Emmons and McCullough (2003) found that a gratitude intervention which involved participants writing down things in their life for which they are thankful increased life satisfaction and positive affect over a three-week period, and decreased negative affect, relative to controls.

A meta-analysis by Sin and Lyubomirsky (2009) of 51 PPIs provides a good indication of the types of positive interventions that have been developed, ranging from expressing gratitude to savouring techniques. This meta-analysis found that positive interventions significantly increased well-being and decreased depressive symptoms, providing a substantial evidence base for continued work on developing and evaluating positive interventions. At the same time more information is needed about individual difference factors and mechanisms underlying effective positive interventions.

Building on a study by King (2001), which found that writing about one's best possible self for 20 minutes on four consecutive days was associated with improved well-being and fewer illness related visits to a health centre, Sheldon and Lyubomirsky (2006) used a best possible selves intervention in a four-week randomised controlled trial. They compared this intervention with a *counting one's blessings* activity derived from Emmons and McCullough's (2003) work. Both interventions and a control activity significantly reduced negative affect at immediate post-assessment, while only the best possible selves intervention significantly increased positive affect. One of the differentiating factors was *self-concordant motivation*, which is the extent to which participants felt authentically motivated to complete the task, with those assigned to the best possible selves task showing the highest

level of motivation compared to the other two groups. Those in the best possible selves intervention also had the highest degree of self-concordant motivation to continue with their assigned activity after they were asked (but not instructed) to perform it over subsequent weeks. Hence, motivation predicted continued exercise performance, which in turn predicted higher positive affect at follow-up (Sheldon & Lyubomirsky, 2006).

An enhanced knowledge of individual-difference factors that are implicated in the varying efficacy of interventions will assist in guiding their most successful application (Lyubomirsky, Sheldon, & Schkade, 2005). Consistent with this approach, p*erson-activity fit* states that the match between the intervention and individual characteristics such as interests, values, motivation, character strengths, needs and personality need to be factored in to determine which interventions work best and for whom (Lyubomirsky et al., 2005; Sheldon & Elliot, 1999; Sheldon & Lyubomirsky, 2006). While there is increasing evidence for the overall efficacy of positive interventions, the benefit of any particular intervention for an individual will depend partly on this fit (Lyubomirsky et al., 2005). Although some insight is being gleaned about possible influential factors, such as practice (Carmody & Baer, 2008), motivation and baseline depression levels (see Sin & Lyubomirsky, 2009), the identification of other factors is still warranted. For example, displaying particular strengths may play a key role for activities that require the use of certain abilities in order to be performed effectively. Consistent with the notion of person-activity fit, dispositional mindfulness can be considered a strength that may aid the effectiveness of some positive interventions.

Mindfulness involves the capacity to be aware of and attend to what is occurring in the present moment (Brown & Ryan, 2003; Kabat-Zinn, 1990). The constructs of awareness and attention are related forms of consciousness whereby attention to particular stimuli is possible due to constant background awareness of the environment and one's own emotions, thoughts and motives (Brown & Ryan, 2003; Thomas, 2006). Many studies have supported a

relationship between mindfulness and both increased well-being and decreased anxiety and stress (Bränström, Duncan, & Moskowitz, 2011; Brown & Ryan, 2003). Extending on this correlational data, mindfulness *training* (e.g., Mindfulness-Based Stress Reduction) was found to increase well-being and decrease stress, particularly if practiced regularly (Carmody & Baer, 2008).

For some, heightened awareness and attention occurs more naturally, and this is referred to as dispositional mindfulness (Brown & Ryan, 2003). This natural tendency may be an important individual difference factor for optimizing effects of specific positive interventions that are based on suppositions of awareness. Dispositional mindfulness may influence the efficacy of simple positive interventions in a number of ways: First, some positive interventions require, at least implicitly, high levels of consciousness in order for the task to be undertaken adequately. For example, the best possible selves activity necessitates insight into one's current situation and potential (Markus & Nurius, 1986) in order to project realistically about one's best possible future. Similarly, the three good things activity requires awareness and attention when identifying positive but not necessarily prominent aspects of one's day.

Second, mindfulness aids memory recall (Mace, 2008). If in-the-moment experiences are registered into awareness and then receive some attention, recall is more likely than if experiences are not registered at all. In line with this, mindfulness has been found to increase momentary experiences of positive emotions whilst also heightening appreciation of and responsiveness to positive daily activities (Geschwind, Peeters, Drukker, Van Os, & Wichers, 2011). Hence, the benefits of memory recall can be particularly helpful for activities such as three good things which involve remembering events and experiences that have occurred throughout the day, both large and small.

Third, when individuals are able to regulate their attention and focus on in-the-moment experiences, they are better able to add clarity, vividness and veracity to their recalled experiences and minimise negative biases and overgeneralisations (Grossman, Niemann, Schmidt, & Walach, 2003; Roberts-Wolfe, Sacchet, Hastings, Roth, & Britton, 2012). Through this process greater mind-body connections are built resulting in more realistic recollections which potentially increase the benefits to be derived from the activity.

Fourth, mindfulness breaks the domination of automatic behaviour and instead fosters "self-endorsed behavioral regulation" which is associated with volitional and informed decision-making (Brown & Ryan, 2003, p. 823). Volitional and autonomous action has been associated with increased well-being, most likely resulting from a more open awareness that is aligned with personal values, motivations and goals (Ryan & Deci, 2000).

In the current study, dispositional mindfulness was evaluated in a three-week randomised controlled trial using the three good things and best possible selves interventions. Potential influential factors such as motivation and frequency of performance were also assessed.

It was hypothesised that participants assigned to either the three good things or best possible selves intervention would have higher mental well-being and positive affect, and lower negative affect, post-intervention and at follow-up, compared to a control group (based on Warwick-Edinburgh Mental Well-being Scale and Positive and Negative Affect Schedule scores). Secondly, it was hypothesised that participants with higher dispositional mindfulness would derive more benefit post-intervention and at follow-up from the three good things or best possible selves interventions than participants with a lower level of mindfulness. It was also predicted that higher motivation would be associated with more frequent performance (practice) of the assigned intervention, and that motivation and practice would be associated

with greater increases in mental well-being and positive affect, and decreases in negative affect.

Method

Participants

A sample consisting of 211 self-selected adults who were also part of a larger well-being study (see Odou & Vella-Brodrick, in press), participated in the study. In the first phase of the study, 159 women and 52 men between the ages of 18 and 74 provided complete data (M_{age} = 34.00 years, *SD* =13.97). At Time 2, the sample consisted of 55 women and 18 men aged 18 – 70 years (M_{age} = 33.15 years, *SD* = 14.11), and at Time 3, 28 women and nine men aged 18 – 70 years (M_{age} = 32.97 years, *SD* = 15.57) remained in the study. Most participants resided in Australia (81.4%). The majority were in full-time employment (41%) or full-time students (27.6%), and more than half were in a relationship (58.8%). Participants were highly educated (*M* = 16 years), with most possessing an undergraduate university degree.

Materials

Measures of well-being, mindfulness and motivation.

Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al., 2007). The WEMWBS consists of 14 items measuring feelings and thoughts related to various facets of positive mental health, incorporating psychological functioning (psychological well-being), affective and cognitive-evaluative elements. Items include “I’ve been feeling close to other people” and “I’ve been interested in new things”. Items are rated on a 5-point Likert scale (*none of the time* to *all of the time*). The scale has been shown to have good content and criterion validity, and high test-retest and internal consistency reliability, with a Cronbach’s alpha coefficient of .91 found using a very large general population sample (Tennant et al., 2007). The same alpha coefficient was found with the current study’s sample.

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS includes two scales, each with 10 items consisting of emotion-related adjectives, that measure positive affect (PA; e.g. "interested") and negative affect (NA; e.g. "irritable"). Lower levels of negative affect and presence of positive affect, as well as life satisfaction, are considered to be indicators of subjective well-being (Andrews & Withey, 1976; Ryan & Deci, 2001). PANAS items are rated on a Likert scale representing degrees of experience of each feeling, from 1 (*very slightly or not at all*) to 5 (*extremely*), during a specified period. In the current study, participants were asked to rate their experience in the preceding week. Higher scores for each scale indicate higher levels of positive or negative affect. Watson et al. (1988) reported evidence of sound factorial and convergent and discriminant validity, and low correlations between the two scales. Reported alpha coefficients ranged from .86 to .90 for PA and .84 to .87 for NA (Watson et al., 1988). In the current study, alpha coefficients of .90 and .87 were found for PA and NA respectively.

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS is designed to measure dispositional mindfulness, or propensity to experience mindful states, with 15 items assessing everyday attention and awareness. Example items include "I could be experiencing some emotion and not be conscious of it until some time later" and "I tend to walk quickly to get where I'm going without paying attention to what I experience along the way". Items are rated on a 6-point Likert scale (*almost always* to *almost never*), and a higher mean score indicates higher mindfulness. The MAAS has been shown to have sound criterion, convergent and discriminant validity in an adult community sample, as well as good test-retest and internal consistency reliability, with a reported alpha coefficient of .87 (Brown & Ryan, 2003). An alpha coefficient of .88 was found using the current study's sample.

These well-being and mindfulness measures were administered at Time 1, 2 and 3.

Motivation and adherence to intervention. At Time 2, participants in the intervention groups were asked, "How motivated did you feel about doing the activity?" with responses on a Likert scale from 1 (*not at all*) to 5 (*extremely*). Participants were also asked how many times during the last week (for Time 2) or two weeks (Time 3) they had completed their assigned activity.

Additional measures at Time 1.

Trait Hope Scale (Snyder et al., 1991). The Trait Hope Scale was used to assess any pre-existing group differences in hope, which is most relevant to the best possible selves intervention. The Trait Hope Scale has 12 items relating to goal-directed behaviour, including "I can think of many ways to get the things in life that are most important to me". Items are rated on an 8-point Likert scale (*definitely false* to *definitely true*). The construct, convergent and discriminant validity of the scale has been established, and it has satisfactory test-retest and internal consistency reliability, with reported alpha coefficients ranging from .74 to .84 (Snyder et al., 1991). In the current study, an alpha coefficient of .89 was found.

The Gratitude Questionnaire – Six Item Form (GQ-6; McCullough et al., 2002). The GQ-6 was used to assess any pre-existing group differences in gratitude, which is most relevant to the three good things intervention. The GQ-6 has six items designed to assess trait propensity to experience gratitude and is rated on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). An example item is "I have so much in life to be thankful for". McCullough et al. (2002) reported evidence that the measure has sound convergent and discriminant validity, as well as good internal consistency reliability (alpha = .82). In the current study, an alpha coefficient of .79 was found.

International Personality Item Pool (IPIP; Goldberg, 1999). Two 10-item scales from the IPIP proxy measure of Goldberg's (1992) Big-Five factor markers assessed extraversion (e.g. "Am the life of the party") and emotional stability (e.g. "Am relaxed most

of the time"), in order to check for pre-existing differences between groups in these qualities related to well-being. Items are rated a on a 5-point Likert scale (*very inaccurate* to *very accurate*) and higher scores indicate higher extraversion and emotional stability, while lower scores reflect higher levels of introversion and neuroticism. These scales have reported alpha coefficients of .87 (extraversion) and .86 (emotional stability) (Goldberg, 1999). In the current study, alpha coefficients were .92 for extraversion and .93 for emotional stability. Sound construct, convergent and discriminant validity of the IPIP have been reported (Lim & Ployhart, 2006). As personality factors are considered to be stable traits, these were measured at baseline only, along with trait hope and gratitude.

Sociodemographic questions. Information was collected about participants' age, sex, relationship and family status, occupation, employment and student status, years of education, health status, country of birth, country of residence and income.

Design

Interventions were administered and data were collected online. This study was a randomised controlled trial, with three conditions: best possible selves intervention, three good things intervention, and no-activity control group. Computer-generated random assignment to conditions occurred when participants commenced the study, and was revealed after participants completed the first set of measures. In a mixed between-within subjects design, scores on the three well-being measures (WEMWBS mental well-being and PANAS positive affect and negative affect) were the dependent variables and were collected over three time periods. The two independent variables were condition (three groups) and level of mindfulness (high and low, based on a median split of baseline MAAS scores). Participants were anonymous and data from different time periods were matched with the use of a unique code.

Procedure

Once ethics approval was obtained, participants were recruited through local advertisements, poster displays in public areas, distribution of flyers and online discussion forums. Participants accessed a website where they completed baseline measures of well-being and mindfulness, as well as control measures of trait hope, gratitude, extraversion and neuroticism. They were then provided with details of their assigned intervention, or informed that they had been allocated to the no-activity control group. For the three good things intervention, which was designed by Seligman et al. (2005) but modified slightly for the purpose of this study, participants were instructed to:

> Recall and imagine three good things that went well each day and [provide] a causal explanation for each good thing . . . After creating each mental image, please write down your experience . . . Please complete this exercise each day for the next 7 days starting today.

Instructions for the best possible selves intervention were based on those used by Sheldon and Lyubomirsky (2006), which were adapted from King (2001). Participants were instructed to:

> Imagine yourself in the future, after everything has gone as well as it possibly could. You have succeeded in accomplishing all of your life goals. Think of this as the realisation of your life dreams, and of your own best potentials. This involves identifying the best possible way that things might turn out in your life in order to help guide your decisions in the present . . . For the next 7 days, starting today, we'd like you to choose an area of your life and imagine your best possible self related to this domain. Choose a new domain each day.

All participants provided demographic data and were requested to return to the website in a week to complete further assessments. At Time 2, participants completed the mindfulness and well-being measures again. Intervention group participants reported the

number of times they had performed their assigned activity and their level of motivation, and were given the option to submit their writings online or by post. Participants were then requested to return to the website two weeks later to complete Time 3 assessments. Intervention group participants were also informed that "we encourage you to continue doing [your assigned intervention] for the next two weeks, but this is not necessary in order to complete the study". Intervention group participants were again asked about the frequency with which they had continued their assigned activity.

Results

Preliminary Analyses

While 211 participants completed baseline measures and were allocated to one of three conditions, attrition considerably reduced participant numbers at subsequent stages. Figure 1 shows the flow of participants through each stage of the study.

Insert Figure 1

As shown in Figure 1, three participants were excluded from Time 2 analyses as they reported that they performed their assigned intervention zero times. None of these participants completed Time 3. Five participants who did not report the number of times they completed their assigned intervention were retained in the dataset. Participants were divided into higher and lower mindfulness categories, determined by a median split of MAAS scores at Time 1.

Data were analysed using the IBM SPSS Statistics 18 package. The appropriate pre-analysis data screening were undertaken and we explored the potential effects of attrition on the data. As recommended by Goodman and Blum (1996), multiple logistic regression involving all independent and dependent variables (condition, level of mindfulness, and Time 1 WEMWBS, PA and NA) was used to assess whether attrition occurred randomly. Some non-random bias at Time 2 was apparent, such that participants in the best possible selves

condition were less likely to continue to Time 2 when relationships between the variables were taken into account (p=.034). However, focusing only on the group to which participants were assigned, dropout rate did not vary significantly across the three conditions at Time 2 (p=.075).

Repeating these analyses with an investigation of attrition between Time 2 and Time 3, we found that participants categorised as having a higher level of dispositional mindfulness were significantly less likely to remain in the study (p=.031).

To examine whether non-random sampling affected means, independent *t*-tests were performed as recommended by Goodman and Blum (1996). There were no significant differences between participants who did and did not continue the study to Time 2 regarding their Time 1 WEMWBS (p = .224), PA (p = .364), NA (p = .539) and MAAS (p = .508) scores, as well as scores on the control measures of hope (p = .327), gratitude (p = .389), extraversion (p = .775) and emotional stability (p = .542). At Time 3, there were no significant differences between participants who did and did not continue the study regarding their Time 1 and Time 2 scores.

Independent *t* -tests showed that participants in the higher mindfulness category had significantly higher mean scores for Time 1 WEMWBS, PA, hope, gratitude, extraversion and emotional stability, and significantly lower NA, than participants with lower mindfulness. As expected by random assignment, however, one-way ANOVAs showed there were no significant differences between the three conditions at Time 1 regarding scores for WEMWBS, NA, PA, MAAS, hope, gratitude, and extraversion and emotional stability.

Results of evaluation of the assumptions of normality of sampling distributions, linearity and reliability of covariates were satisfactory. The assumption of homogeneity of variance was met only for the dependent variable of Time 2 NA, but variance ratios were

acceptable for all dependent variables. Heterogeneity of regression slopes was found for Time 2 and 3 PA.

Main Analyses

ANCOVA was the planned method of analysis, with the advantage of controlling for baseline well-being differences. Due to heterogeneity of regression slopes, ANOVA was instead conducted for PA, with a change score dependent variable created for Time 2 and Time 3 PA by subtracting Time 1 scores. Analyses were performed by SPSS GLM with Type III Sums of Squares adjustment for unequal *n.* A Type 1 error rate of $p < .05$ was adopted, after consideration of the debate regarding the application of Bonferroni adjustments when using multiple outcome measures, with adjustments increasing the chance of Type II errors and necessitating very large sample sizes for power (Feise, 2002; Garamszegi, 2006).

Table 1 presents mean WEMWBS, PA and NA scores at Times 1, 2 and 3. Time 1 means are based on scores of all participants who completed Time 1.

Insert Table 1

Table 1 shows that mean WEMWBS scores tended to increase and NA scores tended to decrease from Time 1 to Time 2 and 3 for participants with higher or lower mindfulness who were assigned an intervention. Increases in mean PA scores were evident for participants with a lower level of mindfulness in both intervention conditions.

Four 2-way ANCOVAs were performed with dependent variables of Time 2 and Time 3 WEMWBS and NA scores, with Time 1 scores as the covariate. In addition two 2-way ANOVAs were performed with dependent variables of change in PA score from Time 1 to Time 2, and change from Time 1 to Time 3. Independent variables were level of mindfulness (higher and lower) and assigned condition (best possible selves, three good things and control).

For Time 2 WEMWBS, there was no significant interaction between condition and level of mindfulness ($F(2,66) = 1.40$, $p = .255$), and no significant main effects of condition ($F(2,66) = 3.01$, $p = .056$) or mindfulness ($F(1,66) = 0.30$, $p = .587$). For Time 2 NA, there was no significant interaction ($F(2,66) = 0.22$, $p = .806$) and no significant main effect of mindfulness ($F(1,66) = 1.15$, $p = .287$). However, a significant main effect of condition was found, $F(2,66) = 3.64$, $p = .032$, with a medium effect size ($\eta^2_p = .099$). Contrast estimates showed that, as a group, participants who completed the best possible selves intervention had significantly lower NA than the control group. For Time 2 PA, there was no significant interaction ($F(2,67) = 1.06$, $p = .351$), and no significant main effects of condition ($F(2,67) = 0.14$, $p = .872$) or mindfulness ($F(1,67) = 1.73$, $p = .193$).

For Time 3 WEMWBS, there was no significant interaction between condition and level of mindfulness ($F(2,30) = 1.68$, $p = .204$), and no significant main effects of condition ($F(2,30) = 0.13$, $p = .878$) or mindfulness ($F(1,30) = 0.94$, $p = .339$). Similarly, for Time 3 NA there was no significant interaction ($F(2,30) = 0.18$, $p = .833$) and no significant main effects of condition ($F(2,30) = 1.39$, $p = .265$) or mindfulness ($F(1,30) = 0.01$, $p = .945$). For Time 3 PA, there were no significant main effects of condition ($F(2,31) = 0.74$, $p = .485$) or mindfulness (F 1,31) = 0.43, $p = .517$). However, there was a significant interaction between condition and mindfulness, $F(2,31) = 3.40$, $p = .046$, with a large effect size ($\eta^2_p = .180$). Figure 2 displays this interaction.

Insert Figure 2

Figure 2 indicates that, on average, participants with a lower baseline level of dispositional mindfulness experienced a decrease in positive affect if they were allocated to the control group and an increase in positive affect if they were allocated to an intervention group, with the opposite finding for participants with a higher baseline level of mindfulness.

Pairwise comparisons revealed a significant difference in change scores between the best possible selves and control group for participants with lower initial mindfulness (p = .017) with participants in the best possible selves group experiencing an increase in PA.

Mindfulness

Additional analyses were undertaken to examine whether scores on the MAAS increased over the course of the study. A two-way repeated measures ANOVA was conducted with MAAS scores as the dependent variable and assigned condition and time (1, 2 and 3) as the independent variables, with the assumption of sphericity met. No significant interaction between time and condition was found. There was a significant main effect of time (F(2,33) = 6.79, p = .003), with a large effect size (η^2_p = .292). Pairwise comparisons showed that Time 3 scores were significantly higher than both Time 1 scores (p = .001) and Time 2 scores (p = .015). The difference between Time 1 and 2 scores was not significant (p = .220). There was also a significant main effect of condition (F(2,34) = 4.20, p = .024), with a large effect size (η^2_p = .198). Pairwise comparisons indicated that the mean MAAS score for the control group over time was significantly lower than for the best possible selves (p = .001) and three good things (p = .015) groups, indicating higher levels of dispositional mindfulness for intervention group participants than control participants across the three time periods, although there were no significant baseline differences between the three conditions.

Motivation and Adherence to Intervention

Using Pearson product-moment correlation coefficients, the relationship between retrospectively reported motivation to perform the assigned activity and frequency of performing the activity (both stated at Time 2) was investigated, as well as the relationship between each of these variables and changes in well-being from Time 1 to Time 2. Correlation coefficients are included in Table 2.

Insert Table 2

As shown in Table 2, there was a strong, positive correlation between motivation to perform the assigned activity and the frequency with which the activity had been performed, as reported at Time 2. There was a strong, positive correlation between motivation to perform the assigned activity and WEMWBS change scores, and a moderate, positive correlation between motivation to perform the assigned activity and PA change scores. With regards to the frequency of activity there was a strong, positive correlation with WEMWBS change scores, but not PA or NA change scores.

To investigate whether continuation of activity after Time 2 moderated the effect of the intervention on Time 3 well-being, three 2-way ANCOVAs were conducted with Time 1 scores as the covariate. Independent variables were intervention (best possible selves or three good things) and continuation of activity after Time 2 as reported at Time 3 (continued or did not continue). The interaction between assigned intervention and continuation of the activity was not significant for WEMWBS ($F(1,20) = 0.04$, $p = .848$), PA ($F(1,20) = 0.22$, $p = .646$) or NA ($F(1,20) = 0.08$, $p = .782$). There were no significant main effects; hence, whether or not the participants continued with their assigned activity did not influence the efficacy of the interventions on well-being, positive affect and negative affect at Time 3.

Discussion

In this randomised controlled trial, the efficacy of two positive psychology interventions was assessed, and dispositional mindfulness was considered as a potential moderator. The hypothesis that the best possible selves and three good things interventions would increase mental well-being and positive affect, and decrease negative affect, at Time 2 (post-intervention) and Time 3 (two-week follow-up), relative to controls, was only partly supported. Time 2 negative affect varied significantly between conditions, controlling for baseline scores; specifically, negative affect was significantly lower for the best possible

selves group than the control group. This finding is consistent with the results of Sheldon and Lyubomirsky (2006), who found that negative affect was reduced immediately after performing best possible selves.

Sheldon and Lyubomirsky (2006), along with King (2001), also found that best possible selves increased positive affect. In the current study however, the best possible selves intervention did not significantly increase positive affect, relative to the control group. Both of the previous studies involved samples of university students, in contrast to the current study's more diverse general sample with a mean participant age in the mid-thirties. In seeking to increase positive affect, considering one's best possible future self may be an activity better suited to younger persons, particularly university students who are most likely aspiring towards a professional career. There were also no significant findings regarding mental well-being scores in this study. It may be that the complex construct of mental well-being as measured by the WEMWBS, incorporating cognitive-evaluative and psychological functioning elements in addition to affect, is less susceptible to change over a relatively short period compared with mood and emotions which are more transient. Another potential explanation is that interventions were most beneficial in changing negative affect because that may have been the aspect of well-being with greatest scope for improvement in this sample. Median baseline mental well-being and positive affect scores were comparable to those found in UK samples of more than 1,000 adults, which had skewed distributions (Crawford & Henry, 2004; Tennant et al., 2007). However, baseline median negative affect in the current study (19.5) was higher than the available normative data (14) (Crawford & Henry, 2004), indicating that the current sample reported higher than average levels of negative affect.

While the results indicated that the best possible selves intervention significantly reduced negative affect, relative to the control group, the difference between the three good

things intervention and the control condition was not significant. The three good things intervention may need to be performed over a longer period in order to be effective. In Seligman et al.'s (2005) study, the benefits of three good things were evident from the one-month follow-up, not directly after the intervention or at one-week follow-up. Seligman et al. noted that the intervention period of one week may have been insufficient for this activity, which may require skills that improve with experience. Consistent with this, they found longer-term benefits for participants who continued the activity. Moreover, Sin and Lyubomirsky's (2009) meta-analysis found that greater increases in well-being resulted from longer interventions.

Non-significant results in the current study could also be attributed to a lack of power, associated with attrition and its impact on the sample size. Power ranged from .07 to .65, while .80 is desirable (Tabachnick & Fidell, 2007). Changes in mean scores over the duration of the study were evident, in the predicted directions. These trends provide further indications of the value of positive psychology interventions in improving various aspects of well-being.

The second hypothesis, that participants with a higher level of dispositional mindfulness would derive greater benefit from the two positive interventions, was not supported. Contrary to expectations, it was found that, on average, only participants with lower initial mindfulness experienced a significant increase in positive affect from Time 1 to Time 3 in the best possible selves condition, relative to the control group. There were no significant differences between participants with higher and lower initial mindfulness in their response to the interventions as indicated by Time 2 and 3 mental well-being and negative affect, and Time 2 positive affect. Participants categorised at Time 1 as having higher mindfulness were significantly more likely to cease participation between Time 2 and 3 than those with lower initial mindfulness, which could indicate that those with a higher baseline level of mindfulness were deriving less benefit from participating in the study. However, the

difference in mean Time 1 MAAS scores between those who did and did not continue the study was not significant. The sample size and concerns about power necessitated a median split for mindfulness, rather than a tertile split with comparisons of the two extreme groups. A tertile split would have enabled a greater distinction between participants in the higher and lower mindfulness categories.

Participants with lower initial mindfulness had, as a group, significantly lower dispositional hope and gratitude than participants with higher mindfulness. The best possible selves intervention may have had more impact on positive affect for participants with lower initial mindfulness by engendering hopeful states which would normally be experienced less frequently, compared with participants with higher dispositional mindfulness. This is similar to Froh, Kashdan, Ozimkowsk and Miller's (2010) conclusion that youth who were low in positive affect derived greater benefit from a gratitude visit because they normally had fewer experiences of gratitude than youth high in positive affect. Alternatively, the apparent differences in the effects of the intervention for participants with higher and lower mindfulness may be due to ceiling effects. As participants in the higher mindfulness category had significantly higher baseline well-being scores than those reporting lower mindfulness, there was less scope for them to increase in well-being as measured by 5-point scales. The participants remaining at Time 3, who had predominately been categorised as having lower mindfulness at baseline, had on average significantly increased in mindfulness since Time 2. The mean MAAS score of participants in the positive intervention conditions increased over time, relative to the control group, suggesting that these interventions may offer a relatively straightforward way to cultivate mindfulness, which is implicated in well-being.

The hypothesis that higher motivation and more frequent performance of the assigned intervention would be associated with larger increases in well-being was partly supported. This suggests that results may have been influenced by differing adherence to the instructions

of the study, particularly completing the assigned intervention each day for a week. All participants who reported completing their assigned intervention at least once were included in Time 2 analyses, and only around half of these participants reported that they had completed it every day. More frequent performance of the activity during the formal seven-day intervention period was strongly related to greater increases in mental well-being, as measured by the WEMWBS. As expected, frequency of performing the activity was strongly and positively associated with motivation to do the activity, as reported at Time 2 in regard to the preceding intervention week. Motivation was also strongly related to increased mental well-being from Time 1 to Time 2, and moderately related to increased positive affect. Causality cannot be established from these correlations; it could be that increased well-being after the intervention week led participants to report that they had been highly motivated, which may not have been an accurate reflection of their motivation during the week. However, these results indicate that stronger effects of the interventions may have been apparent if all intervention participants had performed their assigned activity day for seven days, as instructed.

Some participants may have lacked motivation to persist with their assigned intervention for a number of reasons, including possibly not finding their activity enjoyable. Schueller (2010) found significant positive correlations between preference for one of several interventions and the frequency with which it was performed. Although participants self-selected into the current study and self-administered the intervention, they did not choose their intervention and there was no support built in. Sin and Lyubomirsky's (2009) meta-analysis found that the mean effect size of interventions was largest for individually administered interventions, then group-administered, followed by self-administered interventions.

Although self-administered interventions promote autonomy and flexibility, some element of encouragement may need to be built in. In circumstances where motivation to perform an intervention is lacking, such support is particularly important to maximise potential benefits (Sin & Lyubomirsky, 2009). Moreover, it is likely that attrition could be reduced in future research if ongoing contact with participants is provided. For example, the use of reminder emails, as in Seligman et al.'s (2005) study, would encourage research involvement and prompt participants to return to complete subsequent online measures.

Participants in this study were all Internet users, were generally well-educated and, consistent with previous well-being studies, predominately female (e.g. Quoidbach, Wood, & Hansenne, 2009; Sheldon & Lyubomirsky, 2006). While these factors affect the generalisability of findings, participants varied considerably with regard to age, employment and relationship status. Major strengths of the study are the randomised controlled trial design and the investigation of potential moderators including mindfulness, motivation and practice. It is hoped that this research will prompt further work exploring potential underlying mechanisms and interaction effects of positive interventions.

In sum, the results of this study provide additional support for the efficacy of the best possible selves intervention over a short period. Results also have implications for the viability of delivering interventions remotely, providing further evidence of well-being gains using on-line self-administered methods, while also highlighting the importance of support to encourage participants to persist with interventions and for greater effects. While subject to limitations, the current study's findings also indicate that dispositional mindfulness is not a pre-requisite to perform the best possible selves intervention effectively. Moreover, the best possible selves and three good things activities may foster the development of mindfulness skills relevant to the interventions. Therefore, individuals with low initial levels of

dispositional mindfulness are especially likely to benefit from such accessible, simple interventions for enhancing well-being.

References

Andrews, F. M., & Withey, S. B. (1976). *Social indicators of well-being: Americans' perception of life quality*. New York, NY: Plenum Press.

Bränström, R., Duncan, L. G. and Moskowitz, J. T. (2011), The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample. *British Journal of Health Psychology, 16*, 300–316. doi: 10.1348/135910710X501683

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23-33. doi: 10.1007/s10865-007-9130-7

Brown, K. W., & Ryan, M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848. doi: 10.1037/0022-3514.84.4.822

Crawford, J., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*, 245–265. doi: 10.1348/0144665031752934

Cummins, R. A. (2010). Subjective wellbeing, homeostatically protected mood and depression: A synthesis. *Journal of Happiness Studies, 11*, 1–17. doi: 10.1007/s10902-009-9167-0

Diener, E., Lucas, R. E., & Scollon, C. N. (2006). Beyond the hedonic treadmill: Revising the adaptation theory of well-being. *American Psychologist, 61*(4), 305–314. doi: 10.1037/0003-066X.61.4.305

Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*(2), 276–302. doi: 10.1037/0033-2909.125.2.276

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology, 84*(2), 377–389. doi: 10.1037/0022-3514.84.2.377

Feise, R. J. (2002). Do multiple outcome measures require p-value adjustment? *BMC Medical Research Methodology, 2*(8). doi: 10.1186/1471-2288-2-8

Fordyce, M. W. (1977). Development of a program to increase personal happiness. *Journal of Counseling Psychology, 24*(6), 511–521. doi: 10.1037/0022-0167.24.6.511

Fordyce, M. W. (1983). A program to increase happiness: Further studies. *Journal of Counseling Psychology, 30*(4), 483–498. doi: 10.1037/0022-0167.30.4.483

Fredrickson, B. L. (2001). The role of positive emotions in Positive Psychology. *American Psychologist, 56*(3), 218–226.

Fredrickson, B. L. & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition and Emotion, 19*, 313-332.

Froh, J. J., Kashdan, T. B., Ozimkowsk, K. M., & Miller, N. (2010). Who benefits the most from a gratitude intervention in children and adolescents? Examining positive affect as a moderator. *The Journal of Positive Psychology, 4*(5), 408–422. doi: 10.1080/17439760902992464

Garamszegi, L. Z. (2006). Comparing effect sizes across variables: Generalization without the need for Bonferroni correction. *Behavioral Ecology, 17*(4), 682–687. doi: 10.1093/beheco/ark005

Geschwind, N., Peeters, F., Drukker, M., Van Os., J., & Wichers, M. (2011). Mindfulness training increases momentary positive emotions and reward experience in adults vulnerable to depression: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 79*, 618–628. doi: 10.1037/a0024595.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*(1), 26–42. doi: 10.1037/1040-3590.4.1.26

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt & F. Ostendorf (Eds.), *Personality Psychology in Europe* (Vol. 7, pp. 7–28). Tilburg, The Netherlands: Tilburg University Press.

Goodman, J.S. & Blum, T.C. (1996). Assessing the non-random sampling effects of subject attrition in longitudinal research. *Journal of Management, 22*(4), 627-652. doi: 10.1177/014920639602200405

Grossman, P., Niemann, L., Schmidt, S. & Walach, H. (2003), Mindfulness-based stress reduction and health benefits: A meta-analysis. *Focus on Alternative and Complementary Therapies, 8*: 500. doi: 10.1111/j.2042-7166.2003.tb04008.x

Kabat-Zinn, J. (1990). Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness. New York: Dell Publishing.

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*, 207–202. doi: 10.2307/3090197

King, L. A. (2001). The health benefits of writing about life goals. *Personality and Social Psychology Bulletin, 27*, 798–807. doi: 10.1177/0146167201277003

Lim, B. C., & Ployhart, R. E. (2006). Assessing the convergent and discriminant validity of Goldberg's International Personality Item Pool. *Organizational Research Methods, 9*(1), 29–54. doi: 10.1177/1094428105283193

Linley, P. A., Joseph, S., Harrington, S., & Wood, A. M. (2006). Positive psychology: Past, present, and (possible) future. *The Journal of Positive Psychology, 1*(1), 3–16. doi: 10.1080/17439760500372796

Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology, 9*(2), 111–131. doi: 10.1037/1089-2680.9.2.111

Mace, C. (2008). *Mindfulness and mental health: Therapy, theory and science*. New York, NY: Routledge.

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41*(9), 954–969. doi: 10.1037/0003-066X.41.9.954

Odou, N. & Vella-Brodrick, D. A. (in press) The efficacy of positive psychology interventions to increase well-being and the role of mental imagery ability. *Social Indicators Research,* doi: 10.1007/s11205-011-9919-1

Quoidbach, J., Wood, A. M., & Hansenne, M. (2009). Back to the future: The effect of daily practice of mental time travel into the future on happiness and anxiety. *The Journal of Positive Psychology, 4*(5), 349–355. doi: 10.1080/17439760902992365

Roberts-Wolfe, D., Sacchet, M., Hastings, E., Roth, H. & Britton, W. (2012). Mindfulness training alters emotional memory recall compared to active controls: Support for an emotional information processing model of mindfulness. *Frontiers in Human Neuroscience* 6:15. doi: 10.3389/fnhum.2012.00015

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141–166. doi: 10.1146/annurev.psych.52.1.141

Schueller, S. M. (2010). Preferences for positive psychology exercises. *The Journal of Positive Psychology, 5*(3), 192–203. doi: 10.1080/17439761003790948

Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*(5), 410–421. doi: 10.1037/0003-066X.60.5.410

Sheldon, K. M., & Elliot, A. J. (1999). Goal striving, need satisfaction, and longitudinal well-being: The self-concordance model. Journal of Personality and Social Psychology, 76(3), 482–497. doi: 10.1037/0022-3514.76.3.482

Sheldon, K. M., & Lyubomirsky, S. (2006). How to increase and sustain positive emotion: The effects of expressing gratitude and visualizing best possible selves. *The Journal of Positive Psychology, 1*(2), 73–82. doi: 10.1080/17439760500510676

Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467–487. doi: 10.1002/jclp

Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., et al. (1991). The will and the ways: Development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology, 60*(4), 570–585. doi: 10.1037/0022-3514.60.4.570

Tabachnick, B.G., & Fidell, L.S. (2007).*Using multivariate statistics* (5th ed.). Boston, MA: Pearson Education.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., et al. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes, 5*(63). doi: 10.1186/1477-7525-5-63

`Thomas, D. C. (2006). Domain and development of cultural intelligence: The importance of mindfulness. *Group & Organization Management, 31*(1), 78–99. doi: 10.1177/1059601105275266

Tugade, M. M. & Fredrickson, B. L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies, 8*, 311-333.

Vella-Brodrick, D. A., Park, N., & Peterson, C. (2009). Three ways to be happy: Pleasure, engagement, and meaning—findings from Australian and US samples. *Social Indicators Research, 90*, 165–179. doi: 10.1007/s11205-008-9251-6

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. doi: 10.1037/0022-3514.54.6.1063

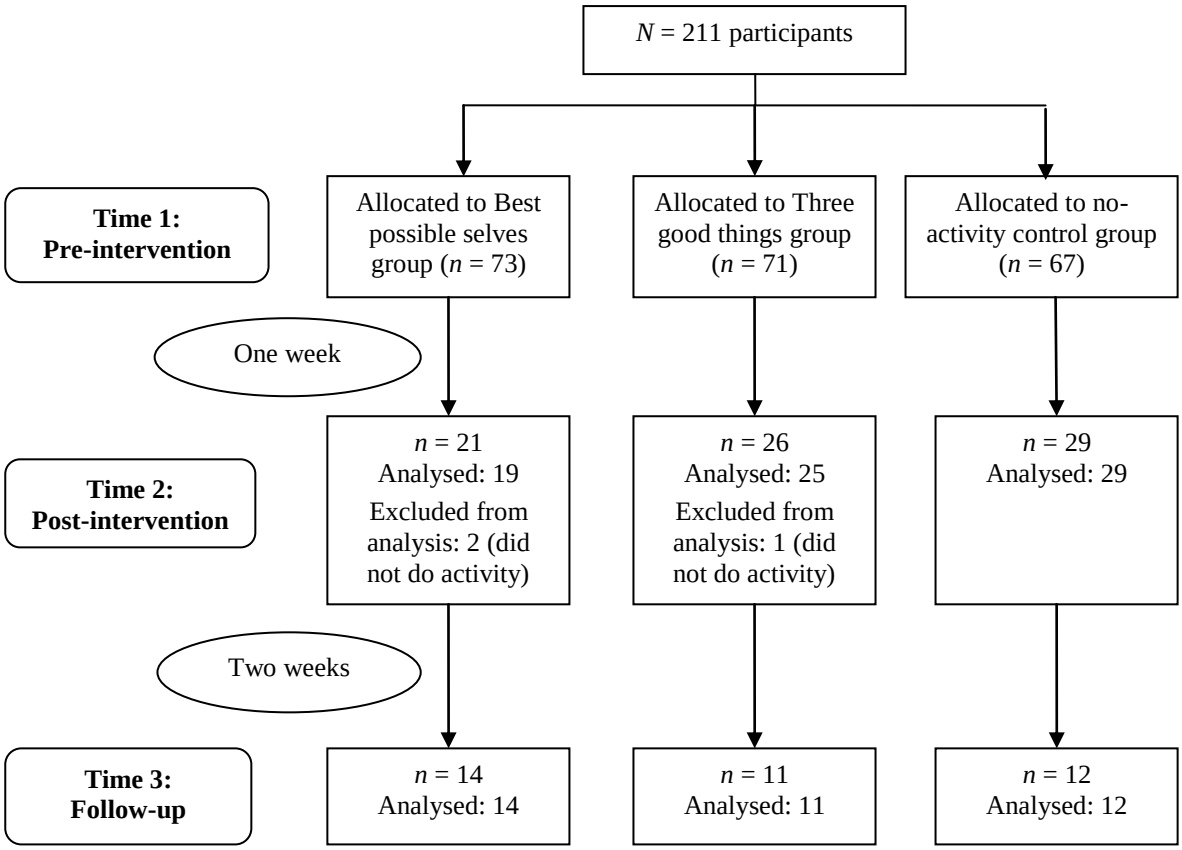

Figure 1. Flow of participants through each stage of study.

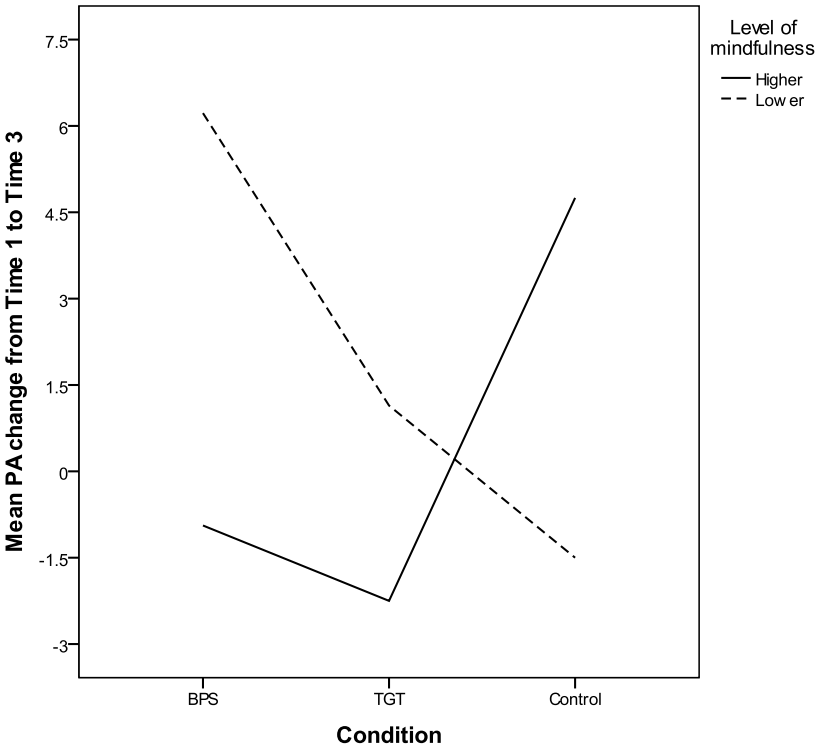

Figure 2. Interaction between condition and level of mindfulness for Time 3 Positive Affect (PA) change scores. BPS = Best possible selves; TGT = Three good things.

Table 1

Mean WEMWBS, PA and NA Scores for Different Groups at Times 1, 2 and 3

Condition and level of mindfulness (m)[a]	Time 1			Time 2			Time 3		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
WEMWBS Mental Well-Being									
Best possible selves									
High m	36	54.67	8.04	7	58.40	7.91	5	59.20	9.83
Low m	37	46.62	6.76	12	51.83	8.72	9	54.44	5.36

Total BPS	73	50.59	8.40	19	54.25	8.83	14	56.14	7.28
Three good things									
High m	36	51.87	7.77	12	57.40	6.38	4	61.50	4.12
Low m	35	46.16	9.15	13	52.54	7.29	7	49.57	11.90
Total TGT	71	49.06	8.89	25	54.87	7.16	11	53.91	11.24
No-activity control									
High m	34	51.73	7.17	15	53.67	5.89	4	58.25	8.26
Low m	31	45.23	7.63	14	46.71	6.59	8	45.63	9.33
Total control	65	48.63	8.03	29	50.31	7.07	12	49.83	10.62
PANAS Positive Affect									
Best possible selves									
High m	36	36.56	8.25	7	36.86	4.45	5	35.46	8.37
Low m	37	31.19	8.17	12	34.03	7.52	9	38.11	8.68
Total BPS	73	33.84	8.59	19	35.07	6.57	14	37.16	8.35
Three good things									
High m	36	34.36	8.09	12	38.79	5.97	4	39.75	3.77
Low m	35	29.52	6.91	13	32.37	7.45	7	32.43	8.48
Total TGT	71	31.97	7.86	25	35.45	7.40	11	35.09	7.82
No-activity control									
High m	35	35.15	7.04	15	36.30	5.28	4	39.75	3.20
Low m	31	28.65	6.85	14	29.50	5.96	8	25.50	5.55
Total control	66	32.09	7.64	29	33.02	6.51	12	30.25	8.47
PANAS Negative Affect									
Best possible selves									
High m	36	17.11	6.26	7	14.57	3.36	5	15.00	3.67
Low m	37	23.19	6.98	12	20.17	8.14	9	20.44	9.85
Total BPS	73	20.19	7.26	19	18.11	7.21	14	18.50	8.44
Three good things									
High m	36	18.08	5.57	12	16.25	2.83	4	14.00	2.94
Low m	35	22.54	7.93	13	19.62	7.56	7	16.43	7.18
Total TGT	71	20.28	7.15	25	18.00	5.93	11	15.55	5.92
No-activity control									
High m	35	20.66	7.69	15	20.67	6.98	4	18.50	7.94
Low m	31	23.51	7.87	14	23.86	7.42	8	23.25	9.10
Total control	66	22.00	7.85	29	22.21	7.25	12	21.67	8.68

[a] Level of mindfulness based on ranked MAAS score at Time 1

Table 2

Pearson Correlations Between Motivation to Perform Activity and Frequency of Activity, and Changes in Well-being

Measure	Motivation [a]	Frequency [b]
Motivation	—	—
Frequency	.539*	—
WEMWBS change	.495*	.534*

PA change	.461*	.219
NA change	-.140	-.305

Note. WEMWBS = Warwick-Edinburgh Mental Well-being Scale; PA = Positive Affect; NA = Negative Affect.
[a]$n = 40$. [b]$n = 39$.
* $p < .01$