DOES RUMINATION FUNCTION AS A LONGITUDINAL MEDIATOR BETWEEN MINDFULNESS AND DEPRESSIVE SYMPTOMS?

BY

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Abstract

The present study was designed to longitudinally examine the relationships among dispositional mindfulness, rumination, and depressive symptoms in adults and determine whether rumination mediated the expected negative association between mindfulness and depressive symptoms across time. A community sample of 483 New Zealand adults completed self-report measures of mindfulness, rumination and depressive symptoms initially and again after three months and a third time a further three months later. The predicted cross-lag associations were found, and in consequence, the predicted longitudinal mediation was supported in the data as well. That is, rumination mediated the negative association between mindfulness and depressive symptoms. In addition, three of the five facets of mindfulness (acting with awareness, non-judging, and non-reacting) exhibited the longitudinal mediation through rumination to depressive symptoms. The findings of this research suggest that certain aspects of mindfulness function to reduce rumination, which then serve to diminish depressive symptoms.

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Does Rumination Function as a Longitudinal Mediator between Mindfulness and Depressive Symptoms?

In New Zealand, 14.3% of adults are diagnosed with depression at some point in their lives (Mental Health Foundation, 2014) thus effective treatments are crucial. Mindfulness has been consistently linked to reductions in depression in the literature (e.g., Baer, 2003; Hofmann, Sawyer, Witt, & Oh, 2010; Keng, Smoski, & Robins, 2011), but the mechanisms of this effect remain largely unknown. To this end, the present study was designed to investigate the possible mediating effect of reduced rumination on the association between mindfulness and depressive symptoms across time.

Mindfulness

The study of mindfulness is a relatively new area of research in psychology, following on from an increase in the popularity of mindfulness practice in the West starting in the 1970s (Keng et al., 2011). The roots of mindfulness are several ancient spiritual traditions, including Hinduism, Buddhism, and yoga (Kabat-Zinn, 1994). The practice of mindfulness often involves meditation, where the goal is to intentionally focus one's attention on the experiences that are occurring in the present moment, internally and externally, thereby achieving a state of mindfulness (Kabat-Zinn, 1994). Interventions and/or sustained practice can increase mindfulness, but individuals who have never received formal training can also experience and express mindfulness, termed 'dispositional mindfulness'. The majority of the psychological literature refers to and measures dispositional mindfulness, an individual's natural or dispositional tendency to be mindful in their day-to-day lives. This disposition tends to endure consistently across time and varying events and experiences (Brown & Ryan, 2003), and is likely based on a combination of genetic dispositions, personality traits, and environmental influences.

Before delving into the mindfulness literature, it is important to understand what is meant by the word 'mindfulness' - a word many in the West may have heard but cannot adequately explain. Teasdale, Segal, and Williams (1995) describe mindfulness as Kabat-Zinn defined it in the following passage:

> "The essence of this state is to 'be' fully in the present moment, without judging or evaluating it, without reflecting backwards on past memories, without looking forward to anticipate the future, as in anxious worry, and without attempting to 'problem-solve' or otherwise avoid any unpleasant aspects of the immediate situation. In this state, one is highly aware and focused on the reality of the present moment 'as it is', accepting it and acknowledging it in its full 'reality'

> without immediately engaging in discursive thought about it, without trying to work out how to change it, and without drifting off into a state of diffuse thinking focused on somewhere else or some other time" (p. 33)

While the present study does not use mindfulness interventions, it is important to understand their origin and their impact in research and on individuals. Kabat-Zinn was one of the first theorists to combine Western psychotherapy with Eastern meditation when he developed his mindfulness-based stress reduction programme (MBSR; Kabat-Zinn, 1982) (Kirby, 2012), which has been used for numerous physical and psychological conditions since its development (Deyo, Wilson, Ong, & Koopman, 2009; Labelle, Campbell, & Carlson, 2010; Ramel, Goldin, Carmona, & McQuaid, 2004; see Hofmann et al., 2010 for a comprehensive list of studies that have used MBSR).

Some measures of dispositional mindfulness have been written to capture a single dimension of mindfulness, e.g., the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) and others (Toronto Mindfulness Scale, Lau et al., 2006; The Philadelphia Mindfulness Scale, Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). However, other researchers have conceptualised mindfulness as multidimensional. Arguably the most successful effort in this vein is the popular measure of dispositional mindfulness, the Five Facet Mindfulness Questionnaire (FFMQ) (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Their intention was to capture all of the important mindfulness dimensions or facets already identified in the research literature, so they performed an exploratory factor analysis on all of the relevant mindfulness items that already existed in the literature (Baer et al., 2006). This analysis identified five unique, but related, facets which together they claimed captured the overall construct of mindfulness. The five facets are as follows: observing, describing, acting with awareness, non-judging, and non-reacting. First, *observing* outlines the process of one attending to the mental or physical experiences that occur within one's own mind and body. Second, *describing* refers to the ability to use language to attach a label to one's own internal experiences. *Acting with awareness* is the third component of mindfulness, referring to an individual's ability to notice one's own behaviours, thoughts, and emotions that occur in the present. Fourth is *non-judging* of inner experience, the ability to hold a point of view that is non-evaluative towards one's own thoughts and feelings. Last, *non-reactivity* to inner experience describes an individual's ability to avoid becoming absorbed and entangled in troublesome thoughts and feelings and instead to let these come and go.

These facets are distinguishable from each other to a certain extent, thus the relationship between mindfulness and other variables is often examined using the five facets individually rather than using the global (i.e. averaged) measure of mindfulness. For example, a study by Royuela-Colomer and Calvete (2016), which will be discussed further below, found all five facets of mindfulness were negatively correlated with depressive symptomology with the exception of the observing facet, which was positively correlated with depressive symptomology. This result demonstrates the efficacy of using the five facets as a measure of mindfulness rather than combining them into a single all-encompassing global measure. Researchers often will conduct statistical analyses in both ways to elucidate similarities and differences between facets. Baer et al. (2006) found moderately high positive correlations among the five facets of mindfulness, thus they argued that it is reasonable to assume that the five facets contribute to the overall construct of mindfulness but in somewhat different ways.

Mindfulness and Depression

Mindfulness training has been used to ameliorate a number of disorders, ranging from chronic pain and diabetes to depression and anxiety (Hofmann et al., 2010). Two particular conditions appear to have robust associations with mindfulness, namely rumination and depression, and these will be examined in conjunction with dispositional mindfulness in the current study in an attempt to identify how mindfulness leads to reductions in depressive symptoms.

A plethora of studies have demonstrated a robust negative association between mindfulness and depression (Barnhofer et al., 2009; Desrosiers, Klemanski, & Nolen-Hoeksema, 2013a; Raphiphatthana, Jose, & Kielpikowski, 2016). Desrosiers et al. (2013a), for example, conducted a subject variable study whereby treatment-seeking adults completed the FFMQ alongside the Mood and Anxiety Symptom Questionnaire. They found that all five mindfulness facets were significantly negatively associated with symptoms of depression, with the exception of observing, which was unrelated to anxiety and depressive symptomology. These findings are consistent with the findings by Royuela-Colomer and Calvete (2016) previously mentioned.

The mindfulness-depression relationship, however, is most convincingly demonstrated in intervention studies using clinical samples of individuals. A meta-analysis by Hofmann et al. (2010) demonstrated the efficacy of mindfulness-based treatments for reducing depression and anxiety. As an example, Barnhofer et al. (2009) investigated the presumed salubrious effects of Mindfulness-Based Cognitive Therapy (MBCT), using a

sample of adults diagnosed with chronic or recurrent depression. Participants were randomly assigned to a MBCT group or a treatment-as-usual (TAU) group. Symptoms of depression were reduced from severe to mild for the participants in the MBCT group, while there was no change in symptom severity for the TAU group. Additionally, a greater number of individuals failed to meet the criteria for depression after receiving MBCT, in comparison to TAU. Another study, by Labelle et al (2010) examined the effects of pre- and post-MBSR intervention on a sample of women who had completed treatment for cancer. Their results revealed that in comparison to the wait-list control group, those women who completed the MBSR programme reported fewer depressive symptoms in conjunction with higher scores of mindfulness. Altogether, a large number of studies have established an inverse relationship between mindfulness and depression in both community and clinical samples. Nevertheless, research is lacking on studies that explore the mechanisms of *how* mindfulness leads to a reduction in depressive symptoms, and longitudinal subject variable studies are particularly needed that examine associations between dispositional mindfulness and depressive symptoms over time.

Rumination and Depression

Rumination is a variable that is often implicated within the association between mindfulness and depression. Defined as "behaviors and thoughts that focus one's attention on one's depressive symptoms and on the implications of these symptoms," (Nolen-Hoeksema, 1991, p. 569), rumination is a known risk factor for depression (Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). According to Nolen-Hoeksema's (1987) Response Styles Theory, depression tends to become amplified and prolonged if an individual responds to his/her low mood by ruminating. Conversely, according to this theory, relief from depressive mood will be more likely to occur if individuals engage in distracting responses. On the basis of this theory, Morrow and Nolen-Hoeksema (1990) induced temporary states of depressed mood in individuals and then experimentally manipulated their responses to this mood. As expected, they found that remediation of depressive affect was smallest for individuals who completed a passive ruminative task in comparison to an active or distracting task. Similarly, Nolen-Hoeksema (2000) conducted a study with the aim of examining the relationship between ruminative responses and depressive diagnoses. A large community sample of adults was interviewed in a clinical setting twice over one year and they also completed a number of self-report measures for depression, anxiety and rumination. Nolen-Hoeksema's (2000) findings corroborated other research in that it showed that ruminative responses to distress predicted major depressive disorders, triggered new onsets of

major depressive episodes, and to some extent, predicted the chronicity of major depressive episodes.

Rumination and Mindfulness

Greater levels of mindfulness have also been shown to reduce rumination (Brown & Ryan, 2003; Heeren & Philippot, 2011; Ramel et al., 2004). Raes and Williams (2010) examined dispositional mindfulness and rumination in a sample of students at a single time point. They found that, when controlling for current depressive symptoms and a history of depression, individuals who are naturally more mindful experienced less uncontrollable rumination. These results suggest that ruminative thinking in individuals with high dispositional mindfulness is less likely to escalate into self-perpetuating and uncontrollable ruminative cycles. In a study by Heeren and Philippot (2011), half of the participants completed mindfulness training based on MBCT, while the other half served as wait-list controls. Measures of rumination and psychopathology were taken both prior to the mindfulness training as well as after completion. Their study revealed that in addition to reducing general psychopathology, mindfulness training reduced maladaptive rumination and increased adaptive rumination. Furthermore, and relevant for the current study, they revealed that the impact of the intervention, i.e., greater mindfulness on reduced psychopathology, was mediated by reductions in rumination.

The Study of Mindfulness, Rumination and Depression Together

This research evidence suggests that rumination plays a mediating role between mindfulness and depression (Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013; Deyo et al., 2009; Labelle et al., 2010). That is, greater mindfulness is likely to diminish the tendency to ruminate, which, in turn, is likely to lead to reductions in levels of depression. This proposed mediating role of rumination has been investigated, yielding mixed results, across a small number of studies that will be reviewed here, and the hypothesis has received mixed support (e.g., Kearns et al., 2016; Kingston, Dooley, Bates, Lawlor, & Malone, 2007; Petrocchi & Ottaviani, 2015; Royuela-Colomer & Calvete, 2016).

The first study in this vein was conducted by Desrosiers et al. (2013b) who used a clinical sample of adults to assess whether use of emotion regulation strategies such as rumination mediated the relationship between mindfulness, depression and anxiety, as measured by self-report questionnaires at a single time point. They found that rumination significantly mediated the relationship between mindfulness and anxiety and depressive symptoms. This study provides promising evidence of the mediational role of rumination in the relationship between mindfulness and depression. However, the study is limited due to

the authors' use of a mediation analysis on concurrent data. A proper mediation analyses would require data to be collected at two or three time points in order to produce results that can provide convincing evidence of a temporal or causal relationships (Jose, 2016).

A subsequent longitudinal study by Petrocchi and Ottaviani (2016) used a small community sample of adults who completed self-report measures of mindfulness, rumination and depression twice over a two-year period. Results demonstrated that non-judging was the only mindfulness facet to predict reductions in rumination and subsequent depressive symptoms after two years. Thus, rumination was found to mediate the relationship between non-judging mindfulness and depressive symptoms. However, as with the Desrosiers et al. (2013b) study cited above, caution must be taken when considering these findings. First, the sample size of this study was very small (N = 41), thus the findings should be treated as suggestive. Second, they performed only two assessments where three assessments would have provided more compelling results.

As mentioned previously, Royuela-Colomer and Calvete (2016) also examined the mediating role of rumination and collected self-report data at two time points on a large sample of Spanish adolescents. Royuela-Colomer and Calvete (2016) used each individual facet of mindfulness to explore the relationships between rumination and depression over time. They specifically found that acting with awareness and non-reactivity predicted lower depression over time, however they did not find that rumination mediated this relationship. Conversely, they found that observing predicted an *increase* in depression over time, and that this relationship was mediated by an increase of rumination. These findings may illuminate a maladaptive role of the observing facet of mindfulness in adolescents. Within the context of other studies on rumination mediating the impact of mindfulness on depression, this study is notable because: it was based on adolescents, it involved only two points of measurement, and their measures of the three constructs were atypical for the field.

A second study that failed to identify rumination as a mediator between mindfulness and depression over time is one by Kearns et al. (2016). Following a group of adults who had demonstrated at least three previous episodes of depression, they measured self-reported mindfulness, rumination and depression initially, and again at a two year follow-up. Consistent with Royuela-Colomer and Calvete's (2016) findings, they found that greater mindfulness predicted reductions in rumination and depression over time, nevertheless rumination was not found to mediate this relationship. They did, however, find a statistical trend towards rumination being a mediator over the longer time period of two years.

Goals of the Present Study

Absent from the literature is a three time point longitudinal study with a large community sample investigating the mediating role of rumination in the association between dispositional mindfulness and depressive symptoms. The current study was designed to build upon the existing literature by filling this gap.

We expected to find, within a longitudinal mediation analysis, that those individuals high in dispositional mindfulness at time one would report lower rumination at time two, and this level of rumination would, in turn, predict lower levels of depressive symptoms at time three. Thus, we expected rumination to statistically mediate the relationship between mindfulness and depressive symptoms over time (Hypothesis 1). Based on the literature reviewed above concerning facets of mindfulness, it was further hypothesised (Hypothesis 2) that we would find rumination to be a significant mediator in the association between two mindfulness facets, specifically non-judging and acting with awareness, and subsequent depressive symptoms.

Method

Participants

The participants in this study were recruited through a nationwide recruitment effort inviting individuals 16 years and over to participate in the *New Zealand Happiness Study*.

The final sample included 552 participants ranging in age from 16 to 80 years, with a mean age of 36 years (*SD* = 16.43). The distribution of age was dichotomised based on statistical frequencies rather than on theoretical grounds in order to achieve two equal-sized groups for subsequent data analysis. Figure 1 summarises the age distribution of participants in addition to gender. 78.3% of participants in the final sample self-identified as Pakeha/NZ European, 4.3% identified as Maori, 0.9% as Pacific Nations, 2.4% as Asian, and 7.4% specified their ethnicity as “other” (and 6.7% of participants did not specify their ethnicity).

Figure 1.

Age distribution by Gender

Note. Total $N = 552$. Values are frequencies.

Procedure

Ethical approval was obtained from Victoria University of Wellington's Human Ethics Committee prior to data collection. The longitudinal subject variable design of the current study involved the completion of a survey at three time points approximately three months apart (May, August, and November, 2010). Existing longitudinal studies that assess naturalistic changes in a population support the use of three month time intervals (Muthén & Curran, 1997). Additionally, Byrne and van de Vijver (2010) assert that a three-month time frame is appropriate when observing the temporal order of events and examining individual differences.

Recruitment flyers were sent to community groups, retirement villages, workplaces, and recreation centres across New Zealand. An advertisement was also placed on the www.facebook.com website and in two large city newspapers. Following recruitment, participants were assigned a unique identification number and the survey was made available for completion either online or by hardcopy.

The survey included a large battery of measures relating to the emotional functioning of the individual as well as demographic questions. The survey took approximately 40-50 minutes to complete and participants were reminded that their participation was both

voluntary and anonymous prior to their involvement. Participants indicated consent by participating. Participants were allowed up to one month to complete the survey and were strongly encouraged to complete the survey at each of the three time points, however this condition was not compulsory. Participants were contacted through e-mail, post, or telephone to advise them of the next survey completion date. Those individuals who completed the survey at all three time points received a $20 gift voucher as a token of appreciation.

Measures

The three psychometric measures that are relevant to the current study are: the Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), a shortened version of the ruminative response subscale from the Response Styles Questionnaire (RSQ; Nolen-Hoeksema, Morrow, & Fredrickson, 1993), and the Beck Depression Inventory-11 (BDI-11; Beck, Steer, & Brown, 1996).

The Five-Facet Mindfulness Questionnaire

The FFMQ (Baer et al., 2006) was used to measure self-report mindfulness in the current study. The FFMQ is a 39-item scale which is scored on a 5-point Likert scale (1 = *never or very rarely* to 5 = *very often or always*). Participants were asked to choose the option that best describes what is true for them. Items in the FFMQ tap into one of five facets of mindfulness, namely *observing*, *describing*, *acting with awareness*, *non-judging* of inner experience, and *non-reacting* to inner experience. Example items of each facet can be found in Table 2. The FFMQ has demonstrated good psychometric properties in student samples and community samples (Baer et al., 2006) The FFMQ generated good internal reliability at all time points (see Table 2).

Table 1.

Example Items for Factors of the FFMQ

Factor	Example Items
Nonjudging	I believe some of my thoughts are abnormal or bad and I shouldn't think that way*
Describing	I'm good at finding the words to describe my feelings
Acting with Awareness	I find it difficult to stay focussed on what's happening in the present*
Observing	I notice how foods and drinks affect my thoughts, bodily sensations, and emotions
Nonreacting	I perceive my feelings and emotions without having to react to them

Note. *Reverse-scored items.

Response Styles Questionnaire

The shortened version of the ruminative response subscale from the RSQ (Nolen-Hoeksema et al., 1993) was used to measure self-report levels of rumination. This scale consisted of 11 items and responses were given on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), whereby higher scores indicate higher levels of ruminative coping. Participants are asked to choose the option that best describes how they responded to a negative event they recently experienced, for example, "Thought about how passive and unmotivated you felt". In this sample, high internal reliability for this scale was found at each time point (see Table 2).

Beck Depression Inventory-II

Depressive symptoms were measured in the current study using the BDI-II (Beck et al., 1996). The BDI-II is a 21-item scale where participants were asked to select one out of a group of four statements for each item that best describes their feelings over the past month. For example, participants were asked to indicate which out of a cluster of four statements best describes how they felt: "I do not feel sad", "I feel sad much of the time", "I'm sad all the time and I can't snap out of it", and "I'm so sad and unhappy that I can't stand it". The 9th item of the BDI pertaining to suicide was not included in the current study due to ethical reasons, resulting in a 20-item scale. The BDI yielded excellent internal reliability at all time points (see Table 2).

Table 2.

Internal Scale Reliability (Cronbach's Alpha) for FFMQ, the Five Facets of Mindfulness, RSQ, and BDI across Time

Measure	Time One	Time Two	Time Three
FFMQ (Overall)	.91	.93	.93
Observing	.75	.83	.84
Describing	.91	.93	.93
Act-Aware	.86	.90	.91
Non-Judging	.91	.93	.94
Non-Reacting	.81	.86	.86
RSQ	.89	.90	.89
BDI	.92	.93	.92

Note. FFMQ = Five Facet Mindfulness Questionnaire; RSQ = Response Styles Questionnaire; BDI = Beck Depression Inventory-11.

Analytic Strategy

The primary goal of the current study was to identify and confirm the previously established relationships among mindfulness, rumination, and depressive symptoms, whereby greater levels of mindfulness would be negatively related to both rumination and depressive symptoms, which, in turn, were expected to be negatively related. Most critically, we sought to determine whether rumination played a mediational role within the relationship between mindfulness and depressive symptoms. A number of steps are involved to address these goals. First, Confirmatory Factor Analyses (CFAs) using Structural Equation Modelling (SEM; Arbuckle, 2009) in AMOS were used to confirm that the FFMQ (Baer et al., 2006), the RSQ (Nolen-Hoeksema et al., 1993), and the BDI (Beck et al., 1996) would demonstrate time invariance, i.e., confirm the assumption that these measures functioned similarly over time. Next, a structural model was created through latent variable path modelling (SEM) to test whether global mindfulness and each of the five facets of mindfulness negatively predicted rumination and depressive symptoms across time, and additionally, whether rumination at time two mediated the relationship between mindfulness at time one and depressive symptoms at time three. Further SEM analyses were conducted to explore possible moderated mediations by sex, meditation practice, and age.

Results

Preliminary Analysis

Missing values analysis found that 26.6% of data was missing (ranging from 15% to 35% missingness at the variable level). Little's MCAR test yielded non-significance, p = .645, indicating that the missing data were missing completely at random. The missing values in the dataset were then imputed using the estimation maximization (EM) procedure in order to best estimate the missing data points and thus retain the full sample size.

Following the guidelines of Trochim and Donnolly (2006) and Field (2009), values for skew and kurtosis between -2 and +2 are considered to be acceptable. Analyses revealed that our variables of mindfulness and rumination fell in the acceptable range, but our variable of depressive symptoms was both skewed and kurtotic (see Table 3). This result is a common finding among studies using the construct of depressive symptoms and is often dealt with by transforming the problematic data (e.g., Hereen & Philippot, 2011; Labelle, Campbell, & Carlson, 2010). However, transforming such variables creates an artificial and arbitrary metric, making it difficult to interpret results. Taking this fact into consideration, logarithmic transformations were performed on the depressive symptoms variable at all time points. This brought skew and kurtosis to acceptable levels, however, reanalyses yielded virtually the

same results as with the untransformed data. We have decided to report results from untransformed data because they conform to a metric which is interpretable.

Table 3.

Skewness and Kurtosis

	Skewness			Kurtosis		
	Statistic	S.E	Value	Statistic	S.E	Value
T1 Mindf	-.019	.104	-.183	.402	.208	1.933
T2 Mindf	-.005	.104	-.048	.388	.208	1.865
T3 Mindf	-.071	.104	-.683	.097	.208	.466
T1 Rum	-.146	.104	-1.404	-.578	.208	-2.779
T2 Rum	-.003	.104	-.029	-.650	.208	-3.125
T3 Rum	.039	.104	.375	-.597	.208	-2.870
T1 Dep	1.930	.104	18.558	5.063	.208	24.341
T2 Dep	2.343	.104	22.529	10.041	.208	48.274
T3 Dep	1.987	.104	19.106	7.194	.208	34.587

Note. Mindf = Mindfulness; Rum = Rumination; Dep = Depressive symptoms; T1 = Time one; T2 = Time two; T3 = Time three.

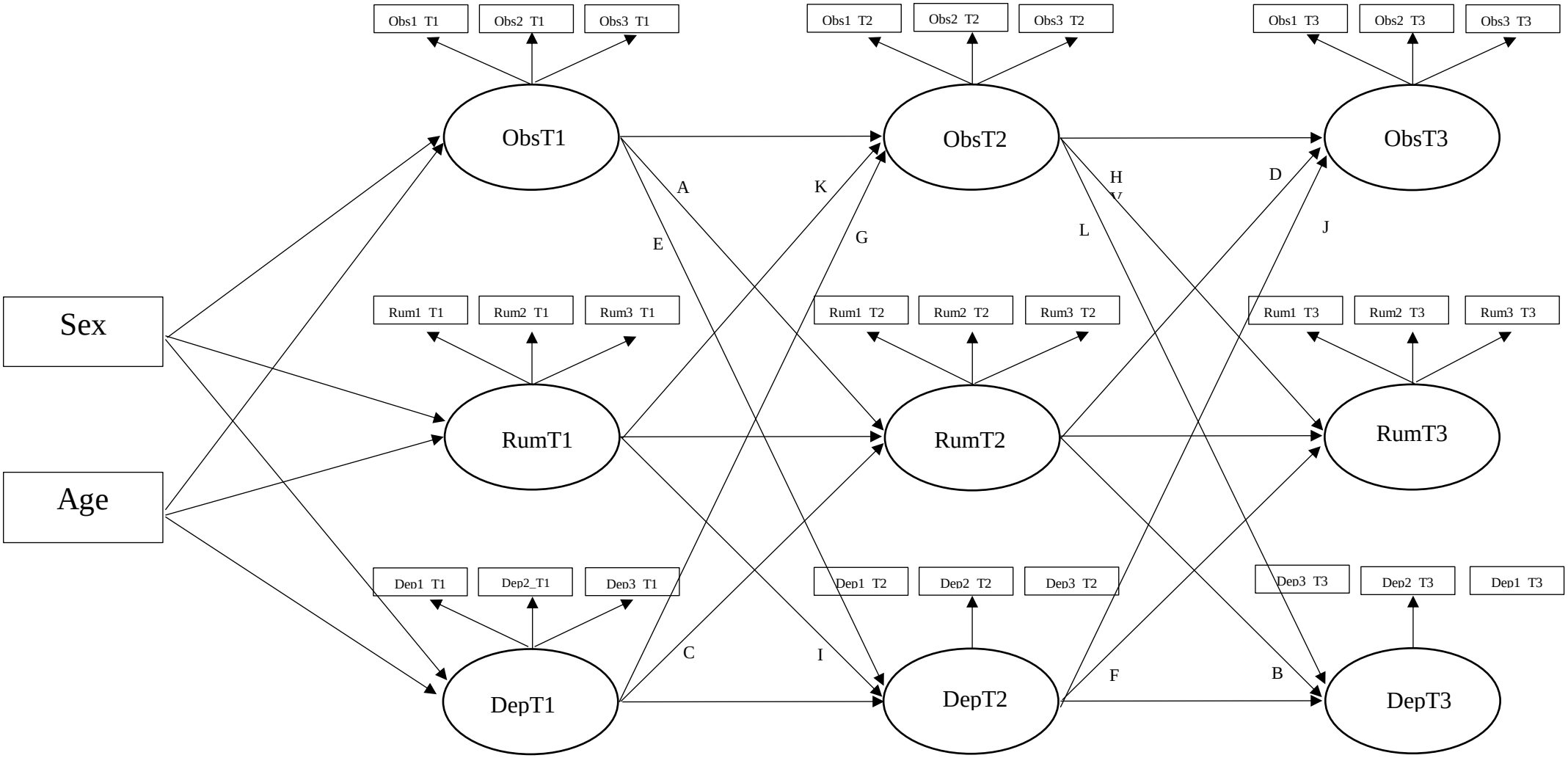

Figure 2. N = 483. A longitudinal structural path model for Observing, Rumination, and Depressive symptoms. Obs = Observing mindfulness; Rum = Rumination; Dep = Depressive symptoms; T1 = Time 1; T2 = Time 2; T3 = Time 3.

Descriptive Statistics

Descriptive statistics for mindfulness, rumination and depressive symptoms scores at each time point, in addition to scores on each of the five facets of mindfulness, are presented in Tables 4, 5, 6 and 7. All variables were consistently correlated in the expected directions over the three time points, namely global mindfulness was negatively correlated with rumination and depressive symptoms, which were positively correlated. Rumination and depressive symptoms were also negatively correlated with all five facets of mindfulness. Mean scores for each variable were sensible, as expected for a community sample. Specifically, the mean global mindfulness score along with the means for the five individual facets of mindfulness scores all fell in the moderate range. Also in line with expectations, the mean depressive symptoms score fell at the lower end of the scale and the mean rumination score was low to moderate.

Table 4.

Descriptive Statistics and Correlations among the Study Variables at Time 1

	Mindf	Rum	Dep	Obs	Des	Act-A	Non-J	Non-R
Mindf		-.47**	-.53**	.57**	.70**	.72**	.74**	.66**
Rum			.61**	-.08	-.25**	-.37**	-.50**	-.37**
Dep				-.11*	-.27**	-.46**	-.54**	-.40**
Obs					.29**	.26**	.16**	.32**
Des						.36**	.31**	.33**
Act-A							.48**	.32**
Non-J								.40**
Non-R								
Mean	2.87	2.76	1.36	3.43	3.20	2.22	2.49	3.03
SD	0.51	0.91	0.39	0.65	0.82	0.70	0.91	0.66

Notes. $N = 552$. Mindf = Mindfulness (Overall); Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non Judging; Non-R = Non Reacting.

*$p < .05$; **$p < .01$

Table 5.

Descriptive Statistics and Correlations among the Study Variables at Time 2

	Mindf	Rum	Dep	Obs	Des	Act-A	Non-J	Non-R
Mindf		-.47**	-.48**	.54**	.74**	.72**	.68**	.69**
Rum			.55**	-.01**	-.25**	-.46**	-.51**	-.35**
Dep				-.10*	-.27**	-.42**	-.45**	-.39**
Obs					.36**	.16**	.06	.36**
Des						.39**	.31**	.36**
Act-A							.49**	.38**
Non-J								.35**
Non-R								
Mean	3.36	2.63	1.33	3.33	3.55	2.27	3.58	3.02
SD	0.48	0.89	0.36	0.62	0.81	0.66	0.78	0.63

Notes. $N = 552$. Mindf = Mindfulness (Overall); Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non Judging; Non-R = Non Reacting.

*$p < .05$; **$p < .01$

Table 6.

Descriptive Statistics and Correlations among the Study Variables at Time 3

	Mindf	Rum	Dep	Obs	Des	Act-A	Non-J	Non-R
Mindf		-.49**	-.45**	.56**	.72**	.66**	.71**	.69**
Rum			.57**	-.06	-.28**	-.44**	-.54**	-.30**
Dep				-.08*	-.32**	-.36**	-.42**	-.29**
Obs					.32**	.13**	.12**	.45**
Des						.30**	.35**	.36**
Act-A							.45**	.32**
Non-J								.35**
Non-R								
Mean	3.38	2.54	1.29	3.33	3.56	3.28	3.53	3.07
SD	0.50	0.89	0.35	0.67	0.84	0.70	0.86	0.65

Notes. $N = 552$. Mindf = Mindfulness (Overall); Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non Judging; Non-R = Non Reacting.

*$p < .05$; **$p < .01$

Table 7.

Zero Order Correlations among Mindfulness at Time 1, Rumination at Time 2, and Depressive Symptoms at Time 3

	Rumination Time 2	Depressive Symptoms Time 3
Mindfulness Time 1	-.41**	-.34**
Rumination Time 2		.43**

Notes. $N = 552$

*$p < .05$; **$p < .01$

Mean Group Differences by Moderators

A MANOVA was conducted to explore the mean group differences of the three main constructs by the three moderators: age (young versus old), sex, and meditation experience. We found significant MANOVA main effects for two of the three independent variables: for age, Wilk's L = .85, $F(3, 471) = 27.61$, $p < .001$, partial $\eta^2 = .15$; and for meditation experience, Wilk's L = .95, $F(3, 471) = 7.58$, $p < .001$, partial $\eta^2 = .05$. No significant main effects were found for sex: Wilk's L = .99, $F(3, 471) = 1.78$, $p = .15$, partial $\eta^2 = .01$. An assessment of the univariate results revealed several significant group comparisons among the dependent variables (see Table 8). No gender differences were noted for mindfulness, rumination and depressive symptoms. In contrast, age differences for all three variables were obtained: older participants reported higher levels of mindfulness and lower levels of rumination and depressive symptoms, relative to younger participants. With regard to meditation experience differences, as expected, meditators reported higher levels of mindfulness, but no differences were noted for rumination and depressive symptoms.

Table 8.

Means and Standard Errors for Mean Group Comparisons for Sex, Age, and Mediation Experience

	Males	Females	Younger	Older	Non-Med	Med
Mindfulness	3.22	3.24	3.09	3.36***	3.12	3.33***
	(.037)	(.025)	(.032)	(.026)	(.026)	(.036)
Rumination	2.54	2.66	2.93	2.27***	2.64	2.56
	(.062)	(.042)	(.053)	(.053)	(.044)	(.061)
Depressive	1.29	1.33	1.39	1.22***	1.33	1.29
Symptoms	(.027)	(.023)	(.023)	(.022)	(.019)	(.026)

Note. $N = 483$. Younger = 16-36 yrs at T1; Older = 37-80 yrs at T1; Non-Med = No meditation experience; Med = Meditation experience. Standard errors are presented within parentheses.

***$p < .001$

Construct Validity of the Measures

CFAs are often used to test a proposed factor structure for a measure, and a variety of fit indices suggests whether the model fit is satisfactory or not (Bryant & Yarnold, 1995). The model fit indices include the χ^2 goodness-of-fit statistic and the ratio of the chi-square value divided by the degrees of freedom (Hu & Bentler, 1999). If the resulting χ^2/df ratio is less than 3, it is considered a good fit (Hu & Bentler, 2009). Two general classifications of model fit indices exist: absolute and incremental. These are used to supplement the χ^2 test by quantifying the degree of fit along a continuum (Hu & Bentler, 2009). In order to provide a comprehensive indication of fit, a variety of fit indices were used. The standardised Root Mean Squared Residual (sRMR) and the Root Mean Square Error of Approximation (RMSEA) are two absolute fit indices that examine how well an *a priori* model replicates the sample data (Hu & Bentler, 1999). Acceptable sRMR values fall below .08, and for RMSEA, values under .06 are good and values under .08 are considered reasonable (Hu & Bentler, 1999). Conversely, incremental fit indices measure the proportionate fit improvement by comparing a target model with a more limited, nested baseline model (Hu & Bentler, 1999). The Comparative Fit Index (CFI) is a popular incremental fit index to report, and values over .90 are considered acceptable.

The 39 items of the FFMQ (Baer et al., 2006) were postulated to load uniquely onto five factors or facets; observing, describing, acting with awareness, non-judging, and non-reacting. Following a precedent set in the literature (Baer et al., 2006) items in each facet were systematically sorted, added, and averaged to create three parcels, for example, every fourth item starting with the first item was chosen to go into the first parcel, and so on and so forth. The CFA revealed acceptable fit indices when entered as a 5-factor model at all three time points: time one, $\chi^2 = 393.58$; $p < .001$; $df = 80$; $\chi^2/df = 4.92$; RMSEA = .08; sRMR = .04; CFI = .94, time two, $\chi^2 = 195.35$; $p < .001$; $df = 80$; $\chi^2/df = 2.44$; RMSEA = .05; sRMR = .04; CFI = .98, and time three, $\chi^2 = 226.96$; $p < .001$; $df = 80$; $\chi^2/df = 2.84$; RMSEA = .06; sRMR = .03; CFI = .98. Internal reliability was found to be satisfactory for all five facets at all three time points (see Table 2).

Additional CFAs were run to confirm that the measures of rumination and depressive symptoms performed appropriately over time as well. Items were systematically parcelled into three observed variables for both rumination and depressive symptoms. A single CFA was run at each time point that included both the BDI and the RSQ. The CFAs revealed acceptable fit indices of the RSQ and BDI at all three time points: time one, $\chi^2 = 25.68$; $p = .001$; $df = 8$; $\chi^2/df = 3.21$; RMSEA = .06; sRMR = .03; CFI = .99, time two $\chi^2 = 17.72$; $p =$

.023; $df = 8$; $\chi^2/df = 2.22$; RMSEA = .05; sRMR = .02; CFI = .99, and time three, $\chi^2 = 40.93$; $p < .001$; $df = 8$; $\chi^2/df = 5.12$; RMSEA = .09; sRMR = .03; CFI = .99. Internal reliability was found to be satisfactory for rumination and depressive symptoms at all three time points (see Table 2).

Longitudinal Measurement Invariance

Once a configurable model for goodness-of-fit was established for the FFMQ, RSQ, and BDI (as suggested by Hu & Bentler, 1999), the next step was to check that each psychometric instrument measures the same construct in the same way across time. To do this, Byrne and van de Vijver (2010) recommend the use of time invariance tests conducted within SEM, whereby three levels of invariance are tested for, namely configural, metric, and scalar. Metric invariance needs to be achieved in order to investigate relationships between the variable of interest and other variables. Scalar invariance is required for meaningful mean comparisons of the variable of interest across groups (Cheung & Rensvold, 2002). To reject the null hypothesis of time invariance, two of the following three criteria must be met: $\Delta\chi^2$ significant at $p < .05$; ΔCFI > .01; and ΔRMSEA > .015 (Cheung & Rensvold, 2002; Vandenberg & Lance, 2000). CFAs were run for each of the three variables across all time combinations (e.g., mindfulness between T1 and T2, rumination between T1 and T3, and depressive symptoms between T2 and T3, and so forth).

Time invariance was identified for all three variables at each time comparison (see Tables 9 and 10), using ΔCFI > .01; and ΔRMSEA > .015 as the chosen criteria. These results indicated that the FFMQ, the RSQ, and the BDI each measured mindfulness, rumination, and depressive symptoms (respectively) consistently across the three time points. The ΔCFI and ΔRMSEA values from the unconstrained model to the more constrained model (measurement weights) yielded values less than 0.01 for the FFMQ, the RSQ and BDI (see tables 9 and 10). This set of results indicates that the parcelled items' loadings were similar across the three time points, establishing metric invariance for all measures. To test for scalar invariance, constraints were imposed upon items' intercepts to be equal across the three time points, in addition to the previously imposed constraints on items' loadings. The FFMQ, RSQ and the BDI demonstrated scalar invariance (see tables 9 and 10), as the model fit indices of the scalar model (structural covariances), specifically the CFI and RMSEA, did not show change greater than the criteria of .01 (Cheung & Rensvold, 2002) in comparison to those of the metric model (measurement weights). This pattern indicates that factors within the FFMQ, RSQ and BDI maintained the same intervals and zero points across the three time

points. These results advise that meaningful mean group comparisons can be made across time of the sub-factors of mindfulness, rumination and depressive symptoms.

Table 9.

Values Indicating Time Invariance for the FFMQ

FFMQ Time 1 and Time 2	CFI	ΔCFI	RMSEA	ΔRMSEA
Unconstrained	.962		.049	
Measurement weights	.960	.002	.049	0
Structural covariances	.959	.001	.047	.002
FFMQ Time 1 and Time 3				
Unconstrained	.960		.051	
Measurement weights	.960	0	.050	.001
Structural covariances	.959	.001	.048	.002
FFMQ Time 2 and Time 3			RMSEA	
Unconstrained	.979		.039	
Measurement weights	.979	0	.038	.001
Structural covariances	.978	.001	.037	.001

Table 10.

Values Indicating Time Invariance for the RSQ and BDI

RSQ and BDI Time 1 and Time 2	CFI	ΔCFI	RMSEA	ΔRMSEA
Unconstrained	.995		.039	
Measurement weights	.993	.002	.040	-.001
Structural covariances	.993	0	.039	.001
RSQ and BDI Time 1 and Time 3				
Unconstrained	.990		.054	
Measurement weights	.983	.007	.063	-.009
Structural covariances	.982	.001	.060	.003
RSQ and BDI Time 2 and Time 3				
Unconstrained	.992		.049	
Measurement weights	.988	.004	.052	-.003
Structural covariances	.989	-.001	.048	.004

Longitudinal Path Model Analysis

The relationships between and among global mindfulness, rumination and depressive symptoms over time were examined using latent variable path analysis in SEM (see Figure 2 for an example). This approach not only allows the relationships between latent variables to be examined at a given time point, but also permits the examination of cross-lag associations

on variables that have been residualised (Kline, 2005). The current study used path analysis to examine cross-lag associations among mindfulness, rumination and depressive symptoms, and, further, to determine whether rumination mediated the relationship between mindfulness and depressive symptoms over time. By using path analysis, we could determine whether the hypothesised path model fits the observed data well, by considering the model's goodness of fit statistics (Hu & Bentler, 1999). In fact, the model fit for the fully saturated path model was found to be acceptable: χ^2 = 1,014.34; $p < .001$; df = 327; χ^2/df = 3.10; RMSEA = .07; sRMR = .045; CFI = .95.

In order to determine whether key associations were consistent across time, equality constraints were placed on the cross-lag links in the model, constraining time 1 and time 2 to be equal to time 2 and time 3 for a particular cross-lag. This analysis yielded a significant result in the chi-square difference test, $p = .013$, therefore the assumption that the cross-lag paths were equal over time was rejected. Thus, we did not constrain cross-lags to be equal between T1-T2 and T2-T3. Also, for the base model, we co-varied out age and gender, which involved a loss of 69 participants whom were added to the study after time one data collection and did not report their age or gender.

Cross-lag Associations

The first hypothesis to test was that global mindfulness at time one would be negatively related to rumination at time two (path *a*), and rumination at time two would be positively related to depressive symptoms at time three (path *b*). The zero order correlations reported above (see Table 7) suggest that this pattern might emerge in the full path model. Cross-lag pathways, in fact, were significant for path *a* (β = -.19, p =.03) and path *b* (β = .05, p = .02), confirming the expected direction and strength of these associations.

Analyses of the remaining five pathways revealed no other significant two-path associations (see Table 11), although four pairs yielded a single significant path.

Table 11.

Cross-lag associations for possible mediation paths

	Beta (β)	Significance (p)
T1 Mindf to T2 Rum	-.19	.03
T2 Rum to T3 Dep	.05	.02
T1 Dep to T2 Rum	.14	.27
T2 Rum to T3 Mindf	-.03	.12
T1 Mindf to T2 Dep	.02	.56
T2 Dep to T3 Rum	.42	.00
T1 Dep to T2 Mindf	.04	.35
T2 Mindf to T3 Rum	-.27	.00
T1 Rum to T2 Dep	.02	.20
T2 Dep to T3 Mindf	.11	.01
T1 Rum to T2 Mindf	-.03	.08
T2 Mindf to T3 Dep	-.10	.01

Note. Mindf = Mindfulness; Rum = Rumination; Dep = Depressive symptoms; T1 = Time 1; T2 = Time 2; T3 = Time 3

Mediation Analyses

The second part of the first hypothesis to test was that rumination would mediate the negative relationship between mindfulness and depressive symptoms. The analyses for indirect effects were specified in AMOS based on 2000 boot-strapped iterations, yielding a 95% bias corrected confidence interval and a Monte Carlo estimate of the p-value. A significant mediation was identified for the proposed pathway from T1 mindfulness to T2 rumination to T3 depressive symptoms: indirect effect = -.009, SE = .006, 95% CI = [-.26, -.001], p = .03.

Mediation analyses of the remaining five pathways yielded no significant mediations (see Table 12), although one resulted in a marginally significant result (Rumination at T1 to Mindfulness at T2 to Depressive symptoms at T3). In sum, the predicted pathway from mindfulness to rumination to depressive symptoms was verified as yielding a significant mediation, whereas no other pathway in the fully saturated model yielded significance.

Table 12.

Longitudinal Mediation Results

	Indirect effect	Standard Error (SE)	95% Confidence Interval (CI)	Significance level (p)
T1 Mindf to T2 Rum to T3 Dep	-.009	.006	-.26, -.001	.03
T1 Dep to T2 Rum to T3 Mindf	-.004	.005	-.02, .002	.23
T1 Mindf to T2 Dep to T3 Rum	.008	.015	-.016, .043	.48
T1 Dep to T2 Mindf to T3 Rum	-.012	.015	-.048, .014	.32
T1 Rum to T2 Dep to T3 Mindf	.003	.003	-.001, .01	.13
T1 Rum to T2 Mindf to T3 Dep	.003	.002	-.0001, .01	.06

Note. Mindf = Mindfulness; Rum = Rumination; Dep = Depressi; T1 = Time 1; T2 = Time 2; T3 = Time 3

Mediation Analyses at the Facet Level

The above described mediations were performed with mindfulness as a single unitary construct, but the literature on the FFMQ has shown the utility of examining mindfulness at the facet level. Accordingly, further mediation analyses were run with each of the five facets of mindfulness as the independent variable (see Figure 2 for an example). A longitudinal latent variable path model involving all five facets simultaneously was determined to be too complex given our sample size, so five separate path models were computed (e.g., the observing facet with mindfulness and depressive symptoms, and so forth). Four significant mediations were obtained (see Table 13). Hypothesis 2 suggested that rumination would mediate the association between acting with awareness and depressive symptoms and also between non-judging and depressive symptoms. Consistent with the hypothesis, those two longitudinal mediations were found. In addition, a third facet, non-reacting, also yielded a significant longitudinal mediation in the expected direction.

And last, the analyses yielded one other significant mediation but with the opposite sign as the other mediations: observing *increased* rumination which, in turn, then increased depressive symptoms. No mediation involving observing was predicted, nor was it expected

that any mindfulness facet would trigger higher levels of either rumination or depressive symptoms.

Table 13.

Five Facets of Mindfulness Longitudinal Mediation Results

	Indirect Effect	SE	95% CI	p
Obs to Rum to Dep	.008	.005	.001, .021	.02
Act-A to Rum to Dep	-.011	.006	-.026, -.003	.01
Non-J to Rum to Dep	-.007	.004	-.019, -.001	.02
Non-R to Rum to Dep	-.011	.006	-.028, -.002	.01

Note. Obs = Observing; Act-A = Acting with Awareness; Non-J = Non-judging; Non-R = Non-reacting; Rum = Rumination; Dep = Depressive symptoms.

Moderators of the Facet-Level Mediated Effect

Based on previous findings by Baer et al. (2006) and Sturgess and Jose (2012), it was reasonable to expect that our mediations might differ based on meditation experience, sex, and/or age. These three moderators were examined separately: meditation practice (meditator vs. non-meditator), gender (female vs. male), and age (younger [16-36 years] vs. older [37-80 years]). Based on chi-square difference tests performed on the five hypothesised mediations for the facets, none of the facet-level mediations significantly differed based on meditation practice, sex, or age (see Tables 14, 15 and 16).

Table 14.

Moderations of Mediations for Meditators versus Non-meditators

	$\Delta\chi^2$	Δdf	*p*
Obs – Rum – Dep	3.241	2	.198
Des – Rum – Dep	.272	2	.873
Act-A – Rum – Dep	.103	2	.950
Non-J – Rum – Dep	.07	2	.966
Non-R – Rum – Dep	.296	2	.862

Notes. N = 483; Meditators = 193; Non-meditators = 290. Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non-Judging; Non-R = Non-Reacting.

Table 15.

Moderations of Mediations for Males versus Females

	$\Delta\chi^2$	Δdf	*p*
Obs – Rum – Dep	2.077	2	.354
Des – Rum – Dep	.424	2	.809
Act-A – Rum – Dep	3.559	2	.169
Non-J – Rum – Dep	1.952	2	.377
Non-R – Rum – Dep	1.158	2	.560

Notes. N = 483; Male = 164; Female = 319. Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non-Judging; Non-R = Non-Reacting.

Table 16.

Moderations of Mediators for Younger versus Older

	$\Delta\chi^2$	Δdf	*p*
Obs – Rum – Dep	1.222	2	.543
Des – Rum – Dep	.179	2	.914
Act-A – Rum – Dep	.086	2	.958
Non-J – Rum – Dep	.633	2	.729
Non-R – Rum – Dep	.847	2	.655

Notes. N = 481; Young = 251; Older = 230. Rum = Rumination; Dep = Depressive symptoms; Obs = Observing; Des = Describing; Act-A = Act Aware; Non-J = Non-Judging; Non-R = Non-Reacting.

Discussion

With the current study we sought to close a gap in the existing literature on the relationships among mindfulness, rumination and depressive symptoms. In particular, the chief aim was to identify whether rumination longitudinally mediated the presumed inverse relationship between mindfulness and depressive symptoms. The main hypothesis of the present study was supported with the results of a longitudinal mediational analysis, whereby rumination was found to significantly mediate the relationship between global mindfulness and depressive symptoms. Our second hypothesis was also supported, in that we found that two facets of mindfulness, namely acting with awareness and non-judging both yielded significant longitudinal mediations. At the same time, we also found an unpredicted significant longitudinal mediation for the facet of non-reacting in the expected direction, and we also found a significant longitudinal mediation for the facet of observing that unfolded in the opposite direction as expected.

The main finding in the present study is that diminished rumination accounted for a significant amount (9%) of the variance in the well-established association between global mindfulness and depressive symptoms. This result is consistent with previous findings (Desrosiers et al., 2013b; Gilbert & Christopher, 2010; Petrocchi & Ottaviani, 2016) obtained in concurrent or two time-point studies. Our study provides more reliable and robust support for such a finding due to our improved methods (three time points) and analytical techniques (bootstrapped longitudinal mediation analysis). This finding suggests that individuals who possess greater levels of global mindfulness initially tended to ruminate to a lesser extent three months later, which, in turn, predicted lower levels of depressive symptoms three more months later.

The implications of this longitudinal mediation finding are several. As discussed in the introduction, mindfulness has been shown to be an effective treatment for reducing depressive symptoms (Barnhofer et al., 2009; Labelle et al., 2010), and the present findings, particularly at the mindfulness facet level, arguably describe in more detail the mechanisms by which mindfulness-based treatments might be effective in reducing depressive symptoms. While we cannot directly link our results to clinical uses of mindfulness since our study was a subject variable longitudinal study, what we can say is that healthy individuals who have a tendency to be more mindful on a daily basis (i.e., report higher dispositional mindfulness) are at less risk of depressive symptoms due to their tendency to ruminate less as a consequence of their mindfulness. Conversely the results suggest that for those individuals who do not possess a mindful predisposition, instructing them about how to respond to stressful events or negative moods in a mindful way rather than in a ruminative fashion may help them to avoid the onset of depressive episodes. Our results and conclusions are consistent with the findings by Deyo et al. (2009), who found similar results from a MBSR training intervention in a sample of healthy non-mindful individuals.

Facets of Mindfulness

Our subsequent facet-level analyses extended the overall mindfulness to rumination to depressive symptoms finding, whereby we were able to identify which particular facets of mindfulness played a role in the reduction of rumination and subsequent depressive symptoms. Consistent with past findings (Baer et al., 2008; Raphiphatthana et al., 2016), acting with awareness, non-judging of inner experience, and non-reacting to inner experience at time one predicted reductions in rumination at time two and subsequent reductions in depressive symptoms at time three. Acting with awareness, non-judging, and non-reacting have been the most consistent three out of the five FFMQ facets to negatively predict

psychological maladaptation (Desrosiers et al., 2013; Paul, Stanton, Greeson, Smoski, & Wang, 2013; Petrocchi & Ottaviani, 2016; Raphiphatthana et al., 2016; Royuela-Colomer & Calvete, 2016), suggesting that they may best capture the 'key active ingredients' of the construct of mindfulness, at least in regard to depressive symptoms. What these significant mediations imply is that individuals who tend to be aware of their actions in the present moment, who do not judge their thoughts and feelings, and rather accept them and let them be, are more likely to experience subsequent lower levels of rumination and, in turn, lower levels of depressive symptoms. In terms of treatment implications, it is possible that those mindfulness programmes that emphasise these three aspects will yield greater reductions in rumination and depressive symptoms than those that emphasise other perspectives.

Somewhat surprisingly, in contrast with the three above mentioned facets which were negatively related to rumination and depressive symptoms, the facet of observing was found to be *positively* related to rumination and depressive symptoms. This finding suggests that those individuals who are particularly observant to mental and physical experiences at time one were more likely to ruminate to a greater extent at time two and have higher levels of depressive symptoms at time three. This result may be considered to be surprising since observing is considered by researchers (Baer et al., 2006) to be one of the five critical mindfulness dimensions, which should all consistently mitigate against psychological maladaptation. However, ours is not the first study to obtain such an outcome for the facet of observing. Baer et al. (2008) found a positive relationship between observing and negative psychological symptoms in a student sample. Further, Royuela-Colomer and Calvete (2016) documented a significant mediation whereby observing was positively related to rumination and depression. They suggested that the observing facet of mindfulness may play a maladaptive role in adolescents. Our study might extend this conclusion to adults as well. Of possible relevance is Baer et al.'s (2006) finding that observing did not fit into a hierarchical model of mindfulness when they examined a subsample of non-meditators, however it did so when a sample of meditators was used. This result suggests that observing may only be a protective facet of mindfulness for those individuals who possess advanced mindfulness experience. Among inexperienced people, observing may unfortunately support the practice of catastrophizing one's negative affect (i.e., rumination). Overall these results suggest that observing may be a counterproductive facet of mindfulness for community samples that do not include a majority of individuals who practice meditative practice.

Describing was the only facet of mindfulness to not be involved in any significant mediations in the current study. This null finding has been obtained in other research as well

(Raphiphatthana et al., 2016), and we, therefore, suggest that it may be a weak facet that does not contribute to the overarching mindfulness construct very well, at least in terms of predicting negative mood states such as rumination and depressive symptoms.

Is Mindfulness the Anti-Rumination Dynamic?

What has been suggested previously and is applicable here, is that the reductions we see in rumination for those individuals reporting higher dispositional mindfulness could be due to mindfulness being the 'antithesis' of rumination. As Desrosiers et al. (2013b) wrote, "rumination involves a self-critical questioning of one's emotions and circumstances whereas the non-judgmental, observing stance of mindfulness is antithetical to this self-critical questioning and may help ruminators disengage from it…" (p. 658). Furthermore, Teasdale et al. (1995) describe being mindful as "direct experience of current reality" (p. 34) whereas rumination is "*thinking* about one's situation…" (p. 34). Selby, Fehling, Panza, and Kranzler (2016) have also touched on this idea of mindfulness being the antithesis of rumination. They argue that attentional control is a key aspect of mindfulness, and it is a *lack* of attentional control that characterises rumination. Thus, if an individual practices mindfulness, i.e., exerting attentional control, it is very likely that he or she will experience a reduction in rumination.

Breaking mindfulness and rumination down into their constituent characteristics may illuminate which aspects act against each other. Rumination is chiefly defined as repetitive, automatic, and negative thinking about oneself (Deyo et al., 2009). Conversely, the non-reacting facet of mindfulness seems to be the opposite of repetitive negative thinking. Rather than repetitively thinking about a negative thought or experience, a mindful individual is trained to not react to such thoughts or experiences. Further, the facet of acting with awareness seems to counteract the automaticity of negative thinking, whereby thoughts and experiences are intentionally observed with awareness by a mindful person, rather than 'getting lost in one's thoughts' typical of a non-mindful person. And finally, non-judging involves the acceptance of negative thoughts rather than counterproductive negative evaluations of oneself for having negative thoughts. We can see then, that these three facets of mindfulness (non-reacting, acting with awareness, and non-judging) seem to directly counteract the main aspects of ruminative thoughts and behaviours.

Moderators of the Mediation Relationships

It was surprising to find that none of age, sex, or meditation experience moderated any of the mediations that were obtained. Evidence in past literature suggests that these individual differences variables were likely to have an impact, but none were found. For

example, as mentioned above, Baer et al., 2006 found that the function of the observing facet of mindfulness differed depending on whether the sample had meditation experience or not, but we did not find that meditation experience significantly moderated any obtained mediation pattern. Another study by Sturgess and Jose (2012) identified that females tended to report higher levels of dispositional mindfulness than males and that older individuals reported higher levels of mindfulness than younger individuals. We did not find any significant moderations by either gender or age. These variables may not have been important moderators for a large and diverse community sample such as the one used in the present study.

Implications of the Findings for Clinical Practice

The examination of the relationships among mindfulness, rumination and depressive symptoms is very relevant regarding treatment for depression. According to the 2011/12 New Zealand Health Survey, 14.3% of New Zealand adults had been diagnosed with depression at some point in their lives, with women having a higher rate than men (17.9% compared to 10.4%, respectively). From the same survey, 6% of adults experienced psychological distress in the last four weeks (Mental Health Foundation, 2014). Considering depression is a prevalent mental health issue in New Zealand, the results obtained in the current study are valuable insofar as they may inform about one method of reducing depression, and might help people who specifically struggle with rumination. At the same time, the findings from the present study also indicate that there is a large portion of reductions in depressive symptoms as a result of mindfulness that is not explained by the pathway through reduced rumination, and these other pathways need to be considered in clinical research and practice. That is, reduced rumination seems to be only one of several factors that transmit the beneficial influences of mindfulness on depression (Barnhofer, Duggan, & Griffith, 2011). In particular, mindfulness may promote a sense of contentment, happiness and/or acceptance, which may subsequently predict reductions in depressive symptoms as well.

Limitations of the Present Study and Future Directions

The findings of the current study should be interpreted in the context of several significant limitations. First, due to the voluntary nature of our recruitment process, we finished with almost twice the number of female participants in comparison to male participants. The issue with this imbalanced ratio is that the sample is not representative of New Zealand's population, where the ratio of male to female is roughly equal. Second, the present findings do not directly add to the mindfulness training literature as such because our study focused on dispositional mindfulness only. Thus, our suggestions for mindfulness

training are tentative and purely theoretical. Third, we were limited by the use of self-report measures because as with all self-report measures, their validity is reliant on the participant's honesty, comprehension of the questions, and introspective ability. Furthermore, self-report data are subject to an array of biases, such as response bias, social desirability bias, and reference bias. However, this study is no more limited by the self-report measures used than any other study employing such measures.

And last, our study identified a number of significant mediations where the size of the indirect effect, although statistically significant, ranged from 7-11%. What these results tell us is that there is a large portion of variance of the direct effect of mindfulness on depressive symptoms which is not explained by the mediator of rumination, and is likely explained by other factors we have not examined. Similar to rumination, some of these potential mediating factors may also be risk factors for depressive symptoms, for example loneliness or maladaptive coping. Future research should consider positive mediators such as optimism, gratefulness, and compassion. Alternatively, different outcome variables could be investigated, as proposed in Borders, Earleywine, and Jajodia (2010) who found that rumination mediated the relationship between mindfulness and aggression. Since mindfulness has been shown to be negatively related to anxiety (Anderson, Lau, Segal, & Bishop, 2007; Brown & Ryan, 2003; Shapiro, Schwartz, & Bonner, 1998), including anxiety as an outcome will likely yield useful insights as well.

Another potentially fruitful future direction might involve conducting a study whereby a MBCT programme is run for individuals who report high levels of rumination. One would expect that the mindfulness training would reduce depression to a greater extent for those individuals who ruminate than for depressed individuals who report low levels of rumination. Future research such as this will help us to understand the important dynamic of how mindfulness reduces depression.

Conclusions

Considering the high rates of depression in New Zealand, it is important to understand the mechanisms by which mindfulness diminishes depressive symptoms. The findings of our subject variable longitudinal study showed that mindfulness at the outset of the study predicted a reduction of rumination three months later, which further predicted a reduction of depressive symptoms another three months later. At the facet level, we found that three of the five facets of mindfulness (namely acting with awareness, non-judging, and non-reacting) predicted reductions in levels of both rumination and depressive symptoms over time and the observing facet of mindfulness predicted increases in these levels over time. No moderations

of age, sex, or meditative experience were found, possibly due to the nature of the sample (i.e., community adults). Our findings imply that interventions such as mindfulness-based cognitive therapy (MBCT) may reduce depressive symptoms in individuals by specifically reducing ruminative thought. This set of findings brings us one step closer to understanding the ways in which mindfulness therapy helps in reducing depression.

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Appendix A:

Five-Facet Mindfulness Questionnaire

Please rate each of the following statements using the scale provided. Choose the option that best describes your own opinion of what is generally true for you.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true

1. When I'm walking, I deliberately notice the sensations of my body moving

2. I'm good at finding words to describe my feelings

3. I criticize myself for having irrational or inappropriate emotions

4. I perceive my feelings and emotions without having to react to them

5. When I do things, my mind wanders off and I'm easily distracted

6. When I take a shower or bath, I stay alert to the sensations of water on my body

7. I can easily put my beliefs, opinions, and expectations into words

8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted

9. I watch my feelings without getting lost in them

10. I tell myself I shouldn't be feeling the way I'm feeling

11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions

12. It's hard for me to find the words to describe what I'm thinking

13. I am easily distracted

14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way

15. I pay attention to sensations, such as the wind in my hair or sun on my face

16. I have trouble thinking of the right words to express how I feel about things

17. I make judgments about whether my thoughts are good or bad

18. I find it difficult to stay focused on what's happening in the present

19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it

20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing

21. In difficult situations, I can pause without immediately reacting

22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words

23. It seems I am "running on automatic" without much awareness of what I'm doing

24. When I have distressing thoughts or images, I feel calm soon after

25. I tell myself that I shouldn't be thinking the way I am thinking

26. I notice the smells and aromas of things

27. Even when I'm feeling terribly upset, I can find a way to put it into words

28. I rush through activities without being really attentive to them

29. When I have distressing thoughts or images, I am able to just notice them without reacting

30. I think some of my emotions are bad or inappropriate, and I shouldn't feel them

31. My natural tendency is to put my experiences into words

32. When I have distressing thoughts or images, I just notice them and let them go

33. I do jobs or tasks automatically without being aware of what I'm doing

34. When I have distressing thoughts or images, I judge myself as good or bad, depending on what the thought/image is about

35. I pay attention to how my emotions affect my thoughts and behavior

36. I can usually describe how I feel at the moment in considerable detail

37. I find myself doing things without paying attention

38. I disapprove of myself when I have irrational ideas

39. I notice visual elements in art or nature, such as colours, shapes, textures, and patterns of light and shadow

Appendix B:

Beck Depression Inventory

For each item indicate (by ticking on the line) which statement describes the way you have been feeling RECENTLY (in the past month or so).

1. ___ I do not feel sad

   ___ I feel sad much of the time

   ___ I am sad all the time

   ___ I am so sad or unhappy that I can't stand it

2. ___ I'm not discouraged about my future

   ___ I feel more discouraged about my future than I used to be

   ___ I do not expect things to work out for me

   ___ I feel my future is hopeless and will only get worse

3. ___ I do not feel like a failure

   ___ I have failed more than I should have

   ___ As I look back, I see a lot of failures

   ___ I feel I am a total failure as a person

4. ___ I get as much pleasure as I ever did from the things I enjoy

   ___ I don't enjoy things as much as I used to

   ___ I get very little pleasure from the things I used to enjoy

   ___ I can't get any pleasure from the things I used to enjoy

5. ___ I don't feel particularly guilty

   ___ I feel guilty over many things I have done or should have done

   ___ I feel quite guilty most of the time

   ___ I feel guilty all of the time

6. ___ I don't feel I am being punished

   ___ I feel I may be punished

   ___ I expect to be punished

   ___ I feel I am being punished

7. ___ I feel the same about myself as ever

   ___ I have lost confidence in myself

   ___ I am disappointed in myself

   ___ I dislike myself

8. ___ I don't criticise and blame myself more than usual

___ I am more critical of myself than I used to be

___ I criticise myself for all of my faults

___ I blame myself for everything bad that happens

9. ___ I don't cry any more than I used to

___ I cry more than I used to

___ I cry over every little thing

___ I feel like crying, but I can't

10. ___ I am no more restless or wound up than usual

___ I feel more restless or wound up than usual

___ I am so restless or agitated that it's hard to stay still

___ I am so restless or agitated that I have to keep moving or doing something

11. ___ I have not lost interest in other people or activities

___ I am less interested in other people or things than before

___ I have lost most of my interest in other people or things

___ It's hard to get interested in anything

12. ___ I make decisions about as well as ever

___ I find it more difficult to make decisions than usual

___ I have much greater difficulty making decisions than I used to

___ I have trouble making any decisions

13. ___ I do not feel I am worthless

___ I don't consider myself as worthwhile and useful as I used to

14. ___ I have as much energy as ever

___ I have less energy than I used to have

___ I don't have enough energy to do very much

___ I don't have enough energy to do anything

15. ___ I have not experienced any change in my sleeping pattern

___ I sleep somewhat more OR less than usual

___ I sleep a lot more OR less than usual

___ I sleep most of the day OR I wake up 1-2 hours early and can't get back to sleep

16. ___ I am no more than irritable than usual

___ I am more irritable than usual

___ I am much more irritable than usual

___ I am irritable all the time

17. ___ I have not experienced any change in my appetite

___ My appetite is somewhat less than usual OR my appetite is somewhat greater than usual

___ My appetite is much less than usual OR my appetite is much greater than usual

___ I have no appetite at all OR I crave food all the time

___ I feel more worthless as compared to other people

___ I feel utterly worthless

18. ___ I can concentrate as well as ever

___ I can't concentrate as well as usual

___ It's hard to keep my mind on anything for long

___ I find I can't concentrate on anything

19. ___ I am no more tired or fatigued than usual

___ I am more tired or fatigued more easily than usual

___ I am too tired or fatigued to do a lot of things I used to do

___ I am too tired or fatigued to do most of the things I used to do

20. ___ I have not noticed any recent change in my interest in sex

___ I am less interested in sex than I used to be

___ I am much less interested in sex now

___ I have lost interest in sex completely

Appendix C:

Response Styles Questionnaire

Directions: Think about the negative events that you listed earlier. We are interested in how you responded to those events. Please indicate which number best described how you responded to the events you listed. Remember there are no right or wrong answers.

	Strongly agree		Neutral		Strongly disagree
1. Thought about how alone you felt	1	2	3	4	5
2. Thought you wouldn't be able to do your job if you didn't snap out of your feelings	1	2	3	4	5
3. Thought about your feelings of fatigue and achiness	1	2	3	4	5
4. Thought about how hard it was to concentrate	1	2	3	4	5
5. Thought "What am I doing to deserve this?"	1	2	3	4	5
6. Thought about how passive and unmotivated you felt	1	2	3	4	5
7. Analysed recent events to try to understand why you felt depressed	1	2	3	4	5
8. Thought about how you didn't seem to feel anything anymore	1	2	3	4	5
9. Thought "Why can't I get going?"	1	2	3	4	5
10. Thought "Why do I always react this way?"	1	2	3	4	5
11. Went away by yourself and thought about why you felt this way	1	2	3	4	5

Appendix D:

Factor Items for the FFMQ

Factor 1: Non-reacting

Item 4. I perceive my feelings and emotions without having to react to them

Item 9. I watch my feelings without getting lost in them

Item 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it

Item 21. In difficult situations, I can pause without immediately reacting

Item 24. When I have distressing thoughts or images, I feel calm soon after

Item 29. When I have distressing thoughts or images I am able just to notice them without reacting

Item 33. When I have distressing thoughts or images, I just notice them and let them go

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Factor 2: Observing

Item 1. When I'm walking, I deliberately notice the sensations of my body moving

Item 6. When I take a shower or a bath, I stay alert to the sensations of water on my body

Item 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions

Item 15. I pay attention to sensations, such as the wind in my hair or sun on my face

Item 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing

Item 26. I notice the smells and aromas of things

Item 31. I notice visual elements in art or nature, such as colours, shapes, textures, or patterns of light and shadow

Item 36. I pay attention to how my emotions affect my thoughts and behaviour

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Factor 3: Acting with awareness

Item 5*. When I do things, my mind wanders off and I'm easily distracted

Item 8*. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted Item 13*. I am easily distracted

Item 18*. I find it difficult to stay focussed on what's happening in the present

Item 23*. It seems I am "running on automatic" without much awareness of what I'm doing

Item 28*. I rush through activities without being really attentive to them

Item 34*. I do jobs or tasks automatically without being aware of what I'm doing

Item 38*. I find myself doing things without paying attention

Factor 4: Describing
Item 2. I am good at finding words to describe my feelings
Item 7. I can easily put my beliefs, opinions, and expectations into words
Item 12*. It's hard for me to find the words to describe what I'm thinking
Item 16*. I have trouble thinking of the right words to express how I feel about things
Item 22*. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words
Item 27. Even when I'm feeling terribly upset, I can find a way to put it into words
Item 32. My natural tendency is to put my experiences into words
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Item 37. I can usually describe how I feel at the moment in considerable detail
Factor 5: Non-judging
Item 3*. I criticize myself for having irrational or inappropriate emotions
Item 10*. I tell myself I shouldn't be feeling the way I'm feeling
Item 14*. I believe some of my thoughts are abnormal or bad and I shouldn't think that way
Item 17*. I make judgements about whether my thoughts are good or bad
Item 25*. I tell myself that I shouldn't be thinking the way I'm thinking
Item 30*. I think some of my emotions are bad or inappropriate and I shouldn't feel them
Item 35*. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about
Item 39*. I disapprove of myself when I have irrational ideas

Note. *Reverse-scored items.

Appendix E:

Parcelled Items of the FFMQ

FFMQ	Parcel 1	Parcel 2	Parcel 3
Factor 1: Observing	Item 1.	Item 6.	Item 11.
	Item 15.	Item 20.	Item 26.
	Item 21.	Item 36.	
Factor 2: Describing	Item 2.	Item 7.	Item 12.*
	Item 16.*	Item 22.*	Item 27.
	Item 31.	Item 37.	
Factor 3: Act-Aware	Item 5.*	Item 8.*	Item 13.*
	Item 18.*	Item 23.*	Item 28.*
	Item 34.*	Item 38.*	
Factor 4: Non-Judge	Item 3.*	Item 10.*	Item 14.*
	Item 17.*	Item 25.*	Item 30.*
	Item 35.*	Item 39.*	
Factor 5: Non-React	Item 4.	Item 9.	Item 19.
	Item 21.	Item 24.	Item 29.
	Item 33.		

Note. *Reverse-scored items.

Appendix F:

Parcelled Items of the RSQ and BDI

	Parcel 1	Parcel 2	Parcel 3
RSQ	Item 1.	Item 2.	Item 3.
	Item 4.	Item 5.	Item 6.
	Item 7.	Item 8.	Item 9.
	Item 10.	Item 11.	
BDI	Item 1.	Item 2.	Item 3.
	Item 4.	Item 5.	Item 6.
	Item 7.	Item 8.	Item 9.
	Item 10.	Item 11.	Item 12.
	Item 13.	Item 12.	Item 15.
	Item 16.	Item 17.	Item 18.
	Item 19.	Item 20.	

Appendix H:

Demographic Characteristics

1. What is your unique code number? ……

2. How old are you? ……

3. Are you male or female? ……

4. What is your ethnic background? (tick all that apply)

___ Pakeha/European/New Zealander

___ Maori

___ Pacific Nations

___ Asian

___ Other

5. If you ticked other, please state your ethnicity: ……

6. What are you currently doing? (tick all that apply)

___ School/Education

___ Training

___ Working

___ Other

7. If you are studying, where are you studying? ……

8. If you ticked other, please list what you are currently doing: ……

9. What is your income range? If you're living as part of a family unit, please indicate (tick) your total household income:

___ $0 - $25,000

___ $25,000 - $50,000

___ $50,000 - $75,000

___ $75,000 - $100,000

___ Above $100,000

10. Where were you born?

___ New Zealand

___ Another country

11. If you ticked another country, where were you born? ……

12. If you were NOT born in New Zealand, how long have you lived in New Zealand?

…….

13. Are you:

___ A New Zealand citizen

___ A New Zealand resident

___ Neither a NZ citizen or resident

14. Circle the option below that best represents how you rate your overall health at this present time Very poor Average Excellent

1 2 3 4 5 6 7