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Mindfulness or expectancy? The label of mindfulness leads to expectancy effects

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Abstract

The increasing popularity of mindfulness practices has seen an accompanying growth in research that includes the development of several self-report mindfulness measures. However, while caution has been recommended in the use of these self-reports, there has been little direct assessment of their susceptibility to expectancy effects. This research aimed at understanding whether expectancy effects exist for self-reported mindfulness measures (Study 1; $n = 60$), and how expectancy effects might manifest in relation to positive and negative expectancy (Study 2; $n = 60$). The first study manipulated whether (i) the task (jigsaws) was labelled as "mindfulness," and (ii) whether "authentic" mindfulness instructions were given. Given any increases in self-reported mindfulness might potentially occur due to engaging in the mindful and attentionally demanding task, the second study manipulated whether the introduction placed mindfulness in a positive or negative context. A pre-/post-test design was employed using the Five Facet Mindfulness Questionnaire and Applied Mindfulness Process Scale self-report measures for mindfulness and the Perceived Stress Scale for well-being. The findings revealed expectancy effects for simply using the term mindfulness and that the direction of effects could be manipulated. This research suggests that researchers need to be cautious in evaluating self-reports of mindfulness practice due to expectancy effects, especially in the context of brief interventions without objective measures.

KEYWORDS
expectancy effects, mindfulness, questionnaires, self-report measures, well-being

1 | INTRODUCTION

Well-being benefits of mindfulness-based programmes (MBPs) have an increasingly solid foundation of evidence in the research literature; where once there was a lack of randomised control trials (RCTs), there are now a growing number of RCTs as well as systematic reviews and meta-analyses (Cooper et al., 2020; Dawson et al., 2020; Galante et al., 2013, 2021; Gu et al., 2015; Kreplin et al., 2018; Vonderlin et al., 2020). Established MBPs, such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT), have used programme structures based

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around eight weeks. However, with the growing recognition of the benefits of these programmes, researchers have begun to investigate what "dosage" of mindfulness is required to observe significant effects (Strohmaier, 2020), and whether brief interventions can produce similar benefits (Howarth et al., 2019). For example, Howarth et al. (2019) report that after only one session and with interventions as brief as 5 min, impact on multiple health outcomes can be seen. However, unlike full-length mindfulness-based interventions (MBI), Howarth et al. caution that "… it is difficult to summarize the overall evidence for brief MBIs due to the vast array of outcomes and heterogeneity in methods. Instead, the conclusions are specific to the factors of MBI, population recruited, outcome, and experimental context." Given that there is a heavy reliance on self-report measures, it is possible that these findings are also subject to expectancy effects. Given this issue, this study investigated expectancy effects using a one-session intervention that could be used to manipulate whether (i) the task was labelled as "mindfulness," and (ii) whether "authentic" mindfulness instructions were given.

The most commonly referenced definition of mindfulness in the literature is Kabat-Zinn's (1990): "the awareness that emerges through paying attention on purpose, in the present moment and nonjudgmentally, to the unfolding of experience moment by moment" (Kabat-Zinn, 2005, p. 64). However, it is difficult to define mindfulness, given its multidimensional nature and deep roots in Buddhism, which make it problematic to translate into Western concepts (Creswell et al., 2007). Some critical and systematic reviews of mindfulness raise important issues (Lomas et al., 2017, 2018) and argue it is vital to analyse the various components of mindfulness separately (Lomas et al., 2017). This shows the need to avoid simplistic statements about the effectiveness of mindfulness practice in mental health and the need to at least clarify which aspect or type of mindfulness one is referring to (Lomas et al., 2017). Attempts have been made to operationally define mindfulness, including Bishop et al.'s (2004) two-component model of self-regulation of attention and orientation towards present moment experiences and Shapiro et al.'s (2006) mechanisms of mindfulness: attention, intention and attitude. As investigations increasingly seek to understand the active components of mindfulness that underlie clinical outcomes, the development of reliable and valid research methods of mindfulness is needed, including recognition of expectancy effects and their accompanying effect sizes. In other words, being part of a mindfulness intervention might make people expect to be more mindful, even if their actual cognitions and behaviours have not changed and that might, in turn, lead to the appearance of positive changes in self-reports.

1.1 | Measuring mindfulness

Several self-report instruments have been presented in recent years to assess mindfulness in terms of being a state, a trait and a process (see Table 1 for a summary). This high number of mindfulness questionnaires demonstrates the extensive amount of research interest in this area. However, research also highlights the need to be cautious in using self-report measures to evaluate mindfulness as practice (Baer, 2018; Baer, et al. 2019; Grossman, 2011; Kim et al., 2016). Other authors have suggested that future research should expand the assessment of mindfulness to include methods other than self-report questionnaires, citing a growing number of laboratory experiments that study the effects of mindfulness and assess how participants cope with stressors or use experience sampling methods as a means to examine individuals' mindful awareness during daily activities (Brown & Ryan, 2003). However, the use of self-reports is likely to remain a popular choice due to its flexible and practical implementation in the field. For example, in Howarth et al.'s (2019) analysis of brief interventions, 55% used a self-report measure of mindfulness (47 of 85), with nine different measures used across these studies.

Implications for Practice and Policy

- Caution should be used in interpreting self-report measures when assessing mindfulness and well-being effects, especially when all groups have been exposed to the label "mindfulness."
- Self-report measures in mindfulness research should be used alongside objective measures.
- Active control groups should include both mindfulness labelled and nonlabelled groups to more accurately measure the "real" effects of mindfulness.

1.2 | Expectancy effects

Expectancy effects refer to ways in which participants' expectations and beliefs affect their perception and behaviour, and as a result, affect the outcome of a study (Vujanovic et al., 2007). In general, when people are aware of the desired outcome, their perception, cognitions and behaviour are also affected in some way (Ostojić et al., 2016; Vujanovic et al., 2007). Expectancy can have self-fulfilling consequences, which could be, therefore, both negative and positive (Ostojić et al., 2016). Inaccurate negative expectancy can stop a person from achieving his or her full potential (nocebo), while positive expectancy can help lead one to benefits (placebo) (Cash et al., 2018; Ostojić et al., 2016). Other effects of expectancy can be to trigger demand characteristics where participants try to produce the results that are expected of them (Nichols & Maner, 2008). If this applied to mindfulness studies, participants believing that the programme should increase their mindfulness will potentially attempt to demonstrate improved mindfulness when completing a self-report. Nichols and Maner (2008) state the need for more research and consideration of these effects, and emphasise "… that the presence of demand may make experimental effects appear more substantial than they actually are."

TABLE 1 Summary of mindfulness scales

Scale name	Authors (year)	No. of items	Factors (trait/state)
Mindfulness Awareness & Attention	Brown and Ryan (2003)	15	Attention, awareness (trait)
Kentucky Inventory of Mindfulness Skills (KIMS)	Baer et al. (2004)	39	Observing, describing, act with awareness, and accept nonjudgementally
Freiburg Mindfulness Inventory (FMI)	Walach et al. (2006)	14	Presence, nonjudgemental acceptance (trait)
Toronto Mindfulness Scale (TMS)	Davis et al. (2009)	10	(State)
Cognitive and Affective Mindfulness Scale-Revised (CAMS-R)	Feldman et al. (2007)	12	(Trait)
Philadelphia Mindfulness Scale (PHLMS)	Cardaciotto et al. (2008)	20	Awareness, acceptance (trait)
Southampton Mindfulness Questionnaire (SMQ)	Chadwick et al. (2008)	16	Clinical focus (trait)
The Five Facet Mindfulness Questionnaire (FFMQ)	Baer et al. (2008)	39	Observation, description, aware actions, nonjudgemental inner experience and nonreactivity
Applied Mindfulness Process Scale (AMPS)	Li et al. (2016)	15	Active use in daily life

1.3 | Aims and objectives

This research aimed at understanding whether expectancy effects exist for self-reported mindfulness measures (Study 1), and how expectancy effects might manifest in relation to positive and negative framing (Study 2). The first study manipulated whether (i) the task was labelled as "mindfulness," and (ii) whether "authentic" mindfulness instructions were given. It was anticipated that the label of mindfulness would produce expectancy effects (increase in self-reported mindfulness) compared with a control group, and a greater increase in self-reported mindfulness would occur for the group that received "authentic" mindfulness instructions.

Given any increases in self-reported mindfulness might potentially occur due to engaging in the mindful and attentionally demanding task (i.e., jigsaws), the second study manipulated whether the introduction placed mindfulness in a positive or negative context. If expectancy effects were responsible for the increase in self-reported mindfulness demonstrated in Study 1, rather than the effect of the actual task, then we would expect to see scores vary by the positive/negative context.

2 | GENERAL METHOD

2.1 | Participants

This research consisted of two quasi-experimental studies using two different samples of participants. Participants were provided with an information sheet and written consent form prior to engaging in the research activity. Participants in both studies of this research consisted of university students and members of the public. The research was evaluated to be low risk and was presented to the Massey University ethics committee (4000016633). A total of 120 participants took part (n = 60 each study). Each study consisted of three groups with 20 participants in each (see Table 2 for demographics).

2.2 | Materials

As both MBSR and MBCT are group-based programmes, we wanted to select a participant task that could be conducted in a group setting (e.g., a computer-based task would not be appropriate). We also wanted the task to involve attention given it is a key component of both Bishop et al.'s (2004) and Shapiro et al.'s (2006) definitions of mindfulness. However, the task needed to avoid an immediate association with mindfulness (e.g., participants may well be aware of "mindful colouring-in"), but nevertheless had the potential to be offered as an "authentic" mindfulness task. This was necessary to avoid the control groups (who did not see or hear mindfulness mentioned) being semantically primed by a task highly associated with mindfulness. For this purpose, jigsaws were selected. Note at the time of data collection, jigsaws had not been commercially linked to mindfulness, although, at the time of writing, the "Calm" software company that produces what it claims is the "No 1 meditation and sleep app" has now launched a series of "Calm jigsaws."

The jigsaw puzzles (*Pomegranate Artpiece Puzzles*) which were used in this research consisted of six different pictures of nature with 100 pieces (10×8 inches) and moderate complexity, which were selected to be consistent with a "well-being" exercise and were randomly given to each participant within the group.

2.3 | Measures

Two mindfulness self-report measures were selected, one being well-established, the Five Facet Mindfulness Questionnaire (FFMQ),

TABLE 2 Participants in Study 1and Study 2

	Study 1 (%)	Study 2 (%)
Gender		
Male	32	26
Female	68	74
Mindfulness experience		
Yes	46	18
No	54	84
Ethnicity		
New Zealander	55	11
Maori/Pasifika	13	68
Asian	20	8
Middle Eastern	12	13

and one being a new process measure of mindfulness, the Applied Mindfulness Process Scale (AMPS). Alongside these measures, a self-report was included that was expected would have convergent validity with the mindfulness measures, while not being a mindfulness measure per se, the Self-Consciousness Scale-Revised (SCS-R). We also included a well-being measure, the Perceived Stress Scale (PSS), as this would allow us to see whether expectancy effects varied between mindfulness and well-being measures. The details of these measures follow.

2.3.1 | The Five Facet Mindfulness Questionnaire

The FFMQ can be considered as one of the most used instruments in measuring mindfulness, and was introduced by Baer et al. (2006). It is used as a measure of trait (dispositional) mindfulness but includes items that can be considered both state and trait (Truong et al., 2020). The FFMQ has two versions: the long form with a 39-item scale and the short form with a 15-item scale. Participants in both studies of this research completed the long form of the FFMQ, which measures five facets of a general tendency to be mindful in daily life. Each item is rated on a 5-point Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Based on several studies, the FFMQ has been illustrated to have excellent internal consistency. In this study, there was high internal consistency with $\alpha = 0.95$, consistent with Karl et al.'s (2020) report of internal consistency for the FFMQ in a New Zealand sample. This New Zealand sample of 399 participants was part of a cross-cultural study where only Western (individualistic) country samples showed good fit, with the New Zealand sample being one of these (Karl et al., 2020).

2.3.2 | The Applied Mindfulness Process Scale

The Applied Mindfulness Process Scale (AMPS) is one of the most recent mindfulness measurements, which was introduced as "a process measure for evaluating mindfulness-based interventions" (Li et al., 2016). The AMPS consists of 15 items that characterise three different fields of applied mindfulness processes: (1) decentering, (2) positive emotional regulation and (3) negative emotional regulation (Li et al., 2016). The AMPS is a new and short mindfulness scale looking at process instead of focussing on either trait or state of mindfulness, and has illustrated solid internal consistency with Cronbach's $\alpha = 0.91–0.94$, along with adequate nomological validity, particularly with associated constructs (Li et al., 2016). In this study, $\alpha = 0.93$. The AMPS has aimed at assessing the frequency with which people use numerous mindfulness methods and practices to deal with day-to-day stressors. In other words, the individual's answers to questions on this scale will indicate how frequently they use mindfulness to handle a variety of situations over the past seven days (Li et al., 2016).

2.3.3 | The Self-Consciousness Scale-Revised

The SCS-R is a revised version of the SCS by Fenigstein et al. (1975; as cited in Scheier & Carver, 1985). This questionnaire aims at measuring three subscales of self-consciousness: *Private self-consciousness*, which is related to the inner and hidden focus of one's thoughts, *Public self-consciousness*, which is related to the outer and noticeable path of one's thoughts, and *Social anxiety*, which is considered a public self-consciousness subscale. The SCS-R *Private self-consciousness* subscale (nine questions) was used as a convergent measure of mindfulness and includes questions such as "I generally pay attention to my inner feelings." In this study, $\alpha = 0.91$.

2.3.4 | The Perceived Stress Scale

The PSS was originally developed as a stress evaluation questionnaire that aims at assessing psychological stress retrospectively (Cohen et al., 1983). Participants answer 10 questions on a 4-point Likert scale ranging from 1 (*never*) to 4 (*very often*). Higher scores are indicative that stressors negatively impact an individual. The PSS has consistently shown good reliability and convergent validity across studies. Psychometric analysis of the PSS-10 confirmed that it is a psychometrically valid instrument for the measurement of psychological stress (Taylor et al., 2014). A combined sample of New Zealand (Auckland) and US participants ($N = 900$) reported Cronbach's $\alpha = 0.88$ (Medvedev et al., 2019). In this study, $\alpha = 0.83$.

2.4 | Design

This research was quasi-experimental in nature, employing 3×2 designs. There was one between-subject variable: for Study 1, this was Group (passive control, active control and experimental), and for Study 2, it was Group (passive control, negative experimental and positive experimental). There was one within-subject variable of test (pretest vs. post-test).

2.5 | Procedure

Both studies were advertised as "jigsaw puzzles and well-being." Data collection occurred before and after the jigsaw activity (pre-test and post-test). The pretest was conducted through an online survey approximately one week before the jigsaw activity. The survey consisted of an information sheet, consent form and four questionnaires. After a delay of approximately one week, participants attended the jigsaw session, where they underwent an introduction according to their group assignment (quasi-randomly assigned according to their availability).

The first author (Ghanbari) facilitated the sessions. All instructions were given verbally by the researcher (See Appendix). Each group consisted of five participants, and each participant received one jigsaw puzzle. Participants had 20 min to complete the puzzle. Post-test data were collected following the jigsaw puzzle activity and consisted of the four questionnaires and the demography scale.

In both Study 1 and Study 2, the passive control group (PASS.CTRL) received neither the term mindfulness nor the mindfulness instruction. Participants in the passive control group were only presented with a summary of the jigsaw puzzle's history and potential benefits of doing jigsaw puzzles on well-being. The latter aspect was to investigate possible expectancy effects for well-being.

In Study 1, the active control group (A. CTRL) received the same information as the passive control group and the label "mindfulness" to their jigsaw puzzle, that is, they were told that they would complete a mindful jigsaw puzzle but were not given any instructions on how to be mindful. This allowed investigation of expectancy effects for both well-being and mindfulness. The experimental group (EXP) received the label "mindfulness" and training on how to be mindful and nonjudgemental during their jigsaw puzzle session. Here, there might be "real" effects on mindfulness and well-being of the mindfulness intervention and the subsequent self-report measures, or it might add to the appearance of "authenticity", thus boosting expectancy effects.

In Study 2, the negative experimental group (NEG.CTRL) was given written information about research on the disadvantages of mindfulness (e.g., increased anxiety) and instructions on how to complete the jigsaw mindfully. The positive experimental group (POS.CTRL) received written information about research on the advantages of mindfulness (e.g., increased attention) and instructions on how to complete the jigsaw mindfully (e.g., how to be mindful and nonjudgemental during the session). Table 3 gives a summary of the study conditions.

TABLE 3 Study 1 and Study 2 conditions

	Mindfulness label	Mindfulness instructions
Study 1		
Pass.CTRL	No	None (history of jigsaws)
Act.CTRL	No	None (history of jigsaws)
EXP	Yes	Yes
Study 2		
Pass.CTRL	No	None (history of jigsaws)
Neg.EXP	Yes	Yes/negative
Pos.EXP	Yes	Yes/positive

3 | RESULTS

This study aimed at investigating the relationship between mindfulness and expectancy through manipulation of (i) the labelling of the task (whether "mindfulness" was mentioned), and (ii) whether "authentic" mindfulness instructions were given. For this purpose, it was hypothesised that simply using the label "mindfulness" on a task would produce expectancy effects and act to improve self-reported measures for mindfulness and well-being.

To check that the groups were approximately equivalent on pretest measures, descriptive (Table 4) and inferential statistics (Table 5) were calculated, indicating that there were no statistically significant differences among groups at baseline, suggesting all three groups were equivalent at pretest. A repeated measures ANOVA with group as a between-subject variable was used, with follow-up post hoc tests. All post hoc pairwise comparisons were adjusted LSD for multiple comparisons to manage family-wise error. Paired samples *t*-tests, partial eta squared (η_p^2) and Cohen's *d* were calculated to assess effect sizes for significant results. $p < 0.05$ was used as a criterion for both studies of this research.

3.1 | Pretest post-test comparisons

3.1.1 | Five Facet Mindfulness Questionnaire

For the FFMQ scores, the repeated measures ANOVA (between-groups: PASS.CTRL, ACT.CTRL, and EXP; within-groups: pre-test, post-test) indicated a significant main effect of time, $F(1,57) = 126.83$, $p = 0.001$, $\eta_p^2 = 0.69$. The data also showed a significant main effect for group, $F(2,57) = 4.68$, $p = 0.013$, $\eta_p^2 = 0.141$, along with a significant interaction effect between time and group, $F(2,57) = 62.93$, $p = 0.001$, $\eta_p^2 = 0.688$. The *t*-test results for the PASS.CTRL illustrated no difference for the FFMQ scores over time, $t(19) = 0.959$, $p = 0.35$, $d = 0.04$, 95% CI [−2.069, 0.769]. By contrast, data showed a significant increase in the FFMQ scores for the ACT.CTRL, $t(19) = 7.968$, $p = 0.005$, $d = 0.55$, 95% CI [−5.935, 3.465] and for the EXP group, $t(19) = 9.710$, $p = 0.001$, $d = 1.49$, 95% CI [−25.10, −16.19]. There was no significant difference between all three groups at pretest. At post-test, the EXP had significantly higher scores than both the PASS.CTRL, $t(38) = 4.565$, $p = 0.001$, $d = 1.44$, 95% CI [−30.46, −11.74] and the ACT.CTRL, $t(38) = 3.903$, $p = 0.001$, $d = 1.23$, 95% CI [−23.996, −7.604]. Data

illustrated that there was no significant difference in the FFMQ scores at post-test between the PASS.CTRL and the ACT.CTRL, t (38) = 1.487, p = 0.14, d = 0.47, 95% CI [−12.52, 1.92].

3.1.2 | Applied Mindfulness Process Scale

For the AMPS scores, results from a repeated measures ANOVA indicated a significant main effect of time, F(1,57) = 85.51, $p < 0.001$, $\eta_p^2 = 0.60$, along with a significant main effect for group, F(2,57) = 5.76, p = 0.005, $\eta_p^2 = 0.168$, as well as a significant interaction effect between time and group, F(2,57) = 19.61, $p < 0.001$, $\eta_p^2 = 0.408$. Follow-up t-tests for the PASS.CTRL illustrated AMPS scores did not show any significant changes over time, t (19) = 1.070, p = 0.29, d = 0.07, 95% CI [−1.478, 0.478]. However, there was a significant increase in the AMPS scores for the ACT.CTRL, t (19) = 5.452, p = 0.001, d = 0.52, 95% CI [−5.19, 2.31] and the EXP, t (19) = 8.048, p = 0.001, d = 0.95, 95% CI [−8.001, −4.699]. There was no significant difference between all three groups at pretest. At post-test, the EXP had significantly higher scores than both the PASS.CTRL, t (38) = 4.764, p = 0.001, d = 1.50, 95% CI [−13.537, −5.463], and the ACT.CTRL, t (38) = 3.383, p = 0.002, d = 1.06, 95% CI [−11.269, −2.831]. Data showed that there was no significant difference in AMPS scores at post-test for the PASS.CTRL and the ACT.CTRL, t (38) = 1.081, p = 0.28, d = 0.34, 95% CI [−7.04, 2.14].

3.1.3 | Self-Consciousness Scale-Revised

A repeated measures ANOVA showed a significant main effect of time for SCS-R scores, F(1,57) = 128.10, p = 0.001, $\eta_p^2 = 0.692$. In addition, the data showed a significant main effect for group, F(2,57) = 1.08, p = 0.34, $\eta_p^2 = 0.037$. ANOVA results demonstrated that there was also a significant interaction effect between time and group, F(2,57) = 33.87, p = 0.001, $\eta_p^2 = 0.543$. A paired samples t-test illustrated that there was no significant difference in the PASS.CTRL SCS-R scores, t (19) = 0.311, p = 0.75, d = 0.03, 95% CI [−1.16, 0.86]. On the contrary, data showed that there was a significant increase in the SCS-R scores for the ACT.CTRL, t (19) = 8.558, p = 0.001, d = 1.03, 95% CI [−4.916, −2.984]. Also, there was a significant increase for the EXP, t (19) = 10.030, p = 0.001, d = 1.51, 95% CI [−7.494, − 4.906]. There was no significant difference between all three groups at pretest; however, at post-test, the EXP had significantly higher scores than both the PASS.CTRL, t (38) = 3.658, p = 0.001, d = 1.15, 95% CI [−7.068, −2.032], and the ACT.CTRL, t (38) = 2.181, p = 0.035, d = 0.69, 95% CI [−5.013, −0.187]. Data demonstrated that there was no significant difference in SCS-R scores at post-test for the PASS.CTRL and the ACT.CTRL, t (38) = 1.598, p = 0.11, d = 0.50, 95% CI [−4.421, 0.521].

3.1.4 | Perceived Stress Scale

ANOVA indicated a significant main effect of time in the PSS scores, F(1,57) = 94.32, p = 0.001, $\eta_p^2 = 0.623$. There was no significant main effect for group, F(2,57) = 3.11, p = 0.052, $\eta_p^2 = 0.098$, but a significant interaction effect between time and group, F(2,57) = 17.42, p = 0.001, $\eta_p^2 = 0.379$. A paired samples t-test illustrated that there was a significant decrease in the PASS.CTRL PSS scores, t (19) = 2.653, p = 0.01, d = 0.29, 95% CI [0.211, 1.789]. Moreover, there was a significant decrease in the ACT.CTRL, t (19) = 5.594, p = 0.001, d = 0.96, 95% CI [1.752, 3.848], and a decrease in the EXP group, t (19) = 7.590, p = 0.001, d = 1.22, 95% CI [4.092, 7.208]. All three groups did not significantly differ from one another at pretest. At post-test, the PASS.CTRL had significantly higher PSS scores than both the ACT.CTRL, t (38) = 3.328, p = 0.002, d = 1.05, 95% CI

TABLE 4 Pretest means and standard deviations for self-report measures in Study 1

	P.CTRL	A.CTRL	EXP
Measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
AMPS	32.35 (6.37)	31.55 (6.99)	36.00 (7.49)
FFMQ	115.9 (13.56)	117.2 (8.25)	117.05 (11.40)
Observe	24.75 (3.49)	24.30 (2.57)	23.40 (2.72)
Describe	27.15 (2.45)	25.70 (3.11)	23.95 (3.03)
Nonreact	26.90 (2.97)	24.65 (1.92)	23.50 (2.70)
Act-Aware	24.30 (2.57)	27.15 (2.45)	23.55 (2.78)
Nonjudge	23.40 (2.72)	26.05 (1.98)	23.90 (2.80)
PSS	22.05 (3.63)	20.5 (2.62)	22.05 (4.68)
SCS-R	15.3 (3.52)	13.5 (3.92)	13.8 (4.32)

Abbreviations: A.CTRL, the active control group; AMPS, Applied Mindfulness Process Scale; EXP, the experimental group; FFMQ, Five Facet Mindfulness Scale; M, mean; P.CTRL, the passive control group; PSS, Perceived Stress Scale; SCS-R, Self-Consciousness Scale-Revised; *SD*, standard deviation.

TABLE 5 t-test results and p values for self-report measures at pretest in Study 1

	P.CTRL vs. A.CTRL		A.CTRL vs. EXP		P.CTRL vs. EXP	
Measure	*t*-test	*p*	*t*-test	*p*	*t*-test	*p*
AMPS	1.081	0.28	1.941	0.60	1.658	0.10
FFMQ	−0.352	0.72	−0.278	0.78	0.048	0.96
PSS	1.546	0.13	0.000	1.00	−1.291	0.20
SCS-R	1.567	0.12	−0.268	0.79	1.203	0.23

Note: 95% Confidence interval for the difference ($p < 0.05$).

[1.312, 5.388], and the EXP, t (38) = 3.752, p = 0.001, d = 1.18, 95% CI [2.141, 7.16]. Data showed that there was no significant difference in the PSS scores at post-test for the ACT.CTRL and the EXP, t (38) = 1.050, p = 0.301, d = 0.33, 95% CI [−1.2017, 3.807].

3.1.5 | Discussion of Study 1

All three groups completed the exact same jigsaw task. However, groups varied in terms of whether the label of mindfulness was presented and whether they were given "authentic" mindfulness instructions. The PASS.CTRL group did not receive the label "mindfulness" nor did they receive training/instructions in mindfulness. Therefore, it was anticipated that they would show no expectancy and no change from pretest to post-test on the FFMQ, AMPS and SCS-R, and this was supported in the results where no significant differences were detected. However, this group was presented with jigsaws in relation to well-being, and it is possible that they would have expectancy about their well-being and show an improvement from pretest to post-test on the PSS. This indeed appears to be the case, albeit with a small effect.

The ACT.CTRL group received the same instructions and tasks as the PASS.CTRL group, but the study was presented to them as being about jigsaws and mindfulness, thus raising the possibility that expectancy around both well-being and mindfulness would occur, leading to improvements from pretest to post-test for all four measures. This indeed was observed for all four measures, with the PSS showing a large effect size, the FFMQ and AMPS both showing medium effects sizes and the SCS-R showing a large effect size. The large effect size for the ACT.CTRL group compared with the small effect size of the PASS.CTRL group raises the possibility that the label "mindfulness" not only leads to expectancy effects regarding mindfulness but also acts as an expectancy booster for well-being effects. That the SCS-R was associated with a large effect size compared with medium effect sizes for the two mindfulness scales suggests the possibility that, without "authentic" training, the participants had their own ideas of what mindfulness should be that perhaps fitted better with the questions of the SCS-R. It is also interesting to note that both the FFMQ and the AMPS produced medium effect sizes: given that the AMPS asks about the use of techniques over the past seven days, this would suggest that a retrospective expectancy effect occurred.

The EXP group received both the label of mindfulness and the authentic mindfulness training instructions. Large effect sizes were seen for all four measures. Note the EXP group was significantly different to the ACT.CTRL at post-test for the FFMQ, AMPS and SCS-R. Given that mindfulness instructions were given to participants, making this group equivalent to other brief mindfulness interventions, it could be possible that these large effects are due to a "real" effect of doing jigsaws mindfully. However, it is more likely that the instructions given appear more "authentic" and hence enhance expectancy effects. This seems a more likely explanation given that the AMPS showed a large effect, despite it being a retrospective measure. These findings align with work that demonstrates sham mindfulness produces an improvement in mood and cardiovascular variables (Zeidan et al., 2010), significant increases in mindfulness dispositions and critical thinking scores (Noone & Hogan, 2018), and pain relief (Zeidan et al., 2015), when compared with a control group.

However, to better distinguish expectancy from "real" effects, Study 2 compared a control group (conducted as per PASS.CTRL in Study 1 with new participants) with two experimental conditions. Both experimental conditions received the same mindfulness training instructions as per Study 1 and both varied in terms of the framing of the introduction. The positive experimental group (P. EXP) received an introduction that framed mindfulness in terms of positive benefits, while the negative experimental group (NEG.CTRL) was framed in terms of negative benefits. If participants' expectancy accounted for the results of the Exp group in Study 1, then we would expect to see the NEG.CTRL group show worse outcomes at post-test, while the POS.CTRL group should show results similar to the results for EXP in Study 1.

3.2 | Study 2 results

Study 2 compared the same control conditions as Study 1 (PASS.CTRL) where there was no label or instructions on mindfulness, with two experimental groups that received both the label of mindfulness and the instructional training in mindfulness. One group's introduction was framed in terms of the positive effects of mindfulness (POS.CTRL), and the other group's introduction was framed in terms of negative effects of mindfulness (NEG.CTRL). The aim was to observe whether expectancy effects would lead to both negative and positive changes in self-reports.

To check that the groups were approximately equivalent on pretest measures, descriptive (Table 6) and inferential statistics (Table 7) were calculated, indicating that there were no statistically significant differences among groups at baseline, suggesting all three groups were equivalent at pretest. A repeated measures ANOVA with group as a between-subject variable was carried out, with follow-up post hoc tests. All post hoc pairwise comparisons were adjusted for multiple comparisons to manage family-wise error. Partial eta squared (η_p^2) and Cohen's d were calculated to assess effect sizes for significant results. $p < 0.05$ was used as a criterion for both studies of this research.

3.3 | Self-report questionnaires

3.3.1 | Five Facet Mindfulness Questionnaire

A repeated measures ANOVA indicated a significant main effect of time on FFMQ scores, $F(1,57) = 0.64$, $p = 0.025$, $\eta_p^2 = 0.86$. There was also a significant main effect for group, $F(2,57) = 4.33$, $p = 0.018$, $\eta_p^2 = 0.132$. Furthermore, data showed a significant interaction effect between time and group, $F(2,57) = 47.78$, $p = 0.002$, $\eta_p^2 = 0.626$.

A paired samples *t*-test illustrated there was no significant difference in the PASS.CTRL FFMQ scores from pretest (M = 117.75, SD = 11.73) to post-test (M = 118.45, SD = 12.17), t (19) = 1.563, p = 0.13, d = 0.05, 95% CI [−1.637, 0.237]. However, there was a decrease in the FFMQ scores for the NEG.CTRL, t (19) = 6.608, p = 0.001, d = 0.32, 95% CI [2.460, 4.740]. On the contrary, data showed a significant increase in the FFMQ scores for the POS.CTRL, t (19) = 6.135, p = 0.001, d = 0.61, 95% CI [−7.433, − 3.657]. All three groups did not significantly differ from one another in the FFMQ scores at pretest. Paired samples *t*-tests, but at post-test, with pairwise comparisons with adjusted LSD for multiple comparisons, revealed a significant difference between the PASS.CTRL and the POS.CTRL, t (38) = 3.678, p = 0.001, d = 1.16, 95% CI [−19.071, −5.529] and the NEG.CTRL and the POS.CTRL, t (38) = 2.651, p = 0.012, d = 0.83, 95% CI [−14.990, −2.010]. However, there were no significant differences between the PASS.CTRL and the NEG.CTRL, t (38) = 1.019, p = 0.31, d = 0.32, 95% CI [−11.352, 3.752].

3.3.2 | Applied Mindfulness Process Scale

A repeated measures ANOVA (PASS.CTRL, NEG.CTRL and POS.CTRL) indicated no significant main effect of time on AMPS scores, F(1,57) = 2.95, p = 0.09, η_p^2 = 0.49. There was no significant main effect for group, F(2,57) = 2.21, p = 0.12, η_p^2 = 0.072, but a significant interaction effect between time and group, F(2,57) = 47.62, p = 0.001, η_p^2 = 0.626. The paired *t*-test results showed no significant difference between pre- and post-test in the PASS.CTRL AMPS scores, t (19) = 0.000, p = 1.00, d = 0.000, 95% CI [−0.644, 0.644]. However, there was a significant decrease in the AMPS scores from pre- to post-test for the NEG.CTRL, t (19) = 6.029, p = 0.001, d = 0.43, 95% CI [1.763, 3.637] and an increase over time for the POS.CTRL group, t (19) = 6.150, p = 0.001, d = 0.56, 95% CI [−5.629, −2.771]. All three groups did not significantly differ in the AMPS scores at pretest. At post-test, data revealed a significant difference between the PASS.CTRL and the NEG.CTRL, t (38) = 2.386, p = 0.02, d = 0.75, 95% CI [0.704, 8.596], by showing a decrease in the NEG.CTRL scores. Moreover, data illustrated a significant difference between the NEG.CTRL and the POS.CTRL, t (38) = 3.529, p = 0.001, d = 1.11, 95% CI [−11.881, −3.219] by illustrating a decrease in the NEG.CTRL score. The independent *t*-test results did not show any significant difference between the PASS.CTRL and the POS.CTRL, t (38) = 1.371, p = 0.17, d = 0.43, 95% CI [−7.182, 1.382].

TABLE 6 Baseline means and standard deviations for self-report measures in Study 2

	P.CTRL	N.EXP	P.EXP
Measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
AMPS	36.85 (5.99)	34.9 (6.24)	35.55 (7.74)
FFMQ	117.75 (11.73)	125.85 (10.92)	125.2 (9.32)
Observe	26.25 (3.38)	25.55 (3.38)	25.00 (4.74)
Describe	25.125 (2.57)	24.95 (2.54)	24.65 (1.56)
Nonreact	22.75 (4.47)	22.70 (3.68)	22.20 (4.02)
Act-aware	21.45 (5.93)	21.15 (3.41)	21.45 (4.72)
Nonjudge	21.35 (4.22)	22.30 (3.28)	21.40 (4.57)
PSS	20.90 (3.61)	19.95 (2.46)	20.90 (2.40)
SCS-R	16.60 (4.26)	16.05 (3.69)	15.65 (3.80)

Abbreviations: A.CTRL, the active control group; AMPS, Applied Mindfulness Process Scale; EXP, the experimental group; FFMQ, Five Facet Mindfulness Scale; M, mean; P.CTRL, the passive control group; PSS, Perceived Stress Scale; SCS-R, Self-Consciousness Scale-Revised; *SD*, standard deviation.

3.3.3 | Self-Consciousness Scale-Revised

The results from repeated measures ANOVA showed a significant main effect of time on SCS-R scores, F(1,57) = 35.39, p = 0.001, η_p^2 = 0.383. No significant main effect for group was found, F(2,57) = 0.23, p = 0.79, η_p^2 = 0.008. ANOVA results demonstrated a significant interaction effect between time and group, F(2,57) = 9.65, p = 0.001, η_p^2 = 0.253. Paired samples *t*-tests yielded a significant increase over time in the PASS.CTRL SCS-R scores, t (19) = 2.116, p = 0.04, d = 0.18, 95% CI [−1.492, −0.008], and the POS.CTRL group, t (19) = 5.553, p < 0.001, d = 0.76, 95% CI [−3.649, −1.651]. However, data demonstrated no significant difference for the NEG.CTRL over time, t (19) = 1.810, p = 0.08, d = 0.13, 95% CI [−1.078, 0.078].

3.3.4 | Perceived Stress Scale

ANOVA results indicated a significant main effect of time on the PSS scores, F(1,57) = 5.205, p = 0.02, η_p^2 = 0.084, a significant main effect

TABLE 7 *t*-test results and *p* values for self-report measures at baseline in Study 2

	P.CTRL vs. N.EXP		N.EXP vs. P.EXP		P.CTRL vs. P.EXP	
Measure	*t*-test	*p*	*t*-test	*p*	*t*-test	*p*
AMPS	1.007	0.32	−0.292	0.77	0.594	0.55
FFMQ	−2.260	0.30	−0.202	0.84	−2.224	0.32
PSS	−1.948	0.15	1.964	0.16	0.000	1.00
SCS-R	0.436	0.66	0.767	0.44	0.350	0.73

Note: 95% Confidence interval for the difference (p < 0.05).

for group, $F(2,57) = 5.872$, $p = 0.001$, $\eta_p^2 = 0.171$, but no significant interaction effect between time and group, $F(2,57) = 2.108$, $p = 0.13$, $\eta_p^2 = 0.069$. The results from a paired samples *t*-test illustrated that there was no significant difference in the PASS.CTRL PSS scores over time; however, a significant increase was revealed in the PSS scores for the NEG.CTRL group over time, $t(19) = 3.690$, $p = 0.07$, $d = 0.85$, 95% CI [1.885, 2.685]. Furthermore, data showed a significant decrease in the PSS scores for the POS.CTRL, $t(19) = 5.366$, $p = 0.001$, $d = 1.10$, 95% CI [1.647, 3.753]. No significant difference was found in the PSS scores at pretest among the groups; however, at post-test, the POS.CTRL group had significantly lower PSS scores than both the NEG.CTRL, $t(38) = 5.105$, $p = 0.001$, $d = 1.61$, 95% CI [2.323, 5.377], and the PASS.CTRL groups, $t(38) = 2.708$, $p = 0.01$, $d = 0.85$, 95% CI [0.644, 4.456]. By contrast, data showed no significant difference in the PSS scores at post-test for the PASS.CTRL and the NEG.CTRL groups, $t(38) = 1.429$, $p = 0.16$, $d = 0.45$, 95% CI [−3.142, 0.542].

3.3.5 | Discussion of Study 2

In general, the PASS.CTRL group did not show any changes from pretest to post-test, although the SCS-R was an exception, where there was a significant increase, albeit a small effect. For the POS.CTRL group, both mindfulness self-reports (FFMQ and AMPS) and the SCS-R showed significant increases from pretest to post-test, with medium effect sizes, while the PSS showed a significant decrease and a large effect size. These findings are generally consistent and expected in regard to the findings for Study 1's P.CRTL and EXP.

For the NEG.CTRL group that received a negative framing of mindfulness, there was a significant decrease from pretest to post-test in self-reported mindfulness for both the FFMQ and the AMPS, with small–medium effect sizes. The PSS saw a significant increase (increase in stress) from pretest to post-test, with a large effect size. The SCS-R saw no significant change from pretest to post-test.

The results indicate that both positive and negative expectancy effects could be observed in the self-report measures depending on the framing, and that they occurred with similar effect sizes (e.g., medium effect sizes for the FFMQ and AMPS and large for the PSS). These results indicate that the effects observed for the EXP group of Study 1 were likely due to expectancy effects and not a "real" effect of the jigsaw task.

3.3.6 | Study 1 and Study 2 PASS.CTRL

Given that both the P.CRTL conditions were identical across Study 1 and Study 2, the two sets of data were combined to form a larger *n* and analysed to confirm the previous findings, which revealed that while the FFMQ, AMPS and SCS-R did not reveal any significant difference between pretest and post-test, the PSS showed a significant difference, with a decrease from pretest ($M = 21.48$, $SD = 3.62$) to post-test ($M = 20.90$, $SD = 3.25$); $t(39) = 2.321$, $p = 0.02$, $d = 0.16$, 95% CI [0.074, 1.076]. This indicates that without the label of "mindfulness," no expectancy effects occurred for the mindfulness and self-consciousness self-reports, while the finding of a decrease in PSS is in line with the expectancy of being in a "well-being" study. However, the effect size for this latter finding was very small.

3.3.7 | Prestudy awareness of mindfulness

There was a similar random distribution of participants who were aware of mindfulness prestudy (those who indicated awareness of mindfulness as opposed to being measured for level/quantity of experience) compared with nonaware participants in Study 1's conditions, and, likewise, a similar random distribution of prestudy mindfulness aware participants in the conditions of Study 2. There was not enough power for conducting inferential statistical tests between aware and nonaware participants; however, the means and standard deviations from pretest to post-test for each questionnaire were compared between those with and without prestudy awareness of mindfulness. In general, there were no observable differences.

4 | GENERAL DISCUSSION

Nichols and Maner (2008) have called for more research into expectancy effects and caution that experimental effects may be overestimated. Given the growing popularity and interest in MBPs as brief interventions and the number of different mindfulness self-report scales that vary in terms of measuring state, trait and mindfulness processes, it seems timely to examine the extent of expectancy effects in such scales.

The PASS.CTRL group in Study 1 only showed a significant pretest/post-test difference for the PSS (decrease), albeit with a small effect size, and only showed a significant difference for SCS-R (increase) in Study 2, albeit with a small effect size. When the two groups were combined, only the PSS showed a significant difference (decrease), but this had a very small effect size. This effect was due to expectancy effects created from the study containing the label "well-being," but given the size of the effect, it is unlikely to be of practical significance (Ferguson, 2009).

Study 1 revealed that even when participants were merely presented with the label of "mindfulness" (ACT.CTRL), all four self-report measures revealed medium–large effect sizes from pretest to post-test. This indicates that expectancy effects from the label of mindfulness led to increases in both mindfulness-related reports (FFMQ, AMPS and SCS-R) and a large effect for the PSS. The experimental group (EXP) that received both the label of mindfulness and the instructions/training in mindfulness showed significant differences from pretest to post-test on all four measures, and with large

effect sizes. Moreover, the EXP group was significantly different to the ACT.CTRL at post-test for the FFMQ, AMPS and SCS-R. There were two possibilities regarding the interpretation of this latter outcome: (1) that the mindfulness instructions/training had a "real" effect or (2) the instructions/training added to the authenticity in establishing an expectancy effect.

Study 2 used the instructions/training conditions of the EXP group in Study 1 while manipulating the frame of reference given to the participants. The POS.CTRL group received information on positive benefits of mindfulness, while the NEG.CTRL group received negative information. If Study 1's EXP group results had been due to real effects of mindfulness practice, then we would expect to see positive differences for both groups from pretest to post-test, albeit likely greater for the POS.CTRL group. However, if the previously observed effects were due to priming expectancy effects, we would expect to see positive effects for POS.CTRL and negative effects for NEG.CTRL, which is what we observed. The FFMQ, AMPS and SCS-R showed small negative effects for NEG.CTRL and medium-to-large positive effects for POS.CTRL. For the PSS, both groups had large effect sizes, albeit in different directions.

These two studies, when taken together, indicate that simply labelling a group session as "mindfulness" leads to medium-to-large effect size expectancy effects on mindfulness and stress self-report measures. The large effect sizes observed for the EXP group of Study 1 (that did receive "authentic" mindfulness instruction) could have been possibly attributed to a real benefit of performing the task mindfully. However, the results of Study 2, where this condition was repeated but presented in either a negative or a positive framing, yield negative and positive changes, respectively. These negative results make it unlikely that there was a "real" effect of practicing mindfulness, or if it existed, it was only a small effect that was unlikely to be practically significant compared with the expectancy effect. Moreover, these effects occurred even on retrospective measures that asked the participants to rate themselves on the past, before the session took place, making it all the more unlikely that the effects were "real."

4.1 | Limitations and implications

The results imply that not only do we need to continue to be cautious in relying on self-report measures of mindfulness, as previously warned (Baer, 2018; Baer, et al. 2019; Grossman, 2011; Kim et al., 2016), including concern for expectancy effects (Doyen et al., 2012; Goyal et al., 2014; Kreplin et al., 2018), but we also need to be aware that such effects can be large and extend from self-reports of mindfulness to self-reports of stress and occur with the mere mention of "mindfulness" in the context of one brief session. Going forward, research involving mindfulness interventions, especially brief ones, could be improved by the following: (1) the inclusion of expectations assessment (e.g., a specific measure of expectations could be created for MBPs), (2) the provision of objective measures alongside self-report measures (e.g., cognitive tasks of attentions and/or emotional habituation), and (3) systematic reviews and meta-analyses of mindfulness interventions should bear the prior two points in mind when evaluating mindfulness research. Furthermore, it will be important to clearly document in the method how a study is set up in terms of instructions given and what details about the study participants were privy to (e.g., did they know it was a "mindfulness" study). This will allow for an assessment of the likely role of expectancy in each specific research study.

However, even if objective measures are included in future mindfulness research, their inclusion will not be able to rule out the role of expectancy effects in any changes that are observed. Expectancy effects have a strong influence on placebo/nocebo effects, with these effects being observed at the neurobiological and physiological level. For example, Murray and Stoessl (2013) reported that "the placebo response is not simply subjective, but rather associated with highly specific and localized neurobiological changes." Therefore, if an intervention is labelled "mindfulness," then expectancy effects may lead to changes in objective measures too. Ideally then, mindfulness research should be conducted as a RCT, with participant information varied in terms of whether mindfulness is directly mentioned or not.

One of the limitations of this study is that we are unable to tease apart what type of expectancy effect took place. There are three possibilities: (1) expectancy led to actual changes in mindfulness and well-being levels as per placebo/nocebo effect; (2) expectancy led to participants believing they should have improved/declined and filling in the self-reports to reflect that belief; or (3) expectancy, combined with social desirability to please the researcher, led to them trying to fulfil what they believed was the researcher's objectives. Moreover, this study used a single-blind design, with the experimenter being aware of group assignment, but not the participants. Using a double-blind design could be regarded as the gold-standard treatment for eliminating experimenter bias as even a single-blind design might influence participants' responses (Gilder & Heerey, 2018). For example, the experimenter's mood and knowledge of the hypothesis might have been picked up on by the different groups, especially with Study 2 and the positive and negative information. Experimenter bias is even more important to consider if the research is led by a researcher who desires a positive outcome due to their own beliefs in the intervention, for example if a researcher who practices mindfulness also designs the study, delivers the intervention, collects and analyses the data (Kreplin et al., 2018). Gilder and Heerey (2018) specifically found that a person's prior beliefs can shape and influence behaviour in the interaction partner. Therefore, future research that is double-blind, includes more than one experimenter and is designed to tease out which of these processes involving expectancy is occurring would help to further the understanding and implications of expectancy effects in mindfulness research. The findings of this research were based on short-term, one-off interventions. The results may differ for longer (e.g., eight weeks and more) mindfulness courses that are administered by a qualified practitioner.

Although there are some studies that suggest brief interventions should be looked at differently to long-term interventions (Miller-Matero et al., 2019; Podgurski et al., 2019), other researchers do not account for this difference when stating the positive impacts of mindfulness (Britton, 2019; Van Dam et al., 2018). Therefore, future investigations of these effects should vary the length and "dose" of MBPs. Additionally, given that we only examined two mindfulness self-report measures in this study, it would be interesting to see whether mindfulness self-reports vary in their susceptibility to expectancy effects.

A further limitation of this study is that although effects were randomised and equally distributed across groups, some participants had awareness and/or experience with mindfulness prior to the study. Although inspection of the data did not indicate any differences concerning expectation effects, it is possible that the small sample size masked such effects. Future research could investigate this issue of participant knowledge of mindfulness with sufficient sample sizes for both those with and without previous awareness/experience of mindfulness (via measure of expectation at pretest, and pretest and post-test comparison).

5 | CONCLUSION

Study 1 demonstrated that simply labelling an activity as "mindful" led to an increase in well-being and mindfulness scores, while Study 2 showed that an individual's subsequent scoring on mindfulness and stress self-report measures can be manipulated in both positive and negative directions. Together, these results indicate that medium–large expectancy effects can be observed for mindfulness and stress self-reports. This suggests that conclusions drawn about the benefits of mindfulness in the literature need to be approached with due caution, especially if assessing brief interventions. Future research on the benefits of MBPs should look to (1) include objective measures and (2) use control groups who do not receive the label "mindfulness." Meanwhile, future research into expectancy effects related to mindfulness should look to tease out what process of expectancy is taking place.

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The authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data sets generated during and/or analysed during this study are available from the corresponding author on reasonable request.

ETHICAL APPROVAL

The research was evaluated to be low risk and was presented to the Massey University ethics committee (4000016633).

INFORMED CONSENT

Informed consents for all three groups and both studies are attached to this manuscript.

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REFERENCES

Baer, R. (2018). Assessment of mindfulness by self-report. *Current Opinion in Psychology*, *28*, 42–48. https://doi.org/10.1016/j.copsyc.2018.10.015

Baer, R., Gu, J., Cavanagh, K., & Strauss, C. (2019). Differential sensitivity of mindfulness questionnaires to change with treatment: A systematic review and meta-analysis. *Psychological assessment*, *31*(10), 1247.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky inventory of mindfulness skills. *Assessment*, *11*(3), 191–206. https://doi.org/10.1177/1073191104268029

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27–45. https://doi.org/10.1177/1073191105283504

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329–342. https://doi.org/10.1177/1073191107313003

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Velting, D., & Devins, G. (2004). Mindfulness: A Proposed Operational Definition. *Clinical Psychology: Science and Practice*, *11*, 230–241. doi:10.1093/clipsy.bph077

Boyle, C. C., Stanton, A. L., Ganz, P. A., Crespi, C. M., & Bower, J. E. (2017). Improvements in emotion regulation following mindfulness meditation: Effects on depressive symptoms and perceived stress in younger breast cancer survivors. *Journal of consulting and clinical psychology*, *85*(4), 397.

Britton, W. B. (2019). Can mindfulness be too much of a good thing? The value of a middle way. *Current Opinion in Psychology*, *28*, 159–165. https://doi.org/10.1016/j.copsyc.2018.12.011

Brown, K. W., & Ryan, R. 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.

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The Philadelphia mindfulness scale. *Assessment*, *15*(2), 204–223. https://doi.org/10.1177/1073191107311467

Cash, D. K., Heisick, L. L., & Papesh, M. H. (2018). Expectancy effects in the autonomous sensory Meridian response. *PeerJ*, *6*, e5229. https://doi.org/10.7717/peerj.5229

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton mindfulness questionnaire (SMQ). *The British Journal of Clinical Psychology*, *47*(Pt 4), 451–455. https://doi.org/10.1348/014466508X314891

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396.

Cooper, D., Yap, K., & O'Brien, M. (2020). Mindfulness and empathy among counseling and psychotherapy professionals: A systematic review and meta-analysis. *Mindfulness*, *11*, 2243–2257.

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine*, *69*(6), 560–565. https://doi.org/10.1097/PSY.0b013e3180f6171f

Davis, K. M., Lau, M. A., & Cairns, D. R. (2009). Development and preliminary validation of a trait version of the Toronto Mindfulness Scale. *Journal of Cognitive Psychotherapy*, *23*(3), 185–197.

Dawson, A. F., Brown, W. W., Anderson, J., Datta, B., Donald, J. N., Hong, K., Allan, S., Mole, T. B., Jones, P. B., & Galante, J. (2020). Mindfulness-based interventions for university students: A systematic review and meta-analysis of randomised controlled trials. *Applied Psychology: Health and Well-Being*, *12*, 384–410.

Donald, J. N., & Atkins, P. W. (2016). Mindfulness and coping with stress: Do levels of perceived stress matter? *Mindfulness*, *7*(6), 1423–1436.

Donald, J. N., Atkins, P. W., Parker, P. D., Christie, A. M., & Ryan, R. M. (2016). Daily stress and the benefits of mindfulness: Examining the daily and longitudinal relations between present-moment awareness and stress responses. *Journal of Research in Personality*, *65*, 30–37.

Doyen, S., Klein, O., Pichon, C.-L., & Cleermans, A. (2012). Behavioural priming: It's all in the mind, but whose mind? *PLoS One*, *7*, e29081.

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. P. (2007). Mindfulness and emotion regulation: The development and initial validation of the cognitive and affective mindfulness scale-revised (CAMS-R). Journal of Psychopathology & Behavioral Assessment, 29(3). Directions, and practical recommendations for dissemination. *The Psychiatric Clinics of North America*, *30*(1), 39–50. https://doi.org/10.1016/j.psc.2006.12.001

Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology*, *43*(4), 522.

Ferguson, C. J. (2009). Is psychological research really as good as medical research? Effect size comparisons between psychology and medicine. *Review of General Psychology*, *13*(2), 130–136.

Galante, J., Friedrich, C., Dawson, A. F., Modrego-Alarcón, M., Gebbing, P., Delgado-Suárez, I., Gupta, R., Dean, L., Dalgleish, T., White, I. R., & Jones, P. B. (2021). Mindfulness-based programmes for mental health promotion in adults in nonclinical settings: A systematic review and meta-analysis of randomised controlled trials. *PLoS Medicine*, *18*, e1003481.

Galante, J., Iribarren, S. J., & Pearce, P. F. (2013). Effects of mindfulness-based cognitive therapy on mental disorders: A systematic review and meta-analysis of randomised controlled trials. *Journal of Research in Nursing*, *18*, 133–155.

Gilder, T. S. E., & Heerey, E. A. (2018). The role of experimenter belief in social priming. *Psychological Science*, *29*, 403–417.

Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., Berger, Z., Sleicher, D., Maron, D. D., Shihab, H. M., Ranasinghe, P. D., Linn, S., Saha, S., Bass, E. B., & Haythornthwaite, J. A. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine*, *174*, 357–368.

Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: Comment on Brown et al. (2011). *Psychological Assessment*, *23*(4), 1034–1040; discussion 1041-1036. https://doi.org/10.1037/a0022713

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical Psychology Review*, *37*, 1–12.

Howarth, A., Smith, J. G., Perkins-Porras, L., & Ussher, M. (2019). Effects of brief mindfulness-based interventions on health-related outcomes: A systematic review. *Mindfulness*, *10*, 1957–1968. https://doi.org/10.1007/s12671-019-01163-1

Jacobs, I., Wollny, A., Sim, C. W., & Horsch, A. (2016). Mindfulness facets, trait emotional intelligence, emotional distress, and multiple health behaviors: A serial two-mediator model. *Scandinavian journal of psychology*, *57*(3), 207–214.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom ofyour body and mind to face stress, pain and illness*. Delacourt.

Kabat-Zinn, J. (2005). Jon Kabat-Zinn, PhD. Bringing mindfulness to medicine. Interview by Karolyn A. Gazella. *Alternative Therapies in Health and Medicine*, *11*(3), 56–64.

Karl, J. A., Prado, S. M. M., Gračanin, A., Verhaeghen, P., Ramos, A., Mandal, S. P., Michalak, J., Zhang, C.-Q., Schmidt, C., Tran, U. S., Druica, E., Solem, S., Astani, A., Liu, X., Luciano, J. V., Tkalčić, M., Lilja, J. L., Dundas, I., Wong, S. Y. S., & Fischer, R. (2020). The cross-cultural validity of the five-facet mindfulness questionnaire across 16 countries. *Mindfulness*, *11*(5), 1226–1237.

Kim, S. M., Park, J. M., & Seo, H. J. (2016). Effects of mindfulness-based stress reduction for adults with sleep disturbance: A protocol for an update of a systematic review and meta-analysis. *Systematic Reviews*, *5*, 51. https://doi.org/10.1186/s13643-016-0228-2

Kreplin, U., Farias, M., & Brazil, I. A. (2018). The limited prosocial effects of meditation: A systematic review and meta-analysis. *Scientific Reports*, *8*, 2403.

Li, M. J., Black, D. S., & Garland, E. L. (2016). The applied mindfulness process scale (AMPS): A process measure for evaluating mindfulness-based interventions. *Personality and Individual Differences*, *93*, 6–15. https://doi.org/10.1016/j.paid.2015.10.027

Lomas, T., Medina, J. C., Ivtzan, I., Ruppercht, S., Hart, R., & Eiroa-Orosa, F. J. (2017). The impact of mindfulness on wellbeing and performance in the workplace: An inclusive systematice review of the empirical literature. *European Journal of Work and Organizational Psychology*, *4*, 492–513.

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2018). A systematic review of the impact of mindfulness on the well-being of healthcare professionals. *Journal of Clinical Psychology*, *74*(3), 319–355. https://doi.org/10.1002/jclp.22515

Loucks, E. B., Britton, W. B., Howe, C. J., Eaton, C. B., & Buka, S. L. (2015). Positive associations of dispositional mindfulness with cardiovascular health: the New England Family Study. *International journal of behavioral medicine*, *22*(4), 540–550.

Lustyk, M. K., Chawla, N., Nolan, R. S., & Marlatt, G. A. (2009). Mindfulness meditation research: issues of participant screening, safety procedures, and researcher training. *Advances in Mind-Body Medicine*, *24*(1), 20–30.

Medvedev, O. N., Krägeloh, C. U., Hill, E. M., Billington, R., Siegert, R. J., Webster, C. S., Booth, R. J., & Henning, M. A. (2019). Rasch analysis of the perceived stress scale: Transformation from an ordinal to a linear measure. *Journal of Health Psychology*, *24*(8), 1070–1081.

Miller-Matero, L. R., Coleman, J. P., Smith-Mason, C. E., Moore, D. A., Marszalek, D., & Ahmedani, B. K. (2019). A brief mindfulness intervention for medically hospitalized patients with acute pain: A pilot randomized clinical trial. *Pain Medicine*, *20*, 2149–2154. https://doi.org/10.1093/pm/pnz082

Murray, D., & Stoessl, A. J. (2013). Mechanisms and therapeutic implications of the placebo effect in neurological and psychiatric conditions. *Pharmacology & Therapeutics*, *140*(3), 306–318.

Nichols, A. L., & Maner, J. K. (2008). The good-subject effect: Investigating participant demand characteristics. *The Journal of General Psychology*, *135*(2), 151–166.

Noone, C., & Hogan, M. J. (2018). A randomised active-controlled trial to examine the effects of an online mindfulness intervention on executive control, critical thinking and key thinking dispositions in a university student sample. *BMC Psychology*, *6*(1), 13. https://doi.org/10.1186/s40359-018-0226-3

Ostojić, L., Legg, E. W., Dits, A., Williams, N., Brecht, K. F., Mendl, M., & Clayton, N. S. (2016). Experimenter expectancy bias does not explain Eurasian jays' (*Garrulus glandarius*) performance in a desire-state attribution task. *Journal of Comparative Psychology*, *130*(4), 407–410. https://doi.org/10.1037/com0000043

Podgurski, L., Greco, C., Croom, A., Arnold, R., & Claxton, R. (2019). A brief mindfulness-based self-care curriculum for an interprofessional group of palliative care providers. *Journal of Palliative Medicine*, *22*, 561–565. https://doi.org/10.1089/jpm.2018.0550

Remmers, C., Topolinski, S., & Koole, S. L. (2016). Why being mindful may have more benefits than you realize: Mindfulness improves both explicit and implicit mood regulation. *Mindfulness*, *7*(4), 829–837.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology*, *4*(3), 219–247.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, *62*, 373–386.

Strohmaier, S. (2020). The relationship between doses of mindfulness-based programs and depression, anxiety, stress, and mindfulness: A dose-response meta-regression of randomized controlled trials. *Mindfulness*, *11*(6), 1315–1335.

Taylor, D. J., Zimmerman, M. R., Gardner, C. E., Williams, J. M., Grieser, E. A., Tatum, J. I., Bramoweth, A. D., Francetich, J. M., & Ruggero, C. (2014). A pilot randomized controlled trial of the effects of cognitive-behavioral therapy for insomnia on sleep and daytime functioning in college students. *Behavior Therapy*, *45*(3), 376–389. https://doi.org/10.1016/j.beth.2013.12.010

Tomfohr, L. M., Pung, M. A., Mills, P. J., & Edwards, K. (2015). Trait mindfulness is associated with blood pressure and interleukin-6: exploring interactions among subscales of the Five Facet Mindfulness Questionnaire to better understand relationships between mindfulness and health. *Journal of Behavioral Medicine*, *38*(1), 28–38.

Truong, Q. C., Krägeloh, C. U., Siegert, R. J., Landon, J., & Medvedev, O. N. (2020). Applying generalizability theory to differentiate between trait and state in the five facet mindfulness questionnaire (FFMQ). *Mindfulness*, *11*(4), 953–963.

Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S. W., Kerr, C. E., Gorchov, J., Fox, K. C. R., Field, B. A., Britton, W. B., Brefczynski-Lewis, J. A., & Meyer, D. E. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*(1), 36–61. https://doi.org/10.1177/1745691617709589

Vonderlin, R., Biermann, M., Bohus, M., & Lyssenko, L. (2020). Mindfulness-based programs in the workplace: A meta-analysis of randomized controlled trials. *Mindfulness*, *11*, 1579–1598.

Vujanovic, A. A., Zvolensky, M. J., Bernstein, A., Feldner, M. T., & McLeish, A. C. (2007). A test of the interactive effects of anxiety sensitivity and mindfulness in the prediction of anxious arousal, agoraphobic cognitions, and body vigilance. *Behaviour Research and Therapy*, *45*(6), 1393–1400. https://doi.org/10.1016/j.brat.2006.06.002

Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness—The Freiburg mindfulness inventory (FMI). *Personality and Individual Differences*, *40*(8), 1543–1555.

Zeidan, F., Emerson, N. M., Farris, S. R., Ray, J. N., Jung, Y., McHaffie, J. G., & Coghill, R. C. (2015). Mindfulness meditation-based pain relief employs different neural mechanisms than placebo and sham mindfulness meditation-induced analgesia. *The Journal of Neuroscience*, *35*(46), 15307–15325.

Zeidan, F., Johnson, S. K., Gordon, N. S., & Goolkasian, P. (2010). Effects of brief and sham mindfulness meditation on mood and cardiovascular variables. *Journal of Alternative and Complementary Medicine*, *16*(8), 867–873. https://doi.org/10.1089/acm.2009.0321

Zhang, J. Y., Zhou, Y. Q., Feng, Z. W., Fan, Y. N., Zeng, G. C., & Wei, L. (2017). Randomized controlled trial of mindfulness-based stress reduction (MBSR) on posttraumatic growth of Chinese breast cancer survivors. *Psychology, Health & Medicine*, *22*(1), 94–109.

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APPENDIX 1

VERBAL SCRIPTS

Jigsaw history

Hi everyone, thanks for accepting our invitation and participating in the research of jigsaws and well-being. At first I would like to talk about the history of jigsaws. The origins of jigsaw puzzles go back to the 1760s, when European map makers pasted maps onto wood and cut them into small pieces. The "dissected map" has been a successful educational toy ever since. Many students still learn geography by playing with puzzle maps of the world. The eighteenth-century inventors of jigsaw puzzles would be amazed to see the transformations of the last 230 years. The jigsaw puzzles have moved from lessons to entertainment, showing diverse subjects like animals, nursery rhymes, and modern tales of super heroes. But the biggest surprise for the early puzzle makers would be how adults have embraced puzzling over the last century (short benefits of jigsaw: human mind has two separate hemispheres, or lobes, called right- and left-brain, with each one dealing in different functions. Right-brain deals with emotions and performs tasks holistically while the left-brain functions in linear fashion. When you are able to use both the sides of the brain, you will find that your mind power is harnessed to its best and gets better. Jigsaw puzzles help you exercise both the parts of your brain).

Well, now we are here to play jigsaws together. There is no winner or loser, so be relaxed and just enjoy it. Let us start.

Mindfulness instructions

This instruction consisted of a short history and definition of mindfulness, as well as helping participants to focus on their breathing and teaching them mindful breathing techniques. Then, they were asked and helped to be mindful during the jigsaw completion by reminding them to concentrate on their breath, the shape and colour of the jigsaw's pieces and any other small details. A summary of the mindful breathing technique that was used in Study 1 is described here:

> The most basic way to do mindful breathing is simply to focus your attention on your breath, the inhale and exhale. You can do this while standing, sitting or even lying in a comfortable position. Your eyes may be open or closed. Tune into your breath. Feel the natural flow of breath—in, out. You don't need to do anything to your breath. Not long, not short, just natural. Notice where you feel your breath in your body. It might be in your abdomen. It may be in your chest or throat or in your nostrils. See if you can feel the sensations of breath, one breath at a time. When one breath ends, the next breath begins. Now as you do this, you might notice that your mind may start to wander. You may start thinking about other things. If this happens, it is not a problem. It's very natural. Just notice that your mind has wandered. You can say thinking or wandering in your head softly. And then gently redirect your attention right back to the breathing. Stay here for five to seven minutes. Notice your breath, in silence. From time to time, you'll get lost in thought, then return to your breath.

Study 2

In addition to the above scripts, the P.EXP with positive framing had this script:

Mindfulness encourages us to intentionally disengage from automatic pilot and bring our full awareness back to the here and now. By doing this, we open up the full range of possibilities of how we can meet the present moment with absolute intention and awareness. In simple words, by practicing mindfulness, you can actually enjoy what you are doing. Your relationships are enriched. You can enjoy better connections and fewer misunderstandings with others because you actively listen, rather than allow your mind to wander elsewhere. You may build greater focus, attention, and a capacity to stay calm under pressure. You may feel more confident, more in control, and have greater participation in all areas of life. You may be able to tap in to gratitude, acceptance, and less judgement of the who, what, where, when, and whys of life. You may experience greater self and social awareness, two mental assets that help significantly in regulating mood and emotions. Furthermore, instead of being distracted by each incoming stimulus, you have a conscious intention to direct your focus to a chosen person/object/thought. Instead of your attention being completely taken by thoughts and concepts, you are open to experiencing the direct felt sensory experience of the present moment. Instead of analyzing and judging whatever is currently happening, you have an attitude of openness and acceptance to the unfolding moment.

Mindfulness practice is credited with numerous forms of psychological and physiological benefits, including long-term reductions in anxiety and depression, pain reduction, anger management, curbing addictions, and emotional well-being. There have been many studies backing up the idea that mindfulness reduces stress. One study on present-moment awareness found that it facilitates an adaptive response to daily stressors (Donald et al., 2016). Another study by Donald and Atkins (2016) found evidence that mindfulness produced less avoidance and more approach coping as a response to stress than relaxation or self-affirmation controls. Mindfulness can also help alleviate stress through improving emotion regulation, leading to a better mood and better ability to handle stress (Remmers et al., 2016, p. 96).

When you induce a state of relaxation, which can be achieved through mindfulness, another kind of meditation, or other activities, you can reap the benefits, including:

- Higher brain functioning
- Increased immune function
- Lowered blood pressure
- Lowered heart rate
- Increased awareness

- Increased attention and focus
- Increased clarity in thinking and perception
- Lowered anxiety levels
- Experience of being calm and internally still
- Experience of feeling connected

Mindfulness cannot only help you deal with a chronic or potentially terminal illness or life-threatening event, it can also help you recover from it. A study in Chinese breast cancer survivors provided evidence that mindfulness can enhance posttraumatic growth and decrease stress and anxiety in cancer patients (Zhang et al., 2017). Another study of young breast cancer survivors showed that women who practiced mindfulness were more likely to experience increased self-kindness, decreased rumination, and decreased stress (Boyle et al., 2017). Beyond the many mental health benefits of mindfulness, it can also improve your general health. For example, a study of how the two facets of mindfulness impact health behaviors found that practicing mindfulness can enhance or increase multiple behaviors related to health, like getting regular health check-ups, being physically active, using seat belts, and avoiding nicotine and alcohol (Jacobs et al., 2016). Another study on mindfulness and health showed that mindfulness is related to improved cardiovascular health through a lower incidence of smoking, more physical activity, and a healthier body mass index (Loucks et al., 2015). Additionally, mindfulness has been positively linked with lower blood pressure, especially when the practitioner is skilled in non-judging and non-reactivity (Tomfohr et al., 2015, p. 112).

In addition to the above scripts, the N.EXP with negative framing had this script:

The definition of mindfulness is paying attention on purpose, to the present moment, with openness, curiosity and a willingness to be with whatever comes up. In one recent study that is published in Psychological Science, the author team led by psychologist Brent Wilson found that after just one 15-min mindfulness induction involving a guided breathing exercise, participants were more likely to form false memories compared to control participants who engaged in mind-wandering. The authors concluded that: When meditators embrace judgement-free awareness and acceptance, their reality-monitoring accuracy may be impaired, increasing their susceptibility to false memories. They called the formation of fake memories a potential unintended consequence of mindfulness meditation in which memories become less reliable. While the studies in the journal article were limited to rather innocuous tasks, we can only imagine the grim possibility of regular mindfulness practitioners forming entirely fictitious realities (and even past histories) for themselves which they then carry into the future, doing god knows what harm to themselves and others!

Many variations of mindfulness practice involve putting down mental baggage by separating ourselves from our thoughts, and then discarding thoughts that are seen as negative or harmful. But what if the same thing is done for positive thoughts? In another Psychological Science paper, an author team, led by Pablo Briñol, found that when participants physically discarded a representation of their thoughts such as by writing them down on a piece of paper and then tossing it in the trash, they tended to use them less in their decision making afterwards, mentally discarding them as well. Relevant to us, the authors found that positive thoughts also seemed to be discarded mentally just like negative ones. In their paper, the authors cautioned: This finding suggests that techniques involved in some mindfulness treatments can backfire—at least for some people and for some situations, particularly those in which positive thoughts are present.

By its definition and based on its Buddhist origin, the practice of mindfulness encourages detachment. A core aspect of practicing mindfulness is to attempt a withdrawal from the streams of thought that have to do with current challenges of every form, whether they have to do with difficulties with a particular relationship or the tasks that one has to perform on that day. Unfortunately, such a withdrawal supports our natural, hard-wired tendency to be "cognitive misers" leading mindfulness practitioners to use the practice as a mean of escape from having to think about difficult problems and arrive at reasonable solutions. Psychiatrist David Brendel summarises this danger of mindfulness practice as follows: Some people use mindfulness strategies to avoid critical thinking tasks. I've worked with clients who, instead of rationally thinking through a career challenge or ethical dilemma, prefer to disconnect from their challenges and retreat into a meditative mindset.

In a 2009 paper in Advances in Mind-Body Medicine, the author team, led by psychologist Kathleen Lustyk et al. (2009), provided an in-depth review of mindfulness practice studies that reported adverse side effects to participants. There is a whole laundry list of psychological and physical effects in the paper. These included reports of depersonalisation (feeling detached from one's mental processes or body), psychosis (loss of contact with reality) with delusions, hallucinations, and disorganised speech, feelings of anxiety, an increased risk of seizures, loss of appetite, and insomnia. The authors especially cautioned vulnerable people, such as those with PTSD, to be particularly careful when undertaking mindfulness practice. Their main point was that participants should be screened carefully for their suitability before undertaking this practice, and its teachers should be properly trained and supervised. As psychologists Miguel Farias and Catherine Wilkolm point out: Buddhist meditation was designed not to make us happier, but to radically change our sense of self and perception of the world. Given this, it is perhaps not surprising that some will experience negative effects such as dissociation, anxiety and depression. However, like the small print on medication, these side effects in some individuals are not what the creators of this pill are concerned with promoting.

In simple words, mindfulness takes work, practice, and personal effort. It is just another thing you should do. Sometimes, being more aware can actually increase personal frustration or judgement. It doesn't always help. It won't make problems go away. It can impair your judgement of some thoughts that may be right or wrong. It may be a temporal solution to some negative emotions which might reappear after a while. This is not an independent problem-solving technique; you will need other mechanisms to permanently tackle a problem. Some self-internal conflicts might be significant in making decisions. Meditation can make you overlook them and remain undecided.