Dispositional Mindfulness and Psychological Health: a Systematic Review

Eve R. Tomlinson 1 · Omar Yousaf 1 · Axel D. Vittersø 1 · Lauraine Jones 1

Published online: 1 July 2017 © The Author(s) 2017. This article is an open access publication

Abstract Interest in the influence of dispositional mindfulness (DM) on psychological health has been gathering pace over recent years. Despite this, a systematic review of this topic has not been conducted. A systematic review can benefit the field by identifying the terminology and measures used by researchers and by highlighting methodological weaknesses and empirical gaps. We systematically reviewed non-interventional, quantitative papers on DM and psychological health in non-clinical samples published in English up to June 2016, following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. A literature search was conducted using PsycINFO, PubMed, Medline and Embase, and 93 papers met the inclusion criteria. Within these, three main themes emerged, depicting the relationship between DM and psychological health: (1) DM appears to be inversely related to psychopathological symptoms such as depressive symptoms, (2) DM is positively linked to adaptive cognitive processes such as less ruminating and pain catastrophising and (3) DM appears to be associated with better emotional processing and regulation. These themes informed the creation of a taxonomy. We conclude that research has consistently shown a positive relationship between DM and psychological health. Suggestions for future research and conceptual and methodological limitations within the field are discussed.

Keywords Mindfulness · Dispositional · Trait · Psychological health · Emotion · Cognition

Introduction

Mindfulness has been defined as the awareness that results from “paying attention in a particular way: on purpose, in the present moment, and non-judgmentally” (Kabat-Zinn 1994, p.4). Rooted in Buddhism, the concept of mindfulness has been drawing increasing interest within Western society. Mindfulness has been conceptualised and studied as both a state (i.e. a momentary condition) and a trait (i.e. a stable characteristic). State mindfulness can be enhanced by interventions such as mindfulness-based stress reduction and mindfulness-based cognitive therapy (Kabat-Zinn 1990; Segal et al. 2002). These interventions have been shown to positively influence psychological outcomes such as anxiety and mood disorders (Hofmann et al. 2010). The success of these interventions has sparked increased theoretical interest in the concept of mindfulness, leading to the exploration of mindfulness as an inherent human capacity or trait. Trait mindfulness, also known as dispositional mindfulness (DM) (Brown et al. 2007; Kabat-Zinn 1990), will be the focus of this review. DM has been found to occur at varying levels within the population, irrespective of mindfulness practice (Brown et al. 2007; Kabat-Zinn 1990). It has been found that regular mindfulness practice can lead to an increase in the baseline of the trait (Quaglia et al. 2016), indicating that mindfulness-based interventions also have the potential to deliver more than just short-term state changes.

In recent years, there has been an increase in research exploring the potential that DM may have in enhancing psychological health within the general population. So far, research into DM and health appears to echo that done with mindfulness interventions, with a previous review suggesting a range of benefits of DM on a variety of psychological health outcomes (Keng et al. 2011). For example, studies using non-clinical samples have shown an inverse association between
DM and psychopathological symptoms such as depressive symptoms (Barnhofer et al. 2011; Bränström et al. 2011; Jimenez et al. 2010; Marks et al. 2010), post-traumatic stress disorder symptoms (Smith et al. 2011), borderline personality disorder symptomatology (Fossati et al. 2011) and eating pathology (Adams et al. 2012; Lavender et al. 2011; Masuda et al. 2012). Furthermore, studies have shown significant negative associations between DM, stress (Brown et al. 2012) and anxiety (Hou et al. 2015) and significant positive associations between DM and psychological well-being (Bajaj et al. 2016a).

It is important to explore the relationship between DM and psychological health because it is likely to have implications for the individual’s self-management of health and well-being. With growing pressure on mental health services, there is an increasing need to promote a proactive approach to health self-management among the general population (Gilburt 2015). DM might be a resource that could be relied on in times of stress or symptomology to facilitate adaptive management of health and well-being (Bajaj et al. 2016a; Brown et al. 2012). It has been shown that DM can be enhanced through mindfulness meditation training (Quaglia et al. 2016). Therefore, if research suggests a positive link between DM and psychological health, more emphasis could be put on the promotion of mindfulness training as a psychosocial intervention for those with low DM. This could be useful not just with adults but also potentially within schools to enhance this adaptive trait within the younger generation. Accordingly, DM could be used as a baseline measure to shape patient-centred mindfulness interventions. DM is a multi-faceted construct, with facets including being able to observe and describe experiences, the ability to act with awareness and focus on the present and being able to be non-judgemental and non-reactive to experiences (Baer et al. 2006). It is likely that these facets will influence psychological health in different ways. Therefore, it is important to ascertain which facets are positive influences, as these can then be promoted within the population.

Despite the rapidly expanding research base exploring the relationship between DM and psychological health, a systematic review of these studies has not yet been conducted. A systematic review of this area is needed to provide a more integrated picture of the association between DM and psychological health. Such a review will benefit the field by informing the creation of a taxonomy. This will be useful to clearly show the areas of psychological health that have been studied in relation to DM, in turn aiding the identification of future research avenues. The review can also benefit the field by exploring the terms and measures used by researchers, which in turn will enable us to assess the consistency within the literature. Indeed, recent research has highlighted some issues related to DM measures and terminology, including a suggested over-reliance on measures assessing DM as a single construct, issues with factor structure of certain DM measures and a lack of distinction in papers between terms relating to DM and cultivated mindfulness (Rau and Williams 2016). Other measurement issues, such as a reliance on correlational analysis and violation of the assumptions of parametric tests through using ordinal data, may also affect the reliability and validity of DM research.

The aim of this paper is to systematically review quantitative empirical studies on dispositional mindfulness and psychological health in non-clinical samples, using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines (Moher et al. 2009). The PRISMA guidelines, widely considered the best practice procedure, were followed to ensure the transparency and reliability of the review.

Method

Eligibility Criteria

Study Characteristics Papers were included if they explored the relationship between DM and psychological health and did not involve interventions to manipulate mindfulness. This was because this review focused on DM, not on trained mindfulness. Experimental studies were included only if mindfulness was not part of the intervention. To decide if papers qualified as measuring an aspect of psychological health, the outcome measures used were appraised and the classification and specialisation of the journal the study was published in was also considered. For example, articles on pain were included only if the study explored a psychological aspect of the phenomenon, such as pain catastrophizing. Papers were included only if they used non-clinical samples. Non-clinical samples were selected because of the interest in DM and psychological health in the general healthy population. All studies in the review were quantitative, and they were included only if they used a validated measure of DM (e.g. the Mindful Attention Awareness Scale, Brown and Ryan 2003).

Report Characteristics Papers were included if they were in English, empirical and peer-reviewed. Literature reviews and meta-analyses were also excluded. There were no restrictions on participant demographics such as age, sex, socio-economic status and year of publication.

Search Strategy

The databases PsycINFO, PubMed, Medline and Embase were searched for papers published up until June 2016. Two search sets were used with the Boolean operators ‘OR’ and ‘AND’. The first search term related to the search terms disposition* OR trait. The second search term related to
mindfulness and included the following search term ‘AND’ ‘mindful’*. The search terms entered were ‘Title’ in the ‘Fields’ search box and ‘All Years to Present’ in the Date ‘Published’ box’. Organic backward and forward searches were conducted to identify additional citations. Backward searches consisted of looking through the references of the identified papers for any other relevant articles. Forward searches were conducted by searching databases for relevant papers that had cited the already included articles.

**Quality Ratings**

The papers included were subjected to quality rating using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (The Alberta Heritage Foundation for Medical Research, February 2004). There are 14 criteria for quantitative studies that relate to the study design and rationale, sample size and characteristics and reporting of results. Each criterion, for example “Question/objective sufficiently described?” was assessed and awarded a score of ‘2’ if fulfilled, ‘1’ if partially fulfilled, ‘0’ if not present or unfulfilled and N/A if not applicable to the study. The maximum average score to be achieved is two. Two of the authors (ET and AV) first completed the quality ratings independently and then met to discuss their ratings and agree on final scores. Any discrepancies between raters were overcome through discussion and by revisiting the papers in question. These discrepancies were easily solved and agreed scores were saved.

**Theme Identification** Two of the authors (ET and ADV) undertook a classification of the topics being studied in the literature and then arrived at the three main categories outlined in the emergent themes section of this paper and in the taxonomy. First, the authors began by determining and agreeing on the focus of the papers (e.g. depression, neuroticism and rumination) and then agreeing on their classification under meaningful categories. The topics of investigation were arranged under three umbrella categories, as it was found they fit easily under either cognitive, emotional or psychopathological aspects of psychological health, as discussed later. These umbrella categories, paired with the keywords taken from the papers as topics of investigation, then informed the creation of the taxonomy.

**Results**

Ninety-three papers, all of which used quantitative methodology, met the eligibility criteria and were included in the systematic review (see Fig. 1 in supplemental data for an outline of the search process). The 93 papers studied a combined total of 34,620 participants. In total, 5287 was the largest study sample and 12 was the smallest. The research was based in a variety of countries, such as India, China, UK, USA and Ghana. Although the studies involved a range of ethnicities, the overall sample was primarily comprised of white Caucasian individuals.

Quality ratings for the 93 papers ranged from 1.55 to 2 (where below 1.6 was classified as low quality, 1.6–1.8 as medium and 1.8 and above as high). Five papers were deemed low quality, 29 papers as medium quality and 59 papers as high quality. This indicated a good standard of research in this area.

**Measures**

Within the 93 papers, seven different instruments were used to measure DM. The most commonly used measure was the Mindful Attention Awareness Scale (MAAS; Brown and Ryan 2003), appearing in 48 papers. The MAAS measures mindfulness as a single construct. It consists of 15 items that detail an example of a lack of awareness and higher scores indicate greater mindfulness. It has been found to have adequate internal consistency (Cronbach’s alpha = .82; Baer et al. 2006). The second most widely used instrument was the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006) used in 30 studies. This 39-item questionnaire measures five facets: acting with awareness, non-judging of inner experience, non-reactivity to inner experience, describing and observing. Each facet has high internal consistency (Cronbach’s alpha = .75 or above; Baer et al. 2006). Nine studies employed the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al. 2004). This 39-item questionnaire explores four subscales: observing, describing, awareness and accepting without judgment. This measure has been found to be reliable with good test-retest reliability. Test-retest correlations for the four subscales are: .65, .81, .86 and .83 respectively (Baer et al. 2004). One study used the extended version of this questionnaire, the KIMS-E, which consists of 46 items measuring the four subscales outlined above and also all seven items of the
non-reactivity to inner experience factor from the FFMQ. One paper used the Freiburg Mindfulness Inventory (FMI; Walach et al. 2006), a 30-item scale with high internal consistency assessing mindful presence, non-judgmental acceptance, openness to experiences and insight (Cronbach’s alpha = .93; Walach et al. 2006). Two studies measured mindfulness using Cognitive and Affective Mindfulness Scale—Revised (CAMS-R; Feldman et al. 2007). This assesses four facets of mindfulness: attention regulation, awareness, non-judgmental acceptance and present-focus orientation. Finally, two studies assessed mindfulness skills by using the Children and Adolescent Mindfulness Measure (CAMM; Greco et al. 2011). Most papers used only one measure of mindfulness. Two papers used both the MAAS and FFMQ (Kadziolka et al. 2016; Woodruff et al. 2014), whilst one paper used the CAMS-R in conjunction with the FFMQ (Feldman et al. 2016). Test-retest reliability scores are lacking for most of these instruments (Park et al. 2013).

Non-DM measures were also used in the reviewed papers, as shown in Table 1. As there were so many of these, only a few of the most commonly used tools will be outlined here. The Depression, Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond 1995) was frequently used within the papers. This 21-item self-report tool measures depression, anxiety and stress experienced over the last week on a 4-point Likert scale. The DASS-21 is a valid and reliable measure for use in non-clinical samples (Antony et al. 1998) with Cronbach’s alpha of .90, .84 and .84 for the depression, anxiety and stress subscales, respectively (Bhambhani and Cabral 2015). The Another Centre for Epidemiological Studies—Depression Scale (CES-D; Radloff 1977) was also frequently used to measure depressive symptomology. This is a 20-item Likert scale with good test-retest reliability (r = .057) and internal consistency (Cronbach’s alpha = .85—.90). Additionally, the Positive and Negative Affect Schedule (PANAS; Watson et al. 1988) was frequently used to measure affect. This scale requires participants to indicate how much they have experienced specific positive and negative emotions over the past few days by responding to words with a 4-point Likert scale. The positive and negative subscales are internally consistent (Cronbach’s alpha for negative affect = .084–.87 and positive affect = .86–.90) with good test-retest reliability of r = .48 and .42 for positive and negative affect, respectively (Watson et al. 1988).

Emergent Themes

Three main themes emerged when looking at the 93 papers. Thirty-nine studies focused on exploring the links between DM and psychopathological symptoms, such as symptoms of depression. Twenty-one studies investigated the cognitive processes that mediate the relationship between DM and psychological health, such as rumination. Forty-two studies explored emotional factors, such as emotional regulation, that were associated with DM. There was some overlap between studies as papers tended to use more than one outcome measure, e.g. depression and stress. Papers have been categorised as accurately as possible to their corresponding overarching theme; however, some appear twice due to focusing on more than one theme. The emergent themes informed the creation of a taxonomy, shown in supplemental data Fig. 2. The research comprising the three themes will be discussed below.

Psychopathological Symptoms

Thirty-nine papers investigated the relationship between DM and psychopathological symptoms in non-clinical populations. The most commonly researched topic within these papers was the link between DM and depressive symptoms. Twenty-nine papers used depressive symptoms as an outcome measure; however, some of these will be covered under ‘cognitive processes’ as they focused mainly on cognitive mediating factors influencing the relationship between DM and depressive symptoms. A total of 21 papers focused on depressive symptoms (Bajaj et al. 2016b; Bakker and Moulding 2012; Barnes and Lynn 2010; Bergin and Pakenham 2016; Bice et al. 2014; Brown et al., 2015; Brown-Iannuzzi et al. 2014; Bhambhani and Cabral 2015; Deng et al. 2014; Gilbert and Christopher 2010; Jimenez et al. 2010; Kangasniemi et al. 2014; Marks et al. 2010; Michalak et al. 2011; Pearson et al. 2015a; Pearson et al. 2015b; Raphiphatthana et al. 2016; Soysa and Wilcomb 2015; Tan and Martin 2016; Waszczuk et al. 2015; Woodruff et al. 2014). All of these studies found a negative relationship between DM and depressive symptoms. Of particular interest, it has been suggested that DM may work to protect against the development of depression and other pathological symptoms (Gilbert and Christopher 2010) by buffering against negative factors such as discrimination (Brown-Iannuzzi et al. 2014), unavoidable distressing experiences (Bergomi et al. 2013), low self-esteem (Michalak et al. 2011), life hassles (Marks et al. 2010) and perceived stress (Bergin and Pakenham 2016). Most of these studies used samples of university students. Only one study out of these explored the links between DM and depressive symptoms in younger participants aged 13–18, also finding that DM is negatively associated with depression (Tan and Martin 2016).

It is well known that anxiety and depressive symptoms tend to co-occur in individuals. It is therefore not surprising that we found that nine of the papers exploring depressive symptoms also looked at anxiety as an outcome measure (e.g. Bajaj et al. 2016b; Bakker and Moulding 2012; Bergin and Pakenham 2016; Brown et al., 2015; Bhambhani and Cabral 2015; Marks et al. 2010; Pearson et al. 2015a; Pearson et al. 2015b; Soysa and Wilcomb 2015; Tan and Martin 2016; Waszczuk et al. 2015). As above, these papers found that DM was inversely related to anxiety. A further seven studies explored the relationship between DM and anxiety without
Table 1  Study characteristics of the included 93 articles on DM and psychological health

| Authors | Measures | Methodology and analysis | n  | Results | Psychological health factor | Quality rating |
|---------|----------|--------------------------|----|---------|----------------------------|---------------|
| Adams et al. (2012) | FFMQ SSQ BULIT-R BSQ | Correlational; ANOVAs, chi-square analyses and hierarchical regression analyses | 112. Students, Age: $M = 20.00$, $SD = 1.69$ | HDM predicted lower bulimic symptoms | Eating disorder | 1.82 |
| Adams et al. (2014) | MAAS PANAS CES-D | Correlational; linear regression models | 399. General, Age: $M = 42.00$, $SD = 9.74$ | HDM predicted greater emotional stability during smoking cessation | Smoking | 1.91 |
| Adams et al. (2015) | MAAS HSI PHQ (3 scales) | Correlational; path analyses | 399. General, Age: $M = 42.00$, $SD = 9.74$ | HDM moderated lower stress and alcohol levels | Stress Alcohol | 2.00 |
| Alleva et al. (2014) | KIMS RRS QIDS | Correlational; mediation analysis | 254. Students, Age: $M = 21.40$, $SD = 2.30$ | Aspects of rumination (brooding, accepting without judgement, reflective pondering) mediate the link between mindfulness and depressive symptoms | Depressive symptoms | 1.64 |
| Bajaj et al. (2016a) | MAAS RSES PANAS SWEMWBS | Correlational; structural equation modelling | 318. Students, Age: $M = 20.30$, $SD = 1.30$ | Self-esteem (SE) fully mediated the link between DM, positive affect and mental well-being. SE also partially mediated the link between DM and negative affect | Well-being | 1.80 |
| Bajaj et al. (2016b) | MAAS RSES DASS | Correlational; structural equation modelling | 417. Students, Age: $M = 20.20$, $SD = 1.40$ | DM exerted indirect effect on anxiety and depression through SE | Anxiety Depression | 1.80 |
| Bakker and Moulding (2012) | MAAS HSPS AAQ-II DASS-21 | Correlational; hierarchical regression analysis | 111. General, Age: $M = 31.07$, $SD = 11.95$ | HDM moderated SPS = lower levels of depression, anxiety and stress | Depression | 1.73 |
| Bhambhani and Cabral (2015) | CAMS-R DASS-21 NAS EQ | Correlational; mediation analyses | 308. 69 general, age: $M = 46.40$, $SD = 12.20$, 239 students, age $M = 22.30$, $SD = 7.00$ | DM and non-attachment are independent predictors of non-clinical psychological distress. These factors explain fully the effect of decentering on psychological distress. | Psychological distress | 1.73 |
| Bao et al. (2015) | MAAS WLEIS PPS | Correlational; multiple mediation model | 380. General, Age: $M = 27.21$, $SD = 5.10$ | DM = less stress | Stress | 1.82 |
| Barnes and Lynn (2010) | FFMQ BDI-II | Correlational; hierarchical linear modelling | 102. Students, Age: $M = 18.99$, $SD = 1.90$ | Acting with awareness, non-reactivity and non-judging inversely related to depressive symptoms. Observing directly related to depressive symptoms | Depressive symptoms | 1.64 |
| Barnhofer et al. (2011) | FFMQ EPQ BDI-II | Correlational; linear regression | 144. General, Age: $M = 43.00$, $SD = 6.80$ | HDM = low neuroticism/depressive symptoms | Neuroticism | 2.00 |
| Bergin and Pakenham (2016) | FFMQ LSPS DASS SLS PWBS | Correlational; hierarchical multiple regression analyses | 481. Students, Age: $M = 21.90$, $SD = 5.78$ | DM = improved psychological adjustment (depression, anxiety, life satisfaction and dimensions of psychological well-being). DM important to mitigate effects of stress on depression and anxiety | Psychological adjustment | 1.91 |
| Authors                  | Measures                                      | Methodology and analysis                          | n               | Results                                                                                                                                                                                                 | Quality rating |
|-------------------------|-----------------------------------------------|--------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Bergomi et al. (2013)   | FMI, INC-S, IAAM, BSI, PANAS, PANAS-SF, IAAM, BSI, PANAS | Correlational; structural equation modelling     | 376. General, Age: $M = 40.40, SD = 18.40$ | DM moderates link between unavoidable distressing events and pathological symptoms/negative affect                                                                                                       | 1.90           |
| Bice et al. (2014)      | MAAS, Need Fulfilment Measure, I-PANAS-SF     | Correlational; linear regression analyses, mediation analysis | 399. General, Age: $M = 35.76, SD = 12.00$. | DM positively associated with need fulfilment and both negatively associated with poor mental health outcomes (neg. Affect and depressive symptoms)                                                          | 1.73           |
| Black et al. (2012)     | MAAS, CES-D, AQ, PSS                          | Correlational; mediation path analysis           | 52/87. Students, Age: $M = 16.20, SD = 7.00$. | DM shields high pro-smoking intentions and low smoking refusal self-efficacy from turning into higher risk smoking behaviour                                                                                 | 2.00           |
| Bluth and Blanton (2014)| CAMM, PANAS, SCS, SLS, SSS                    | Correlational; bivariate correlations and mediation analysis | 65. Students. | DM and self-compassion mediate pathway to emotional well-being                                                                                                                                         | 1.73           |
| Bodenlos et al. (2015)  | FFMQ, PSS-14, SF-36, RAPI                    | Correlational; bivariate correlations and multiple hierarchical regression analyses | 310. Students, Age: $M = 19.70, SD = 1.30$. | DM observation facet negatively associated with physical health. Acting with awareness and non-judging positively linked to emotional well-being                                                                   | 1.82           |
| Bowlin and Baer (2012)  | FFMQ, PWB, SCS, DASS                         | Correlational; ANOVA, chi-square and hierarchical regression analysis | 280. Students, Age: $M = 19.00$ | DM moderates between self-control and psychological symptoms                                                                                                                                             | 1.64           |
| Brünström et al. (2011) | FFMQ, HADS, PSOM, PSS                         | Correlational; ANOVA and multiple regression analyses | 382. General | HDM diminishes stress and depression                                                                                                                                                                   | 2.00           |
| Brown et al. (2012)     | MAAS, PSS, POMS, PANAS, FNE, Salivary Cortisol| Correlational; restricted maximum likelihood mixed models | 44. Students, Age: $M = 44.00, SD = 1.36$ | HDM lowers cortisol responses                                                                                                                                                                         | 1.67           |
| Brown et al. (2015)     | FFMQ, SPWB, SSRQ, DTS, CESD-R, PSS, PSWQ, B-YAACQ, FFMQ | Correlational; structural equation modelling     | 624. General | Distinct facets of DM relate to individual psychological health outcomes                                                                                                                                 | 1.82           |
| Authors                  | Measures                           | Methodology and analysis | n                  | Results                                                                 | Psychological health factor | Quality rating |
|--------------------------|------------------------------------|--------------------------|--------------------|-------------------------------------------------------------------------|-----------------------------|----------------|
| Brown-Iannuzzi et al.    | PRS DES BDI                        | Correlational; multiple regression | Age: M = 40.93, SD = 9.60 | DM dampens relationships between depressive symptoms related to discrimination |                            |                |
| (2014)                   |                                    |                          |                    |                                                                         |                             |                |
| Bullis et al. (2014)     | KIMS ASI SFS STAI-T Distress tolerance Heart rate SUDS STAI-B DSQ | Correlational; hierarchical regression model | 48. General, Age: M = 29.10, SD = 8.32 | DM reduces heart rate activity and anxiety during CO2 challenge -firemen | Stress                      | 1.82           |
| Christopher et al. (2013)| MAAS RAPI EIS ICSRLE              | Correlational; hierarchical linear regression and mediational model | 125. Students, Age: M = 24.00, SD = 8.00 | Impulsivity mediated relationship between DM and alcohol-related problems | Alcohol use and problems    | 1.73           |
| Ciesla et al. (2012)     | MAAS PANAS-X RSQ Daily stress      | Correlational; hierarchical linear regression | 78. General, Age: M = 16.73, SD = 1.33 | DM lowers levels of dysphoric mood in adolescents. DM = less rumination | Ruminaiton                  | 2.00           |
| Coffey and Hartman       | FFMQ TMMT TLI RRQ BSI              | Correlational; structural equation modelling | 258. Students, Two samples, Age: M = 18.90, SD = 1.80 and M = 18.75, SD = 1.20 | DM lowers levels of dysphoric mood in adolescents Stress |                            |                |
| (2008)                   |                                    |                          |                    |                                                                         |                             |                |
| Cole et al. (2014)       | MAAS ER89 STAI-Trait CES-D AESI    | Correlational; hierarchical regression analyses | 431. Students, Age: M = 22.40, SD = 3.20 | DM buffered positive relationship between academic stress and depression but not anxiety | Academic Stress Psychological well-being | 1.64           |
| Daubennier et al. (2014) | FFMQ STAI PSS RRQ PANAS Salivary cortisol | Correlational; regression analyses; | 43. General | LDM = psychological distress and CAR Stress |                            |                |
| Day et al. (2015)        | KIMS PCS PSWQ                      | Correlational; MANOVA    | 214. Students, Age: M = 18.70, SD = 2.30 | PCS scores lower due to DM Pain |                            | 1.80           |
| de Fries (2014)          | MAAS MMSE PHQ MCQ MOS ERQ          | Correlational; hierarchical regression analyses | 134. General, Age: M = 65.43, SD = 9.50 | DM positively related to mental health. DM buffers negative effects of life stress on mental health | Mental health                | 1.82           |
| Authors               | Measures                          | Methodology and analysis                       | n                  | Results                                                                 | Psychological health factor          | Quality rating |
|----------------------|-----------------------------------|-----------------------------------------------|--------------------|------------------------------------------------------------------------|--------------------------------------|---------------|
| Deng et al. (2014)   | MAAS                              | Correlational; Pearson’s correlation coefficient | 23. Students, Age: $M = 21.90$, SD = 1.60 | Depression negatively related to DM                                   | Depression                           | 1.27          |
| Feldman et al. (2016)| Study 1: CAMS-R, FFMQ, PANAS, Heart rate, Skin conductance, Study 2: FFMQ, PANAS, BDEPS | Study 1: Correlational, hierarchical regression analyses | Study 1: 97. Students, Age: $M = 20.48$, SD = 4.12 | Both studies found that higher DM = lower emotional reactivity to aversive experiences | Emotional reactivity                   | 1.82          |
| Feldman et al. (2009)| Study 1: MAAS, Neuroticism scale, Trait anger scale, Study 2: MAAS, Neuroticism scale, BDI | Correlational; hierarchical regression analysis | Study 1: 195. Students | DM moderates psychosomatic neuroticism                               | Neuroticism                           | 1.55          |
| Fettman et al. (2010)| FFMQ                              | Correlational; regression analyses             | 226. Students      | HDM = lower impulsivity; higher self-control and mediates neurotism   | Neuroticism                           | 1.73          |
| Fisak and Von Lehe (2012) | FFMQ, PSWQ                        | Correlational; bivariate correlations and hierarchical regression analyses | 400. Students, Age: $M = 21.67$, SD = 4.95 | DM facets non-reactivity, non-judgment and acting with awareness, significantly predicted worry symptoms | Worry symptoms                        | 1.73          |
| Fogarty et al. (2015)| FFMQ                              | Longitudinal; mixed-model ANCOVAs, MACOVA      | 80. General        | DM = facilitates more adaptive emotional responding under stress      | Emotional stress and differentiation | 1.83          |
| Fossati et al. (2011)| MAAS, PDQ-4, BPD scale, ASQ, CES-D | Correlational; stepwise multiple regressions and mediation analysis | 501. Students, Age: $M = 17.22$, SD = 0.88 | DM mediates need for approval and BPD features                      | Borderline Personality Disorder      | 1.73          |
| Gilbert and Christopher (2010) | MAAS, CCI, CES-D                 | Correlational; hierarchical linear regression analysis | 278. Students, Age: $M = 22.10$, SD = 6.22 | DM moderates depression                                               | Depression                           | 1.73          |
| Gouveia et al. (2016)| MAAS, IM-P, SCS, PSI-SF           | Correlational; regression-based pth analyses   | 333. General, Age: $M = 42.32$, SD = 5.66 | Higher DM & self-compassion associated with greater mindful parenting which is associated with lower parenting stress | Stress                               | 1.91          |
| Harrington et al. (2014)| KIMS, SRIS, PWB                  | Correlational; MANOVA                         | 184. Students, Age: $M = 19.70$, SD = 1.33 | DM positively correlated to psychological well being                  | Well being                           | 1.64          |
| Authors            | Measures                                                                 | Methodology and analysis                                      | n                | Results                                                                                          | Psychological health factor | Quality rating |
|--------------------|---------------------------------------------------------------------------|----------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------|----------------------------|---------------|
| Hertz et al. (2015) | FFMQ ECR Salivary cortisol PANAS VAS                                      | Experimental; mediation models                                | 228. General, Age: $M = 21.31$, SD = 6.12 | DM associated with lower cortisol during conflict via attachment avoidance. DM predicted less negative affect and more positive cognitive appraisals post-conflict via lower attachment anxiety | Stress                     | 1.80          |
| Hou et al. (2015)   | MAAS CAS-P Salivary cortisol STAI PSS                                      | Experimental; LCS modelling                                   | 105. Students, Age: $M = 21.00$, SD = 1.16 | DM increases CAR and decreases anxiety                                                           | Anxiety                    | 1.90          |
| Howell et al. (2008)| MAAS Well-being scale SQS                                                  | Correlational; path analysis                                  | 305. Students, Age: $M = 21.10$, SD = 4.91 | DM predicts sleep quality and well being                                                         | Well being                 | 1.80          |
| Howell et al. (2010)| MAAS SQS Glasgow sleep effort scale Pre-Sleep arousal scale Sleep hygiene index Epworth sleepiness scale Dysfunctional belief and attitudes scale | Correlational; structural equation modelling                  | 334. Students, Age: $M = 20.89$, SD = 4.98 | DM positively regulates sleep quality                                                              | Well being                 | 1.80          |
| Jacobs et al. (2016)| KIMS TElQue-SF DASS-21 MHB                                                  | Correlational; path analyses                                  | 427. General, Age: $M = 34.10$, SD = 9.90 | DM facets linked to multiple health behaviours                                                   | Stress Multiple health behaviours | 1.90          |
| Jimenez et al. (2010)| FMI CES-D NMR-15 mDES PWBS                                                | Correlational; structural equation modelling                  | 514. Students    | DM lowers depression                                                                                | Depression                  | 1.90          |
| Kadziolka et al. (2016)| FFMQ MAAS SCI Mindfulness practice – history questionnaire. ECG & heart rate Skin conductance | Experimental; bivariate correlations, ANOVAs                 | 47. General, Age: $M = 22.21$, SD = 2.90 | High DM associated with more effective down-regulation (parasympathetic nervous system activity, returning body to baseline) following stress | Stress                     | 1.64          |
| Kangasniemi et al. 2014) | KIMS Physical activity AAQ-2 SCL-90 BDH I                               | Experimental. ANOVA and ANCOVA.                              | 108. General, Age: $M = 43.00$, SD = 5.20 | Higher DM = Higher self-reported physical activity and less psychological and depressive symptoms. Correlation also found between objectively measured physical activity and psychological well-being | Physical activity Depressive symptoms | 1.91          |
| Authors                       | Measures                          | Methodology and analysis                  | n                  | Results                                                                 | Psychological health factor               | Quality rating |
|-------------------------------|-----------------------------------|-------------------------------------------|--------------------|------------------------------------------------------------------------|-------------------------------------------|----------------|
| Kiken and Shook (2012)        | MAAS DAS LMSQ FES BDI-II BAI PANAS| Correlational; structural equation modelling | 181 Students. Age: \(M = 19.40\), \(SD = 3.40\) | DM reduces emotional disorders                                      | Emotional distress                        | 1.91           |
| Kong et al. (2016)            | MAAS PANAS SPWB sFMRI             | Experimental; correlational analysis, linear regression | 290 Students. Age: \(M = 21.56\), \(SD = 1.01\) | Individual differences in DM linked to spontaneous brain activity. DM engages brain mechanisms that differentially influence hedonic and eudaimonic well-being | Well-being | 1.82 |
| Lamis and Dvorak (2014)       | MAAS NAS BDI-II SAEI-28 MCSD-B    | Correlational; meditational model          | 552 Students. Age: \(M = 19.85\), \(SD = 1.66\) | Depressive symptoms and suicide rumination negatively associated with DM and non-attachment. DM-suicide rumination association in part mediated by depressive symptoms | Depressive symptoms, Suicide rumination | 2.00 |
| Lattimore et al. (2011)       | Study 1: TFEQ-R21 KIMS HADS       | Both studies: correlational; Pearson’s correlations | 386 total. Study 1: students. Age: \(M = 21.00\), \(SD = 5.50\) | DM reduces emotional eating in females                                | Eating disorder                           | 1.91           |
| Laurent et al. (2013)         | FFMQ CES-D Salivary cortisol      | Experimental; dyadic growth curve modelling | 100 couples. Age: \(M = 21.31\), \(SD = 6.12\) | Women’s DM (non-reactivity facet) predicted higher conflict cortisol levels. Men’s DM (describing facet) predicted lower cortisol reactivity | Stress                                    | 1.91           |
| Lavender et al. (2009)        | MAAS BULIT-R WBSI                 | Correlational; hierarchical regression analyses | 406 Students. Age: \(M = 19.10\), \(SD = 1.50\) | HDM negatively associated with bulimic symptoms                      | Eating disorder                           | 1.55           |
| Lavender et al. (2011)        | KIMS EAT-26 DASS-21               | Correlational; hierarchical regression analyses | 406 Students. Age: \(M = 19.10\), \(SD = 1.50\) | HDM suggests lower levels of eating pathology among young adult women | Eating disorder                           | 1.73           |
| Mahoney et al. (2015)         | MAAS KIMS ASI-3 AAQ-II BAI GAS STAI-Y1 | Correlational; chi-square, independent t tests, Pearson’s correlations | 511 Younger adults age: \(M = 20.10\), \(SD = 2.50\), Older adults age: \(M = 71.80\), \(SD = 7.30\) | DM significantly inversely associated with anxiety sensitivity, experiential avoidance, trait and state anxiety | Anxiety                                    | 1.90           |
| Malinowski and Lim (2015)     | FFMQ UWES-9 WEMWBWS PCQ JAWS      | Correlational; structural equation modelling | 299 General. Age: \(M = 40.10\), \(SD = 11.60\) | DM predicts work engagement and well-being                            | Wellbeing                                  | 2.00           |
| Authors                  | Measures                          | Methodology and analysis                  | n          | Results                                                                 | Psychological health factor                                | Quality rating |
|-------------------------|-----------------------------------|-------------------------------------------|------------|-------------------------------------------------------------------------|------------------------------------------------------------|----------------|
| Marks et al. (2010)     | MAAS, IIESS-RIE, RTSQ, DASS-21    | Correlational; multiple regression analyses | 317. Students. Age: $M = 16.10$, $SD = 1.10$. | DM reduces depression, anxiety and stress due to life hassles   | Stress                                                     | 1.91           |
| Masada et al. (2010)    | MAAS, IRI-PD, SCS                 | Correlational; multiple regression         | 625. Students. Age: $M = 20.40$, $SD = 4.20$ | DM inversely related to psychological ill health and emotional distress | Emotional Distress                                      | 1.91           |
| Masuda and Wendell (2010)| MAAS, MAC-R, GHQ-12, IRI-PD       | Correlational; linear regression analyses  | 795. Students. Age: $M = 20.40$, $SD = 4.20$ | DM mediates the relationship between disordered eating-related cognitions and psychological distress | Eating disorder                                           | 1.82           |
| Masuda et al. (2012)    | MAAS, EAT-26, GHQ-12, MAC-R, AAQ-16 | Correlational; hierarchical multiple regressions | 278. Students. Age: $M = 20.88$, $SD = 4.30$ | DM moderates disordered eating                                 | Eating disorder                                           | 1.91           |
| McDonald et al. (2016)  | MAAS, DASS-21, DERS, ECR-R        | Correlational; $T$ tests, chi-square, Pearson's correlations | 402. General | DM inversely related to distress, mediated by anxiety and emotion regulation deficits | Distress                                                   | 2.00           |
| Michalak et al. (2011)  | KIMS, RSE, BDI                    | Correlational; hierarchical regression analyses | 216. Students. Age: $M = 24.80$, $SD = 7.60$ | Self-esteem more strongly associated with depression in LDM   | Depression                                                 | 1.64           |
| Mun et al. (2014)       | FFMQ, PCP, S, PCS, CPAQ           | Correlational; structural equation modelling | 335. Students. Age: $M = 19.62$, $SD = 3.00$ | DM mediates pain severity, catastrophising and impairment     | Pain                                                       | 2.00           |
| Murphy and MacKillop (2012) | FFMQ, AUDIT-C, UPPS-P, MCQ, CPQ, AUDIT-C, UPPS-P, MCQ | Correlational; hierarchical regression analyses | 116. Students. Age: $M = 20.30$, $SD = 1.30$ | Effects of DM on alcohol consumption mediated by impulsivity | Alcohol                                                   | 1.91           |
| Ostafin et al. (2013)   | FFMQ, CPS, IAT                    | Correlational; multiple regression analyses | 61. Students. Age: $M = 19.60$, $SD = 1.90$ | DM inversely related with alcohol preoccupation              | Alcohol                                                   | 1.73           |
| Paolini et al. (2012)   | MAAS, CCEBstate, FCQstate         | Experimental; Spearman rank order correlations | 19. General | Brain study shows younger adults with HDM able to return to DMN; older adults low in DM continued to be pre-occupied with food | Eating disorders                                           | 1.69           |
| Pearson et al. (2015a)  | MAAS, LET, PSWQ, BYAACQ           | Correlational; structural equation modelling | 1277. Students | DM inversely related to alcohol-related problems, anxiety and depressive symptoms | Alcohol /anxiety /depression                             | 1.82           |
| Pearson et al. (2015b)  | FFMQ, CESD-R, PSWQ, ALS, DTS      | Correlational; Lo-Mendell-Rubin adjusted likelihood ratio test | 94. Students. Age: $M = 20.60$, $SD = 4.40$ | HDM associated with adaptive emotional outcomes, LDM associated with depressive and anxiety symptoms, affective instability and distress intolerance | Depression /anxiety                                     | 1.77           |
| Authors | Measures | Methodology and analysis | n | Results | Psychological health factor | Quality rating |
|---------|----------|--------------------------|---|---------|-----------------------------|---------------|
| Petrocchi and Ottaviani (2016) | FFMQ CES-D RRS | Longitudinal; multiple regression analysis | 41. Students. Age: $M = 24.40$, $SD = 2.80$ | DM prospectively predictive of lower depressive symptoms and rumination | Depression | 1.91 |
| Pidgeon et al. (2013) | MAAS DASS-21 TFEQ-EE GNKQ | Correlational; bivariate correlations, moderation analysis | 157. General | DM is a moderator between psychological distress and engagement in emotional eating. | Eating disorder | 1.73 |
| Prakash et al. (2015) | MAAS PSS DERS WBSI | Experimental; bivariate correlations, simple mediation models | 100. General | DM reduces stress | Stress | 1.82 |
| Prazak et al. (2012) | KIMS Heart rate SWBS WBI DS14 | Correlational; multiple regressions | 506. Students. Age: $M = 21.40$, $SD = 4.80$ | HDM associated with better cardiovascular and psychological health | Cardiovascular /mental health | 1.55 |
| Raes and Williams (2010) | KIMS-E LARSS BDI-II MDQ | Correlational; hierarchical regression analyses | 164. Students. Age: $M = 19.21$, $SD = 0.91$ | DM reduces uncontrollable ruminative cycles | Depression | 1.55 |
| Raphiphatthana et al. (2016) | FFMQ BAI CES-D | Correlational; exploratory factor analysis | 284. Students | DM facets predictive of anhedonia over time | Depression /mental health | 1.70 |
| Rasmussen and Pidgeon (2011) | MAAS RSES SIAS | Correlational; mediation analysis | 205. Students. Age: $M = 23.10$, $SD = 6.70$ | DM predictive of high self-esteem and low levels of social anxiety | Anxiety | 1.64 |
| Richards et al. (2010) | MAAS Self care scale SRIS SOS-10 | Correlational; mediation analysis | 148. General. Age: $M = 42.30$, $SD = 14.90$ | DM mediates the relationship between self-care and well-being | Well-being | 1.73 |
| Short et al. (2016) | FFMQ PANAS DASS-21 SCMS BRIEF PRF-IN DREFS | Correlational; correlational analysis, multiple mediator models | 77. Students. Age: $M = 21.20$, $SD = 6.00$ | Executive functioning and self-regulation mediates the inverse relationship between DM and negative affect | Well-being | 1.82 |
| Sirois and Tosti (2012) | MAAS GPS PCS SF-36 | Correlational; structural equation modelling | 339. Students. Age: $M = 21.70$, $SD = 4.90$ | DM mediates procrastination and stress | Stress | 1.80 |
| Slonim et al. (2015) | FFMQ HPLP-II DASS | Correlational; canonical correlation and MANOVA | 207. Students. Age: $M = 21.80$, $SD = 3.60$ | DM associated with distress and self-care | Distress /well-being | 1.55 |
| Authors                  | Measures                                                                 | Methodology and analysis                        | $n$                     | Results                                                                 | Psychological health factor | Quality rating |
|--------------------------|--------------------------------------------------------------------------|-------------------------------------------------|-------------------------|-------------------------------------------------------------------------|----------------------------|---------------|
| Smith et al. (2011)      | MAAS, AUDIT, BDI-II, Firefighter stress, LOT-R, PMS, PHQ-15, PDS, ISEL  | Correlational; hierarchical multiple regression analyses | 124. General. Age: $M = 33.70$, $SD = 8.13$ | MD = fewer PTSD symptoms                                               | PTSD                       | 1.73          |
| Soysa and Wilcomb (2015) | FFMQ, SCS-Short, Self-efficacy scale, DASS-21, WEMWBS                  | Correlational; hierarchical regression analyses  | 204. Students          | DM predictive of stress, depression, anxiety and well-being             | Stress /depression /anxiety /well-being | 1.82          |
| Tan and Martin (2016)    | CAMM, DASS-21, RSSES, RSCA, AFQ-Y8, DMQ-R                             | Correlational; regression analyses              | 106. General. Age: $M = 15.00$, $SD = 1.20$ | DM negatively associated with stress, anxiety, depression, cognitive inflexibility, and a positive association with self-esteem and resiliency | Stress /depression /anxiety /well-being | 1.91          |
| Vinci et al. (2016)      | FFMQ, DMQ-R, AUDIT                                                     | Correlational; linear regression analyses       | 207. Students. Age: $M = 20.10$, $SD = 1.90$ | Coping motives and conformity motives mediate the relationship between DM and problematical alcohol use | Alcohol                    | 1.82          |
| Vujanovic et al. (2007)  | MAAS, ASI, MASQ, ASQ, BVS                                              | Correlational; hierarchical multiple regression analyses | 248. General. Age: $M = 22.40$, $SD = 7.90$ | DM with anxiety sensitivity predictive of anxious arousal symptoms and agoraphobic cognitions | Anxiety                    | 1.82          |
| Walsh et al. (2009)      | MAAS, ECR-R, NEO-PI-R                                                  | Correlational; regression analyses              | 153. Students. Age: $M = 25.90$, $SD = 6.70$ | DM predicted by trait anxiety, attachment anxiety and attentional control | Anxiety                    | 1.73          |
| Wang and Kong (2014)     | MAAS, WLEIS, GHQ-12, SWLS                                              | Correlational; structural equation modelling    | 321. Students. Age: $M = 27.20$, $SD = 5.40$ | Emotional intelligence partially mediates the effect of DM on distress | Distress                   | 1.80          |
| Waszczyk et al. (2015)   | MAAS, Mood and feelings scale, CASI                                    | Correlational; structural equation modelling    | 2118. Twins. Age: $M = 16.30$, $SD = 0.70$ | DM is 33% hereditable and 66% due to non-shared environment, attentional control links DM to anxiety and depression sensitivity | Depression /anxiety       | 2.00          |
| Weinstein et al. (2009)  | MAAS, Stress appraisal single item COPE, Anxiety measure, LOT, KIMS WHO-5, BFI | Correlational; hierarchical regression analyses | 368. Students          | DM = less use of avoidant coping strategies                              | Stress                     | 1.82          |
| Wenzel et al. (2015)     | Correlational; hierarchical linear regression                          | 1147. General. Age: $M = 34.30$, $SD = 11.90$ | DM mediator for high levels of neuroticism | Neuroticism                                                              |                            | 1.82          |
measuring depressive symptoms. These studies further supported the beneficial influence of DM, finding that DM was negatively associated with anxiety sensitivity, trait and state anxiety and social anxiety (Fisak and Von Lehe 2012; Hou et al. 2015; Mahoney et al. 2015; Rasmussen and Pidgeon 2011; Vujanovic et al. 2007; Walsh et al. 2009).

Eating pathology and risk factors for disordered eating were explored in eight papers (Adams et al. 2012; Latimore et al. 2011; Lavender et al. 2009; Lavender et al. 2011; Masuda and Wendell 2010; Masuda et al. 2012; Paolini et al. 2012; Pidgeon et al. 2013). Overall, it appeared that DM is negatively associated to eating pathology. For example, Lavender et al. (2009) found a negative association between DM and bulimic symptoms in a large sample of undergraduate men and women.

Despite not occurring as often as the abovementioned disorders, symptoms of Borderline Personality disorder (BPD) were explored in relation to DM in two papers (Fossati et al. 2011; Wupperman et al. 2008). Both papers found that DM was negatively associated with the number of BPD features, concluding that deficits in mindfulness may go some way to explain BPD features. Additionally, post-traumatic stress disorder (PTSD) was covered by one paper (Smith et al. 2011), finding that DM was associated with fewer PTSD symptoms in a sample of urban fire fighters.

Overall, papers exploring the link between DM and psychopathological symptoms are bolstered by using validated measures of DM (e.g. the MAAS) and reliable outcome measures (e.g. DASS-21). The studies predominantly use cross-sectional designs with suitable sample sizes for the methods of correlational analysis used. However, arguably the literature is limited due to participants’ ordinal responses, obtained through the employment of Likert style questionnaires, being analysed with parametric tests. It has been argued this violates the assumptions of parametric analysis (Field 2013). This should therefore be considered when reviewing the findings of the literature, as it may reduce the reliability and validity of the results.

**Cognitive Processes** Twenty-one papers aimed to unravel the potential mediators of the influence of DM on psychological health. Most of these papers focused on how DM relates to cognitive thinking styles and how these styles impact on psychological health. For example, Kiken and Shook (2012) have found that, generally, individuals with higher DM are less likely to get caught up in negative cognitive thinking processes that are likely to leave them at risk of emotional disorders. Studies have suggested that DM is inversely associated with the use of avoidant coping strategies when in stressful situations (Weinstein et al. 2009; Sirois and Tosti 2012). An example of an avoidant coping strategy is procrastination, which has been found by Sirois and Tosti (2012) to be positively associated with poor health and negatively
associated with DM. They found that DM mediates the effects of procrastination on health.

Rumination is another example of an avoidant coping strategy and a cognitive process that appears to have been researched frequently in relation to DM. Defined as repetitive thinking about a situation or mood and its consequences (Nolen-Hoeksema 1991), six papers in this review have focused on rumination (Alleva et al. 2014; Ciesla et al. 2012; Coffey and Hartman 2008; Petrocchi and Ottaviani 2016; Raes and Williams 2010; Lamis and Dvorak 2014). These studies have found that DM predicts reduced uncontrollable ruminative cycles and less suicidal rumination (Petrocchi and Ottaviani 2016; Raes and Williams 2010; Lamis and Dvorak 2014; Ciesla et al. 2012). Furthermore, two papers have found that DM is inversely related to pain catastrophizing, which is the tendency to ruminate on feelings of pain and experience increased helplessness (Day et al. 2015; Mun et al. 2014). Rumination is a risk factor for depression and psychological distress, and two studies have found that rumination does mediate the link between DM and depressive symptoms (Alleva et al. 2014) and psychological distress (Coffey and Hartman 2008). This suggests that DM might reduce rumination, which in turn protects against psychological ill health. In a similar vein, studies have indicated that DM is associated with reduced neuroticism, which is a trait that encapsulates negative thinking and is a risk factor for ill health (Barnhofer et al. 2011; Feltman et al. 2009; Wenzel et al. 2015).

One paper, by Short et al. (2016), aimed to find out how DM links to executive functioning. Results indicated that the ‘acting with awareness’ and ‘non-judgement of inner experience’ facets of mindfulness positively correlated with total executive function in a sample of students. The authors argue that individuals high in these traits are aware of changes internally and externally, which activate executive functions, allowing them to successfully navigate situations.

There appears to also be a literature exploring cognitive mediating factors between DM and addictive behaviours, such as smoking and alcohol use. A study by Black et al. (2012) has shown that DM helps to prevent smoking by buffering pro-smoking intentions and enhancing smoking refusal, whilst Ostafin et al. (2013) found that DM is inversely related to preoccupation with alcohol. Three papers have found that the relationship between DM and alcohol problems can be explained partly by personality traits: impulsivity and neuroticism (Christopher et al. 2013; Fettermann et al. 2010; Murphy and MacKillop 2012). Finally, one paper has found that lower coping motives in students mediate the link between mindfulness facets and alcohol use (Vinci et al. 2016).

Most of the papers exploring the relationship between DM and cognitive processes use cross-sectional designs featuring self-report measures which can be prone to response bias, therefore reducing the reliability of the results somewhat. However, it is worth highlighting that one study by Petrocchi and Ottaviani (2016) detailed a longitudinal exploration into DM, rumination and depressive symptoms. The researchers found that DM (specifically the facet ‘non-judge’) at time one had a protective function against depressive symptoms and rumination at time two (2 years later). Similar longitudinal studies are needed to form a reliable picture of how DM and psychological health interact over time. Petrocchi and Ottaviani’s (2016) study also indicated that four out of five of the FFMQ subscales (not ‘observe’) had high test-retest reliability. This is an interesting finding, suggesting that the psychometric properties of the FFMQ may not be that robust, which may have implications for the reliability of the results of the many studies in this area using the FFMQ.

**Emotional Factors** Forty-two papers explored the link between DM and emotional factors. There is a large literature exploring the effects of DM on perceived stress, with 27 papers focusing on stress in this review. Overall, these studies have found that higher DM is associated with lower perceived stress (e.g. Bhambhani and Cabral 2015; Gouveia et al. 2016; Jacobs et al. 2016; Marks et al. 2010; Soysa and Wilcomb...
et al. 2016; Zimmaro et al. 2016). All 13 papers demonstrated and Lim 2015; Prazak et al. 2012; Richardse t al. 2010; Short (Bajaj et al. 2016a; Bluth and Blanton 2014; Bodenlos et al. 2015; Howells et al. 2014; Harrington et al. 2014; Howell et al. 2015). Pain catastrophizing involves negative evaluation and emotional sensitivity, whereas DM involves non-judgmental acceptance. It appears that DM can enhance patient resilience and buffer against the development of negative thinking patterns that predict psychological ill health. This is a noteworthy finding that has implications at individual and societal levels. Proactive attempts to increase DM are likely to improve psychological well-being and equip individuals with healthy cognitive processes and emotional regulatory strategies. This will allow healthy individuals to remain resilient and present in the potential midst of diagnoses and long-term illness.

These studies have enlisted suitable sample sizes for the statistical analyses used, boosting the validity of the findings. However, almost all the papers are limited by the nature of the samples used. Over-reliance on the use of Western student samples, particularly Psychology undergraduates, reduces the external validity of the findings of many of these papers (e.g. Bluth and Blanton 2014; Marks et al. 2010). Additionally, sampling biased towards females (e.g. Howell et al. 2008) is also of concern. Few of these papers detail data screening or examination of distribution, making it hard to evaluate the suitability of the data for the statistical tests used. However, the few that do (e.g. Tan and Martin 2016) have normally distributed data with assumptions being met for statistical analysis.

Discussion

This review has presented an integrated overview of the research exploring the links between DM and psychological health. The research explored a range of outcome measures, which we propose belong to three dominant themes (see supplemental data Fig. 2). Overall, DM appears to be positively associated with psychological health. The 93 included papers were generally deemed to be of a high research standard when assessed using the quality assessment criteria. Specific methodological limitations within the literature will be covered within this discussion.

Several meaningful results have been found, but perhaps one of the most prominent is the inverse relationship between DM and negative cognitive patterns. It appears that cognitive processes are a key mechanism through which DM affects psychological health. For example, rumination is a risk factor for psychological distress and depression (Nolen-Hoeksema et al. 2008), and studies suggest DM protects against rumination (Petrocchi and Ottaviani 2016). It is thought this is due to individuals high in DM having greater awareness but less attachment and judgement of thoughts (Brown et al. 2007). This reduces the repetitive focus and attenuation of thoughts that can lead to psychological distress and depression. Related to rumination, research has also demonstrated an inverse association between DM and pain catastrophizing (Day et al. 2015). Pain catastrophizing involves negative evaluation and emotional sensitivity, whereas DM involves non-judgmental acceptance. It appears that DM can enhance patient resilience and buffer against the development of negative thinking patterns that predict psychological ill health. This is a noteworthy finding that has implications at individual and societal levels. Proactive attempts to increase DM are likely to improve psychological well-being and equip individuals with healthy cognitive processes and emotional regulatory strategies. This will allow healthy individuals to remain resilient and present in the potential midst of diagnoses and long-term illness.
Furthermore, as research suggests that DM is linked to the selection of adaptive stress-coping techniques (Weinstein et al. 2009), interventions to increase DM in non-clinical samples might reduce the somatisation of stress and potentially lessen the use of unhealthy coping strategies such as smoking, drinking and over-eating.

**Conceptual/Methodological Issues and Suggestions for Future Research**

Interpretation of the results presented in this review is made difficult by a number of conceptual and methodological issues in the research area. One of the most prominent issues to arise is the lack of consistency in the use of terminology relating to dispositional mindfulness. Rau and Williams (2016) touched upon the suggestion that research risks portraying all forms of mindfulness as the same construct. In line with this, throughout the process of conducting this systematic review, it was clear that mindfulness is often used an umbrella term to encapsulate both dispositional mindfulness and mindfulness therapy, irrespective of the fact that these are vastly different constructs. In the future, authors should aim to clearly state the aspect of mindfulness they are exploring. This will help to promote transparency within the literature and foster a clearer distinction between different types of mindfulness.

There are also issues relating to the DM measures used. Grossman (2011) questioned the validity of DM measures, expressing uncertainty over whether they actually measure mindfulness or some other construct. Further, it has been noted that there is no agreed ‘gold standard’ for mindfulness instruments and there is ‘a lack of available external referents for determining construct validity’ and a ‘convergent validity among different mindfulness scales’ (Grossman 2011, p. 1034). This review found that DM is most commonly assessed as a one-dimensional construct by the MAAS (Brown and Ryan 2003). This has been discouraged, with some arguing that tools such as the MAAS are oversimplified (Grossman 2011). Instead, it has been argued that DM should be assessed as a multi-faceted construct (Rau and Williams 2016), e.g. by using the FFMQ, which was found to be the second most commonly used measure in this review. It is important to assess the links between facets of DM and psychological outcome variables as different facets may have different effects on health. This was found to be the case in research using the FFMQ by Adams et al. (2012). They found that DM facets ‘describing’ and ‘non-judging’ predicted lower eating pathology and body dissatisfaction, whilst ‘observe’ predicted higher anorexic symptoms. Further exploration between specific DM facets and psychological health is needed as it will help to aid the development of effective patient-centred interventions. In the future, researchers should aim to use multi-faceted DM measures and avoid adding up facet scores to form a total score, as this effectively makes an average of correlated and uncorrelated facets, forming an inaccurate picture of the relationship between DM and the outcome variable (Baer et al. 2006).

Despite promoting the use of multi-faceted DM measures such as the FFMQ, it has been argued that the factor structure of this measure may need to be re-evaluated first (Baer et al. 2006; Petrocchi and Ottaviani 2016). Studies show that the ‘observe’ facet of this scale has low test-retest reliability and has demonstrated non-significant or negative correlations with the other four facets of DM (Baer et al. 2004). Dropping this facet may therefore be advisable, as it currently negatively affects the validity of the measure (Sieglung and Petrides 2016). Future research needs to look to improve the reliability and validity of tools to measure DM and develop methodology to reliably distinguish between state and trait measures and use it to validate existing psychometric instruments.

This review has identified that the research in this area uses predominantly quantitative (questionnaire-based) methodologies (the number of qualitative papers excluded from the review were few). Additionally, by following an established procedure to narrow down the search engine results, four key terms were used through which to explore the link between DM and psychological health: moderate, mediate, predict and correlate. This would have fostered the finding of more quantitative studies. The frequent use of self-report inventories expose studies to significant response bias and allow only a certain depth of findings (Kabat-Zinn et al. 1985). Future research may benefit the field by employing qualitative methods, which could shed more light on some of the existing findings by a more in-depth investigation of the phenomena. More longitudinal studies, such as that by Petrocchi and Ottaviani (2016), can also help to explore the effects of DM over time. Additionally, this review has identified that often ordinal data is used with parametric tests, violating the assumptions of analysis. Future research should overcome this by using Rasch analysis to transform ordinal data into interval data to improve precision of measurement and reliability of analysis (Medvedev et al. 2016).

Lastly, the research outlined is limited due to predominantly being conducted with student populations of mainly white Caucasian individuals. More research using more representative samples would enhance external validity of the results. In particular, as there is a large literature focusing on the positive effects of DM on stress reactivity and recovery, researchers should strive to explore this in populations that are exposed to more stressful situations and are more vulnerable to the ill effects of stress, for example marginalised groups such as ethnic minorities and disabled individuals (Thoits 2010). This will ensure that results can be applied to those who may need it most. Additionally, although there has been some research in this area demonstrating the psychological benefits of DM in older adults (Mahoney et al. 2015; Paolini et al. 2012; Prakash et al. 2015), less has been carried out with
children and younger age groups. It is likely that DM will exhibit the same benefits in younger adults and children, and if this is found to be the case, there is argument to target schools to boost DM in school-aged children. It is possible that this might enhance emotion regulation and decrease mal-adaptive thinking styles among children.

Limitations

This review included only published articles in English. Papers published in other languages may give further clarification of the links between DM and psychological health; this may be particularly valuable because non-English articles can shed some light on this phenomenon in other cultures. Moreover, the search terms were searched in the titles and abstracts of articles, which may have left out some research whose focus was different but contributed to DM and psychological health in some capacity. The review is strengthened, however, by including papers from a wide range of countries, suggesting that the findings have high cross-cultural external validity.

In conclusion, this review has demonstrated that DM is positively related to psychological health on a range of outcome measures. DM appears to be inversely associated with a variety of psychopathological symptoms and studies suggest that the underlying cognitive processes may be a mediating factor in this relationship. DM appears to buffer against the propensity to engage in negative thinking patterns, which is a risk factor for depressive symptoms. Emotional factors such as well-being and emotional regulation also appear to be benefited by DM. These findings should be used within a proactive approach to boost DM to promote well-being, resilience and self-management of psychological health within the general population. This review shows that there are several avenues for future research and has outlined conceptual and methodological limitations within the field such as issues with DM measures, unsuitability of ordinal data for parametric tests, sample selection and the use of inconsistent terminology. These issues should be overcome in future studies to progress this area of research.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

Adams, C. E., Cano, M. A., Heppner, W. L., Stewart, D. W., Correa-Fernández, V., et al. (2015). Testing a moderated mediation model of mindfulness, psychosocial stress, and alcohol use among African American smokers. *Mindfulness*, 6(2), 315–325. doi:10.1007/s12671-013-0263-1.

Adams, C. E., Chen, M., Guo, L., Lam, C. Y., Stewart, D. W., Correa-Fernández, V., et al. (2014). Mindfulness predicts lower affective volatility among African Americans during smoking cessation. *Psychology of Addictive Behaviors*, 28(2), 580–585. doi:10.1037/a0036512.

Adams, C. E., McVay, M. A., Kinsaul, J., Benitez, L., Vinci, C., Stewart, D. W., & Copeland, A. L. (2012). Unique relationships between facets of mindfulness and eating pathology among female smokers. *Eating Behaviors*, 13(4), 390–393. doi:10.1016/j.eatbeh.2012.05.009.

Alleva, J., Roelofs, J., Voncken, M., Meevissen, Y., & Alberts, H. (2014). On the relation between mindfulness and depressive symptoms: rumination as a possible mediator. *Mindfulness*, 5(1), 72–79.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*, 10(2), 176.

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. doi: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. doi:10.1177/1073191105283504.

Bajaj, B., Gupta, R., & Pande, N. (2016a). Self-esteem mediates the relationship between mindfulness and well-being. *Personality and Individual Differences*, 94, 96–100.

Bajaj, B., Roberts, R. W., & Pande, N. (2016b). Mediating role of self-esteem on the relationship between mindfulness, anxiety, and depression. *Personality and Individual Differences*, 96, 127–131.

Bakker, K., & Moulding, R. (2012). Sensory-processing sensitivity, dispositional mindfulness and negative psychological symptoms. *Personality and Individual Differences*, 53(3), 341–346. doi:10.1016/j.paid.2012.04.006.

Bao, X., Xue, S., & Kong, F. (2015). Dispositional mindfulness and perceived stress: the role of emotional intelligence. *Personality and Individual Differences*, 78, 48–52.

Barnes, S. M., & Lynn, S. J. (2010). Mindfulness skills and depressive symptoms: a longitudinal study. *Imagination, Cognition and Personality*, 30(1), 77–91.

Bamforth, T., Duggan, D. S., & Griffith, J. W. (2011). Dispositional mindfulness moderates the relation between neuroticism and depressive symptoms. *Personality and Individual Differences*, 51(8), 958–962.

Bernin, A. J., & Pakenham, K. I. (2016). The stress-buffering role of mindfulness in the relationship between perceived stress and psychological adjustment. *Mindfulness*, 7(4) 1–12 doi: 10.1007/s12671-016-0532-x.

Bergomi, C., Ströhle, G., Michalak, J., Funke, F., & Berking, M. (2013). Facing the dreaded: Does mindfulness facilitate coping with distressing experiences? A moderator analysis. *Cognitive Behaviour Therapy*, 42(1), 21–30.

Bhandhini, Y., & Cabral, G. (2015). Evaluating nonattachment and decentering as possible mediators of the link between mindfulness and psychological distress in a nonclinical college sample. *Journal of evidence-based complementary & alternative medicine*, 21(4), 295–305. doi: 10.1177/2156587215607109.

Bice, M. R., Ball, J. W., & Ramsey, A. T. (2014). Relations between mindfulness and mental health outcomes: need fulfilment as a mediator. *International Journal of Mental Health Promotion*, 16(3), 91.

Black, D. S., Sussman, S., Johnson, C. A., & Milam, J. (2012). Trait mindfulness helps shield decision-making from translating into health-risk behavior. *Journal of Adolescent Health*, 51(6), 588–592.

Bluth, K., & Blanton, P. W. (2014). Mindfulness and self-compassion: exploring pathways to adolescent emotional well-being. *Journal of Child and Family Studies*, 23(7), 1298–1309.
Bodenlos, J. S., Wells, S. Y., Noonan, M., & Mayrsohn, A. (2015). Facets of dispositional mindfulness and health among college students. The Journal of Alternative and Complementary Medicine, 21(10), 645–652.

Bowlin, S. L., & Baer, R. A. (2012). Relationships between mindfulness, self-control, and psychological functioning. Personality and Individual Differences, 52(3), 411–415. doi:10.1016/j.paid.2011.10.050.

Bränström, R., Duncan, L. G., & Moskowitz, J. T. (2011). The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample. British Journal of Health Psychology, 16(2), 300–316.

Brown-Iannuzzi, J. L., Adair, K. C., Payne, B. K., Richman, L. S., & Fredrickson, B. L. (2014). Discrimination hurts, but mindfulness may help: Trait mindfulness moderates the relationship between perceived discrimination and depressive symptoms. Personality and Individual Differences, 56, 201–205.

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, 822–848. doi:10.1037/0022-3514.84.4.822.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: theoretical foundations and evidence for its salutary effects. Psychological Inquiry, 18(4), 211–237.

Brown, K. W., Weinstein, N., & Creswell, J. D. (2012). Trait mindfulness modulates neuroendocrine and affective responses to social evaluative threat. Psychoneuroendocrinology, 37(12), 2037–2041. doi:10.1016/j.psyneuen.2012.04.003.

Brown, D. B., Bravo, A. J., Roos, C. R., & Pearson, M. R. (2015). Five facets of mindfulness and psychological health: evaluating a psychological model of the mechanisms of mindfulness. Mindfulness, 6(5), 1021–1032.

Bullis, J. R., Boe, H. J., Asnaani, A., & Hofmann, S. G. (2014). The benefits of being mindful: trait mindfulness predicts less stress reactivity to suppression. Journal of Behavior Therapy and Experimental Psychiatry, 45(1), 57–66.

Christopher, M., Ramsey, M., & Anick, J. (2013). The role of dispositional mindfulness in mitigating the impact of stress and impulsivity on alcohol-related problems. Addiction Research & Theory, 21(6), 429–434. doi:10.3109/16066359.2012.737873.

Ciesla, J. A., Reilly, L. C., Dickson, K. S., Emanuel, A. S., & Updegraff, J. A. (2012). Dispositional mindfulness moderates the effects of stress among adolescents: rumination as a mediator. Journal of Clinical Child and Adolescent Psychology, 41(6), 760–770.

Coffey, K. A., & Hartman, M. (2008). Mechanisms of action in the inverse relationship between mindfulness and psychological distress. Complementary Health Practice Review, 13(2), 79–91. doi:10.1177/1533210108316307.

Cole, N. N., Nonterah, C. W., Utsey, S. O., Hook, J. N., Hubbard, R. R., Opare-Henaku, A., & Fischer, N. L. (2014). Predictor and moderator effects of ego resilience and mindfulness on the relationship between academic stress and psychological well-being in a sample of Ghanaian college students. Journal of Black Psychology, 41(4), 340–357. doi:10.1177/0095798414537393.

Daubenmier, J., Hayden, D., Chang, V., & Epel, E. (2014). It’s not what you think, it’s how you relate to it: dispositional mindfulness moderates the relationship between psychological distress and the cortisol awakening response. Psychoneuroendocrinology, 48, 11–18. doi:10.1016/j.psyneuen.2014.05.012.

Day, A. M., Smitherman, C. A., Ward, E. L., & Thorn, E. B. (2015). An investigation of the associations between measures of mindfulness and pain catastrophizing. Clinical Journal of Pain, 31(3), 222–228. doi:10.1097/AJP.0000000000000102.

de Frias, C. M. (2014). Memory compensation in older adults: the role of health, emotion regulation, and trait mindfulness. Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 69B(5), 678–685. doi:10.1093/geronb/gbt004.

Deng, Y. Q., Li, S., & Tang, Y. Y. (2014). The relationship between wandering mind, depression and mindfulness. Mindfulness, 5(2), 124–128.

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale–revised (CAMS-R). Journal of Psychopathology and Behavioral Assessment, 29, 177–190. doi:10.1007/s10862-006-9035-8.

Feldman, G., Lavallee, J., Gildawie, K., & Greeson, J. M. (2016). Dispositional mindfulness uncouples physiological and emotional reactivity to a laboratory stressor and emotional reactivity to executive functioning lapses in daily life. Mindfulness, 7(2), 527–541.

Feltman, R., Robinson, M. D., & Ode, S. (2009). Mindfulness as a moderator of neuroticism–outcome relations: a self-regulation perspective. Journal of Research in Personality, 43(6), 953–961. doi:10.1016/j.jrp.2009.08.000.

Fetterman, A. K., Robinson, M. D., Ode, S., & Gordon, K. H. (2010). Neuroticism as a risk factor for behavioral dysregulation: a mindfulness-mediation perspective. Journal of Social and Clinical Psychology, 29(3), 301–321. doi:10.1521/jscp.2010.29.3.301.

Field, A. (2013). Discovering statistics using IBM SPSS statistics (4th ed.). London: Sage.

Fisak, B., & Von Lehe, A. C. (2012). The relation between the five facets of mindfulness and worry in a non-clinical sample. Mindfulness, 3(1), 15–21.

Fogarty, F. A., Lu, L. M., Sollers III, J. J., Krivoshchekov, S. G., Booth, R. J., & Conedine, S. N. (2015). Why it pays to be mindful: trait mindfulness predicts physiological recovery from emotional stress and greater differentiation among negative emotions. Mindfulness, 6(2), 175–185.

Fossati, A., Feeny, J., Maffei, C., & Borroni, S. (2011). Does mindfulness mediate the association between attachment dimensions and borderline personality disorder features? A study of Italian non-clinical adolescents. Attachment & Human Development, 13(6), 563–578.

Gilbert, B., & Christopher, M. (2010). Mindfulness-based attention as a moderator of the relationship between depressive affect and negative cognitions. Cognitive Therapy and Research, 34(6), 514–521. doi:10.1007/s10608-009-9282-6.

Gilburt, H. (2015). Mental health under pressure. Retrieved from: https://www.kingsfund.org.uk/publications/mental-health-under-pressure

Gouveia, M. J., Carona, C., Canavarro, M. C., & Moreira, H. (2016). Self-compassion and dispositional mindfulness are associated with parenting styles and parenting stress: the mediating role of mindful parenting. Mindfulness, 7(3), 700–712.

Greco, L., Baer, R. A., & Smith, G. T. (2011). Assessing mindfulness in children and adolescents: development and validation of the child and adolescent mindfulness measure (CAMM). Psychological Assessment, 23(3), 606–614.

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.

Harrington, R., Loffreda, D. A., & Perz, C. A. (2014). Dispositional mindfulness as a positive predictor of psychological well-being and the role of the private self-consciousness insight factor. Personality and Individual Differences, 71, 15–18. doi:10.1016/j.paid.2014.06.050.

Hertz, R. M., Laurent, H. K., & Laurent, S. M. (2015). Attachment mediates effects of trait mindfulness on stress responses to conflict. Mindfulness, 6(3), 483–489.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: a meta-
analytic review. Journal of Consulting and Clinical Psychology, 78(2), 169.
Hou, W. K., Ng, S. M., & Wan, J. H. Y. (2015). Changes in positive affect and mindfulness predict changes in cortisol response and psychiatric symptoms: a latent change score modelling approach. Psychology & Health, 30(5), 551–567. doi:10.1080/08870446.2014.990389.
Howell, A. J., Digdon, N. L., & Buro, K. (2010). Mindfulness predicts sleep-related self-regulation and well-being. Personality and Individual Differences, 48(4), 419–424. doi:10.1016/j.paid.2009.11.009.
Howell, A. J.,Digdon, N. L.,Buro, K., &Sheptycki, A. R. (2008). Relations among mindfulness, well-being, and sleep. Personality and Individual Differences, 45(8), 773–777. doi:10.1016/j.paid.2008.08.005.
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.
Jimenez, S. S., Niles, B. L., & Park, C. L. (2010). A mindfulness model of affect regulation and depressive symptoms: positive emotions, mood regulation expectancies, and self-acceptance as regulatory mechanisms. Personality and Individual Differences, 49(6), 645–650.
Kabat-Zinn, J. (1990). Full-catastrophe living: using the wisdom of your body and mind to face stress, pain and illness: the program of the Stress Reduction Clinic at the University of Massachusetts Medical Center. New York: Dell.
Kabat-Zinn, J. (1994). Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life. London: Piatkus.
Kabat-Zinn, J., Lipworth, L., & Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. Journal of Behavioral Medicine, 8(2), 163–190.
Kadziolka, M. J., Di Pierdomenico, E. A., & Miller, C. J. (2016). Trait-like mindfulness promotes healthy self-regulation of stress. Mindfulness, 7(1), 236–245.
Kangasniemi, A., Lappalainen, R., Kankaanpää, A., & Tammelin, T. (2014). Mindfulness skills, psychological flexibility, and psychological symptoms among physically less active and active adults. Mental Health and Physical Activity, 7(3), 121–127.
Keng, S. L., Smokos, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: a review of empirical studies. Clinical Psychology Review, 31(6), 1041–1056.
Kiken, L. G., & Shook, N. J. (2012). Mindfulness and emotional distress: the role of negatively biased cognition. Personality and Individual Differences, 53(3), 329–333.
Kong, F., Wang, X., Song, Y., & Liu, J. (2016). Brain regions involved in dispositional mindfulness during resting state and their relation with well-being. Social Neuroscience, 11(4), 331–343.
Lamis, D. A., & Dvorak, R. D. (2014). Mindfulness, nonattachment, and suicide rumination in college students: the mediating role of depressive symptoms. Mindfulness, 5(5), 487–496.
Lattimore, P., Fisher, N., & Malinowski, P. (2011). A cross-sectional investigation of trait disinhibition and its association with mindfulness and impulsivity. Appetite, 56(2), 241–248. doi:10.1016/j.appet.2010.12.007.
Laurent, H., Laurent, S., Hertz, R., Egan-Wright, D., & Granger, D. A. (2013). Sex-specific effects of mindfulness on romantic partners’ cortisol responses to conflict and relations with psychological adjustment. Psychoneuroendocrinology, 38(12), 2905–2913.
Lavender, J. M., Gratz, K. L., & Tull, M. T. (2011). Exploring the relationship between facets of mindfulness and eating pathology in women. Cognitive Behaviour Therapy, 40(3), 174–182. doi:10.1080/16506073.2011.555485.
Lavender, J. M., Jardin, B. F., & Anderson, C. A. (2009). Bulimic symptoms in undergraduate men and women: contributions of mindfulness and thought suppression. Eating Behaviors, 10(4), 228–231.
Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the depression anxiety stress scales (2nd ed.). Sydney: Psychology Foundation.
Mahoney, C. T., Segal, D. L., & Coolidge, F. L. (2015). Anxiety sensitivity, experiential avoidance, and mindfulness among younger and older adults age differences in risk factors for anxiety symptoms. The International Journal of Aging and Human Development, 81(4), 217–240.
Malinowski, P., & Lim, H. J. (2015). Mindfulness at work: positive affect, hope, and optimism mediate the relationship between dispositional mindfulness, work engagement, and well-being. Mindfulness, 6(6), 1250–1262.
Marks, A. D., Sobanski, D. J., & Hine, D. W. (2010). Do dispositional rumination and/or mindfulness moderate the relationship between life hassles and psychological dysfunction in adolescents? Australian and New Zealand Journal of Psychiatry, 44(9), 831–838.
Masuda, A., & Wendell, J. W. (2010). Mindfulness mediates the relation between disordered eating- related cognitions and psychological distress. Eating Behaviors, 11(4), 293–296. doi:10.1016/j.eatbeh.2010.07.001.
Masuda, A., Price, M., & Latzman, R. (2012). Mindfulness moderates the relationship between disordered eating cognitions and disordered eating behaviors in a non-clinical college sample. Journal of Psychopathology and Behavioral Assessment, 34(1), 107–115. doi:10.1007/s10862-011-9252-7.
Masuda, A., Wendell, J. W., Chou, Y. Y., & Feinstein, A. B. (2010). Relationships among self-concealment, mindfulness and negative psychological outcomes in Asian American and European American college students. International Journal for the Advancement of Counselling, 32(3), 165–177.
McDonald, H. M., Sherman, K. A., Petocz, P., Kangas, M., Grant, K. A., & Kasparian, N. A. (2016). Mindfulness and the experience of psychological distress: the mediating effects of emotion regulation and attachment anxiety. Mindfulness, 7(4), 1–10. doi:10.1007/s12671-016-0517-9.
Medvedev, O. N., Siegert, R. J., Feng, X. J., Billington, D. R., Jang, J. Y., & Krägeloh, C. U. (2016). Measuring trait mindfulness: how to improve the precision of the Mindful Attention Awareness Scale using a Rasch model. Mindfulness, 7(2), 384–395.
Michalak, J., Teismann, T., Heidenreich, T., Ströhle, G., & Vocks, S. (2011). Buffering low self-esteem: the effect of mindful acceptance on the relationship between self-esteem and depression. Personality and Individual Differences, 50(5), 751–754.
Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Journal of Clinical Epidemiology, 62(10), 1006–1012. doi:10.1016/j.jclinepi.2009.06.005.
Mun, C. J., Okun, M. A., & Karoly, P. (2014). Trait mindfulness and catastrophizing as mediators of the association between pain severity and pain-related impairment. Personality and Individual Differences, 66, 68–73.
Murphy, C., & MacKillop, J. (2012). Living in the here and now: interrelationships between impulsivity, mindfulness, and alcohol misuse. Psychopharmacology, 219(2), 527–536.
Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. Journal of Abnormal Psychology, 100(4), 569.
Nolen-Hoeksema, S., Wisco, B. E., & Lybumirsky, S. (2008). Rethinking rumination. Perspectives in Psychological Science, 3, 400–424. doi:10.1111/j.1745-6924.2008.00088.x.
Ostafin, B. D., Kassman, K. T., & Wessel, I. (2013). Breaking the cycle of desire: Mindfulness and executive control weaken the relation between an implicit measure of alcohol valence and preoccupation with alcohol-related thoughts. Psychology of Addictive Behaviors, 27(4), 1153.
Paolini, B., Burdette, J. H., Laurienti, P. J., Morgan, A. R., Williamson, D. A., & Rejeski, W. J. (2012). Coping with brief periods of food...
restriction: mindfulness matters. Frontiers in Aging Neuroscience, 4, 13.

Park, T., Reilly-Spong, M., & Gross, C. R. (2013). Mindfulness: a systematic review of instruments to measure an emergent patient-reported outcome (PRO). Quality of Life Research, 22(10), 2639–2659.

Pearson, M. R., Brown, D. B., Bravo, A. J., & Witkiewitz, K. (2015a). Staying in the moment and finding purpose: the associations of trait mindfulness, decentering, and purpose in life with depressive symptoms, anxiety symptoms, and alcohol-related problems. Mindfulness, 6(3), 645–653.

Pearson, M. R., Lawless, A. K., Brown, D. B., & Bravo, A. J. (2015b). Mindfulness and emotional outcomes: identifying subgroups of college students using latent profile analysis. Personality and Individual Differences, 76, 33–38.

Petrocchi, N., & Ottaviani, C. (2016). Mindfulness facets distinctively predict depressive symptoms after two years: the mediating role of rumination. Personality and Individual Differences, 93, 92–96.

Pidgeon, A., Lacota, K., & Champion, J. (2013). The moderating effects of mindfulness on psychological distress and emotional eating behaviour. Australian Psychologist, 48(4), 262–269. doi:10.1111/j.1742-9544.2012.00091.x.

Prakash, R. S., Hussain, M. A., & Schirda, B. (2015). The role of emotion regulation and cognitive control in the association between mindfulness disposition and stress. Psychology and Aging, 30(1), 160–171. doi:10.1037/a0038544.

Prazak, M., Critelli, J., Martin, L., Miranda, V., Purdum, M., & Powers, C. (2012). Mindfulness and its role in physical and psychological health. Applied Psychology: Health and Well-Being, 4(1), 91–105.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. Applied psychological measurement, 1(3), 385–401.

Raes, F., & Williams, J. M. G. (2010). The relationship between mindfulness and uncontrollability of ruminitive thinking. Mindfulness, 1(4), 199–203.

Raphiphatthana, B., Jose, P. E., & Kielkpiowski, M. (2016). How do the facets of mindfulness predict the constructs of depression and anxiety as seen through the lens of the tripartite theory? Personality and Individual Differences, 93, 104–111.

Rasmussen, M. K., & Pidgeon, A. M. (2011). The direct and indirect benefits of dispositional mindfulness on self-esteem and social anxiety. Anxiety, Stress, & Coping, 24(2), 227–233.

Rau, H. K., & Williams, P. G. (2016). Dispositional mindfulness: a critical review of construct validation research. Personality and Individual Differences, 93, 32–43.

Richards, K. C., Campenni, C. E., & Muse-Burke, J. L. (2010). Self-care and well-being in mental health professionals: the mediating effects of self-awareness and mindfulness. Journal of Mental Health Counseling, 32(3), 247.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). Mindfulness-based cognitive therapy for depression: a new approach to relapse prevention. New York: Guilford.

Short, M. M., Mazmanian, D., Oinonen, K., & Mushquash, C. J. (2016). Executive function and self-regulation mediate dispositional mindfulness and well-being. Personality and Individual Differences, 95, 97–103.

Siegle, A. B., & Petrides, K. V. (2016). Zeroing in on mindfulness facets: similarities, validity, and dimensionality across three independent measures. PloS One, 11(4), e0153073.

Sirois, F. M., & Tosti, N. (2012). Lost in the moment? An investigation of procrastination, mindfulness, and well-being. Journal of Rational-Emotive & Cognitive-Behavior Therapy, 30(4), 237–248. doi:10.1007/s10942-012-0151-y.

Slonim, J., Kienhuis, M., Di Benedetto, M., & Reece, J. (2015). The relationships among self-care, dispositional mindfulness, and psychological distress in medical students. Medical education online, 20 27924. doi:10.3402/meo.v20.27924.

Smith, B. W., Ortiz, J. A., Steffen, L. E., Tooley, E. M., Wiggin, K. T., Yeater, E. A., et al. (2011). Mindfulness is associated with fewer PTSD symptoms, depressive symptoms, physical symptoms, and alcohol problems in urban firefighters. Journal of Consulting and Clinical Psychology, 79(5), 613–617. doi:10.1037/a0025189.

Soyas, C. K., & Wilcomb, C. J. (2015). Mindfulness, self-compassion, self-efficacy, and gender as predictors of depression, anxiety, stress, and well-being. Mindfulness, 6(2), 217–226.

Tan, L. B., & Martin, G. (2016). Mind full or mindful: a report on mindfulness and psychological health in healthy adolescents. International Journal of Adolescence and Youth, 21(1), 64–74.

Thoits, P. A. (2010). Stress and health major findings and policy implications. Journal of Health and Social Behavior, 51(1 suppl), S41–S53.

Vinci, C., Spears, C. A., Peltier, M. R., & Copeland, A. L. (2016). Drinking motives mediate the relationship between facets of mindfulness and problematic alcohol use. Mindfulness, 7(3), 754–763.

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.

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

Walsh, J. J., Balint, M. G., Smolina, D. R., Frederiksen, L. K., & Madsen, S. (2009). Predicting individual differences in mindfulness: the role of trait anxiety, attachment anxiety and attentional control. Personality and Individual Differences, 46(2), 94–99.

Wang, Y., & Kong, F. (2014). The role of emotional intelligence in the impact of mindfulness on life satisfaction and mental distress. Social Indicators Research, 110(3), 843–852.

Waszczuk, M. A., Zavos, H., Antonova, E., Haworth, C. M., Plomin, R., & Eley, T. C. (2015). A multivariate twin study of trait mindfulness, depressive symptoms, and anxiety sensitivity. Depression and Anxiety, 32(4), 254–261.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063.

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. Journal of Research in Personality, 43(3), 374–385. doi:10.1016/j.jrp.2008.12.008.

Wenzel, M., von Versen, C., Hirschmüller, S., & Kubiak, T. (2015). Curb your neuroticism—mindfulness mediates the link between neuroticism and subjective well-being. Personality and Individual Differences, 80, 68–75. doi:10.1016/j.paid.2015.02.020.

Woodruff, S. C., Glass, C. R., Arnkoff, D. B., Crowley, K. J., Hindman, R. K., & Hirschhorn, E. W. (2014). Comparing self-compassion, mindfulness, and psychological inflexibility as predictors of psychological health. Mindfulness, 5(4), 410–421.

Wupperman, P., Neumann, C. S., & Axelrod, S. R. (2008). Do deficits in mindfulness underlie borderline personality features and core difficulties. Journal of Personality Disorders, 22(5), 466–482. doi:10.1521/pedi.2008.22.5.466.

Zimmerman, L. A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W. N., ... & Jablonski, M. E. (2016). Association of dispositional mindfulness with stress, cortisol, and well-being among university undergraduate students. Mindfulness, 7(4), 874–885. doi:10.1007/s12671-016-0526-8.