Predictive Associations of Dispositional Mindfulness Facets with Anxiety and Depression: A Meta-Analytic Structural Equation Modeling Approach

Ángel Prieto-Fidalgo, Joana Gómez-Odriozola, Estibaliz Royuela-Colomer, Izaskun

Orue, Liria Fernández-González, Lucía Oñate, Nerea Cortazar, Ioseba Iraurgi, and

Esther Calvete

Faculty of Psychology and Education, University of Deusto.

Author Note

Ángel Prieto-Fidalgo https://orcid.org/0000-0002-3259-2886

Joana Gómez-Odriozola https://orcid.org/0000-0001-6004-4927

Estíbaliz Royuela-Colomer: https://orcid.org/0000-0001-9912-9610

Izaskun Orue: https://orcid.org/0000-0003-1322-6802

Liria Fernández-González: https://orcid.org/0000-0003-1411-0078

Lucía Oñate: https://orcid.org/0000-0002-0322-4806

Nerea Cortazar: https://orcid.org/0000-0002-9286-6818

Ioseba Iraurgi: https://orcid.org/0000-0002-0143-9539

Esther Calvete https://orcid.org/0000-0002-6928-9557

Correspondence concerning this article should be addressed to Joana Gómez-

Odriozola, University of Deusto, Faculty of Psychology and Education, Avenida de las

Universidades, 24, 48007, Bilbao, Spain. E-mail: joanagomez@deusto.es

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

Predictive Associations of Dispositional Mindfulness Facets with Anxiety and

Depression: A Meta-Analytic Structural Equation Modeling Approach

Abstract

Objectives In recent years, the number of studies on the relationship between dispositional mindfulness (DM) facets and depression and anxiety symptoms has increased notably. The objective of this meta-analysis was to identify the longitudinal predictive associations from DM facets to depression and anxiety symptoms in both adult and adolescent samples.

Methods Studies were eligible if they measured anxiety or depressive symptoms at least two times and DM during the first measurement. This meta-analysis seeks to clarify the proposed relationships, applying a Two-Stage Structural Equation Modeling method to data collected from adult and adolescent studies. In total, 34 studies were included.

Results The results indicated that, in adult samples, the facets of Acting with Awareness, Non-Judging, Describing, and Non-Reacting covaried significantly with depression and anxiety symptoms at time one, but only Acting with Awareness and Non-Reacting facets predicted a decrease of symptoms over time. Due to the scarcity of studies using childhood and adolescent samples, only the role of Acting with Awareness predicting depression was evaluated, and the results indicated that this facet predicts a decrease in depression over time among adolescents.

Conclusions These results provide insight into the longitudinal relationships between DM facets and depression and anxiety symptoms and suggest the importance of focusing attention on these facets in mindfulness interventions.

Trial Registration The project was preregistered at the Open Science Framework (https://osf.io/ye4af).

Keywords: meta-analysis; path analysis; mindfulness; anxiety symptoms; depressive symptoms

Predictive Associations of Dispositional Mindfulness Facets with Anxiety and

Depression: A Meta-Analytic Structural Equation Modeling Approach

Depressive and anxiety disorders are highly prevalent. According to a report of the

World Health Organization (2017), an estimated 4.4% of the global population suffers from

depression (over 300 million people) and 3.6% from anxiety (over 260 million people).

Depression is considered the leading cause of disability worldwide and is the major

contributor to suicide deaths, while anxiety disorders are among the top ten causes of years

lived with disability. Moreover, the high comorbidity and recurrence rates of these disorders

clearly increase the risk for repeated episodes (Kessler et al., 2005). Therefore, the study of

protective and risk factors for depression and anxiety is particularly relevant.

In this sense, a propensity to be mindful could prevent the development and

maintenance of psychological problems, whereas low levels of mindfulness could represent a

vulnerability factor for psychopathology (Carpenter et al., 2019). Kabat-Zinn (1994) defined

mindfulness as "paying attention in a particular way: on purpose, in the present moment and

non-judgmentally" (p. 4). In contrast to the conceptualization of mindfulness as a state that

occurs when practicing mindfulness (e.g., Bishop et al., 2004), dispositional mindfulness

(DM) refers to an individual's characteristic tendency to maintain present moment awareness

and can be considered "an inherent human capacity" (Kabat-Zinn, 2003, p. 146). In a recent

systematic review (Tomlinson et al., 2018), DM appeared to be inversely related to

psychopathological symptoms, such as depressive symptoms, and was positively linked to

adaptive cognitive processes and better emotional regulation.

DM has been shown to have a multidimensional nature, although there is no

agreement regarding the different aspects that mindfulness encompasses. Baer et al. (2006)

developed one of the most widespread models, which includes five facets: (1) Acting with

Awareness, experiencing moment by moment through a 'relaxed state of alert'; (2) Non-

Judging, welcoming and accepting the experience as it is, including ourselves; (3) Describing, being able to communicate or describe what is happening on a verbal and non-verbal level; (4) Observing, becoming aware of the experience without identifying with it, being mere observers of the phenomena that occur; and (5) Non-Reacting, having a space that allows time to respond appropriately without reacting immediately. Baer et al. (2006) derived these facets from a factor analysis of 112 items from five questionnaires: the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), the Freiburg Mindfulness Inventory (FMI; Buchheld et al., 2001), the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004), the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman et al., 2007), and the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008). Based on this factor analysis, Baer et al. (2006) established the items that evaluated each of the factors and constructed the Five Facet Mindfulness Questionnaire (FFMQ).

The subscales of the FFMQ are designed to capture both the attentional component of mindfulness (Observing, Describing, and Acting with Awareness) as well as the attitudinal component (not judging and not reacting) (Eisenlohr-Moul et al., 2012). Each of these aspects could play a different role in psychological adjustment. In fact, recent research suggests that different facets of mindfulness may have differential relationships with various psychological variables (Cash & Whittingham, 2010). In this sense, although most of the facets are negatively associated with psychological distress (Bergin & Pakenham, 2016; Bränström et al., 2011; Cash & Whittingham, 2010; Van Son et al., 2015), the Observing facet does not correlate or even positively correlates with psychopathology (Baer et al., 2008; Bergin & Pakenham, 2016). In general, long-term studies suggest that Acting with Awareness would be the most protective facet against depression (e.g., Calvete et al., 2019; Duan & Li, 2016),

followed by Non-Judging (Barnes & Lynn, 2010; Petrocchi & Ottaviani, 2016) and Non-Reacting (Ciesla et al., 2012; Royuela-Colomer & Calvete, 2016).

Considering this evidence, some recent meta-analyses of correlates of FFMQ DM facets have been conducted. In the meta-analysis conducted by Mattes (2019) of 97 studies with adult samples, medium-sized positive correlations were found between Acting with Awareness and the absence of depressive symptoms and between Non-Judging and the absence of global levels of depression, anxiety, and stress. In a meta-analysis consisting of 148 eligible studies with adult samples, Carpenter et al. (2019) found a large negative relationship between affective symptoms and overall trait mindfulness. With regard to different facets, Non-Judging and Acting with Awareness showed large negative correlations, Describing and Non-Reacting showed medium negative correlations, and the Observing facet was not significantly correlated with affective symptoms. A significant difference across symptom types was found for the Describing facet. The inverse relationship of this facet with symptoms of generalized anxiety disorder was weaker compared to its relationship with depressive symptoms.

However, the most important limitation of these prior meta-analyses is the lack of long-term data that would allow the development of predictive models. To our knowledge, there are no meta-analyses of longitudinal studies examining whether DM facets predict symptoms of anxiety and depression. Additionally, it is important to consider that the diversity of DM measures that have been employed constitutes an important difficulty for the study of the role that each facet plays.

Of the five instruments from which the FFMQ originated, the MAAS evaluates the facet of Acting with Awareness, and the KIMS is a multifactorial instrument that includes four dimensions that can be considered equivalent to some FFMQ factors. The MAAS, the KIMS, and the FFMQ show adequate psychometric properties and are some of the most

widely employed scales for measuring mindfulness (Sauer et al., 2013). The other three

instruments are either univariate and overlap with various facets of the FFMQ (as is the case

with the CAMS or the SMQ) or their factorial structure is not very stable, as in the case of the

FMI (Bergomi et al., 2013; Walach et al., 2006). Among other more recent scales that assess

trait mindfulness, the Comprehensive Inventory of Mindfulness Experiences (CHIME;

Bergomi et al., 2014) and the Adolescent and Adult Mindfulness Scale (AAMS; Droutman et

al., 2018) also have some factors that are similar to those of the FFMQ. The equivalence of

subscales of different mindfulness assessment measures with the five facets of the FFMQ and

representative item examples are displayed in Table 1.

Therefore, the main goal of the current study was to conduct a meta-analysis of

longitudinal predictive associations from DM facets to psychological symptoms, including

depression and anxiety. This aim is important in identifying whether certain DM facets are

more effective in predicting reductions in negative mood than others, as previous literature

has suggested (Cash & Whittingham, 2010). It was hypothesized that the results would

confirm the protective role of Acting with Awareness and Non-Judging against negative

affect. These would be the strongest DM facets in predicting reductions in depression and

anxiety over time, followed by Describing and Non-Reacting. Concerning Observing, it was

expected that this facet would not predict any change. The study's secondary aim was to shed

light on the role that DM facets play in children and adolescent samples. It was hypothesized

that Acting with Awareness and Non-Judging also would constitute significant predictors of

reductions in depression and anxiety in children and adolescents.

Method

Search Process and Criteria

To identify relevant articles, a multiset process was employed. The first literature search was conducted on February 11, 2019. The search was updated on April 27, 2020. The literature search included ProQuest—with PsycInfo, PsycArticles, PsycTest, and Psychology Database—and PubMed databases. The searches were configured to select only the articles that met the criteria of being written in English and peer reviewed. With the aim of identifying the articles that assessed trait anxiety or depressive symptoms and DM, the search criteria were divided into two blocks. The first block included words related to anxiety or depression (Anxiety OR Anxious OR Depression OR Depressive). The second block included the names of trait mindfulness scales that assess aspects corresponding to the five DM facets ("Five Facet Mindfulness Questionnaire" OR "Mindful Attention Awareness Scale" OR "Kentucky Inventory of Mindfulness Skills" OR "Comprehensive Inventory of Mindfulness Experiences" OR "Adolescent and Adult Mindfulness Scale"). To identify the articles that thorough the document included at least one of the phrases of each block, we nested both blocks with the AND command.

The search identified 2,147 articles (1,897 in the ProQuest search engine and 250 in PubMed). After removing duplicates, 1,786 articles were kept for the eligibility phase (see Figure 1). The project was preregistered at the Open Science Framework (https://osf.io/ye4af).

Inclusion and Exclusion Criteria

Exclusion criteria were applied in the screening step. Using the title and abstract information, the articles that were not a primary source (e.g., meta-analysis or systematic review) were excluded. In the eligibility step, inclusion criteria were applied: Articles had to measure trait anxiety or depressive symptoms in at least two times and DM in the first time with the following instruments: FFMQ, KIMS, MAAS, CHIME, and AAMS. Additionally,

studies had to include more than three participants and the participants could not have

received any psychological, psychopharmacological, or educational intervention. That is,

intervention studies were only included if the control group did not receive any active

treatment (e.g., waitlist). Due to the different research designs that could meet the inclusion

criteria, most of the articles were reviewed under full text.

Required Data and Codification System

The current study focused on the predictive role of DM on trait anxiety and depressive

symptoms (outcomes). Therefore, to perform an autoregressive two-time path analysis using

the Meta-Analytic Structural Equation Modeling (MASEM) methodology (Jak & Cheung,

2020), apart from the sample size, the following information was required: the matrix of

correlations between DM at time one, the outcome at time one (O1), and the outcome at time

two (O2) (i.e., DM with O1, DM with O2, and O1 with O2 correlations), and the number of

observations at each correlation. To apply a statistical correction for the differences between

studies regarding the time between assessments, the elapsed time was also considered.

Each study was coded for the following information: authors, title, year,

clinical/nonclinical sample, sample size, time elapsed between assessments, population

(adolescence, adulthood), age mean, age *SD*, and percentage of women. To code the different

combinations of outcomes (anxiety or depression) and the five DM facets, the correspondent

data per combination—correlations, associated sample size, and scale information—was

introduced in a new row in the database. Two researchers simultaneously coded the articles,

and other two researchers reviewed the entire process.

Data Collection and Procedure

The studies that included the required study data (e.g., time between assessments, sample size) and two of the three correlations mentioned above were considered to be included in the subsequent analysis. Only six of the 190 (3.1%) studies included complete data. To collect the largest possible amount of studies, in cases where some data were not reported, the corresponding authors were contacted to provide the missing data. In case of no response or bounced emails, the other authors were contacted. Ultimately, 34 studies were included in the meta-analysis (see Figure 1). Of those, four studies lacked the correlation between O1 and O2 (Black et al., 2012; Boyle et al. 2017, Henrich et al. 2020, Williams et al., 2010) and two lacked the correlation between DM and O2 (Jury & Jose, 2019; Schut & Boelen, 2017).

Data Analysis

The matrixes of correlations between variables (i.e., DM, O1, O2) were extracted for each study. Correlations were organized by age group and income/outcome combination (e.g., Non-Judging and anxiety in adults; Acting with Awareness and depression in adolescents). Then, for each age group and income/outcome combination a meta-analytic integration of correlations was conducted based on the MASEM methodology (Jak & Cheung, 2020). MASEM was carried out only if at least eight studies contributed with at least two correlations in a specific group and income/outcome combination.

The analyses were done using the metaSEM (Cheung, 2015) and OpenMx (Boker et al., 2011) packages in R statistical software. The metaSEM package includes two of the approaches of MASEM: Two-Stage Structural Equation Modeling (TSSEM) and One-Stage MASEM (OSMASEM) (Jak & Cheung, 2020). The TSEEM technique divides the MASEM analysis into two steps. In the first step, the correlations data derived from different studies are converted to a unique correlation pool. In the second step, the correlation pool is used to

model a path analysis or SEM analysis. In OSMASEM, these two steps are configured into a unique step that allows the moderation of quantitative variables, such as the time elapsed between times, at the study-level.

The present study used the TSSEM techniques in all combinations with at least eight studies and the OSMASEM in all combinations with at least twenty studies. Specially, the heterogeneity of the data was first explored using a fixed effects model with step 1 of TSSM. Data were considered homogenous when the root-mean-square error of approximation (RMSEA) was less than 0.06 or when the Tucker–Lewis index (TLI) and the comparative fit index (CFI) were greater than 0.95. Second, Stage 1 TSSEM with random effects model was conducted only in cases where heterogeneity was assumed. Thus, the correlation pool was obtained in Stage 1. Third, to estimate the moderating effect of the time elapsed between time one and time two in the different studies, an OSMASEM was conducted. Due to the multivariate nature of the technique, this analysis was carried out only with combinations supported by at least twenty studies.

It is not clear how to analyze the publication bias in a MASEM. Some frequently used methods in a meta-analysis are the funnel plot (Lin & Chu, 2018) and Rosenthal Fail-Safe N methods (Rosenthal, 1978). The first graphically explores the asymmetry of the distribution of effect sizes of studies. The aim of the Fail-Safe N method is to calculate how many additional studies with a zero effect size would be needed to obtain non-significant results. To analyze the publication bias, each correlation was transformed to Z-score. Subsequently, the asymmetry of Z-scores was estimated for and Fail-Safe N method was applied to each distribution of correlations of each type of correlation (i.e., DM-O1, DM-O2, or O1-O2) for each DM facet and outcome combination. Z-score distributions with asymmetry ranges between -1 and 1 were considered non-problematic in terms of publication bias (Hair et al., 2017). Following Rosenthal's criteria (1978), Fail-Safe N method values greater than $5 * k -$

10 (where *k* is the number of studies that contribute with the corresponding correlation) were considered non-problematic in terms of publication bias.

Results

Description of the Studies

Table 2 shows a summary of the characteristics of the studies included in the meta-analysis. Eight of the 34 studies were conducted in adolescent samples and 26 in adult samples. Three of the studies using adolescent samples tested the effects of an intervention, and five of them had a longitudinal design. In adults, 16 studies were intervention studies, 10 of which had longitudinal designs. Regarding the participants in studies with adolescent samples, 49.75% were women, with a weighted average age of 15.72 years ($SD = 0.81$). In adult studies, the sample in conjunction was composed of 51.69% women, with a weighted average age of 31.61 years ($SD = 7.52$).

Table 3 shows the number of studies and sample size according to the data available per age group and income/outcome combination. Given that studies with adolescents had a higher average sample size (1093 versus 117 in adults), although fewer studies with adolescents were found, in general, the total sample size of adolescent greater than the total sample size of adults. Following the criterion of at least eight studies available, all combinations were studied in adults. In contrast, in adolescents only the Acting with Awareness facet with depression as the outcome was analyzed.

Stage 1 of TSSEM

Table 4 shows the fit indices of the homogeneity contrast of the first stage of fixed effects of TSSEM in adult samples. The RMSEAs of all combinations were greater than 0.06 and/or TLI/CFI were lower than 0.95. Based on these fit indices, the hypothesis of

homogeneity was rejected and heterogeneity of the correlation coefficients across studies was

assumed. In contrast, in adolescents, the correlation coefficients of Acting with Awareness

and depression combination fitted with the homogeneity assumption, $\chi^2(19) = 49.03$, $p <$

.001, RMSEA = .038 [.025; .051], TLI = .989, CFI = .990. The resultant correlations for

these combinations were positive from the autoregressive correlations of depression, $r(9263)$

$= .64$, $p < .001$, and negative from depression and Acting with Awareness at time one,

$r(8745) = -.36$, $p < .001$, and time two, $r(8745) = -.30$, $p < .001$.

For adults, as all combinations displayed heterogeneity, a random effect TSSEM was

carried out. Table 5 shows the correlation estimations for each income/outcome combination

with the confidence interval and heterogeneity statistics. Except for the Observing facet, all

the correlations were significant with the same pattern: the autoregressive correlations

between outcomes were positive and high, and the correlations between DM and both

outcomes (O1 and O2) were negative and low. Except for Observing in depression, all other

Q statistics were significant, indicating the heterogeneous nature of the correlation matrix. In

general, the correlations that included the facets of DM showed low heterogeneity ($I^2 < .25$)

across studies. In contrast, a high level of heterogeneity ($I^2 > .75$) was found for most of the

longitudinal correlations between outcomes. This indicates high variability in these variables

between studies.

Stage 2 of TSSEM

The pooled correlations extracted in Stage 1 were used to estimate the predictive

models in the combinations with at least eight studies. The pooled correlations of studies with

adolescents were used to infer coefficients behind the hypothesized predictive model for the

Acting with Awareness facet of DM and depressive symptomatology (Figure 2). All the

standardized coefficients were statistically significant. Both the covariance between

depression and Acting with Awareness at time one and the longitudinal path from Acting

with Awareness at time one to depression at time two were negative, meaning that this DM

facet predicted a decrease of depressive symptomatology over time. In turn, as expected,

depression at time one significantly predicted depression at time two.

Figure 3 and Figure 4 show the analyzed models for adults that were computed using

the random effects correlations from stage one. Figure 3 shows standardized coefficients

between DM facets and anxiety. Acting with Awareness, Non-Judging, Describing, and Non-

Reacting showed a significant covariance with anxiety symptoms at time one, but prospective

significant paths between facets of DM at time one and anxiety at time two were found only

for the Acting with Awareness and Non-Reacting facets. In all combinations, anxiety at time

one significantly predicted anxiety at time two. Similar patterns were observed in the models

for DM facets and depressive symptoms (Figure 4). Acting with Awareness, Non-Judging,

Describing, and Non-Reacting showed a significant covariance with depressive symptoms at

time one, but prospective significant paths between facets of DM at time one and depression

at time two were only significant and negative for the Acting with Awareness and Non-

Reacting facets and marginally significant and negative for Non-Judging. Depression at time

one significantly predicted the depression level at time two.

OSMASEM

The multivariate nature of the OSMASEM requires the collection of data from a large

number of studies (approximately 20–25). Thus, OSMASEM analyses were conducted only

for the Acting with Awareness facet and depressive symptoms in adults, in which data were

extracted from the information on 24 studies with a sample of 2,409 participants (Table 2).

Then, the moderating effect of the elapsed time of each study was included into the previous

model: Acting with Awareness predicting depression. Figure 5 shows the OSMASEM model,

which provided similar results, with Acting with Awareness predicting reductions of depression over time. However, the elapsed time between times did not moderate the prospective relationship between depressive symptoms or the predictive path between Acting with Awareness and depression.

Publication Bias

All Z-score distributions of the correlations ranged from -1 to 1 in each of the three correlations for each facet and outcome combination in adults and adolescents. This supports the idea that the correlations were not distributed asymmetrically, and consequently there was no evidence of publication bias. Fail-Safe N values were greater than Rosenthal's criteria (1978) in all cases, with the exception of the correlations of paths that were not significant (e.g., the correlation of the Observing facet with depression at time 2 in adults) and the correlations between the Describe facet with anxiety in adults at time one, Fail-Safe N = 66, Rosenthal's criteria = 80. Apart from this, there was no evidence of a problematic publication bias according to the Fail-Safe N method in this meta-analysis.

Discussion

While several studies, including meta-analyses, have examined the cross-sectional associations between DM and psychological symptoms, longitudinal research is scarce. The current study conducted a meta-analysis on predictive associations from DM facets to symptoms of anxiety and depression over time. The findings indicate that only Acting with Awareness and Non-Reacting predict changes in symptoms over time.

Regarding Acting with Awareness, this facet covaries with fewer depressive symptoms and also predicts a decrease in depressive symptoms over time. In fact, it is the facet that most consistently predicts reductions of depression. The ability to pay attention to the present moment could be helpful in reducing rumination (Jury & Jose, 2019) and staying

in touch with available sources of positive reinforcement (Cash & Whittingham, 2010). Additionally, being conscious of mood changes and other "depressive modes of mind" activation cues could be an essential first step in facing them (Barnhofer & Crane, 2009). Moreover, Acting with Awareness also predicts a reduction in anxiety symptoms over time. In this case, consciousness of vulnerability signals to anxiety or stress may be crucial for developing appropriate coping strategies. Moreover, the breadth of the consciousness characteristic of this facet could counteract biases toward detecting and interpreting threats (Walsh et al., 2009).

Similarly, Non-Reacting predicted reductions in both anxiety and depression over time. As expected, not giving an immediate or automatic response to an experience could prevent the emergence or perpetuation of psychopathological symptoms. Specifically, this feature has been one of the most strongly and negatively linked to generalized anxiety disorder (Van Son et al., 2015). Nassif et al. (2019) proposed that higher levels of non-reactivity to inner experience were protective against the negative psychological impact of combat exposure through better emotional regulation, which allows more appropriate ways of coping with stressors.

The results for the other DM facets failed to demonstrate predictive associations of symptoms. Non-judging did not predict reductions in anxiety, and the results for depression were marginally significant. The lack of significant findings for Non-Judging was unexpected, as this facet has been proposed to be particularly beneficial against psychological symptoms (e.g., Bränström et al., 2011; Cash & Whittingham, 2010). This implies that the longitudinal relationships between the facet of Non-Judging and psychological symptoms are not as consistent as the cross-sectional association evidenced by large negative correlations gathered both in this study and in previous meta-analyses (e.g., Carpenter et al., 2019).

Although Describing covaried both with depression and anxiety symptoms, it did not predict a decrease in symptoms over time. It has been suggested that Describing may be a weak facet that does not contribute to the prediction of mood states as much as other facets (Jury & Jose, 2019). Finally, as observed in another meta-analysis (Carpenter et al., 2019), the facet of Observing neither covaried with the symptoms nor predicted them over time. In fact, this facet has even been positively correlated with psychopathology in previous studies in non-meditating samples (Baer et al., 2008; Barnes & Lynn, 2010), and Royuela and Calvete (2016) found that Observing predicted an increase in depression through the mediation of increased rumination. For instance, Bergin and Pakenham (2016) documented a positive relationship between the tendency to notice internal stimuli and anxiety symptoms. They suggested that perceiving those sensations as dangerous could predispose individuals to anxiety. Thus, the interpretation of internal sensations as dangerous may be the result of DM facet combinations, such as high scores on subscales assessing attentional components of mindfulness (e.g. Observing) and lower scores in subscales assessing attitudinal components (e.g. Non-Reacting) (Khan & Laurent, 2019).

In this study, we examined the studies focused on samples of adolescents separately. The available studies were scarce, and only the role of Acting with Awareness in depressive symptoms could be examined. As in the samples of adults, Acting with Awareness predicted decreases in depressive symptoms in adolescents. This could lead us to conclude that, in earlier developmental stages, Acting with Awareness acts in a similar way, constituting a protective factor against depression. More studies are required to deepen our understanding of the relationship between other DM facets and psychopathology in children and adolescents.

The results do not indicate any major problems concerning publication bias in the present meta-analysis, except for the conclusion about the covariation between the Describe

facet of DM and anxiety in adults. Thus, the results regarding the association of Describe with anxiety should be considered with caution. The absence of publication bias makes sense considering that correlations' significance is not usually decisive for accepting or rejecting a manuscript. Furthermore, most studies in this meta-analysis, especially those that implemented interventions, did not report this type of data.

Limitations and Future Research

Throughout the process of this meta-analysis, certain difficulties were encountered that represent limitations of the present work. The main difficulty was related to the collection of the necessary data for the elaboration of the meta-analysis. Only 3% of the papers that met the inclusion criteria reported the necessary data. Of the authors contacted, only 12% sent the necessary data. This impediment means that the present meta-analysis is a partial representation of the studies published in this area. In anticipation of the difficulty of data collection, the procedure was designed to collect only three resulting correlations between each DM facet, O1, and O2. The models that have been generated through this pool of three correlations yield saturated models, and it is not possible to estimate goodness-of-fit indices. Given the lack of response from most of the authors, the small number of studies that were finally included only allowed us to analyze the moderating effect of time in one of the combinations using a multivariate OSMASEM technique. Another limitation is the theoretical-practical framework of the MASEM. For example, it is not yet clear how to represent publication biases or, in the specific case of the OSMASEM technique, how to estimate fit indices.

Another limitation of this study is that it focused on the predictive associations from DM facets to symptoms but did not include the associations from symptoms to DM. The reason for this is that the latter have been evaluated in very few studies (Elhai et al., 2018;

Gómez-Odriozola & Calvete, 2020; Jury & Jose, 2019). However, as the research on DM and psychological symptoms advances, it will be necessary to evaluate the evidence on the possible negative impact that the symptoms have on the capacity for mindfulness. In addition, it should be noted that the adult sample was composed of clinical and non-clinical samples. Some of the facets could work differently according to the level of symptomatology. Unfortunately, however, the scarcity of studies did not allow the exploration of this possibility. Future studies should further examine the moderating effect of the sample type (clinical or non-clinical).

Despite the limitations, this meta-analysis offers a unique exploration of the longitudinal predictive associations between DM and anxiety and depressive symptoms. This and other previous studies that use the MASEM show the potential of this tool, which makes it possible to test path analysis or SEM models with the extraction of correlations from studies with specific characteristics (e.g., Groth, 2019; Gu et al., 2015; Rhodes et al., 2020). However, this kind of meta-analysis implies overcoming a great challenge of scientific production: the adoption of transparency standards in the publication of scientific works, such as the open publication of data sets.

Even though there were difficulties collecting the necessary data, the OSMASEM technique offers numerous opportunities for future meta-analyses in the field and constitutes a strong point of the present study. For instance, if more studies provided access to data, more complex models could be conducted, in which more paths and variables could be added. For example, it could be possible to analyze models involving all DM facets. Apart from avoiding the saturation of the models, having additional data would allow for the testing of models that include moderators (e.g., clinical vs. non-clinical sample, age, or gender), the effects of all facets in conjunction (and not just separately), bidirectional relationships between mindfulness and psychological symptoms, and the potential overlap between anxiety and

depression. Additionally, each facet of DM might play a different role, not only with

psychological symptoms, but also with mental health indicators, such as well-being or

happiness, among others (e.g., Ciarrochi et al., 2011). Therefore, future studies also could

target positive outcomes and broaden research on DM to find out what other factors are

predicted by different DM facets over time.

In conclusion, the present study shows that only two facets, Acting with Awareness

and Non-Reacting, are predictive of depressive and anxiety symptoms over time in adult

samples. Therefore, the results highlight the importance of assessing distinct aspects of

mindfulness separately, both in research and in clinical practice. Furthermore, in view of the

results, developers and implementers of mindfulness-based programs should consider that the

cultivation of some specific facet of mindfulness could be especially beneficial. Due to the

fact that Acting with Awareness and Non-Reacting are strongly related to symptomatology

over time, interventions focused on the training of present-centered attention and a less

reactive attitude could be particularly effective. In this sense, other authors have previously

recommended introducing mindfulness with an emphasis on non-reactivity (Barnes & Lynn,

2010).

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Standards: The procedures of this study have been approved by the

institutional research committee of the University of Deusto and have been performed in

accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its

later amendments.

Author Contributions: A. P. collaborated with the design of the study, analyzed the

data, wrote part of the paper, prepared the tables, and conducted literature search; J.G.

developed the theoretical framework, wrote part of the paper, prepared the tables, and revised

the references; E.R. collaborated with the design of the study and conducted literature search;

I.O. collaborated with the design of the study and contributed to the final version of the

manuscript; L.F. collaborated with the design of the study and revised the references; L.O.

contributed to the development of the theoretical framework; N.C. contributed to the final

version of the manuscript, contributed to the development of the theoretical framework, and

reviewed the tables; I.I. collaborated with the design of the study and verified the analytical

methods; E.C. collaborated with the design of the study, supervised the project, and

conceived the original idea; All the authors except I.I. collaborated in the selection process of

the articles; All authors discussed the results and approved the final version of the manuscript

for submission.

Data Availability: All data are available at the Open Science Framework.

https://osf.io/afgrj/ doi: 10.17605/OSF.IO/AFGRJ

References

Note. References with an asterisk were included in the meta-analytic integration.

*Ahmad, F., El Morr, C., Ritvo, P., Othman, N., Moineddin, R., & MVC Team (2020). An

eight-week, web-based mindfulness virtual community intervention for students' mental

health: Randomized controlled trial. *JMIR Mental Health, 7*(2), e15520. https://

doi.org/10.2196/15520

*Andreotti, E., Antoine, P., Hanafi, M., Michaud, L., & Gottrand, F. (2017). Pilot

mindfulness intervention for children born with esophageal atresia and their parents.

Journal of Child and Family Studies, 26(5), 1432–1444. https://doi.org/10.1007/s10826-

017-0657-0

*Antoine, P., Dauvier, B., Andreotti, E., & Congard, A. (2018). Individual differences in the

    effects of a positive psychology intervention: Applied psychology. *Personality and*

    Individual Differences, 122, 140–147. https://doi.org/10.1016/j.paid.2017.10.024

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), 191–191.

    https://doi.org/10.1177/1073191104268029

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report

    assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27–45.

    https://doi.org/10.1177/1073191105283504

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E.,

    Duggan, D., & Williams, J. M. G. (2008). Construct validity of the Five Facet

    Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3),

    329–342. https://doi.org/10.1177/1073191107313003.

*Barnes, S. M., & Lynn, S. J. (2010). Mindfulness skills and depressive symptoms: A

    longitudinal study. *Imagination, Cognition and Personality, 30*(1), 77-91.

    https://doi.org/10.2190/ic.30.1.e

Barnhofer, T., & Crane, C. (2009). Mindfulness-based cognitive therapy for depression and

    suicidality. In F. Didonna (Ed.) *Clinical handbook of mindfulness* (pp. 221-243).

    Springer.

Bergin, A. J., & Pakenham, K. I. (2016). The stress-buffering role of mindfulness in the

    relationship between perceived stress and psychological adjustment. *Mindfulness, 7*(4),

    928-939. https://doi.org/10.1007/s12671-016-0532-x

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). The assessment of mindfulness with self-

    report measures: Existing scales and open issues. *Mindfulness, 4*(3), 191-202.

    https://doi.org/10.1007/s12671-012-0110-9

Bergomi, C., Tschacher, W., & Kupper, Z. (2014). Konstruktion und erste Validierung eines

Fragebogens zur umfassenden Erfassung von Achtsamkeit [Construction and first

validation of a questionnaire for the comprehensive recording of mindfulness].

Diagnostica, 60(3), 111-125. https://doi.org/10.1026/0012-1924/a000109

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V.,

Abbey, S., Speca, M., Velting D., &, Devins, G. (2004). Mindfulness: A proposed

operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241.

https://doi.org/10.1093/clipsy/bph077

*Black, D. S., Sussman, S., Johnson, C. A., & Milam, J. (2012). Testing the indirect effect of

trait mindfulness on adolescent cigarette smoking through negative affect and perceived

stress mediators. *Journal of Substance Use, 17*(5–6), 417–429.

https://doi.org/10.3109/14659891.2011.587092

Boker, S., Neale, M., Maes, H., Wilde, M., Spiegel, M., Brick, T, Spies, J., Estabrook, R.,

Kenny, S., Bates, T., Mehta, P., & Fox, J. (2011). OpenMx: An open source extended

structural equation modeling framework. *Psychometrika, 76*(2), 306-317.

https://doi.org/10.1007%2Fs11336-010-9200-6

*Boyle, C. C., Stanton, A. L., Ganz, P. A., Crespi, C. M., & Bower, J. E. (2017).

Improvements in emotion regulation following mindfulness meditation: Effects on

depressive symptoms and perceived stress in younger breast cancer survivors. *Journal of

Consulting and Clinical Psychology, 85*(4), 397–402.

https://doi.org/10.1037/ccp0000186

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.

https://doi.org/10.1348/135910710x501683

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

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg Mindfulness Inventory (FMI). *Journal for Meditation and Meditation Research, 1*(1), 11–34

*Calvete, E., Morea, A., & Orue, I. (2019). The role of dispositional mindfulness in the longitudinal associations between stressors, maladaptive schemas, and depressive symptoms in adolescents. *Mindfulness, 10*(3), 547-558. https://doi.org/10.1007/s12671-018-1000-6

*Calvete, E., Orue, I., & Sampedro, A. (2017). Does the acting with awareness trait of mindfulness buffer the predictive association between stressors and psychological symptoms in adolescents? *Personality and Individual Differences, 105*, 158–163. https://doi.org/10.1016/j.paid.2016.09.055

Carpenter, J. K., Conroy, K., Gomez, A. F., Curren, L. C., & Hofmann, S. G. (2019). The relationship between trait mindfulness and affective symptoms: A meta-analysis of the Five Facet Mindfulness Questionnaire (FFMQ). *Clinical Psychology Review, 74*. https://doi.org/10.1016/j.cpr.2019.101785

Cash, M., & Whittingham, K. (2010). What facets of mindfulness contribute to psychological well-being and depressive, anxious, and stress-related symptomatology? *Mindfulness, 1*(3), 177-182. https://doi.org/10.1007/s12671-010-0023-4

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the

Southampton Mindfulness Questionnaire (SMQ). *British Journal of Clinical Psychology, 47*(4), 451–455. https://doi.org/10.1348/014466508x314891

Cheung, M. W. L. (2015). metaSEM: An R package for meta-analysis using structural equation modeling. *Frontiers in Psychology, 5,* 1521. https://doi.org/10.3389/fpsyg.2014.01521

Ciarrochi, J., Kashdan, T. B., Leeson, P., Heaven, P., & Jordan, C. (2011). On being aware and accepting: A one-year longitudinal study into adolescent well-being. *Journal of Adolescence, 34*(4), 695-703. https://doi.org/10.1016/j.adolescence.2010.09.003

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 & Adolescent Psychology, 41*(6), 760-770. https://doi.org/10.1080/15374416.2012.698724

*Crescentini, C., Chittaro, L., Capurso, V., Sioni, R., & Fabbro, F. (2016). Psychological and physiological responses to stressful situations in immersive virtual reality: Differences between users who practice mindfulness meditation and controls. *Computers in Human Behavior, 59*, 304–316. https://doi.org/10.1016/j.chb.2016.02.031

*Demarzo, M., Montero-Marin, J., Puebla-Guedea, M., Navarro-Gil, M., Herrera-Mercadal, P., Moreno-González, S., Calvo-Carrión, S., Bafaluy-Franch, L., & Garcia-Campayo, J. (2017). Efficacy of 8- and 4-session mindfulness-based interventions in a non-clinical population: A controlled study. *Frontiers in Psychology, 8,* 1343. https://doi.org/10.3389/fpsyg.2017.01343

*Dixon, H. C., & Overall, N. C. (2016). Dispositional mindfulness attenuates the link between daily stress and depressed mood. *Journal of Social and Clinical Psychology, 35*(3), 255-268. http://dx.doi.org/10.1521/jscp.2016.35.3.255

Droutman, V., Golub, I., Oganesyan, A., & Read, S. (2018). Development and initial

validation of the Adolescent and Adult Mindfulness Scale (AAMS). *Personality and

Individual Differences, 123*, 34-43. https://doi.org/10.1016/j.paid.2017.10.037

*Duan, W., & Li, J. (2016). Distinguishing dispositional and cultivated forms of mindfulness:

Item-level factor analysis of five-facet mindfulness questionnaire and construction of

short inventory of mindfulness capability. *Frontiers in Psychology, 7.*

https://doi.org/10.3389/fpsyg.2016.01348

*Duijndam, S., Denollet, J., Nyklíček, I., & Kupper, N. (2017). Perceived cognition after

percutaneous coronary intervention: Association with quality of life, mood and fatigue in

the THORESCI study. *International Journal of Behavioral Medicine, 24*(4), 552–562.

https://doi.org/10.1007/s12529-016-9624-1

*El Morr, C., Ritvo, P., Ahmad, F., Moineddin, R., & MVC Team. (2020). Effectiveness of

an 8-week web-based mindfulness virtual community intervention for university students

on symptoms of stress, anxiety, and depression: Randomized controlled trial. *JMIR

Mental Health, 7*(7), e18595. https:// doi.org/10.2196/18595

Eisenlohr-Moul, T. A., Walsh, E. C., Charnigo Jr, R. J., Lynam, D. R., & Baer, R. A. (2012).

The "what" and the "how" of dispositional mindfulness: Using interactions among

subscales of the Five-Facet Mindfulness Questionnaire to understand its relation to

substance use. *Assessment, 19*(3), 276-286. https://doi.org/10.1177/1073191112446658

*Elhai, J. D., Levine, J. C., O'Brien, K. D., & Armour, C. (2018). Distress tolerance and

mindfulness mediate relations between depression and anxiety sensitivity with

problematic smartphone use. *Computers in Human Behavior, 84,* 477-484.

https://doi.org/10.1016/j.chb.2018.03.026

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. P. (2007). Mindfulness and

emotion regulation: The development and initial validation of the cognitive and affective

mindfulness scale-revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment, 29*(3), 177-190. https://doi.org/10.1007/s10862-006-9035-8

*Galla, B. M. (2017). "Safe in my own mind": Supporting healthy adolescent development through meditation retreats. *Journal of Applied Developmental Psychology, 53*, 96–107. https://doi.org/10.1016/j.appdev.2017.09.006

*Gambrel, L. E., & Piercy, F. P. (2015). Mindfulness-based relationship education for couples expecting their first child—Part 1: A randomized mixed-methods program evaluation. *Journal of Marital and Family Therapy, 41*(1), 5-24. https://doi.org/10.1111/jmft.12066

*Gómez-Odriozola, J., & Calvete, E. (2020). Longitudinal bidirectional associations between dispositional mindfulness, maladaptive schemas, and depressive symptoms in adolescents. *Mindfulness, 11*, 1943-1955. https://doi.org/10.1007/s12671-020-01402-w

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical Psychology Review, 37*, 1-12. https://doi.org/10.1016/j.cpr.2016.09.011

Groth, N., Schnyder, N., Kaess, M., Markovic, A., Rietschel, L., Moser, S., Michel, C., Schultze-Lutter, F., & Schmidt, S. J. (2019). Coping as a mediator between locus of control, competence beliefs, and mental health: A systematic review and structural equation modelling meta-analysis. *Behaviour Research and Therapy, 121*, 103442. https://doi.org/10.1016/j.brat.2019.103442

Hair, J.F., Hult, G.T.M., Ringle, C.M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modelling (PLS-SEM). 2nd Ed. Sage.

*Henrich, J. F., Gjelsvik, B., Surawy, C., Evans, E., & Martin, M. (2020). A randomized clinical trial of mindfulness-based cognitive therapy for women with irritable bowel

syndrome—Effects and mechanisms. *Journal of Consulting and Clinical Psychology, 88*(4), 295-310. https://doi.org/10.1037/ccp0000483

Jak, S., & Cheung, M. W. L. (2020). Meta-analytic structural equation modeling with moderating effects on SEM parameters. *Psychological Methods, 25*(4), 430-455. https://doi.org/10.1037/met0000245

*Johnson, C., & Wade, T. (2019). Which aspects of mindfulness are important to include in adolescent interventions? *Early Intervention in Psychiatry, 13*(3), 387-397. https://doi.org/10.1111/eip.12490

*Jury, T. K., & Jose, P. E. (2019). Does rumination function as a longitudinal mediator between mindfulness and depression? *Mindfulness, 10*(6), 1091–1104. https://doi.org/10.1007/s12671-018-1031-z

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. Hyperion.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*(2), 144-156. https://doi.org/10.1093/clipsy/bpg016

*Keng, S. L., Lee, C. S. L., & Eisenlohr-Moul, T. A. (2019). Effects of brief daily mindfulness practice on affective outcomes and correlates in a high BPD trait sample. *Psychiatry Research, 280*, 112485. https://doi.org/10.1016/j.psychres.2019.112485

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 617-627. https://doi.org/10.1001/archpsyc.62.6.617

Khan, F., & Laurent, H. K. (2019). Assessing the impact of mindfulness and life stress on

    maternal well-being. *Mindfulness, 10*(1), 26-35. https://doi.org/10.1007/s12671-018-

    0943-y

*Kiken, L. G., Lundberg, K. B., & Fredrickson, B. L. (2017). Being present and enjoying it:

    Dispositional mindfulness and savoring the moment are distinct, interactive predictors of

    positive emotions and psychological health. *Mindfulness, 8*(5), 1280–1290.

    https://doi.org/10.1007/s12671-017-0704-3

Lin, L., & Chu, H. (2018). Quantifying publication bias in meta-analysis. *Biometrics*, *74*(3),

    785-794. https://doi.org/10.1111/biom.12817

*Ma, Y., She, Z., Siu, A. F.-Y., Zeng, X., & Liu, X. (2018). Effectiveness of online

    mindfulness-based interventions on psychological distress and the mediating role of

    emotion regulation. *Frontiers in Psychology, 9*, 1–9.

    https://doi.org/10.3389/fpsyg.2018.02090

Mattes, J. (2019). Systematic review and meta-analysis of correlates of FFMQ mindfulness

    facets. *Frontiers in Psychology, 10,* 02684. https://doi.org/10.3389/fpsyg.2019.02684

*Nassif, T. H., Start, A. R., Toblin, R. L., & Adler, A. B. (2019). Self-reported mindfulness

    and soldier health following a combat deployment. *Psychological Trauma: Theory,*

    Research, Practice, and Policy, 11(4), 466–474. https://doi.org/10.1037/tra0000413

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. http://doi.org/10.1016/j.paid.2015.08.017

*Pots, W. T., Fledderus, M., Meulenbeek, P. A., Peter, M., Schreurs, K. M., & Bohlmeijer, E.

    T. (2016). Acceptance and commitment therapy as a web-based intervention for

    depressive symptoms: Randomised controlled trial. *The British Journal of Psychiatry,*

    208(1), 69-77. https://doi.org/10.1192/bjp.bp.114.146068

Rhodes, R. E., Boudreau, P., Josefsson, K. W., & Ivarsson, A. (2020). Mediators of physical

activity behaviour change interventions among adults: A systematic review and meta-

analysis. *Health Psychology Review, 1-15*.

https://doi.org/10.1080/17437199.2019.1706614

*Rodríguez-Vega, B., Melero-Llorente, J., Bayón-Pérez, C., Cebolla, S., Mira, J., Valverde,

C., & Fernández-Liria, A. (2014). Impact of mindfulness training on attentional control

and anger regulation processes for psychotherapists in training. *Psychotherapy Research,

24*(2), 202-213. https://doi.org/10.1080/10503307.2013.838651

Rosenthal, R. (1978). Combining results of independent studies. *Psychological Bulletin*, *85*,

185-193. https://doi.org/10.1037/0033-2909.85.1.185

*Royuela-Colomer, E., & Calvete, E. (2016). Mindfulness facets and depression in

adolescents: Rumination as a mediator. *Mindfulness, 7*(5), 1092-1102.

https://doi.org/10.1007/s12671-016-0547-3

*Sairanen, E., Lappalainen, R., Lappalainen, P., Kaipainen, K., Carlstedt, F., Anclair, M., &

Hiltunen, A. (2019). Effectiveness of a web-based Acceptance and Commitment Therapy

intervention for wellbeing of parents whose children have chronic conditions: A

randomized controlled trial. *Journal of Contextual Behavioral Science, 13*, 94–102.

https://doi.org/10.1016/j.jcbs.2019.07.004

Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, N.

(2013). Assessment of mindfulness: Review on state of the art. *Mindfulness, 4*(1), 3-17.

https://doi.org/10.1007/s12671-012-0122-5

*Schut, D. M., & Boelen, P. A. (2017). The relative importance of rumination, experiential

avoidance and mindfulness as predictors of depressive symptoms. *Journal of Contextual

Behavioral Science, 6*(1), 8–12. https://doi.org/10.1016/j.jcbs.2016.11.008

*Shahar, B., Britton, W. B., Sbarra, D. A., Figueredo, A. J., & Bootzin, R. R. (2010). Mechanisms of change in mindfulness-based cognitive therapy for depression: Preliminary evidence from a randomized controlled trial. *International Journal of Cognitive Therapy, 3*(4), 402–418. https://doi.org/10.1521/ijct.2010.3.4.402

*Shearer, A., Hunt, M., Chowdhury, M., & Nicol, L. (2016). Effects of a Brief Mindfulness Meditation Intervention on Student Stress and Heart Rate Variability. *International Journal of Stress Management, 23*(2), 232–254. https://doi.org/10.1037/a0039814

*Thomas, J., Raynor, M., & Bahussain, E. (2016). Stress reactivity, depressive symptoms, and mindfulness: A Gulf Arab perspective. *International Perspectives in Psychology: Research, Practice, Consultation, 5*(3), 156–166. https://doi.org/10.1037/ipp0000055

Tomlinson, E. R., Yousaf, O., Vittersø, A. D., & Jones, L. (2018). Dispositional mindfulness and psychological health: A systematic review. *Mindfulness, 9*(1), 23-43. https://doi.org/10.1007/s12671-017-0762-6

Van Son, J., Nyklíček, I., Nefs, G., Speight, J., Pop, V. J., & Pouwer, F. (2015). The association between mindfulness and emotional distress in adults with diabetes: Could mindfulness serve as a buffer? Results from diabetes MILES: The Netherlands. *Journal of Behavioral Medicine, 38*, 251-260. https://doi.org/10.1007/s10865-014-9592-3

Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness-the Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences, 40*(8), 1543-1555. https://doi.org/10.1016/j.paid.2005.11.025

Walsh, J. J., Balint, M. G., SJ, D. R. S., Fredericksen, 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. https://doi.org/10.1016/j.paid.2008.09.008

*Williams, V., Ciarrochi, J., & Deane, F. P. (2010). On being mindful, emotionally aware,

and more resilient: Longitudinal pilot study of police recruits. *Australian Psychologist,*

45(4), 274–282. https://doi.org/10.1080/00050060903573197

World Health Organization. (2017). *Depression and other common mental disorders: Global*

health estimates.

https://www.who.int/mental_health/management/depression/prevalence_global_health_e

stimates/en

Figure 1   Click here to access/download;Figure;Figure 1.docx ⬇

Figure 1.

PRISMA Flow Diagram of the Literature Search and Selection Process

* Reasons: Cross-sectional; n < 3; intervention without non-active control; lack of measures of dispositional mindfulness at time 1, outcome at time one, and/or outcome at time two.

Figure 2

Click here to access/download;Figure;Figure 2.docx ⬇

Figure 2.

*Path diagram of the Second Stage TSSM With Fixed Effects Model Between the Acting
With Awareness Facet of DM and Depression in Adolescents*

```
                ┌──────────────────┐    .61 (.02)***
             →  │  Depression T1   │ ───────────────→  ┌──────────────────┐
            │   └──────────────────┘                   │                  │   ↻  .58 (.02) ***
-.41 (.02) ***                                         │  Depression T2   │
            │   ┌──────────────────┐   -.08 (.02)***   │                  │
             →  │        AA        │ ───────────────→  └──────────────────┘
                └──────────────────┘
```
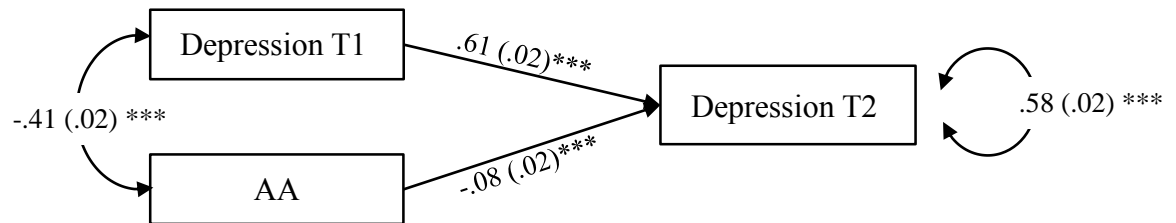
* p < .05; ** p < .01; *** p <.001

Note. AA = Acting with Awareness facet of DM; T1 = time one; T2 = time two.

Figure 3

Click here to access/download;Figure;Figure 3.docx ⬇

Figure 3.

Path Diagram of the Second Stage TSSM With Random Effects Model Between the DM Facets and Anxiety in Adults

A) Acting with Awareness and Anxiety

```
           Anxiety T1 ─── .64 (.05)*** ──┐
                                         Anxiety T2      .53 (.06) ***
-.34 (.04) ***                          
              AA ──── -.11 (.04)** ──────┘
```

B) Non-Judging and Anxiety

```
           Anxiety T1 ─── .68 (.05)*** ──┐
                                         Anxiety T2      .54 (.06)***
-.35 (.05) ***                          
              NJ ──── .01 (.04) ─────────┘
```

C) Describing and Anxiety

```
           Anxiety T1 ─── .69 (.04)*** ──┐
                                         Anxiety T2      .53 (.06) ***
-.15 (.03) ***                          
              De ──── -.02 (.02) ────────┘
```

D) Observing and Anxiety

```
           Anxiety T1 ─── .69 (.05)*** ──┐
                                         Anxiety T2      .52 (.07) ***
-.05 (.05)                          
              Ob ──── .03 (.03) ─────────┘
```

E) Non-Reacting and Anxiety

```
           Anxiety T1 ─── .67 (.05)*** ──┐
                                         Anxiety T2      .51 (.07) ***
-.25 (.05) ***                          
              NR ──── -.09 (.04)* ───────┘
```

* p < .05; ** p < .01; ***; p <.001

Note. AA = Acting with Awareness; NJ = Non-Judging; De = Describing; Ob = Observing; NR = Non-Reacting; T1 = time one; T2 = time two.

Figure 4   Click here to access/download;Figure;Figure 4.docx ⬇

Figure 4.

Path Diagram of the Second Stage TSSM With Random Effects Model Between the DM Facets and Depression in Adults

A) Acting with Awareness and Depression

B) Non-Judging and Depression

C) Describing and Depression

D) Observing and Depression

E) Non-Reacting and Depression
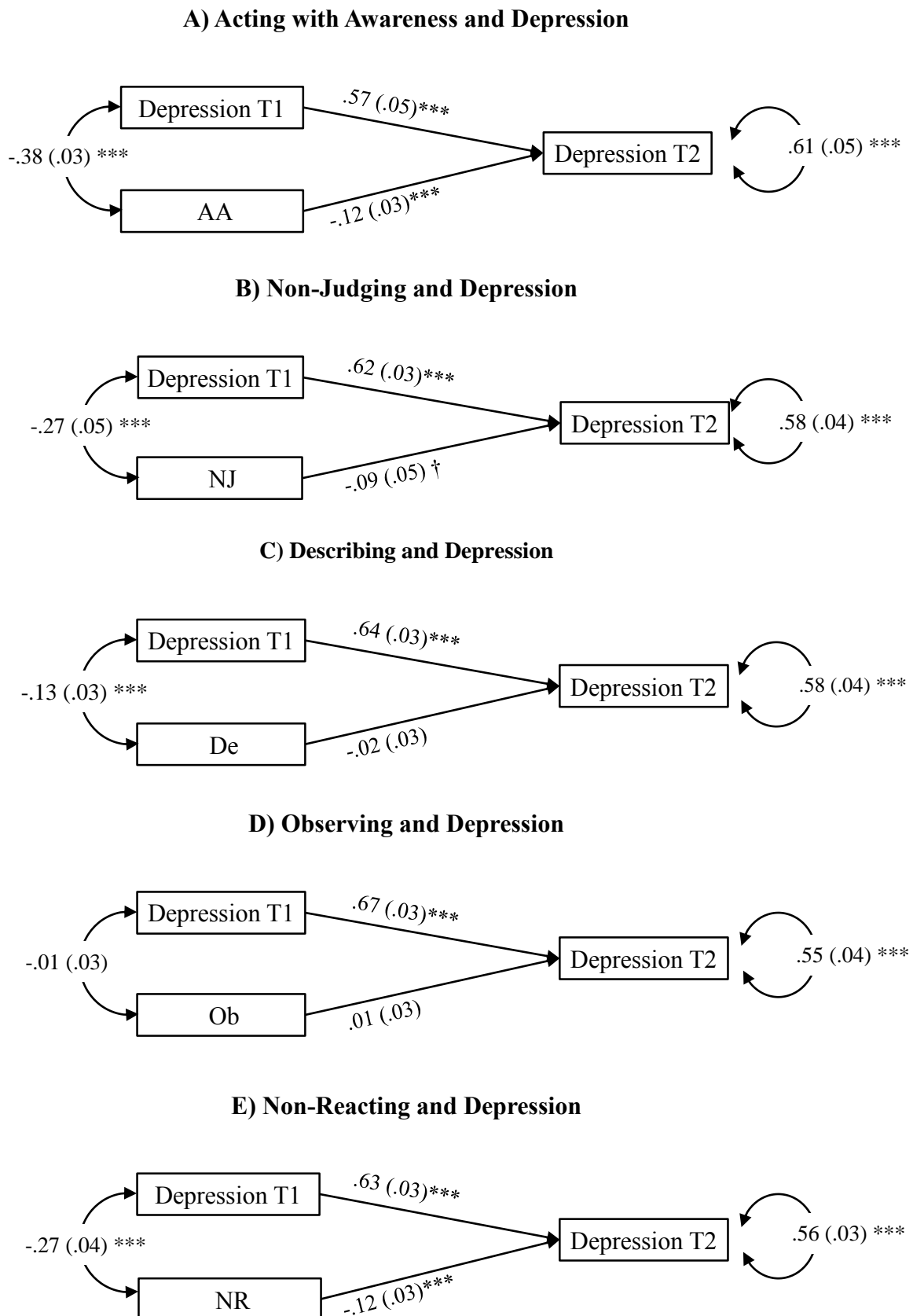
† $p < .1$; *$p < .05$; **$p < .01$; ***$p < .001$

Note. AA = Acting with Awareness; NJ = Non-Judging; De = Describing; Ob = Observing; NR = Non-Reacting; Dep. = depression; T1 = time one; T2 = time two.

Figure 5

Click here to access/download;Figure;Figure 5.docx

Figure 5.

Path Diagram of the OSMASEM With Random Effects Model Between the Acting with Awareness Facet of DM and Depression in Adults
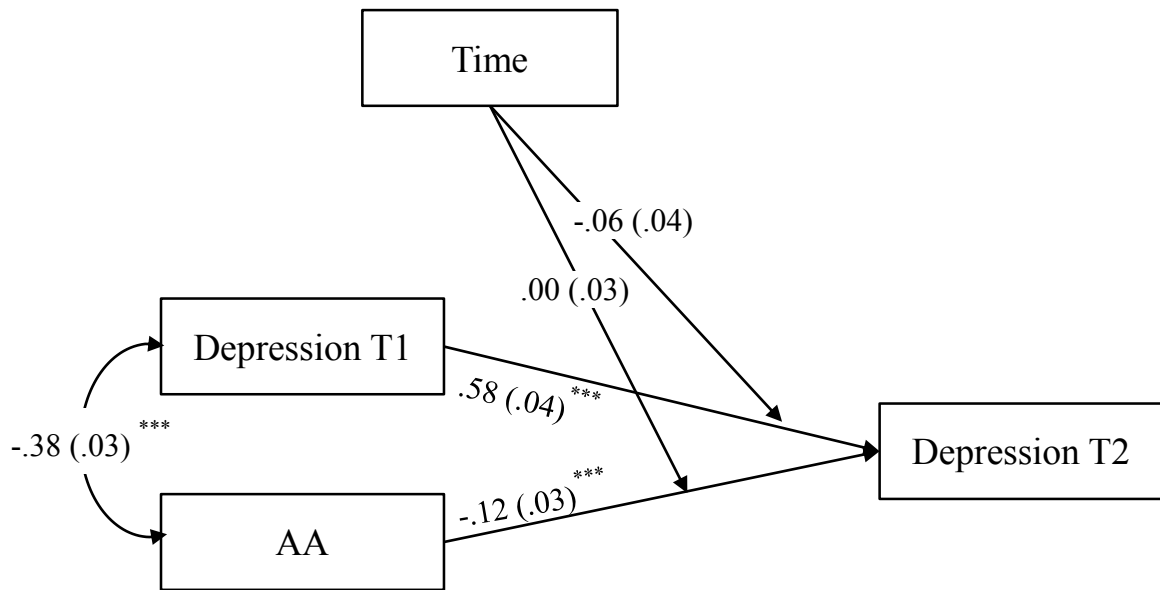
* *p* < .05; ** *p* < .01; ***; *p* <.001

Note. AA = Acting with Awareness; T1 = time one; T2 = time two; Time = elapsed time from time one to time two.

Table 1

Table 1.

Equivalence of Subscales of Different Mindfulness Assessment Measures with the Five Facets of the Five Facet Mindfulness Questionnaire and Representative Item Examples

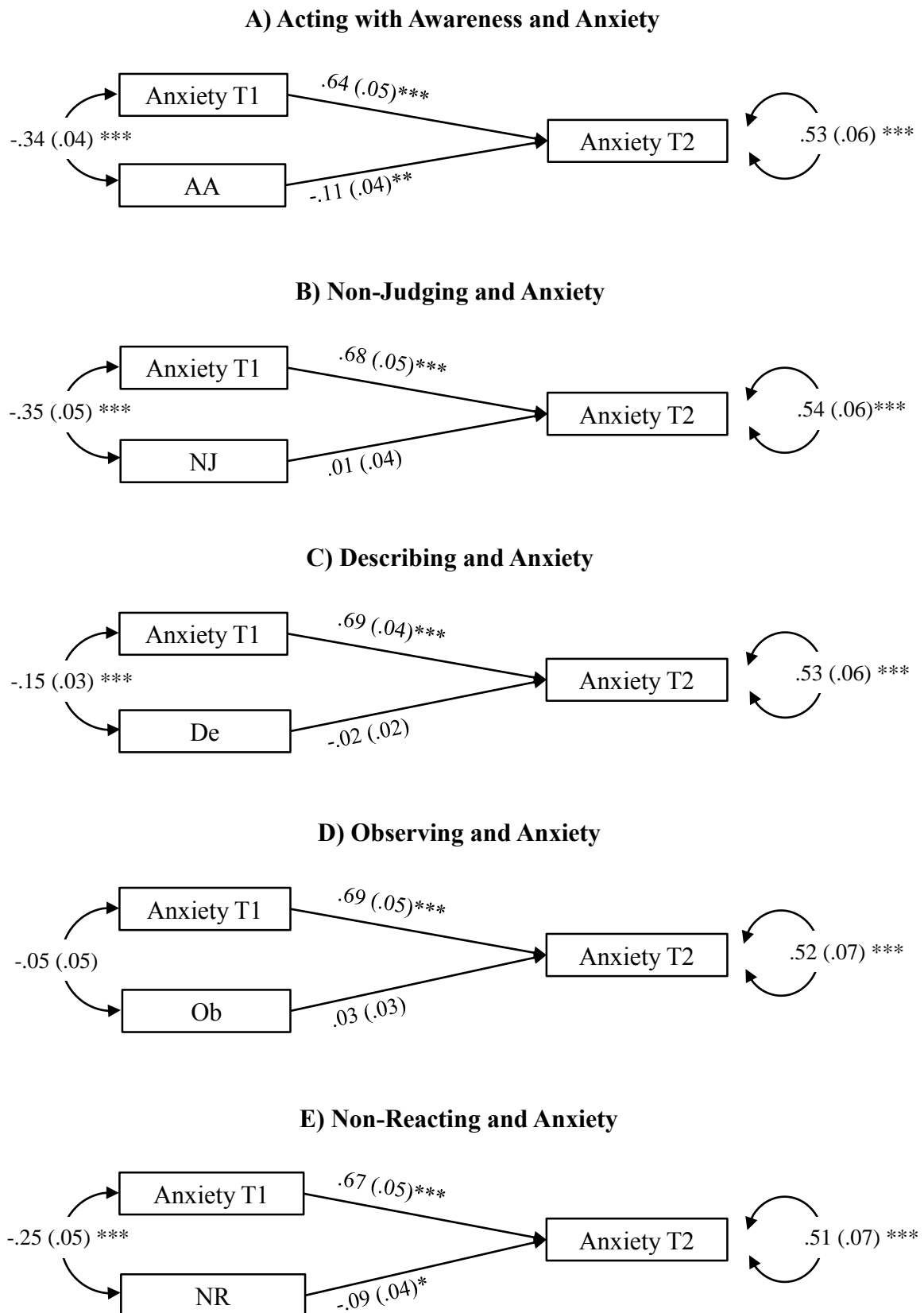| FFMQ	MAAS	KIMS	CHIME	AAMS
Acting with Awareness "I find it difficult to stay focused on what's happening in the present" (reverse item)	**"I find myself doing things without paying attention"** (reverse item)	**Act with awareness** "I tend to do several things at once rather than focusing on one thing at a time" (reverse item)	**Acting with awareness** "I find it easy to concentrate on what I am doing"	
Non-Judging "I tell myself I shouldn't be thinking the way I'm thinking" (reverse item)		**Accept without judgment** "I criticize myself for having irrational or inappropriate emotions" (reverse item)	**Accepting and non-judgmental orientation** "In the ups and downs of life, I am warm to myself"	**Being non-judgmental** "I tend to evaluate if the emotions I feel are appropriate" (reverse item)
				Self-accepting "The emotions I feel sometimes seem wrong" (reverse item)
Non-reacting "In difficult situations, I can pause without immediately reacting"			**Decentering and non-reactivity** "In difficult situations, I can stop for a moment instead of reacting straight away"	
Describing "I'm good at finding the words to describe my feelings"		**Describe** "My natural tendency is to put my experiences into words"		
Observing "I pay attention to how my emotions affect my thoughts and behavior"		**Observe** "I notice when my moods begin to change"	**Awareness of internal experiences** "When my mood changes, I notice it straight away"	**Focus on the present moment** "When I take a shower or a bath, I notice how water feels on my body"
			Awareness of external experiences "I pay attention to the feeling of things like the wind in my hair or sunshine on my face"	

Note. FFMQ = Five Facet Mindfulness Questionnaire; MAAS = Mindful Attention Awareness Scale; KIMS = Kentucky Inventory of Mindfulness Skills; CHIME = Comprehensive Inventory of Mindfulness Experiences; AAMS = Adolescent and Adult Mindfulness Scale.

Table 2

Table 2.

Studies Included in the Meta-Analysis and Their Characteristics

First author and year	Design	Days	*n*	Population	Clinical sample	Women %	Age: *M(SD)*	Anxiety	Depression	Measures	Facets
Ahmad et al., 2020	Inter.	60	37	Adults	No	80%	25.40 (7.30)	BAI	PHQ	FFMQ	Ob; De; NR; NJ; AA
Andreotti et al., 2017	Inter.	42	8	*Adol.*	Yes: Esophageal atresia	50%	10.70 (1.10)	STAI	CDI	MAAS	AA
Antoine et al., 2018	Inter.	42	43	Adults	No	70%	37.2 (15.16)	STAI	BDI	FFMQ; MAAS	Ob; De; NR; NJ; AA
Barnes & Lynn, 2010	Long.	273	102	Adults	No	67%	18.99 (1.90)	—	BDI	FFMQ	Ob; De; LNR; NJ; AA
Black et al., 2012	Long.	90	4885	*Adol.*	No	49%	16.2 (0.70)	—	CES-D	MAAS	AA
Boyle et al., 2017	Inter.	42	30	Adults	Yes: Breast Cancer Survivors	100%	47.71 (6.84)	—	CES-D	FFMQ	Ob; De; NR; NJ; AA
Calvete et al., 2019	Long.	730	1190	*Adol.*	No	49%	15.16 (0.95)	—	CES-D	MAAS	AA
Calvete et al., 2017	Long.	365	1257	*Adol.*	No	51%	15.18 (0.94)	—	CES-D	MAAS	AA
Crescentini et al., 2016	Inter.	60	18	Adults	No	83%	36.94 (10.39)	STAI	—	FFMQ, MAAS	Ob; De; NR; NJ; AA
Demarzo et al., 2017	Inter.	244	47	Adults	No	71%	21.71 (1.01)	HADS	HADS	FFMQ, MAAS	Ob; De; NR; NJ; AA
Dixon & Overall, 2016	Long.	10	53	Adults	No	89%	22.57 (6.00)	—	CES-D	MAAS	AA
Duan & Li, 2016	Long.	182	347	Adults	No	52%	21.31 (0.88)	DASS	DASS	FFMQ	De; NJ; AA
Duijndam et al., 2017	Long.	365	199	Adults	Yes: Percutaneous coronary intervention	19%	63.3 (10.7)	—	BDI	FFMQ	AA
El Morr et al., 2020	Inter.	60	80	Adults	No	80%	25.40 (7.30)	BAI	PHQ	FFMQ	Ob; De; NR; NJ; AA
Elhai et al., 2018	Long.	34	261	Adults	No	76%	19.73 (3.52)	ASI	PHQ	MAAS	AA
Galla, 2017	Inter.	6	30	*Adol.*	No	51%	17.21 (1.15)	—	CES-D	MAAS	AA
Gambrel & Piercy, 2015	Inter.	28	34	Adults	No	50%	31.12 (4.52)	DASS	DASS	FFMQ	Ob; De; NR; NJ; AA
Gómez-Odriozola & Calvete., 2020	Long.	182	802	*Adol.*	No	49%	14.60 (1.00)	—	CES-D	FFMQ	Ob; De; NR; NJ; AA
Henrich et al., 2020	Inter.	42	23	Adults	Yes: Irritable bowel	100%	35.48 (14.71)	DASS	DASS	FFMQ	Ob; De; NR; NJ; AA
Johnson & Wade, 2019	Inter.	365	116	*Adol.*	No	48%	13.41 (0.31)	DASS	DASS	CHIME	Ob; NR; NJ; AA
Jury & Jose, 2019	Long.	91	552	Adults	No	67%	36 (16.43)	—	BDI	FFMQ	Ob; De; NR; NJ; AA
Keng et al., 2019	Inter.	14	29	Adults	Yes: Borderline symptoms	79%	21.17 (2.05)	DASS	DASS	FFMQ	Ob; De; NR; NJ; AA
Kiken et al., 2017	Long.	63	89	Adults	No	59%	42.1 (9.93)	—	CES-D	MAAS	AA
Ma et al., 2018	Inter.	60	23	Adults	No	61%	26.78 (7.78)	SAS	SDS	FFMQ	Ob; De; NR; NJ; AA
Nassif et al., 2019	Long.	121	627	Adults	No (risk of developing PTSD)	0%	—	—	PHQ	FFMQ	NR
Pots et al., 2016	Inter.	91	87	Adults	Yes: Mild to moderate depressive symptoms	72%	48.54 (12.63)	HADS	CES-D	FFMQ	Ob; De; NR; NJ; AA
Rodríguez et al., 2014	Inter.	60	33	Adults	No	76%	28.44 (4.03)	STAI	BDI	FFMQ; MAAS	Ob; De; NR; NJ; AA
Royuela-Colomer & Calvete, 2016	Long.	121	459	*Adol.*	No	58%	16.11 (0.98)	—	CES-D	FFMQ; MAAS	Ob; De; NR; NJ; AA
Sairanen et al., 2019	Inter.	121	25	Adults	No	73%	42.3 (5.50)	DASS	DASS	FFMQ	Ob; De; NR; NJ; AA
Schut & Boelen, 2017	Long.	365	208	Adults	No	88%	21.50 (2.20)	—	BDI	MAAS	AA
Shahar et al., 2010	Inter.	60	19	Adults	Yes: Mayor depression in remission	95%	46.74 (11.70)	—	BDI	MAAS	AA
Shearer et al., 2016	Inter.	28	16	Adults	No	63%	19.8 (1.30)	STAI	BDI	FFMQ	Ob; De; NR; NJ; AA
Thomas et al., 2016	Inter.	60	12	Adults	No	100%	20.75 (0.95)	KUAS	BDI	MAAS	AA
Williams et al., 2010	Long.	365	60	Adults	No	27%	—	DASS	DASS	MAAS	AA

Note. Long. = studies that follow a longitudinal design (no intervention); Inter. = studies that assess the efficacy of an intervention; *n* = number of participants in both times; *Adol.* = adolescents; Adults = college students or adults; BAI = Beck Anxiety Inventory; STAI = State-Trait Anxiety Inventory; HADS = Hospital Anxiety and Depression Scale; DASS = Depression, Anxiety and Stress Scale; ASI = Anxiety Sensitivity Index; SAS = Self-rating Anxiety Scale; KUAS = Kuwait University Anxiety Scale; PHQ = Patient Health Questionnaire; CDI = Children Depression Inventory; BDI = Beck Depression Inventory; CES-D = Center of Epidemiologic Studies-Depression; SDS = Self-rating Depression Scale; FFMQ = Five Facet Mindfulness Questionnaire; MAAS = Mindful Attention Awareness Scale; CHIME = Comprehensive Inventory of Mindfulness Experiences; Ob = Observing; De = Describing; NR = Non-Reacting; NJ= Non-Judging; AA = Acting with Awareness.

Table 3
Click here to access/download;Table;Table 3.docx ✉

Table 3.

Number of Studies and Sample Size per Combination of DM Facet and Outcome in

Adults and Adolescents

	Anxiety				Depression			
	Adolescents		Adults		Adolescents		Adults	
DM facets	*Studies*	*n*	*Studies*	*n*	*Studies*	*Sample*	*Studies*	*n*
Acting with Awareness	2	125	17†	1175	8†	8747	24‡	2409
Non-Judging	1	116	14†	842	3	1377	16†	1508
Describing	0	0	14†	842	2	1261	16†	1508
Observing	1	116	13†	495	3	1377	15†	1161
Non-Reacting	1	116	13†	495	3	1377	16†	1788

Note. The groups without obelisk symbol did not meet the criteria for the meta-analytic integration.

† Meets the criteria for TSSEM; ‡ Meets the criteria for TSSEM and OSMASEM.

n = sample of the correlations between time one to time two.

Table 4

Table 4.

Contrast of Homogeneity Based on Fixed Effects With First Stage TSSEM in Adults

	χ^2	df	RMSEA		TLI	CFI
			Value	90% CI		
Anxiety						
Acting with awareness	105.90***	44	.143	[.11, .18]	.935	.939
Non-judging	97.85***	37	.166	[.13, .21]	.905	.912
Describing	82.28***	37	.143	[.10, .19]	.920	.926
Observing	69.84***	34	.167	[.11, .22]	.892	.901
Non-reacting	84.02***	34	.197	[.15, .25]	.868	.879
Depression						
Acting with awareness	168.00***	59	.136	[.11, .16]	.929	.932
Non-judging	97.76***	39	.127	[.10, .16]	.928	.934
Describing	74.94***	39	.099	[.06, .13]	.952	.956
Observing	49.75	36	.070	[.00, .12]	.978	.980
Non-reacting	76.39***	39	.093	[.06, .12]	.965	.968

*p < .05; **p <.01; ***p < .001

Note. RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval; TLI

= Tucker-Lewis Index; CFI = Comparative Fit Index.

Table 5
Click here to access/download;Table;Table 5.docx ⬇

Table 5.

Pooled Correlations Based on Random Effects With First Stage TSSEM and Homogeneity Statistics in Adults

		Estimate	SE	Confidence interval		I^2	Q
				Lower	Upper		
Anxiety							
AA	DM-O1	-.34***	0.036	-0.41	-0.27	0.28	110.90***
	O1-O2	.68***	0.043	0.59	0.76	0.81	
	DM-O2	-.32***	0.035	-0.39	-0.25	0.26	
NJ	DM-O1	-.35***	0.047	-0.44	-0.26	0.21	83.53***
	O1-O2	.68***	0.045	0.59	0.77	0.75	
	DM-O2	-.23***	0.046	-0.32	-0.14	0.14	
De	DM-O1	-.15***	0.032	-0.21	-0.09	0.00	66.09**
	O1-O2	.69***	0.044	0.60	0.77	0.74	
	DM-O2	-.13***	0.032	-0.19	-0.06	0.00	
Ob	DM-O1	-.05	0.045	-0.14	0.04	0.00	56.82**
	O1-O2	.69***	0.050	0.59	0.79	0.70	
	DM-O2	-.00	0.045	-0.09	0.09	0.00	
NR	DM-O1	-.25***	0.046	-0.34	-0.16	0.11	65.69***
	O1-O2	.69***	0.049	0.59	0.79	0.69	
	DM-O2	-.26***	0.042	-0.34	-0.18	0.02	
Depression							
AA	DM-O1	-.38***	0.028	-0.44	-0.33	0.35	182.3***
	O1-O2	.61***	0.040	0.53	0.69	0.86	
	DM-O2	-.33***	0.028	-0.39	-0.28	0.17	
NJ	DM-O1	-.27***	0.047	-0.37	-0.18	0.58	92.45***
	O1-O2	.64***	0.032	0.58	0.71	0.56	
	DM-O2	-.26***	0.046	-0.35	-0.17	0.42	
De	DM-O1	-.13***	0.032	-0.19	-0.07	0.00	62.89**
	O1-O2	.65***	0.032	0.58	0.71	0.58	
	DM-O2	-.10**	0.039	-0.18	-0.03	0.05	
Ob	DM-O1	-.01	0.042	-0.09	0.07	0.00	42.2
	O1-O2	.67***	0.030	0.61	0.73	0.45	
	DM-O2	.01	0.040	-0.07	0.08	0.00	
NR	DM-O1	-.27***	0.041	-0.36	-0.19	0.53	63.94**
	O1-O2	.66***	0.025	0.61	0.71	0.42	
	DM-O2	-.29 ***	0.024	-0.34	-0.24	0.00	

*p < .05; **p <.01; ***p < .001

Note. AA = Acting with Awareness; NJ = Non-Judging; De = Describing; Ob = Observing; NR = Non-Reacting; DM-O1 = correlation between outcome at time one and mindfulness at time two; O1-O2 = correlation between outcome at time one and outcome at time two; DM-O2 = correlation between outcome at time one and mindfulness at time two.