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Citation for published version:

Tunc, H, Morris, PG, Kyranides, MN, McArdle, A, Mcconachie, D & Williams, J 2023, 'The relationships between valued living, depression and anxiety: A systematic review, meta-analysis and meta-regression', *Journal of Contextual Behavioral Science*. <https://doi.org/10.1016/j.jcbs.2023.02.004>

Digital Object Identifier (DOI):

[10.1016/j.jcbs.2023.02.004](https://doi.org/10.1016/j.jcbs.2023.02.004)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Journal of Contextual Behavioral Science

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The Relationships Between Valued Living and Depression and Anxiety: A Systematic Review, Meta-Analysis, and Meta-Regression

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Accepted for publication in the Journal of Contextual and Behavioral Science on 23rd

February 2023. Interim citation:

Tunc, H., Morris, P.G., Kyranides, M.N., McArdle, A., McConachie, D. & Williams, J. (in press). The relationships between valued living and depression and anxiety: a systematic review, meta-analysis and meta-regression. *Journal of Contextual Behavioral Science*

Highlights

- There was a negative medium-to-large correlation between valued living and depression.
- There was a negative small-to-medium correlation between valued living and anxiety.
- Region and valued living measure were significant moderators in the meta-analysis of the relationship between valued living and depression.
- Population and mean age were significant moderators in the meta-analysis of the relationship between valued living and anxiety.

ABSTRACT

Introduction: Valued living is one of the core processes of Acceptance and Commitment Therapy (ACT). The main aim of this study is to systematically review the relationship between valued living and depression, and valued living and anxiety, and to examine how these relationships vary across different demographic characteristics and populations/clinical groups (PROSPERO ID: CRD42021236882).

Method: Literature searches were carried out using MEDLINE, EMBASE, PsycINFO, ProQuest Dissertations and Thesis Global, Social Science databases. All studies using a validated measurement of valued living (as conceptualized in ACT) and a measurement of depression and/or anxiety were considered for inclusion. The methodological quality of included studies was assessed using a risk of bias assessment tool specifically developed for this systematic review.

Results: A total of 72 studies with 78 (sub)samples were included in this review, of which 17 studies were rated as high risk of bias, while 61 were rated as low risk for bias. The primary high-risk quality issue related to small sample sizes. Most included studies were student or chronic pain samples. Meta-analyses overall showed negative correlations between both valued living and depression ($r = -.42$, 95%CI [-.45; -.39], $p < .001$, $k = 72$, $o = 14,797$), and valued living and anxiety ($r = -.26$, 95%CI [-.29; -.22], $p < .001$, $k = 60$, $o = 11,628$). Meta-regression analyses uncovered significant moderations suggesting that the negative correlation between valued living and depression was stronger in studies using the Valuing Questionnaire compared to those using the Valued Living Questionnaire. The inverse association between valued living and anxiety tended to be stronger in older samples and in chronic pain samples compared to the general population.

Discussion: The evidence overall demonstrated significant negative relationships between valued living and both depression and anxiety, with a greater effect size for the association between valued living and depression. This highlights the importance for clinicians in considering valued living as a potential mechanism of change for depression and anxiety.

Keywords: Acceptance and commitment therapy, Valued living, Depression, Anxiety, Values, Systematic review, Meta-analysis.

1. INTRODUCTION

The use of values and valued living in clinical psychology and psychotherapy has become more widespread with Acceptance and Commitment Therapy (ACT). According to the ACT model, psychopathology can emerge as a result of psychological inflexibility, and therefore, ACT aims to increase psychological flexibility to treat psychological problems (Hayes et al., 2006). Valued living, together with acceptance, cognitive defusion, being present, self as context, and committed action, form the six inter-related core components that this psychotherapy method targets to strengthen, and thus establish psychological flexibility (Hayes et al., 2006).

There is a growing body of research investigating the effectiveness of ACT with a variety of mental health difficulties and populations. The existing evidence has shown that ACT is an effective treatment method across various psychopathologies such as major depressive disorder (A-Tjak et al., 2018) and dealing with chronic pain (Wetherell et al., 2011). However, the evidence for the impact of valued living on mental health difficulties is inconclusive. This is because although these studies delivered all ACT processes, most of them did not measure valued living or other ACT components separately and only looked at the effect of overall treatment.

1.1. Valued Living, Depression, and Anxiety

Most recent studies on valued living have been ACT-related, with ACT having stimulated development of related measure and interventions due to values-based action being one of the core processes of ACT (e.g., Brassington et al., 2016; McCracken & Gutierrez-Martinez, 2011). There is though a level of disconnect between some clinically orientated measures of valued living and models of values, such as that proposed by Schwarz (2012). Inverse associations between valued living and depression and anxiety have been reported in many studies across various populations. For example, valued living was inversely correlated with both depression and anxiety in studies focused on participants with acquired brain injury (Baseotto et al., 2020), cancer survivors (Lewson et al., 2021), and in a trauma-exposed sample (Donahue et al., 2017). Moyer et al. (2018) found a negative association between valued living and depression at baseline among parents with a relationship violence history.

Although most studies have reported a negative relationship between valued living and depression and valued living and anxiety, this has not been consistent across studies. For instance, no significant associations between valued living and either depression or anxiety at

pre-treatment were reported in a study with older adults attending ACT therapy for chronic pain (Mccracken & Jones, 2012). This study also did not find significant changes in valued living or anxiety at post treatment, though changes in valued living might reasonably be expected to take some time to manifest.

1.2. Previous Reviews

Existing literature reviews have shown that ACT is an effective treatment method when working with individuals that display various psychopathologies such as anxiety disorder (Swain et al., 2013), depression (Bai et al., 2020), and chronic pain (Feliu Soler et al., 2018). While there are many systematic reviews investigating the effectiveness of ACT across a range of conditions and samples, only a few systematic reviews have focused on valued living. A recent systematic review (Rahal & Gon, 2020) showed that the ACT interventions aimed at enhancing values-based action have a positive effect on the targeted outcomes such as in individuals with chronic pain, depression and anxiety. However, this review was based on studies using ACT, and all the core processes of ACT such as mindfulness were delivered in the interventions with clinical samples. Therefore, the impact found as a result of the interventions cannot be attributed solely to valued living. In another systematic review, Chauhan (2016) investigated whether ACT-based approaches improve valued living or not. The result showed that there was insufficient evidence to conclude that ACT consistently improves values-based action greater than control groups / alternative treatments over time. Wagner (2019) reviewed associations between valued living and depression, anxiety and distress among chronic illness populations, finding inverse associations with depression, but not with anxiety or distress after controlling for co-variates. To the best of our knowledge, there is no other systematic review or meta-analysis that examines the association between valued living and mental health.

1.3. Objectives

Values and valued living are critical components in creating and enhancing psychological flexibility, which is the main goal of acceptance and commitment therapy (Hayes et al., 2006). A better understanding of the association of valued living with different mental health constructs will provide evidence of the role of values in psychotherapy and in ACT. The current study sought to systematically review the relationship of valued living (as conceptualized in acceptance and commitment therapy) with depression and anxiety. Meta-analyses were conducted to examine the relationship between valued living and depression, and the

relationship between valued living and anxiety empirically. Meta-regression (moderator) analyses were performed to examine how the pooled correlations change across different demographic characteristics and clinical groups/populations. The research questions of this review were as follows:

- (1) Is there a negative relationship between valued living and depression?
- (2) How does the relationship between valued living and depression vary across different demographic characteristics and clinical groups / populations?
- (3) Is there a negative relationship between valued living and anxiety?
- (4) How does the relationship between valued living and anxiety vary across different demographic characteristics and clinical groups / populations?

2. METHOD

PRISMA (Page, Moher, et al., 2021) and Cochrane (Higgins et al., 2022) guidelines were followed for conducting and reporting this systematic review and meta-analysis.

2.1. Protocol

The details of the protocol for this review were registered and published on PROSPERO and it can be accessed at

https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021236882.

The registration ID of this review is: CRD42021236882.

2.2. Search Strategy

Searches were carried out in the PsycINFO, MEDLINE, EMBASE, ProQuest Dissertations and Thesis Global, Social Science databases in March 2021. The literature search was updated in April 2022 using the same search and study selection strategy. No limit has been set for the search start date.

The following search terms and phrases related to values, valued living, depression, anxiety and acceptance and commitment therapy were used to catch the relevant studies:

("Valu* living" or "Valu* directed living") OR (("acceptance and commitment therap*" or "acceptance-based" or "acceptance therap*" or ABBT) AND (Valu*)) AND (depress* or anxi*).

Using the specified search terms, Ovid gateway was used to conduct the search in the PsycINFO, MEDLINE, and EMBASE databases. Using the same search terms, ProQuest was used to search in the following databases: ProQuest Dissertations and Theses Global and Social Science Database (ProQuest Dissertations and Theses Global Business, Science & Technology,

Literature & Language, The Arts, History databases were excluded. Included Index Term: Acceptance and commitment therapy, Acceptance, Values, ACT, Acceptance and Commitment Therapy).

2.3. Eligibility Criteria

All studies with any population that compared valued living with depression and/or anxiety using measurement tools with sufficient evidence for their validity were considered for inclusion in this review. There was no limit on publication date, with search last updated in April 2022.

Cross-sectional studies that reported a correlation between valued living and depression and/or anxiety, and any intervention studies (e.g., studies based on acceptance and commitment therapy) that reported a correlation (parametric test) between valued living and depression and/or anxiety at baseline were included. The purpose of considering the baseline level in intervention studies is to ensure that the impact caused by the intervention does not affect the results. Additionally, all studies that measured valued living and depression and/or anxiety but did not report the correlation analysis were also considered for inclusion.

Case studies, books, book chapters, qualitative studies, and studies without an English abstract were excluded.

2.4. Study Selection

A total of 1343 studies were identified through database searches, and 1085 studies remained after duplicates were removed.

First, titles and abstracts of the studies obtained from the database searches were reviewed by the first author. Studies that appeared to have a measure of valued living or the studies that incorporated an ACT intervention were included in the full-text screening. In total, 684 studies were excluded, leaving 401 studies to have their full text assessed for eligibility at this stage.

Full-text review was conducted by first author. In the full-text review stage, all studies reporting a correlation analysis between valued living and depression and/or anxiety at baseline were included in this review. Studies that used a valid measure of valued living and depression and/or anxiety at baseline but did not report correlations between these variables in the paper

were identified. The corresponding authors of 106 studies were contacted to obtain the correlation analysis (the correlation coefficient r values and the number of participants n). A reminder e-mail was also sent to the corresponding authors who did not provide the requested information two weeks after the initial e-mail. Among these, the data for 39 studies were provided by authors and these studies were included in this review. The remaining 67 studies were not included as the authors did not respond/provide the effect sizes.

In total, 72 articles were included in the systematic review and meta-analysis. The details of the study selection process can be seen in Figure 1.

INSERT FIGURE 1 ABOUT HERE

2.5. Data Extraction

All data were extracted and double-checked by the first author. A data extraction form was developed for this review, and the following data were extracted: Study name, author(s), year of publication, country the study took place in, sample size (the number of participants (N) used in valued living - depression and valued living - anxiety correlations for each study were extracted separately), the mean age of participants, gender distribution, race/ethnicity information, education level, data collection method, clinical characteristics of participants, study design, the measurement tools used for the outcome variables (valued living, depression and anxiety), the correlation coefficient r values and p -value of the relationship between valued living and depression and between valued living and anxiety. In studies which used more than one tool for assessing the same outcome (e.g., two different measurement tools for assessing valued living) and reported more than one effect size, the effect size from the most commonly used measurement tool (among studies included in this review) was selected to reduce the heterogeneity. The characteristics of included studies can be seen in the supplemental Table S1 in the appendix.

2.6. Risk of Bias (Quality) Assessment

The existing quality assessment tools for cross-sectional studies were not entirely suitable for our research questions. Therefore, a new risk of bias (RoB) assessment tool was developed specifically for this review to assess the quality of studies. Our RoB assessment tool evaluates the methodological quality of obtained cross-sectional data, whether from cross-sectional studies or from the baseline of intervention / longitudinal studies. There are six main domains in this RoB assessment tool, based on sampling and recruitment, sample size, valued living measurement, depression measurement, anxiety measurement, and statistical analysis. The studies were rated as “well covered”, “adequately addressed”, “poorly addressed”, or “not applicable” for these domains. The sampling and recruitment domain and the measurement domains were adapted from the Appraisal tool for Cross-Sectional Studies (AXIS; Downes et al., 2016). Additionally, one overall RoB domain is available in this tool, and this domain can be rated as “high risk of bias” or “low risk of bias”. This risk of bias (quality) assessment tool can be found in appendix.

Before assessing included studies, the quality assessment tool was piloted. Two reviewers independently assessed all studies for risk of bias, and then these two evaluations were compared. In cases of disagreement, the review team members discussed until a consensus was reached.

2.7. Statistical Analyses for Meta-Analysis

All statistical analyses were performed in R software (R Core Team, 2021) using R Studio (RStudio Team, 2020). Meta (Schwarzer, 2007), tidyverse (Wickham et al., 2019), and dmetar (Harrer et al., 2019) packages were used to conduct the meta-analysis. The statistical analyses were guided by Harrer et al. (2021).

As the studies included in the review were not from a homogeneous population, the random-effects model was used to synthesize the observed effects into a pooled effect size. Fisher's z transformation of correlations was automatically calculated by the packages used in R. The correlation coefficient effect sizes were classified as small, medium, and large for .10, .30, and .50 effect sizes respectively (Cohen, 2013). To estimate the between-study heterogeneity variance (τ^2), the restricted maximum likelihood estimator (Viechtbauer, 2005)

was used. Q -statistics, I^2 , and prediction intervals were also calculated to investigate between study heterogeneity.

3. RESULTS

Seventy-two studies were included in this review. Of these studies, 53 studies assessed all outcomes, while 17 assessed only valued living and depression, and 2 studies assessed only valued living and anxiety. The correlation analyses were available in 33 studies while the authors provided the effect sizes of 39 studies for this review. Some studies include multiple (sub)samples (e.g., clinical sample, community sample etc.) and analyzed their data separately. We also included these (sub)samples in analyses separately. In total, this review contains 72 studies with 78 (sub)samples; 70 studies with 72 (sub)samples were included in the meta-analysis of the correlation between valued living and depression, and 55 studies with 60 (sub)samples were included in the meta-analysis of the correlation between valued living and anxiety.

3.1. Quantitative Summaries of Study Characteristics

The final sample size included in the meta-analysis that focused on the relationship between valued living and depression was 14,797 and 11,628 participants were included in the meta-analysis that focused on the relationship between valued living and anxiety. Based on studies that reported demographic information of participants, the weighted (by *sample size*) quantitative summaries of study characteristics are presented. The majority of participants were female, with around 68% in both meta-analyses. The weighted average age was 35.01 in valued living and depression, and 34.26 in valued living and anxiety. The lowest mean age was 14.96 and the highest mean age was 64.3 in both meta-analyses. The majority of samples were based in North America and Europe (62/72 samples of valued living and depression, 47/60 samples of valued living and anxiety). University/college student samples were used the most, followed by chronic pain samples. The weighted percentages of White participants were 74.65% and 76.14%, and the weighted percentages of participants with undergraduate level (including students at this stage) and higher were 84.79% and 86.65% in the meta-analyses of valued living and depression and valued living and anxiety respectively. However, it should be noted that a considerable number of studies did not report the race/ethnicity and education level characteristics and the percentages for these two variables may not be represent well.

Approximately 70% of studies included in both meta-analyses were published in 2018 and after while only around 10% were published in 2012 and before. Studies were mostly journal articles. There was a similar number of cross-sectional and treatment/intervention studies in the meta-analysis of valued living and depression. In the meta-analysis of valued living and anxiety, most of the data were derived from cross-sectional studies. Only 2 of the included studies were longitudinal. While the majority of data for the relationship between valued living and depression were gathered in-person, most data for valued living and anxiety were collected online/mobile. The detailed of these quantitative summaries of study characteristics can be seen in Table 1.

INSERT TABLE 1 ABOUT HERE

3.2. Risk of Bias (Quality) Assessment of the Included Studies

The quality of 72 studies with 78 (sub)samples was assessed using the developed quality assessment tool. Each study was evaluated in 7 different domains in total (six main domains and one overall domain, see section 2.6. and Figure 2 for details). An overall consistency of 87.7% was achieved in the RoB assessment for a total of 546 domains, which the two reviewers evaluated independently. The domains that the reviewers rated differently were discussed until a consensus was reached.

In total 61 of these studies were rated as low risk of bias while 17 were rated as high risk of bias. Robvis (McGuinness & Higgins, 2020) was used to create the risk of bias plots. The risk of bias judgement for each domain and each study was presented using a traffic light plot (see Figure 2). All studies included in the review are shown in this plot.

INSERT FIGURE 2 ABOUT HERE

Regarding the quality of studies, the authors agreed to focus only on the methodological quality of studies for risk of bias assessment, avoiding reporting quality items. The most common limitation for which studies were rated as high on risk of bias was that they had a small sample size (e.g., Brassington et al., 2016; Gentili et al., 2021), and likely had low statistical power (Domain 2). We acknowledge that random sampling is not common and easy approach to implement for correlational or intervention studies, and we evaluated the sampling frame that was taken into account when recruiting participants (Domain 1). There were no studies that sampled outside the targeted population frame and were therefore rated as high risk of bias. Regarding the measurement domains (Domain 3, 4 and 5), only studies using a measurement tool with sufficient evidence for its validity and reliability were included in this review, and therefore, no studies were rated as high risk of bias in these domains. However, in some studies the scales used did not have sufficient evidence for validity and reliability in the targeted population, such as adolescent population (e.g., Duchschere, 2020). Lastly, the authors requested the correlation findings when these were not reported in the paper for domain 6. The only concern about this domain was the inability to determine whether the data met the statistical test's assumptions.

Figures 3 and 4 present summary graphs of the proportion of studies with the risk-of-bias judgments within each domain for valued living and depression (72 (sub)samples) and for valued living and anxiety (60 (sub)samples) respectively. In line with Cochrane Handbook (Higgins et al., 2022), these summary graphs were weighted by the number of participants (N), meaning that the higher N the more weight in the table for studies.

INSERT FIGURE 3 ABOUT HERE

INSERT FIGURE 4 ABOUT HERE

3.3. Meta-analysis of the Relationship Between Valued Living and Depression

A meta-analysis based on 72 effect sizes from 70 studies was conducted to explore the relationship between valued living and depression. The total number of participants was 14,797. The pooled correlation between valued living and depression was negative, $r = -.42$, 95%CI [-.45; -.39], $p < .001$, $k = 72$, $o = 14,797$. The meta-analysis of the relationship between valued living and depression was visualized through a forest plot (see Figure 5).

3.4. Meta-analysis of the Relationship Between Valued Living and Anxiety

For the relationship between valued living and anxiety, a meta-analysis based on 60 effect sizes from 55 studies was performed. The total number of participants was 11,628. There was a negative correlation between valued living and anxiety, $r = -.26$, 95%CI [-.29; -.22], $p < .001$, $k = 60$, $o = 11,628$. A forest plot was used to visualize the meta-analysis of the relationship between valued living and anxiety (see Figure 6).

3.5. Heterogeneity

All relevant studies were considered, including different populations and different study designs. Therefore, we expected that the effect size might not be the same across populations. The heterogeneity in the meta-analysis was explored to check whether the effect size is reasonably consistent, or whether it varies substantially across populations.

3.5.1. Heterogeneity for Valued Living and Depression Relationship

The Q -statistic was significant and this indicated that all studies in the meta-analysis of the relationship between valued living and depression did not share the same effect size, $Q(71) = 252.47$, $p < .001$. The I^2 statistic was 72%, 95%CI [65%; 78%], meaning that 72% of the variance in observed effects was due to between-study heterogeneity across studies, and was not caused by sampling error. The variance of true effects was $\tau^2 = 0.02$ and the standard deviation of true effects was $\tau = 0.13$. The prediction interval ranged from -.60 to -.19. Based on this evidence, it is expected that the true effect size in 95% of all populations comparable to those in this analysis will fall in this prediction interval range (-.60 to -.19) in future studies. The prediction interval does not cross 0, and therefore, it can be predicted that most studies would find a negative relationship between valued living and depression.

3.5.2. Heterogeneity for Valued Living and Anxiety Relationship

The Q -statistic was also significant in the meta-analysis of the relationship between valued living and anxiety, and showed that all studies did not share the same effect size, $Q(59) = 160.07, p < .001$. The I^2 statistic was 63%, 95%CI [51%; 72%], indicating that 63% of the variance in observed effects was due to between-study heterogeneity across studies, and was not caused by sampling error. The variance of true effects was $\tau^2 = 0.01$ and the standard deviation of true effects was $\tau = 0.1$. The prediction interval ranged from -.44 to -.05. Based on this finding, it is expected that the true effect size in 95% of all populations comparable to those in this analysis will fall in this prediction interval range (-.44 to -.05) in future studies. The prediction interval does not cross 0, so it can therefore be predicted that most studies will find a negative relationship between valued living and anxiety.

INSERT FIGURE 5 ABOUT HERE

INSERT FIGURE 6 ABOUT HERE

3.6. Sensitivity Analyses: Outliers and Influential Cases

As analyses have shown that heterogeneity is available in both meta-analyses, sensitivity analyses was conducted to examine if any potential outliers or influential cases have an extreme effect. Some studies have extreme effect sizes that significantly differ from the pooled correlation. A study can be classified as an outlier if the 95% confidence interval of its effect size does not overlap with the pooled effect size's confidence interval (Harrer et al., 2021). Based on this definition, the pooled effects were recalculated with outliers removed for both meta-analyses.

In the meta-analysis of the relationship between valued living and depression, 12 studies (Duchschere (2020), Grau et al. (2020), Lundgren et al. (2012), Mccracken & Jones (2012), Miller & Orsillo (2020), Smith et al. (2020), Smout et al. (2014), Takabatake et al. (2022), Taravella (2010), Vasiliou et al. (2021), Viskovich & Pakenham (2020), Zucchelli et al. (2022)) were identified as outliers. After outliers were removed, the pooled effect size increased slightly by 0.01 while prediction interval range has narrowed and the I^2 statistic dropped to 20%. The recalculated meta-analysis results with outliers removed can be seen in Table 2.

In the meta-analysis of the relationship between valued living and anxiety, 7 studies (Chamberlain (2020), Donahue et al. (2017), Duchschere (2020), Edwards et al. (2019), Lin et al. (2020) - (Caucasian American Sample), Lin et al. (2020) - (Taiwan Sample), Rickardsson et al. (2019)) were identified as outliers. The pooled effect size for valued living and anxiety did not change after outliers were removed. The prediction interval range has narrowed slightly and the I^2 statistic dropped to 38%. The recalculated meta-analysis results with outliers removed can be seen in Table 2.

INSERT TABLE 2 ABOUT HERE

The authors were unable to identify any common factor between these outlier studies. They differed from each other mostly in terms of their population/clinical characteristics, the measurement tools they used to assess the outcome variables, their study design, and their risk of bias status (see details in supplemental Table S1). Therefore, the results with removing these studies should be interpreted with caution, as the results may also vary depending on how you define a study as an outlier. Only the study conducted by Duchschere (2020) was identified as an outlier in both meta-analyses. This study was conducted with male adolescent detainees' between 14 to 17 years of age, and found no significant correlations between either valued living and depression or valued living and anxiety at baseline. When omitting Duchschere (2020) from the analyses, the pooled effect size remained the same in both the meta-analyses.

Some studies may have a large impact on the pooled effect and on heterogeneity in a meta-analysis even when they are not identified as an outlier. Influence analyses was conducted in order to detect the studies that most influenced our results. These influence analyses employ the leave-one-out approach, during which the results are recalculated by excluding one study each time (Harrer et al., 2021). Thus, it can be seen how the results will change when a study is not included in the meta-analysis. Baujat plots (Baujat et al., 2002) were used to illustrate each study's influence on the pooled result and on the overall heterogeneity (based on Q -statistic) separately for valued living and depression, and for valued living and anxiety relationships.

INSERT FIGURE 7 ABOUT HERE

INSERT FIGURE 8 ABOUT HERE

3.7. Meta-Regression (Moderator) Analyses

All relevant studies with various populations and study designs were included in the meta-analyses. We pre-specified to conduct moderator analyses based on age and population (e.g., chronic pain, general population) status. Additional potential moderator variables were also included to investigate the sources of heterogeneity. Meta-regression analyses were performed to examine the moderating effect of the continuous variables “mean age” and “sex”, and the

categorical variables “population”, “valued living measure”, “region”, and “risk of bias” on the relationships between valued living and depression/anxiety. Mixed-effects model was used in these analyses. The Cochrane handbook recommends at least 10 studies for conducting a moderator analysis and a meta-analysis (Higgins et al., 2022). However, this is not a fixed rule and many published meta-analyses have less than 10 studies. Fu et al. (2011) suggests a minimum of 4 studies in each category for categorical variables, and 6 to 10 studies for continuous variables for conducting meta-regression analyses. In this review, we did not include any subgroup categories with less than four studies in the analyses and all continuous variables had at least 10 studies.

Valued living measure and region were significant moderator variables in the meta-analysis of the relationship between valued living and depression. The correlation between valued living and depression was significantly weaker, by .14, for Valued Living Questionnaire (VLQ) compared to Valuing Questionnaire (VQ; the reference category in meta-regression). Valued living measure variable explained 22.53% of the variance in true effect size. On the other hand, the association was not significantly different for Chronic Pain Values Inventory and Engaged Living Scale compared to VLQ. Regarding the region, the correlation was significantly stronger for Australia, by -.16, compared to North America (the reference category in meta-regression) while Europe was not significantly different than North America. Region variable explained 18.36% variance. The results for moderator analyses were not significant for mean age ($p = .63$), sex ($p = .297$), population ($p = .804$) and risk of bias ($p = .71$) in the relationship between valued living and depression. The residual heterogeneities were significant for all moderators. The meta-regression findings with heterogeneity details for valued living and depression meta-analysis are presented in Table 3.

INSERT TABLE 3 ABOUT HERE

In the meta-analysis of the relationship between valued living and anxiety, mean age and population were significant moderators. The negative association between valued living and anxiety strengthened as mean age increased. The negative correlation increased by .004 for every unit increase in mean age and this explained 25.27% of the variance in true effect size. Population, another significant moderator, explained 35.19% of the variance. Among population categories, general population was significantly different than the chronic pain (the

reference category in meta-regression). The negative correlation between valued living and anxiety meta-analysis was weaker by .14 in general population compared to chronic pain. Other population categories did not significantly differ from chronic pain. In addition to these, even if valued living measure was not a significant moderator in the meta-analysis of valued living and anxiety, Multidimensional Psychological Flexibility Inventory (MPFI) significantly differed from the reference category, Valuing Questionnaire (VQ). The negative correlation was weaker for MPFI by .14 compared to VQ. No significant results obtained for sex ($p = .569$), region ($p = .216$), and risk of bias ($p = .578$) moderators. The details of the meta-regression analyses with heterogeneity details for valued living and anxiety can be seen in Table 4.

INSERT TABLE 4 ABOUT HERE

3.8. Publication Bias

Funnel plot is the most commonly used method to assess publication bias. Contour-enhanced funnel plots were created for meta-analyses of the relationship between valued living and depression, and the relationship between valued living and anxiety (see Figure 9 and Figure 10). The data in the funnel plot is expected to form a roughly symmetrical figure. Besides evaluating visually, we also ran Egger's regression (Egger et al., 1997) tests to detect any asymmetry in the plots. Table 5 presents the Egger's regression tests results. While Egger's test did not indicate the presence of asymmetry in the funnel plot for valued living and depression, the test result was significant for funnel plot asymmetry in valued living and anxiety relationship indicating potential publication bias.

INSERT FIGURE 9 ABOUT HERE

INSERT FIGURE 10 ABOUT HERE

INSERT TABLE 5 ABOUT HERE

To adjust the asymmetry in the funnel plot for the meta-analysis of the relationship between valued living and anxiety, trim and fill (Duval & Tweedie, 2000) method was used. This method adds the possible missing effects to the funnel plot until it is symmetrical and then recalculates the pooled effect for meta-analysis. Figure 11 presents the contour-enhanced funnel plot with trim and fill method for valued living and anxiety. The trim and fill method imputed 15 missing results with smaller effect sizes than the observed effect sizes to the funnel plot for the relationship between valued living and anxiety. The recalculated pooled correlation for valued living and anxiety decreased to -.21 and the I^2 statistic increased by 9% to 72%. The prediction interval range has expanded, and it crossed 0. This result means that a positive relationship cannot be ruled out from future studies after trim and fill method adjustment. The results of trim and fill method with 15 added studies is presented in Table 6.

INSERT FIGURE 11 ABOUT HERE

INSERT TABLE 6 ABOUT HERE

4. DISCUSSION

This review sought to systematically examine the relationship between valued living and depression, and between valued living and anxiety. Meta-analyses were performed to estimate the pooled correlation between these variables. Meta-regression (moderator) analyses were also conducted to identify how the associations vary across different study characteristics and populations. The results of the meta-analyses showed the negative correlation between valued living and depression and between valued living and anxiety, with a greater effect size (r) for valued living and depression. Overall, the findings of this review highlighted the relationships of valued living with the psychopathological variables of depression and anxiety and it showed that valued living is a critical mechanism of change to target within the ACT therapeutic model (Hayes et al., 2006).

The findings obtained from meta-analyses have implications for both theory and practice. First, this review may help better understand the role of valued living in acceptance and commitment therapy by investigating its relationship with psychopathological constructs, depression and anxiety. The review demonstrates an inverse relationship between value-directed living and depression and anxiety across various populations. Although a review of correlational evidence cannot determine whether any relationship is causal, it supports the notion that valued living may have importance in relation to such outcomes and increases the rationale for baseline, post and follow-up measures of valued living in interventions. In particular, there was a relatively strong correlation in the meta-analysis of the relationship between valued living and depression. The stronger link between depression and valued-living may in part be understood in the context of the link between pleasurable activity scheduling and behavior activation within the wider cognitive behavior therapy literature, which is frequently used in depression as an effective approach (Ekers et al., 2014). Behavioral activation targets reactivating a person's diminished daily routines and behaviors with positive reinforcements (Chartier & Provencher, 2013). Considering this, the behaviors aimed to be activated in behavioral activation therapy can be targeted to be compatible with person's personal values.

4.1. Moderator Findings

The meta-regression results indicated a significant moderator effect of population in the meta-analysis of the relationship between valued living and anxiety. The pooled correlation was significantly weaker in the general population compared to the chronic pain group. This may be related to clinically higher levels of anxiety being typically found in chronic pain groups than in the general population, or potentially the greater impact of chronic pain on their ability to live their life in a value living consistent manner (McCracken et al., 2004). In the relationship between valued living and depression, region of study samples was a significant moderator. Taken population and region together, it would be beneficial to explore in greater depth what might contribute to this relationship within different populations and geographic regions. These factors could then be addressed at either a public health, systemic or in a more individualized way to improve mental health.

An interesting finding was that the negative association between valued living and anxiety strengthened as mean age increased. Age was also found to be a significant moderator in a recent meta-analytic study for the association of experiential avoidance with depression and

anxiety (Akbari et al., 2022). This would be interesting to explore further and might reflect a cumulative process whereby the more entrenched anxiety becomes in older age it may lead to a greater drift away from valued consistent living. Research has suggested that psychological flexibility can act as buffer for adverse life events against the development of depressive symptoms (Fonseca et al., 2020).

The measurement tool used to assess valued living was a significant moderator in the association between valued living and depression, and the correlation was weaker in VLQ compared to VQ. In the relationship between valued living and anxiety, the correlation was significantly weaker in MPFI compared to VQ even if the overall moderator analysis for valued living measure was not significant. Among the measures included in this review, the VQ and ELS were found to have stronger psychometric support (Reilly et al., 2019).

Risk of bias status was not a significant moderator in both meta-analyses. The studies with high risk of bias were methodologically akin to the low risk of bias studies, and therefore, it is unsurprising that they had similar overall effect sizes, as their methodologies were of similar quality other than their sample size. Lastly, it should be taken into account that the number of studies and participants contributing to meta-regression analyses with categorical moderator variables were not evenly divided.

Regarding examining publication bias, trim and fill method was used to adjust the asymmetry in the funnel plot for the correlation between valued living and anxiety. However, missing effect sizes may not be the only source of the asymmetry in a funnel plot and there are alternative explanations apart from publication bias. Page et al. (2021) indicated that true between-study heterogeneity might be one of the causes of asymmetry in a funnel plot. The statistical analysis showed that the heterogeneity is available in the meta-analysis of the relationship between valued living and anxiety, and our population based moderator analyses found a statistically significant difference between groups. Therefore, the asymmetry in the funnel plot for valued living and anxiety may be due to the presence of some subgroups with different true effect sizes in the meta-analysis, not publication bias.

4.2. Limitations and Strengths

This review has some limitations. Meta-regression (moderator) analyses were performed to investigate the heterogeneity in the meta-analyses, but it should be noted that heterogeneity was still present even after these moderator analyses, although some patterns have emerged.

Furthermore, some limitations related to the literature include that only two of the studies (Duchscherer (2020); Shabani et al. (2019)) were conducted with an adolescent sample. The literature was also mainly based on studies conducted in North America and Europe, and therefore generalizing the findings to other geographic regions, countries and cultures may be limited. Additionally, due to the large number of studies conducted with university students, this group is likely to be over-represented in the main analyses. Another limitation is that some studies used multiple measurement tools to assess the same variable (e.g., valued living) and reported their effect sizes separately. We included only one effect size (from the most commonly used measurement tool among studies included in this review) from each study. Therefore, some measurement tools may be over-represented while some effect sizes from some validated measures may not be included in the analyses. Considering that valued living measure yielded a significant moderator role, subsequent reviews might investigate the effect of each measurement tools separately. If resourcing permitted, this review could have been improved by having study selection and the data extraction completed independently by multiple reviewers and by including a manual search of reference lists of included studies.

The quality assessment tool that we developed for this review has both strengths and limitations. This quality assessment tool focuses on key components that are methodologically essential for correlational statistics. Thus, it is a suitable tool for the research questions of our review. Further, some domains were adapted from AXIS (Downes et al., 2016), an existing and frequently used quality assessment tool. However, this appraisal tool has not been published previously, and it was used for this review for the first time.

Strengths of the systematic review and meta-analyses include that the review protocol was submitted on PROSPERO before conducting the literature search, making the review process transparent. When conducting and reporting this study, the PRISMA and Cochrane guidelines were followed for the generalizability and reproducibility of the review. Another key strength is that we tried to include all available data on this topic in the analyses. In order to minimize publication bias, all relevant studies, published and unpublished, that assessed valued living and depression and/or anxiety at baseline were considered for inclusion. Additionally, to address reporting bias, we identified studies that measured valued living and depression and/or anxiety but did not report the correlation analyses between these variables in the papers reviewed, and their corresponding authors were contacted to obtain these data for 106 studies.

The heterogeneity was also investigated in meta-analyses, and we performed meta-regressions and some sensitivity analyses to examine any factors affecting the results.

4.3. Directions for Future Research

The review findings are based on cross-sectional data and thus cannot demonstrate a causal relationship, though it is possible that valued living reduces anxiety and depression and /or that present psychological well-being may affect how much individuals live according to their values (Gregoire et al., 2021). Further longitudinal studies are needed to understand the nature and direction of this relationship between valued living and mental health. The relationship is currently under-explored in some populations, such as among adolescents, which perhaps reflects that most current valued living measurement tools were developed and validated for adult populations. Developing and testing valued living measures for adolescents would likely make a significant contribution to the field. The number of studies conducted with samples from underdeveloped regions is also very low. Research with underexplored samples can show us how the relationship between valued living and mental health works in different cultures, ethnic groups, and geographic regions. Further research could initially use multiple baseline designs to explore the impact of increased focus on valued living as opposed to other core components of ACT. In addition to empirical studies, future reviews might examine the relationship of valued living with different mental health outcomes such as stress, burnout, and well-being.

The results showed the negative association between valued living and depression and valued living and anxiety symptoms. The review findings highlight the potential for clinicians to target and increase the focus on valued living as a key therapeutic process and mechanism of change. Valued living interventions could also have potential as a preventative approach, to reduce the numbers of people developing mental health difficulties, particularly among at risk groups such as front-line healthcare workers, students, teachers, and those from more deprived communities

In conclusion, this was the first meta-analytic research focusing on valued living as a core component of acceptance and commitment therapy, and the psychopathological constructs of depression and anxiety. The findings support a moderate to large negative correlation between valued living and depression, and a small to moderate negative correlation between valued living and anxiety. This review contributes to our understanding of the associations between

valued living and depression and anxiety across different demographic characteristics and various populations (both community and clinical samples). Future studies should investigate the impact of valued living across a wider range of clinical constructs and in currently under-explored groups such as adolescents and low-income countries.

5. Declaration of competing interest

None

6. Data and supplementary materials

Data and supplementary materials are available upon reasonable request.

7. Acknowledgements

The authors would like to thank

- All authors who conducted studies and provided data for this review.
- The academic support librarian of the University of Edinburgh, Rowena Stewart, for her help and advice on the search strategy of this review.
- The study abroad program of the Ministry of National Education of Türkiye for Hamdullah Tunç's PhD Studentship. The funder had no role in this review.
- All peer reviewers for their constructive feedback.
- Cristian Alcaíno and all the PGR community in the Clinical and Health Psychology Department, the University of Edinburgh for their help and support.

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Tables and Figures

Note: Color should be used for all figures in print.

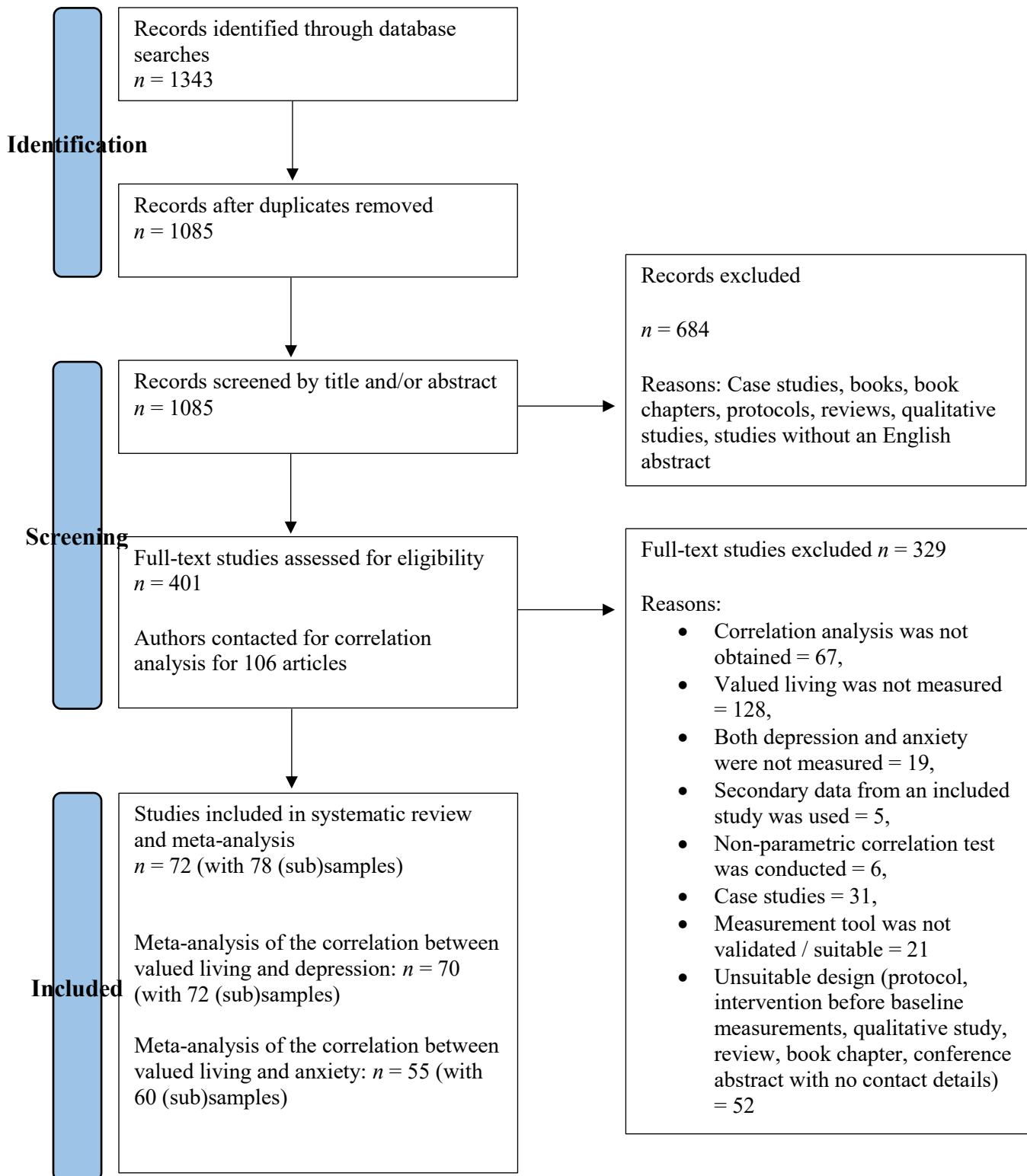


Figure 1. Prisma flow chart detailing the number of studies considered at each stage of the selection process. n : number of records.

Table 1

Quantitative summaries of study characteristics.

Variables	Reported Demographics	
	Valued Living-Depression	Valued Living-Anxiety
Final Sample Size N (k)	14,797 (72)	11,628 (60)
Weighted Female % (k)	68.31% (71)	68.45% (59)
Weighted Mean Age (Min - Max mean age among studies) (k)	35.01 (14.96 – 64.3) (68)	34.26 (14.96 – 64.3) (57)
Weighted Education Level % (Undergrad level and higher) (k)	84.79% (38)	86.65% (37)
Publication Date		
2006 – 2012 k (%)	7 (9.72%)	6 (10%)
2013 – 2017 k (%)	14 (19.44%)	12 (20%)
2018 – 2022 k (%)	51 (70.83%)	42 (70%)
Risk of Bias		
Low Risk of Bias k (n)	55 (14,276)	51 (11,299)
High Risk of Bias k (n)	17 (521)	9 (329)
Geographic Region of Sample		
North America k (n)	34 (4,242)	25 (4,363)
Europe k (n)	28 (8,174)	22 (3,800)
Asia k (n)	1 (125)	4 (1,209)
Australia k (n)	7 (2,169)	7 (2,169)
Middle East k (n)	2 (87)	2 (87)
Weighted Race / Ethnicity %		
White % (k)	74.65% (39)	76.14% (29)
Black % (k)	17.73% (27)	16.81% (20)
Asian % (k)	10.26% (19)	9.99% (15)
Hispanic/Latin % (k)	10.81% (21)	12.01% (17)
Population Type		
University/College Students k (n)	18 (4,552)	16 (4,113)
Chronic Pain k (n)	16 (2,342)	13 (1,898)
General Population k (n)	7 (1,904)	10 (3,798)
Other Clinical k (n)	7 (3,952)	4 (184)
Data Collection Method		
In-person k (n)	35 (7,186)	23 (2,567)
Online / Mobile k (n)	26 (6,579)	28 (8,105)
Mixed k (n)	10 (975)	8 (899)
Study Design		
Cross-sectional k (n)	35 (7,513)	32 (8,282)
Intervention / Treatment k (n)	35 (7,110)	26 (3,172)
Longitudinal k (n)	2 (174)	2 (174)
Publication Type		
Journal Article k (n)	65 (13,486)	54 (10,371)
Doctoral Thesis k (n)	3 (678)	2 (626)
Master's Thesis k (n)	4 (633)	4 (631)

Note: Variables were weighted by sample size in each study. k = number of samples included in analysis. n = number of participants.

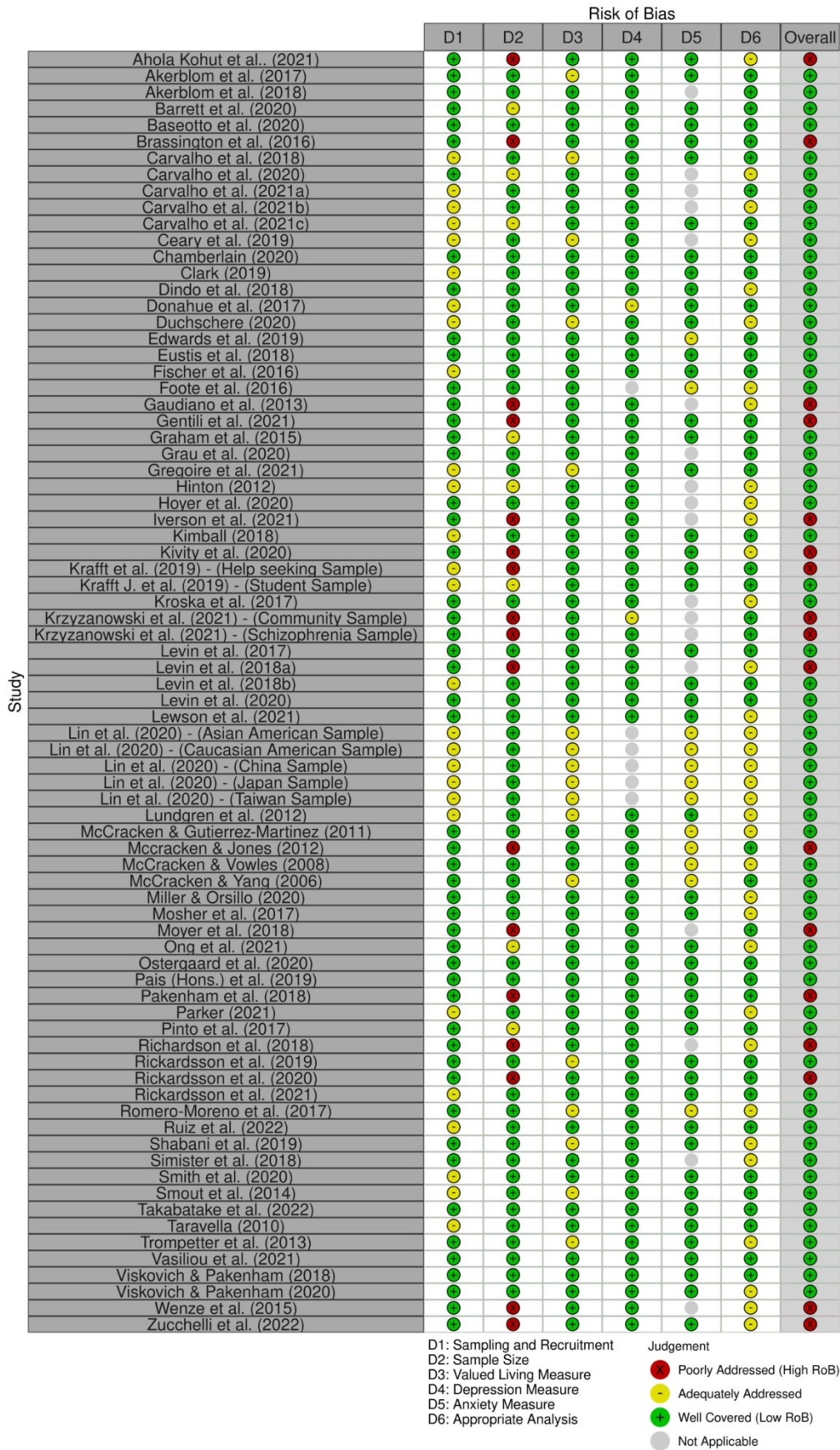


Figure 2. Risk of bias (RoB) judgements for included studies. D: Domain.

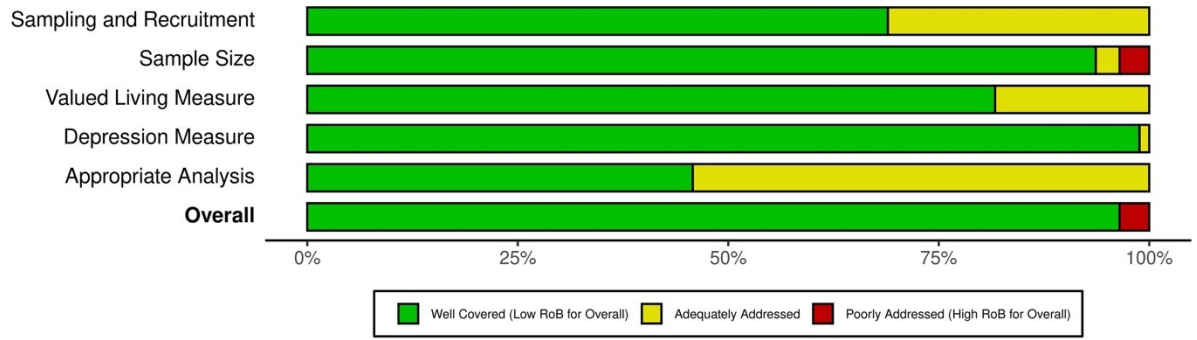


Figure 3. The weighted (by N) summary bar plot of risk of bias (RoB) judgement for valued living and depression relationship.

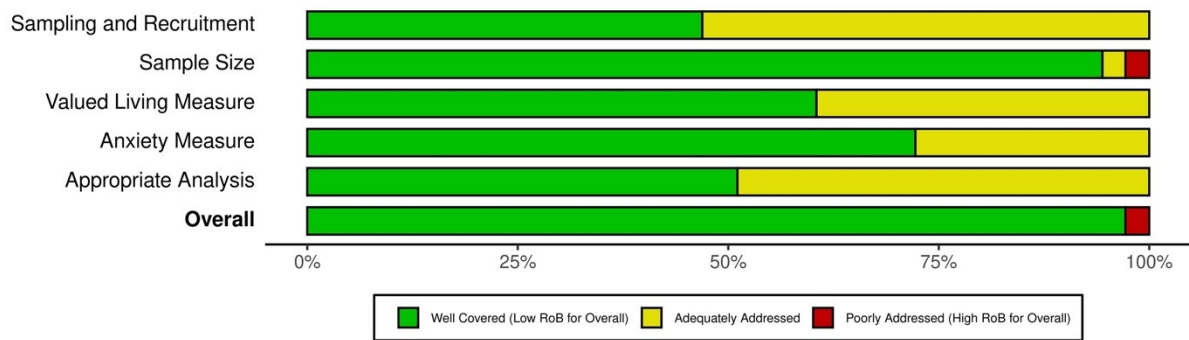


Figure 4. The weighted (by N) summary bar plot of risk of bias (RoB) judgement for valued living and anxiety relationship.

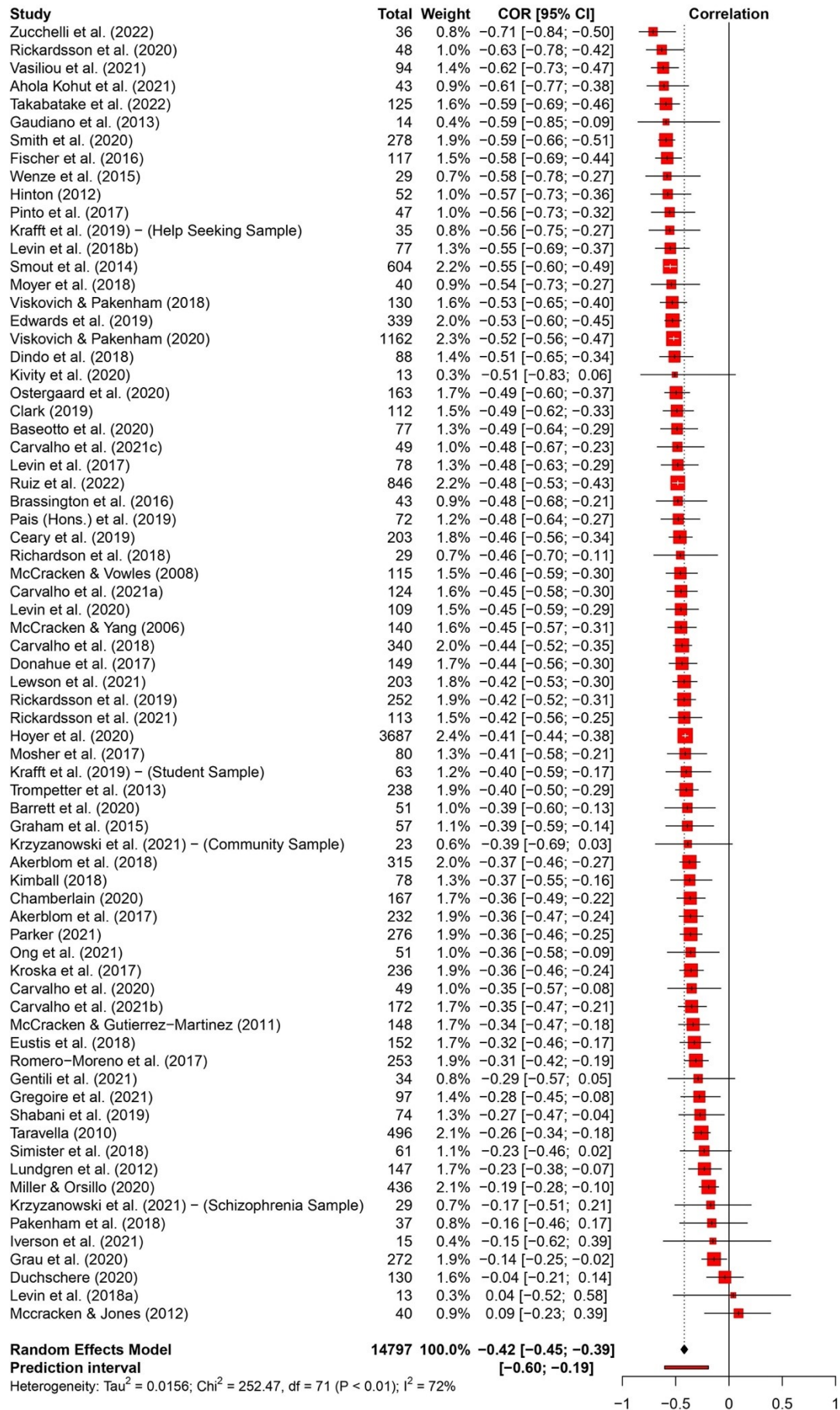


Figure 5. The forest plot presenting the relationship between valued living and depression.

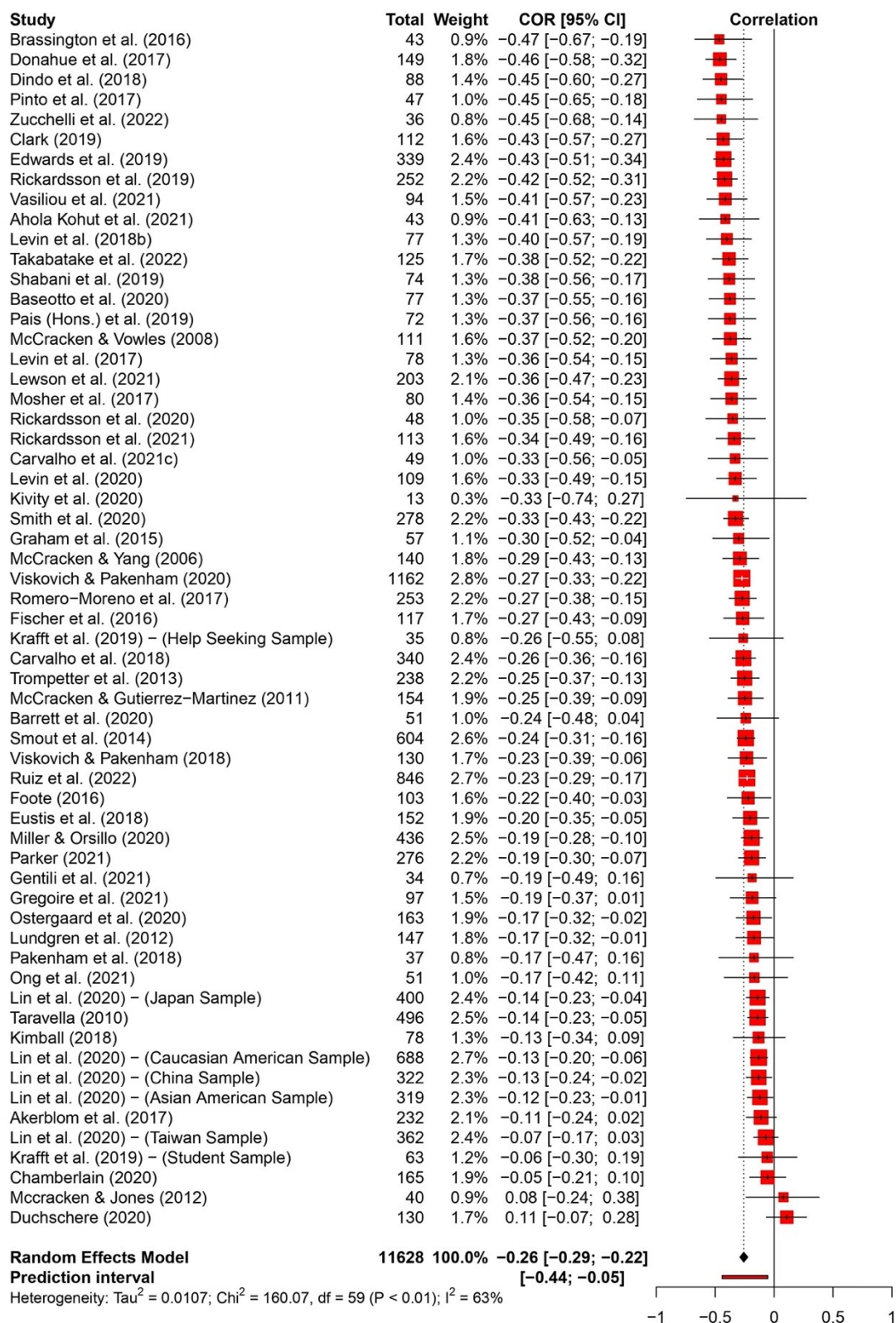


Figure 6. The forest plot presenting the relationship between valued living and anxiety.

Table 2

The outlier analyses for the meta-analysis of the relationships between valued living and depression and anxiety.

Analysis	<i>k</i>	<i>r</i>	95% CI	<i>p</i>	<i>I</i> ²	95% PI
Valued Living - Depression						
Main Analysis	72	-.42	-.45; -.39	< .001	72%	-.60; -.19
Results with Outliers Removed ^a	60	-.43	-.45; -.40	< .001	20%	-.5; -.35
Valued Living - Anxiety						
Main Analysis	60	-.26	-.29; -.22	< .001	63%	-.44; -.05
Results with Outliers Removed ^b	53	-.26	-.29; -.23	< .001	38%	-.37; -.13

a: Removed as outliers: "Duchschere (2020)", "Grau et al. (2020)", "Lundgren et al. (2012)", "McCracken & Jones (2012)", "Miller & Orsillo (2020)", "Smith et al. (2020)", "Smout et al. (2014)", "Takabatake et al. (2022)", "Taravella (2010)", "Vasiliou et al. (2021)", "Viskovich & Pakenham (2020)", "Zucchelli et al. (2022)"

b: Removed as outliers: "Chamberlain (2020)", "Donahue et al. (2017)", "Duchschere (2020)", "Edwards et al. (2019)", "Lin et al. (2020) - (Caucasian American Sample)", "Lin et al. (2020) - (Taiwan Sample)", "Rickardsson et al. (2019)"

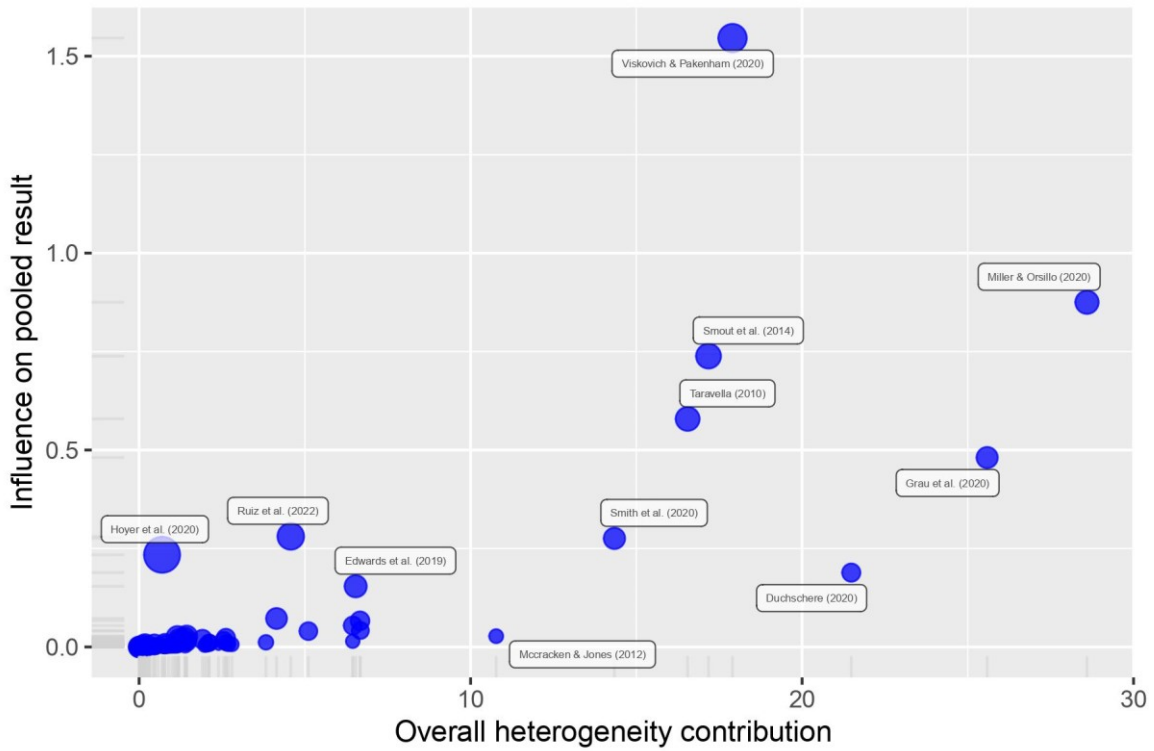


Figure 7. Baujat plot illustrating the influential studies on the pooled result and on the heterogeneity for the relationship between valued living and depression.

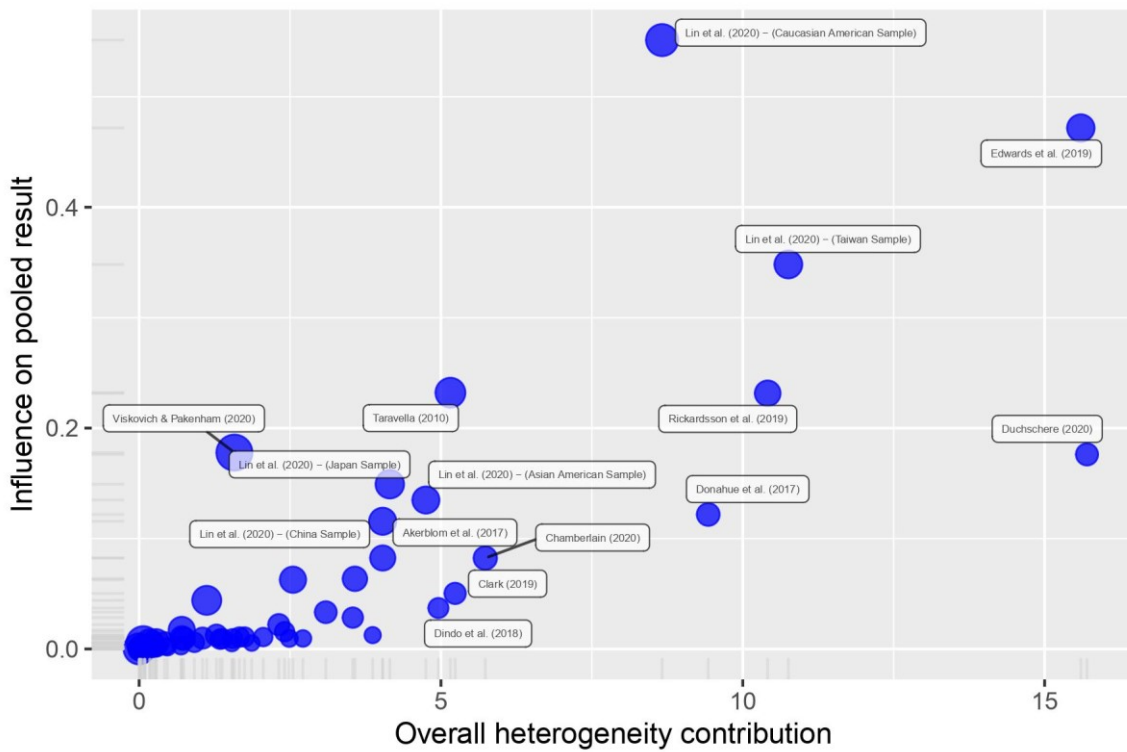


Figure 8. Baujat plot illustrating the influential studies on the pooled result and on the heterogeneity for the relationship between valued living and anxiety.

Table 3

Meta-Regression Analyses for Valued Living and Depression Relationship

Moderators	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
Mean Age						
*Intercept		-0.42	0.06	-6.95	< .001	-0.54; -0.30
Age	68	-0.001	0.00	-0.48	.63	-0.00; 0.00
Test of Moderators	$F(1, 66) = 0.23, p = .63. R^2 = 0.00\%$.					
Heterogeneity	$Q(66) = 247.68, p < .001. \tau^2 = 0.02. I^2 = 76\%$.					
Sex						
*Intercept		-0.37	0.07	-5.03	< .001	-0.52; -0.22
Female %	71	-0.11	0.10	-1.05	.297	-0.32; 0.10
Test of Moderators	$F(1, 69) = 1.10, p = .297. R^2 = 0.58\%$.					
Heterogeneity	$Q(69) = 248.87, p < .001. \tau^2 = 0.02. I^2 = 75\%$.					
Population						
*Intercept (Reference: Chronic Pain)	16	-0.44	0.04	-11.86	< .001	-0.51; -0.36
University Students	18	-0.00	0.05	-0.01	.996	-0.1; 0.1
General Population	7	-0.04	0.06	-0.57	.573	-0.17; 0.09
Other Clinical	7	-0.06	0.07	-0.80	.43	-0.21; 0.09
Test of Moderators	$F(3, 44) = 0.33, p = .804. R^2 = 0.00\%$.					
Heterogeneity	$Q(44) = 162.87, p < .001. \tau^2 = 0.01. I^2 = 70\%$.					
*Valued Living Measure						
*Intercept (Reference: VQ)	27	-0.51	0.03	-16.84	< .001	-0.57; -0.45
*VLQ	23	0.14	0.05	2.95	.004	0.04; 0.23
CPVI	8	0.08	0.06	1.37	.177	-0.04; 0.20
ELS	5	0.01	0.07	0.17	.862	-0.12; 0.15
Test of Moderators	$F(3, 59) = 3.16, p = .031. R^2 = 22.53\%$.					
Heterogeneity	$Q(59) = 172.28, p < .001. \tau^2 = 0.01. I^2 = 67\%$.					
*Region						
*Intercept (Reference: North America)	34	-0.41	0.03	-14.53	< .001	-0.46; -0.35

*Australia	7	-0.16	0.06	-2.55	.013	-0.29; -0.03
Europe	28	-0.05	0.04	-1.16	.25	-0.13; 0.03
Test of Moderators	$F(2, 66) = 3.32, p = .042. R^2 = 18.36\%$.					
Heterogeneity	$Q(66) = 182.12, p < .001. \tau^2 = 0.01. I^2 = 68\%$.					
Risk Of Bias	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Intercept (Reference: High RoB)	17	-0.47	0.06	-8.24	< .001	-0.58 - -0.35
Low RoB	55	0.02	0.06	0.37	.71	-0.10 - 0.14
Test of Moderators	$F(1, 70) = 0.14, p = .71. R^2 = 0.00\%$					
Heterogeneity	$Q(70) = 252.17, p < .001. \tau^2 = 0.02. I^2 = 75\%$.					

Note. *k*: Number of studies. *SE*: Standard error. *p*: Significance value. *CI*: Confidence intervals. VQ: Valuing Questionnaire; VLQ: Valued Living Questionnaire; CPVI: Chronic Pain Values Inventory; ELS: Engaged Living Scale. RoB: Risk of Bias. R^2 : Proportion of variance explained. *: Significant moderators or significantly different categories.

Table 4

Meta-Regression Analyses for Valued Living and Anxiety Relationship

Moderators	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Mean Age						
*Intercept		-0.12	0.05	-2.56	.013	-0.22; -0.03
*Age	57	-0.004	0.00	-2.92	.005	-0.01; -0.00
Test of Moderators	$F(1, 55) = 8.51, p = .005. R^2 = 25.27\%$.					
Heterogeneity	$Q(55) = 132.45, p < .001. \tau^2 = 0.01. I^2 = 61\%$.					
Sex	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Intercept		-0.22	0.07	-3.23	.002	-0.36; -0.09
Female %	59	-0.06	0.10	-0.57	.569	-0.26; 0.14
Test of Moderators	$F(1, 57) = 0.33, p = .569. R^2 = 0.00\%$.					
Heterogeneity	$Q(57) = 159.27, p < .001. \tau^2 = 0.01. I^2 = 67\%$.					
*Population	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Intercept (Reference: Chronic Pain)	13	-0.31	0.03	-9.62	< .001	-0.37; -0.24
University Students	16	0.06	0.04	1.53	.133	-0.02; 0.15
*General Population	10	0.14	0.04	3.28	.002	0.05; 0.23
Other Clinical	4	0.02	0.09	0.22	.83	-0.16; 0.2
Test of Moderators	$F(3, 39) = 3.77, p = .018. R^2 = 35.19\%$.					
Heterogeneity	$Q(39) = 79.31, p < .001. \tau^2 = 0.01. I^2 = 52\%$.					
Valued Living Measure	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Intercept (Reference: VQ)	24	-0.30	0.03	-10.57	< .001	-0.35; -0.24
VLQ	11	0.02	0.05	0.31	.758	-0.09; 0.12
CPVI	8	0.01	0.05	0.14	.888	-0.10; 0.12
ELS	5	0.06	0.06	1.02	.314	-0.06; 0.18
*MPFI	8	0.14	0.05	2.74	.009	0.04; 0.24
Test of Moderators	$F(4, 51) = 2.10, p = .094. R^2 = 16.57\%$.					
Heterogeneity	$Q(51) = 120.70, p < .001. \tau^2 = 0.01. I^2 = 62\%$.					
Region	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>

*Intercept (Reference: Asia)	4	-0.17	0.06	-2.88	.006	-0.29; -0.05
Australia	7	-0.12	0.08	-1.51	.136	-0.27; 0.04
Europe	22	-0.13	0.07	-1.95	.056	-0.26; 0.00
North America	25	-0.07	0.06	-1.15	.254	-0.20; 0.06
Test of Moderators	$F(3, 54) = 1.53, p = .216. R^2 = 8.82\%$.					
Heterogeneity	$Q(54) = 133.75, p < .001. \tau^2 = 0.01. I^2 = 63\%$.					
Risk Of Bias	<i>k</i>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>95% CI</i>
*Intercept (Reference: High RoB)	9	-0.30	0.07	-4.48	< .001	-0.43; -0.17
Low RoB	51	0.04	0.07	0.56	.578	-0.1; 0.18
Test of Moderators	$F(1, 58) = 0.31, p = .578. R^2 = 0.00\%$.					
Heterogeneity	$Q(58) = 159.04, p < .001. \tau^2 = 0.1. I^2 = 67\%$.					

Note. *k*: Number of studies. *SE*: Standard error. *p*: Significance value. *CI*: Confidence intervals. VQ: Valuing Questionnaire; VLQ: Valued Living Questionnaire; CPVI: Chronic Pain Values Inventory; ELS: Engaged Living Scale; MPFI: Multidimensional Psychological Flexibility Inventory. RoB: Risk of Bias. R^2 : Proportion of variance explained. *: Significant moderators or significantly different categories.

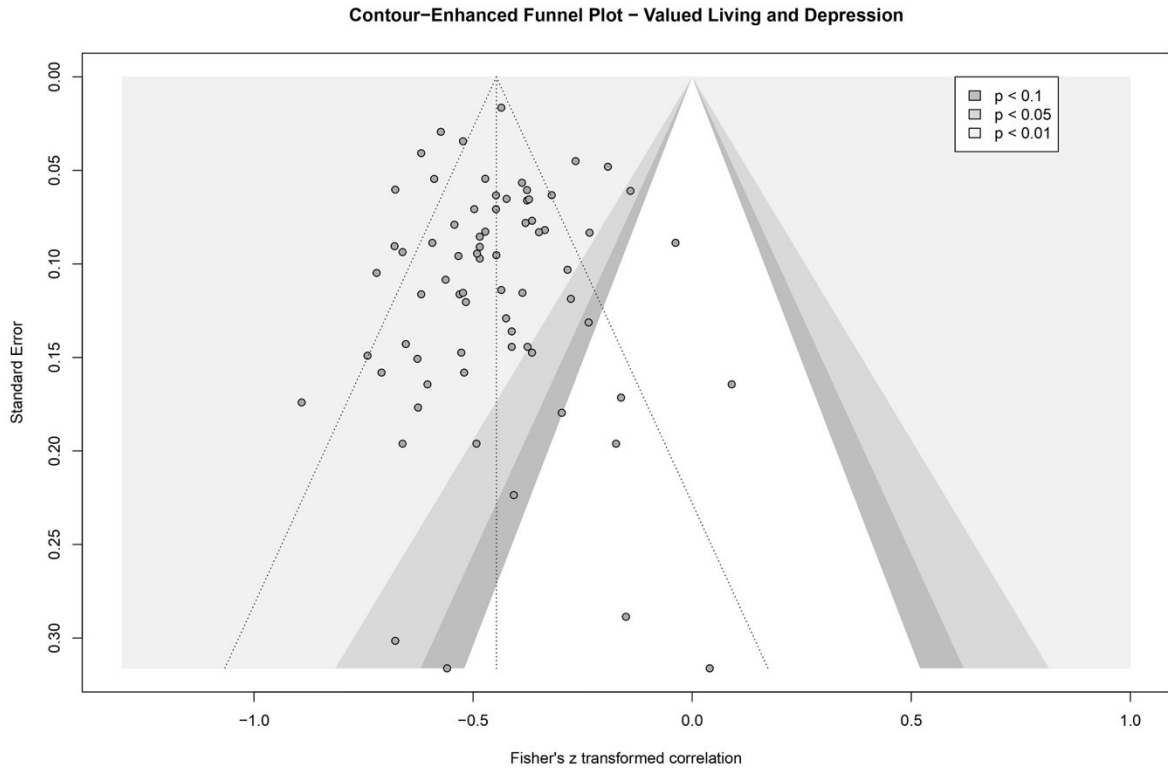


Figure 9. The contour-enhanced funnel plots for meta-analyses of the relationship between valued living and depression.

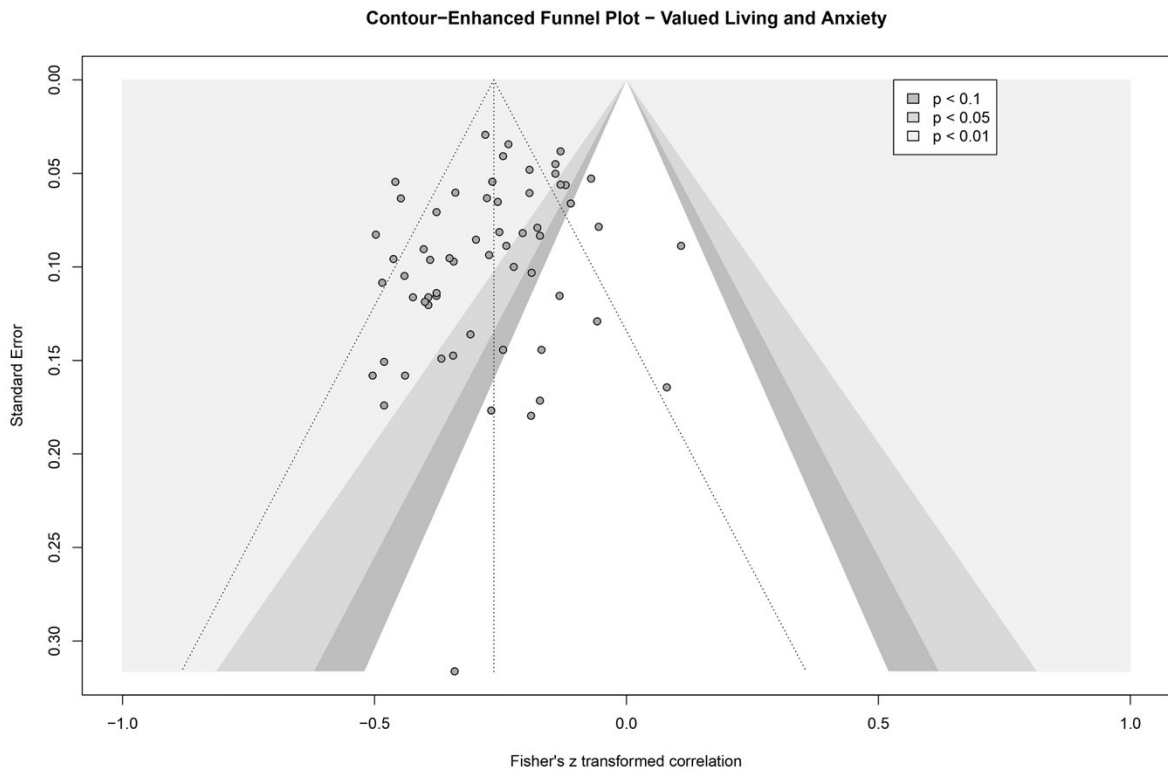


Figure 10. The contour-enhanced funnel plots for meta-analyses of the relationship between valued living and anxiety.

Table 5

Egger's regression results for testing the asymmetry in the funnel plots for valued living and depression, and for valued living and anxiety.

	Intercept	95%-CI	<i>t</i>	<i>p</i>
Depression	0.08	-0.68; 0.84	0.2	.841
Anxiety	-0.94	-1.85; -0.04	-2.04	.046

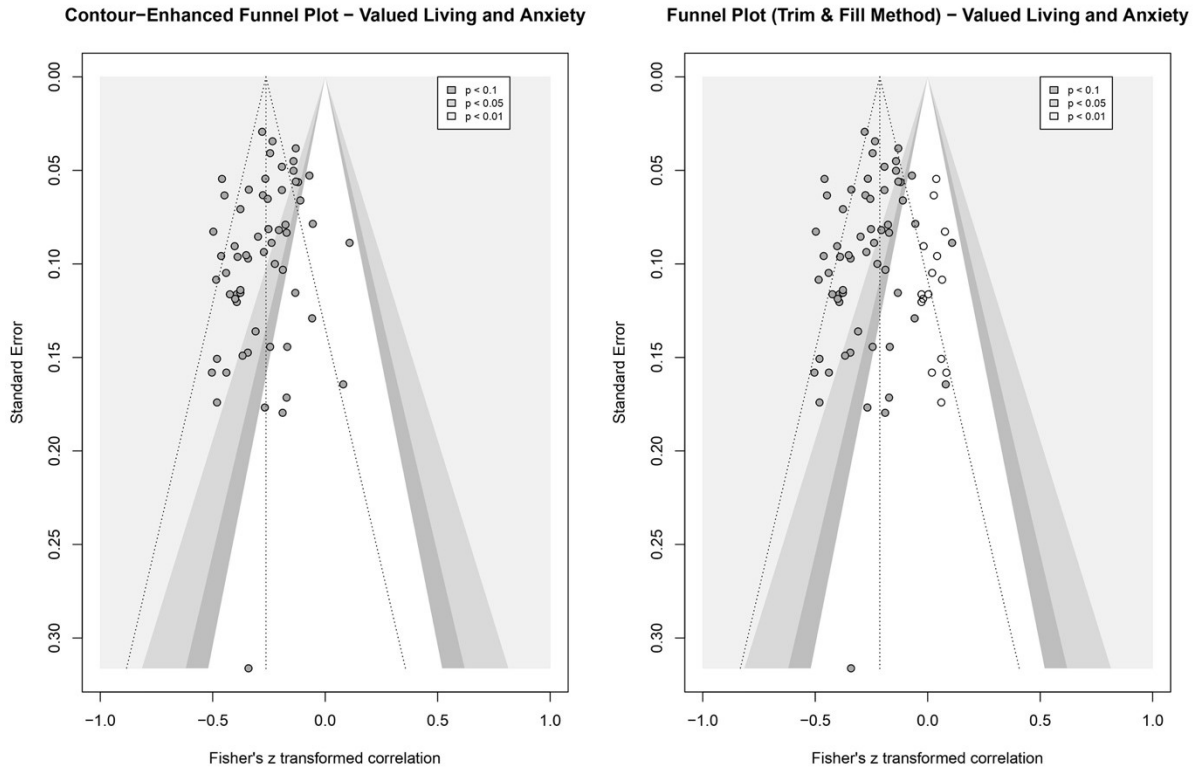


Figure 11. The contour-enhanced funnel plot with trim and fill method for valued living and anxiety.

Table 6

Results of trim and fill method for valued living and anxiety.

Analysis	<i>k</i>	<i>r</i>	95% CI	<i>p</i>	<i>I</i> ²	95% PI
Main Analysis	60	-.26	-.29; -.22	< .001	63%	-.44; -.05
Trim and Fill (15 studies added)	75	-.21	-.25; -.17	< .001	72%	-.45; .06

Appendix

- 1. Supplemental Table S1**
- 2. Risk of Bias (Quality) Assessment Tool**

Supplemental Table S1

The characteristics of included studies (Studies are listed in alphabetical order). Note: Correlational data from baseline were considered for intervention and longitudinal studies.

Author/s, Year - Country	N (meta-depression)	N (meta-anxiety)	Clinical Characteristics / Population	Study Design	Valued Living Measure	Depression Measure	Anxiety Measure
(Ahola Kohut et al., 2021) - Canada	43	43	Parents of Children with Inflammatory Bowel Disease	Online ACT intervention and Nutrition Workshop	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Akerblom et al., 2017) – Sweden	232	232	Chronic Pain	Cross-sectional	Chronic Pain Values Inventory - Success	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Akerblom et al., 2018) – Sweden	315	-	Adults with chronic pain and traumatic exposure	Cross-sectional	Chronic Pain Values Inventory - Success	Hospital Anxiety and Depression Scale	-
(Barrett et al., 2020) – Ireland	51	51	Adult actively engaged with primary or secondary mental health services	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Baseotto et al., 2020) – United Kingdom	77	77	Acquired brain injury	Cross-sectional	Valuing Questionnaire - Progress	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Brassington et al., 2016) – United Kingdom	43	43	Individuals with long term health conditions	ACT intervention	Valuing Questionnaire - Progress	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale

							Depression Scale
(Carvalho, et al., 2018) – Portugal	340	340	General population	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Carvalho et al., 2020) – Portugal	49	-	Women with musculoskeletal Chronic Pain	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	-
(Carvalho et al., 2021a) – Portugal	124	-	Women with musculoskeletal chronic pain	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	-
(Carvalho et al., 2021b) – Portugal	172	-	General population	Cross-sectional	Comprehensive Assessment of Acceptance and Commitment Therapy processes - Valued Action	DASS-21	-
(Carvalho et al., 2021c) – Portugal	49	49	Individuals with Chronic Illness	RCT - Online ACT vs Compassion Focused Therapy	Comprehensive Assessment of Acceptance and Commitment Therapy processes - Valued Action	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Ceary et al., 2019) – United States	203	-	University students	Cross-sectional	The Survey of Guiding Principles - Success	DASS-21	-
(Chamberlain, 2020) – United States	167	165	General Population	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Clark, 2019) – United States	112	112	University Students	Cross-sectional	Multidimensional Psychological	DASS-42	DASS-42

					Flexibility Inventory - Connection with Values		
(Dindo et al., 2018) – United States	88	88	At-risk veterans undergoing orthopaedic surgery	ACT intervention	Chronic Pain Values Inventory - Success	Hamilton Rating Scales for Anxiety and Depression	Hamilton Rating Scales for Anxiety and Depression
(Donahue et al., 2017) – United States	149	149	Trauma-exposed sample	Cross-sectional	Valued Living Questionnaire - Composite	Patient Health Questionnaire-3	Overall Anxiety Severity and Impairment Scale
(Duchscher, 2020) – United States	130	130	Adolescent males in juvenile detention	ACT-based intervention	Valuing Questionnaire - Progress	Brief Symptom Inventory	Brief Symptom Inventory
(Edwards et al., 2019) – United Kingdom	339	339	Chronic Pain	Cross-sectional	Chronic Pain Values Inventory - Success	British Columbia Major Depression Inventory	Pain Anxiety Symptoms Scale
(Eustis et al., 2018) – United States	152	152	College students	Web-based acceptance-based behavioural therapy program	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Fischer et al., 2016) – Australia	117	117	Undergraduate university students	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Foote et al., 2016) – United States	-	103	Individuals with Chronic Pain	Cross-sectional	Chronic Pain Values Inventory - Success	-	Pain Anxiety Symptoms Scale

(Gaudio et al., 2013) – United States	14	-	Individuals with Major depressive disorder, with psychotic features	Acceptance-based behavioural therapy intervention	Valued Living Questionnaire - Composite	Quick Inventory of Depressive Symptomatology–Clinician Rating	-
(Gentili et al., 2021) – Sweden	34	34	Individuals with Chronic Pain	ACT intervention (mobile)	Valuing Questionnaire - Progress	Patient Health Questionnaire-9	Generalized Anxiety Disorder-7
(Graham et al., 2015) – United States	57	57	University Students	Cross-sectional	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Grau et al., 2020) – United States	272	-	Patients who voluntarily sought treatment at PTSD Partial Hospitalization Programs (PHPs)	Cross-sectional	Valued Living Questionnaire - Composite	Quick Inventory of Depressive Symptomatology–Self Report	-
(Gregoire et al., 2021) – Canada	97	97	University students	Longitudinal	Engaged Living Scale - Valued Living	Patient Health Questionnaire-9	Generalized Anxiety Disorder-7
(Hinton, 2012) – United States	52	-	University students reporting significant distress, low self-esteem, and depressive symptoms	ACT intervention	Valued Living Questionnaire - Composite	Beck Depression Inventory - II	-
(Hoyer et al., 2020) – Germany	3687	-	Patients of a university psychotherapy outpatient clinic	CBT intervention	Valued Living Questionnaire - Composite	Beck Depression Inventory - II	-

(Iverson et al., 2021) – United States	15	-	Women who experience intimate partner violence	Patient-centered brief counselling intervention	Valued Living Questionnaire - Composite	Center for Epidemiological Studies Depression	-
(Kimball, 2018) – United States	78	78	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	DASS-42	DASS-42
(Kivity et al., 2020) – Israel	13	13	Individuals with Anxiety disorder	Transdiagnostic treatment	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Krafft et al., 2019) - Help Seeking Sample – United States and Canada	35	35	Adults expressing interest in receiving online self-help	RCT - Multiple Versions of an Acceptance and Commitment Therapy Matrix App	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Krafft et al., 2019) - Student Sample – United States and Canada	63	63	University Students	RCT - Multiple Versions of an Acceptance and Commitment Therapy Matrix App	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Kroska et al., 2017) – United States	236	-	College students	Cross-sectional	Valued Living Questionnaire - Composite	Inventory of Depression and Anxiety Symptoms - The General Depression scale	-

(Krzyzanowski et al., 2021) - Community Sample – Canada	23	-	Community Sample	Cross-sectional	Valued Living Questionnaire - Composite	Calgary Depression Scale for Schizophrenia	-
(Krzyzanowski et al., 2021) - Schizophrenia Sample – Canada	29	-	Individuals with schizophrenia	Cross-sectional	Valued Living Questionnaire - Composite	Calgary Depression Scale for Schizophrenia	-
(Levin et al., 2017) – Unites States	78	78	College students	Web-based acceptance and commitment therapy	Valuing Questionnaire - Progress	Counseling Center Assessment of Psychological Symptoms-34	Counseling Center Assessment of Psychological Symptoms-34
(Levin et al., 2018a) – Unites States	13	-	Overweight/obese individuals struggling with weight self-stigma	Guided self-help ACT intervention	Valuing Questionnaire - Progress	Patient Health Questionnaire-9	-
(Levin et al., 2018b) – Unites States	77	77	University Students	Longitudinal - Assessments over 7 days	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Levin et al., 2020) – Unites States	109	109	College students	RCT - ACT or mindfulness-based stress reduction self-help book	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Lewson et al., 2021) – Unites States	203	203	Cancer survivors	Cross-sectional	Valuing Questionnaire - Progress	Four-item NIH Patient-Reported Outcomes Measurement Information	Four-item NIH Patient-Reported Outcomes Measurement

						System (PROMIS)	Information System (PROMIS)
(Lin et al., 2020) - Asian American Sample – Unites States	-	319	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	-	Mood and Anxiety Symptom Questionnaire - Somatic Anxiety
(Lin et al., 2020) - Caucasian American Sample – Unites States	-	688	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	-	Mood and Anxiety Symptom Questionnaire - Somatic Anxiety
(Lin et al., 2020) - China Sample – China	-	322	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	-	Mood and Anxiety Symptom Questionnaire - Somatic Anxiety
(Lin et al., 2020) - Japan Sample – Japan	-	400	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	-	Mood and Anxiety Symptom Questionnaire - Somatic Anxiety
(Lin et al., 2020) - Taiwan Sample – Taiwan	-	362	General Population	Cross-sectional	Multidimensional Psychological Flexibility Inventory -	-	Mood and Anxiety Symptom Questionnaire

					Connection with Values		- Somatic Anxiety
(Lundgren et al., 2012) – Sweden	147	147	University students	Cross-sectional	Bull's-Eye Values Survey - Overall Values Attainment	DASS-21	DASS-21
(McCracken & Gutierrez-Martinez, 2011) – United Kingdom	148	154	Chronic Pain	ACT intervention	Chronic Pain Values Inventory - Success	British Columbia Major Depression Inventory	Pain Anxiety Symptoms Scale
(McCracken & Jones, 2012) – United Kingdom	40	40	Adults with Chronic Pain Adults (in their 60-70s)	ACT intervention	Chronic Pain Values Inventory - Success	British Columbia Major Depression Inventory	Pain Anxiety Symptoms Scale
(McCracken & Vowles, 2008) – United Kingdom	115	111	Individuals with Chronic Pain	Intervention - Assessment for chronic pain treatment	Chronic Pain Values Inventory - Success	British Columbia Major Depression Inventory	Pain Anxiety Symptoms Scale
(McCracken & Yang, 2006) – United Kingdom	140	140	Individuals with Chronic Pain	Cross-sectional	Chronic Pain Values Inventory - Success	British Columbia Major Depression Inventory	Pain Anxiety Symptoms Scale
(Miller & Orsillo, 2020) – United States	436	436	Underrepresented minority students	Cross-sectional	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Mosher et al., 2017) – United States	80	80	Patients with Metastatic breast cancer (MBC)	Cross-sectional	Valuing Questionnaire - Progress	Four-item NIH Patient-Reported Outcomes Measurement Information System (PROMIS)	Four-item NIH Patient-Reported Outcomes Measurement Information

							System (PROMIS)
(Moyer et al., 2018) – United States	40	-	Parents who have suffered from relationship violence and/or sexual assault	ACT intervention	Valued Living Questionnaire - Composite	Beck Depression Inventory - II	-
(Ong et al., 2021) – United States	51	51	Outpatient clinic prior to in-person therapy	Online self-help ACT intervention	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Ostergaard et al., 2020) – Norway	163	163	Individuals with history of major depressive disorder and residual symptoms of depression	Cross-sectional	Engaged Living Scale - Valued Living	Beck Depression Inventory - II	Beck Anxiety Inventory
(Pais (Hons.) et al., 2019) – Australia	72	72	Individuals with Traumatic brain injury	Cross-sectional	Valued Living Questionnaire - Composite	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Pakenham et al., 2018) – Australia	37	37	Individuals With Multiple Sclerosis	Intervention - Resilience training program	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Parker, 2021) – United States	276	276	University students	Cross-sectional	Multidimensional Psychological Flexibility Inventory - Connection with Values	DASS-42	DASS-42

(Pinto et al., 2017) – Australia	47	47	Transdiagnostic population	Acceptance and Commitment Therapy Group programme	Valued Living Questionnaire - Composite	DASS-21	DASS-21
(Richardson et al., 2018) – United Kingdom	29	-	Adults with severe and enduring mental health problems	ACT intervention	Valued Living Questionnaire - Composite	Patient Health Questionnaire-9	-
(Rickardsson et al., 2019) – Sweden	252	252	Individuals with Chronic Pain	Cross-sectional	Valuing Questionnaire - Progress	Patient Health Questionnaire-9	Generalized Anxiety Disorder-7
(Rickardsson et al., 2020) – Sweden	48	48	Individuals with Chronic Pain	Internet-delivered ACT	Valuing Questionnaire - Progress	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Rickardsson et al., 2021) – Sweden	113	113	Individuals with Chronic Pain	Internet-delivered ACT	Valuing Questionnaire - Progress	Patient Health Questionnaire-9	Generalized Anxiety Disorder-7
(Romero-Moreno et al., 2017) – Spain	253	253	Caregivers of relatives with dementia	Cross-sectional	Valued Living Questionnaire Adapted to Caregiving - Commitment to Own Values	Center for Epidemiological Studies Depression	Tension-Anxiety subscale of the Profile of Mood States
(Ruiz et al., 2022) – Spain	846	846	General population	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Shabani et al., 2019) – Iran	74	74	Adolescents with obsessive-compulsive disorder on an optimal dose of	RCT- ACT vs CBT	Valued Living Questionnaire - Composite	Children's Depression Inventory	Revised Children's Manifest Anxiety Scale

			selective serotonin reuptake inhibitors				
(Simister et al., 2018) – Canada	61	-	Individuals with Fibromyalgia (FM)	Online ACT	Valued Living Questionnaire - Composite	Center for Epidemiological Studies Depression	-
(Smith et al., 2020) – United States	278	278	General Population	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Smout et al., 2014) – Australia	604	604	University students	Cross-sectional	Valuing Questionnaire - Progress	DASS-21	DASS-21
(Takabatake et al., 2022) – Japan	125	125	Outpatients and inpatients with tinnitus	Cross-sectional	Valuing Questionnaire - Progress	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Taravella, 2010) – United States	496	496	Undergraduate students	Cross-sectional	Valued Living Questionnaire - Composite	DASS-42	DASS-42
(Trompetter et al., 2013) – Netherlands	238	238	Individuals with Chronic Pain	Online ACT- and mindfulness-based self-help program	Engaged Living Scale - Valued Living	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Vasiliou et al., 2021) – Cyprus	94	94	Primary Headache Sufferers	ACT-intervention	Valuing Questionnaire - Progress	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale
(Viskovich & Pakenham, 2018) –	130	130	University students	Web-based ACT	Engaged Living Scale - Valued Living	DASS-21	DASS-21

Australia							
(Viskovich & Pakenham, 2020) – Australia	1162	1162	University students	Web-based ACT	Engaged Living Scale - Valued Living	DASS-21	DASS-21
(Wenze et al., 2015) – United States	29	-	Individuals with Comorbid bipolar and substance use disorder	Adjunctive Psychosocial Intervention	Valued Living Questionnaire - Composite	Quick Inventory of Depressive Symptomatology–Clinician Rating	-
(Zucchelli et al., 2022) – United Kingdom	36	36	Individuals with visible differences who experience appearance-related concerns	ACT prototype mobile program	Comprehensive Assessment of Acceptance and Commitment Therapy processes - Valued Action	Hospital Anxiety and Depression Scale	Hospital Anxiety and Depression Scale

Quality Criteria for Systematic Review

Write Systematic Review Question(s) Here:

- 1- Is there a negative relationship between valued living – depression?
- 2- Is there a negative relationship between valued living – anxiety?

Outcomes: Valued living, depression, anxiety.

Study		
Section	Quality Criteria	Decision
1.	SAMPLE	
1.1.	The sample frame was taken from an appropriate population base, and the recruitment was likely to select subjects/participants that were representative of the target/reference population under investigation.	
1.2.	The sample size was adequate.	
2.	METHOD	
2.1.	Valued living was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously.	
2.2.	Depression was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously.	
2.3.	Anxiety was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously?	
3.	STATISTICAL ANALYSIS AND RESULTS	
3.1.	The appropriate statistical analysis was used.	
4.	OVERALL	
4.1.	Overall Risk of Bias	

Operationalisation of Quality Criteria

Ensure these are outlined in a manner that makes it clear which category studies should be allocated to:

1.1. – The sample frame was taken from an appropriate population base, and the recruitment was likely to select subjects/participants that were representative of the target/reference population under investigation.

Well covered	The sampling method ensures that minimal bias is introduced by ensuring that an appropriate sample frame was used for recruitment, appropriate and not unduly rigorous inclusion/exclusion criteria were applied, and the recruitment was likely to select subjects/participants that were reasonably representative of the target population.
Adequately addressed	The sampling method may introduce some element of bias in the study. The sampling method, the recruitment and/or the inclusion/exclusion criteria applied may have limited the generalizability of the results to the target population.
Poorly addressed	The sampling method includes elements of sampling bias, and the sample was probably non-representative of the target population. An appropriate sampling frame was not used for recruitment and/or the recruitment was likely to select subjects/participants that were not representative of the target population.
Not addressed	
Not reported	
Not applicable	
Notes	

1.2. – The sample size was adequate.

Well covered	The sample size for those completing measures well covered if 64 participants or more (1 tailed t-test-correlation with alpha $p = 0.05$, power 0.80 and medium effect size ($\rho = 0.3$) needs 64 participants per group).
Adequately addressed	The sample size for those completing measures adequately addressed if 49 – 63 participants (1 tailed t-test-correlation with alpha $p = 0.05$, power 0.70 and medium effect size ($\rho = 0.3$) needs 49 participants per group).
Poorly addressed	The sample size for those completing measures poorly addressed if less than 49 participants (1 tailed t-test-correlation with alpha $p = 0.05$, power less than 0.70 and medium effect size ($\rho = 0.3$)).
Not addressed	

Not reported	
Not applicable	
Notes	

2.1. – Valued living was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously.

Well covered	Standardised measure(s) of valued living used. The balance of evidence indicates that the psychometrics of the measurement tool(s) are robust (i.e., valid and reliable) in the targeted population.
Adequately addressed	Standardised measure(s) of valued living used with adequate psychometric properties, but little or no evidence of reliability and validity in the targeted population.
Poorly addressed	Non-standardised measure(s) of valued living used, or the measurement tool(s) have psychometric data, but the balance of evidence suggests that the psychometrics are poor.
Not addressed	
Not reported	
Not applicable	
Notes	

2.2. – Depression was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously.

Well covered	Standardised measure(s) of depression used. The balance of evidence indicates that the psychometrics of the measurement tool(s) are robust (i.e., valid and reliable) in the targeted population.
Adequately addressed	Standardised measure(s) of depression used with adequate psychometric properties, but little or no evidence of reliability and validity in the targeted population.
Poorly addressed	Non-standardised measure(s) of valued living used, or the measurement tool(s) have psychometric data, but the balance of evidence suggests that the psychometrics are poor.
Not addressed	
Not reported	
Not applicable	
Notes	

2.3. – Anxiety was measured correctly using instruments/measurements that valid and reliable, and had been trialled, piloted, or published previously?

Well covered	Standardised measure(s) of anxiety used. The balance of evidence indicates that the psychometrics of the measurement tool(s) are robust (i.e., valid and reliable) in the targeted population.
Adequately addressed	Standardised measure(s) of anxiety used with adequate psychometric properties, but little or no evidence of reliability and validity in the targeted population.

Poorly addressed	Non-standardised measure(s) of valued living used, or the measurement tool(s) have psychometric data, but the balance of evidence suggests that the psychometrics are poor.
Not addressed	
Not reported	
Not applicable	
Notes	

3.1. – The appropriate statistical analysis was used.

Well covered	The assumptions of the statistical test(s) were checked, and the appropriate statistical analysis was used to address the research question (e.g., correlation was used to test the relationship between valued living – depression/anxiety).
Adequately addressed	The appropriate analysis was used to address the research question; however, no information was given to enable determination as to whether the data met assumptions of the statistical test(s).
Poorly addressed	Unsuitable statistical analysis was used to address the research question.
Not addressed	
Not reported	
Not applicable	
Notes	

4.1. – Overall Risk of Bias

Low Risk of Bias	All criteria are rated as adequately addressed and/or well covered.
High Risk of Bias	One or more criteria is rated as poorly addressed.
Unclear	At least one criterion in the sample or method section (section 1 and section 2) is rated as not reported or not addressed, and/or statistical method and analysis section (section 3) is rated as not addressed, so not enough information to make a clear judgement.
Notes	