

## Review

## Growth mindsets and psychological distress: A meta-analysis

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## HIGHLIGHTS

- Results ( $k = 72$  samples;  $N = 17,692$ ) suggest a link between mindsets and mental-health outcomes.
- Growth mindsets are negatively related to psychological distress.
- Growth mindsets are positively related to treatment value and active coping.
- Domain and assessment of mindsets as well as assessment timing moderated effects.
- Effects did not differ based on psychological distress type or sample characteristics.

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## ABSTRACT

We investigated if growth mindsets—the belief in the malleable nature of human attributes—are negatively related to psychological distress and if they are positively related to treatment value and active coping. In the meta-analysis, we included articles published between 1988 and 2019, written in English, that reported on mindsets as well as a qualifying dependent variable and included information required to calculate an effect size. With a random effects approach, meta-analytic results ( $k = 72$  samples,  $N = 17,692$ ) demonstrated that mindsets relate, albeit with minimal effects, to distress, treatment and coping. Specifically, there is a negative relation between growth mindsets and psychological distress ( $r = -0.220$ ), a positive relation between growth mindsets and treatment value ( $r = 0.137$ ) and a positive relation between growth mindsets and active coping ( $r = 0.207$ ). Differences in mindset domain, assessment method of mindsets and timing of assessments moderated effects. There were not differences based on operationalization of psychological distress outcome or sample characteristics (i.e., developmental stage, diagnostic status, ethnicity). We discuss theoretical and practical applications of the findings.

## 1. Introduction

Mental health problems, which refer to a range of conditions (e.g., depression, anxiety disorders) are prevalent and costly. For example, in the United States, close to 19% of adults report a mental health problem (National Institutes of Health, 2017) and 13%–20% of children experience a mental health disorder in a given year (Centers for Disease Control and Prevention, 2013). Mental health disorders are on the rise globally, with estimates of \$16 trillion in costs to the global economy by 2030 (Patel et al., 2018). Considering increasing rates and expenses, identifying modifiable prevention and treatment targets that produce sizable reductions in the symptoms associated with mental health problems can inform large-scale treatment efforts.

In the current study, we examine the evidence regarding the potential to leverage growth mindsets, defined as beliefs in the malleability of human traits and attributes (Dweck & Leggett, 1988), to help reduce the burden of mental health problems. Specifically, we meta-analytically examine the link between growth mindsets and psychological distress, defined as symptoms of anxiety, depression, psychological stress, or absence of well-being. Further, we examine if growth mindsets are also linked to the value placed on seeking treatment, defined as positive attitudes and actions towards treatment. We also examined the link between growth mindsets and more active coping, defined as active steps such as reframing the meaning of problems or taking steps to solve problems that can help to reduce the negative impact of stressors on mental health. Finally, we offer an analysis of

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potential boundary conditions of these relations. A better understanding of links between growth mindsets and psychological distress as well links to potential mediators (i.e., treatment and coping) can help to identify specific functions of mindsets that can be used to improve intervention efforts in mental health. Before elaborating on findings from the meta-analysis, we first offer a theoretical overview of mindset theory.

## 2. Mindset theoretical approach

Building on a long tradition in psychology highlighting the importance of personal beliefs for understanding human behavior, the implicit theory, or mindset approach outlines how beliefs form a framework for assigning meaning to events, especially when facing adversity (Dweck, 2000; Dweck & Leggett, 1988). Individuals can vary along a continuum from fixed mindsets (beliefs that human attributes are relatively stable) to growth mindsets (beliefs that human attributes can be developed). Individuals can hold different mindsets across a range of attributes and abilities. For example, an individual may believe that their weight is relatively stable but that their intelligence can be changed. Additionally, these mindsets, although postulated to be somewhat consistent over time (Dweck, 2008), can also be shifted with one-shot laboratory manipulations (e.g., Alexander, 2016) and longer-term interventions (e.g., Paunesku et al., 2015).

Research on mindsets often focuses on beliefs about intelligence with the majority of this early work investigating the relation between mindsets, self-regulation, and academic goal achievement (e.g., Molden & Dweck, 2006). For example, growth, relative to fixed, mindsets are associated with learning goals, mastery-oriented strategies such as seeking help from teachers, and self-efficacy. In addition, growth, relative to fixed, mindsets are associated negatively with setting goals focused on outperforming peers, avoidant coping, and anxiety (Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013). Despite evidence for links to self-regulatory processes, more recent work suggests that the effects of growth mindsets on academic achievement are meager (Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018) and complicated (Chao, Visaria, Mukhopadhyay, & Dehejia, 2017).

Moving beyond goal achievement and academics, research extending mindsets to mental health contexts is accumulating and early work is promising. For example, an initial meta-analysis of youth reports that fixed mindsets are correlated with mental health problems ( $r = 0.25$ ; 95% CI = 0.19; 0.32,  $p < .001$ ; Schleider, Abel, & Weisz, 2015). We extend this synthesis by exploring relations in studies that included adults as well as youth, and research that incorporated various study designs (e.g., experimental studies, results of mindsets interventions). In addition, we report relationships between growth mindsets and two additional processes (i.e., treatment value, active coping) that might help prevent or reduce psychological distress. And, our more recent search added six years of literature—considering the increased attention to mindsets and mental health, the broader inclusion criteria, identified more than four times the number of samples than the earlier synthesis ( $k = 72$  current work;  $k = 17$  meta-analysis with youth, Schleider et al., 2015), which allowed for more insight into potential moderators of effects. We review this expanding literature as it relates to each of our outcomes of interest below.

## 3. Mindsets and psychological distress

Growth mindsets are postulated to buffer against the adverse impact of negative life events, in large part because maladaptive cognitions, such as believing in the fixed nature of one's condition, can presage psychopathology (e.g., Beck, 1987). Thus, it stands to reason that a more growth-oriented mindset should be associated with reduced psychological distress. In the current work, psychological distress is defined as symptoms of depression, anxiety, psychological stress, (absence of) well-being and absence of other distress-related constructs (e.g.,

suicidality). Further, clinically speaking, many treatments for psychological distress—for example, cognitive-behavioral therapy—are predicated on the idea that clients can make adaptive changes in the way they think, act, and, feel in response to situations and stressors in their lives. One of the first published studies (Tamir, John, Srivastava, & Gross, 2007) to examine the links between mindsets and distress did so in a sample of first year college students transitioning to college. In this study, growth mindsets of emotion correlated positively with positive emotions and well-being and negatively with negative emotions and depression. These findings support and extend earlier work linking patterns of beliefs to mental health outcomes (e.g., Beck, 1996; Wells & Matthews, 1996) by focusing on mindsets specific to the malleability of emotion. Additionally, in a sample of participants with social anxiety disorder, individuals with stronger fixed mindsets reported higher levels of perceived stress and anxiety (De Castella et al., 2014). Furthermore, interventions designed to foster growth mindsets help to reduce mental health symptoms. For example, in a sample of close to 600 participants, a growth mindset intervention, relative to a control, reduced the incidence of clinically significant reported depressive symptoms 9-months post intervention. The intervention consisted of a brief self-administered reading and writing activity that taught a growth mindset of personality, with a focus on people's socially relevant characteristics (Miu & Yeager, 2015).

Although correlational and laboratory studies as well as rigorous randomized trials support the theory that mindsets are related to psychological distress, other work fails to find such links. Additionally, the literature in this area is rapidly expanding with an increasing number of interventions designed to test the potential to leverage growth mindsets to reduce mental health problems (e.g., Calvete et al., 2019; Miu & Yeager, 2015; Schleider, Burnette, Widman, Hoyt, & Prinstein, 2019; Schleider & Weisz, 2016c; Schleider & Weisz, 2018). Thus, a cumulative understanding of the overall effect size across domains, designs, outcomes, and samples can provide a sense of whether the investment is warranted—that is, do growth mindsets relate to psychological distress, and if so, what is the size of this effect?

## 4. Mindsets, treatment, and coping

In addition to exploring if mindsets relate to psychological distress, we also examined two related and important outcomes. Namely, we investigated if individuals with stronger growth, relative to fixed, mindsets report engaging in more adaptive self-regulatory strategies including seeking help and reframing the meaning of the problem—what we term in the current work, treatment value and active coping. We define treatment value as treatment seeking and adherence behaviors, stronger intentions to engage in treatment, and more positive attitudes towards treatment. We define active coping as affective, cognitive, and behavioral strategies (e.g., problem-solving, cognitive reappraisal) that help individuals handle their distress in ways that engage with the discomfort, rather than avoid it.

First, in terms of the mindset to treatment value link, a person needs to believe in the potential to change in order to find treatment to be a meaningful path forward. Indeed, individuals with growth mindsets report placing greater value on their health (Thomas, Burnette, & Hoyt, 2019) and their fitness (Orvidas, Burnette, & Russell, 2018). Similarly, within mental health contexts, individuals with stronger growth, relative to fixed, mindsets of substance abuse problems report more positive attitudes towards treatment (Grand, 2001). Additionally, growth mindsets of personality predict more positive attitudes towards counseling and greater personal commitment to counseling (Angilella, 2005). In summary, in the current work, we examine if growth mindsets relate positively to treatment value and what the size of this effect is.

Second, in terms of the mindset to active coping link, growth mindsets set the stage for the meaning assigned to events, including affective and cognitive responses to distress. Individuals who hold stronger growth mindsets may be more likely to see affective states as

temporary and to engage in those feelings rather than attempt to avoid them. For example, a recent integrative review of the link between mindsets and emotion regulation presented evidence in support of the theory that growth mindsets of emotions are linked to more adaptive strategies that then subsequently relate to less emotional distress (Kneeland, Dovidio, Joormann, & Clark, 2016). Additionally, individuals with growth mindsets of chronic pain report engaging in active coping, which predicts lower levels of depression (Higgins, Bailey, LaChapelle, Harman, & Hadjistavropoulos, 2015). In another line of work, individuals with growth mindsets of emotions engage in more active coping and use cognitive reappraisal, with implications for improved social adjustment and fewer depressive symptoms (e.g., De Castella et al., 2013; Livingstone, 2012; Tamir et al., 2007). Thus, we expect a positive relation between growth mindsets and active coping strategies.

## 5. Moderators

The above review highlights likely links between mindsets and mental-health related outcomes but a question that remains is what strengthens or weakens these relations? In selecting moderators, we focused on variables in the literature that had the greatest degree of heterogeneity, had inconsistent findings, and/or those that could be especially relevant to clinical research and practice. This theoretically-driven approach led to seven moderators: domain of mindset (i.e., emotion, personality, intelligence, addiction, or other domain), assessment of mindset (i.e., measured or manipulated), time of assessment of outcome (i.e., immediate or longitudinal), psychological distress operationalization (i.e., anxiety, depression, stress, well-being, or other type), and sample-level characteristics including developmental stage (adolescence, emerging adult, adult), diagnostic status (diagnosed vs. not), and minority status of sample (percentage of sample that was white vs. non-white). We outline the theoretical reasoning for each of these moderators below and provide descriptive information for studies included in the meta-analysis. For the descriptive information, because multiple studies contributed to multiple categories, percentages often add to more than 100%. For example, some studies report effect sizes for both self-reports of mindsets and experimental manipulations and thus the sum of percentages for the moderator mindset assessment methods adds to more than 100%.

### 5.1. Mindset domain

When examining links between growth mindsets and psychological distress, the earliest work tended to focus on mindsets of intelligence and people. This is perhaps not surprising given the concentration on these two domains in predicting academic performance and person perception (Molden & Dweck, 2006). Following the introduction of emotion-related mindsets in the work of Tamir et al. (2007), investigations of this mindset domain, including mindsets about specific emotions such as anxiety and depression, have grown steadily. However, research often still includes mindsets of intelligence and people as the neuroplasticity of the brain and the idea that personalities and traits can and do change are relevant in models of mental health. Furthermore, research has also investigated mindsets related to addiction such as substance use (Grand, 2001) as well as attribute-specific mindsets that may contribute to mental-health concerns as well as treatment-seeking behaviors such as mindsets about shyness (Gillen, 2014; Valentin, Jencius, Jarek, Gier-Lonsway, & McGrath, 2013; Valentin, Mounts, Durik, & Gier-Lonsway, 2011), or mindsets about the nature of pain (Higgins et al., 2015). Overall, emotion mindsets were the most frequently represented among the samples in our review (54% of samples) followed by intelligence mindsets (25%), person mindsets (25%), or another attribute-specific mindset (22%). Only 3% of samples ( $k = 2$ ) reported on addiction-related mindsets and thus this specific sub-category is not used in the analysis section but is useful for a

descriptive review of existing domains.

In addition to the heterogeneity in the investigations of mindset domains, there are also inconsistencies in findings. For example, although some research does not find a significant link between mindsets of intelligence and mental health (Tamir et al., 2007), subsequent work reported that growth mindsets of math ability predicted fewer depressive symptoms (Da Fonseca et al., 2009) and that fostering growth mindsets of intelligence led to reduced anxiety among anxious adolescents (Da Fonseca et al., 2008). And, in terms of clinical relevance, in designing mindset interventions for psychological distress, identifying the domains associated with the strongest effect sizes has the potential to result in the most efficient and targeted mindset interventions. Here, we examined if any links between growth mindsets and the outcomes of distress, treatment, or coping are stronger or weaker depending on the domain in which researchers examined effects of mindsets.

### 5.2. Mindset assessment method

In addition to heterogeneity in the mindset domain, research also differed in terms of the method for assessing mindsets. Although the majority of research measured self-reported mindsets (89%), some used experimental practices or interventions to manipulate mindsets (19%). Additionally, although promising findings for distress have emerged from the literature regardless of assessment type, not all experimental work has found differences for treatment-related outcomes. For example, participants in a growth mindset, relative to a fixed mindset condition, reported comparable help-seeking intentions and attitudes towards mental health services (Alexander, 2016) but in a study assessing mindsets, growth mindsets predicted greater confidence in the potential effectiveness of treatment (Grand, 2001). In addition to heterogeneity in assessments and inconsistent findings, it is particularly important for clinical researchers to know the strength of the evidence that supports the potential efficacy of modifying mindsets in changing key outcomes if mindsets are to be considered potential treatment targets in the reduction of psychological distress. Thus, we examined if any links between growth mindsets and the outcomes of distress, treatment value, or coping are stronger or weaker depending on whether researchers assessed or manipulated mindsets.

### 5.3. Outcome assessment timing

Relatedly, we examined whether effect sizes differed based on the timing of the outcome assessment. Although relationships between mindsets and psychological distress, for example, have clearly emerged from cross-sectional work, there are fewer investigations that take a longitudinal approach and thus it is unclear whether mindsets are related to future outcomes. Indeed, in the current work, 93% reported cross-sectional effects, whereas only 28% looked at effects over time, with a range of 13 days to 18 months and a median of 4 months in terms of time between assessments. In addition to heterogeneity in assessment timing, the answer to this question is particularly important for clinical researchers because demonstration of longitudinal relations between mindsets and outcomes strengthens the possibility of a causal relationship and provides additional evidence of the potential utility for targeting mindsets in an effort to have a lasting impact on clinically relevant outcomes.

### 5.4. Psychological distress assessment operationalization

This moderator is relevant only for the link between growth mindsets and psychological distress. The included studies measuring psychological distress related to anxiety (38%), depression (56%), psychological stress (11%), (lack of) well-being (33%), or other distress-related outcomes (e.g., suicidality; 10%) with some studies examining several outcomes in the same sample. Findings are sometimes inconsistent depending on which symptom of distress is assessed. For example,

in a single session growth mindset intervention for female adolescents, the students receiving the mindset intervention, relative to those receiving the attention-matched control, reported modest but statistically significant reductions in depressive symptoms. However, the intervention failed to significantly reduce social anxiety symptoms (Schleider et al., 2019). Thus, a question that remains is are growth mindsets better predictors of certain psychological distress-related symptoms, relative to others?

### 5.5. Sample characteristics: developmental stage

Here, we focused on whether relationships between growth mindsets and psychological distress, treatment value, and active coping are stronger for adolescents (12–17), emerging adults (18–25) or adults (adult samples that range in age beyond 25)<sup>1</sup>. We made this distinction for three reasons. First, a majority of early work focused on youth, including an initial meta-analysis (Schleider et al., 2014), yet a substantial percentage of the samples we identified consisted of emerging adults (29%) and adults (45%). Second, although existing literature supports links in both youth (Schleider et al., 2014) and adults (e.g., Schroder, Callahan, Gornik, & Moser, 2018), other work only finds significant links between mindsets and mental health problems in adolescents, but not emerging adults, postulating the importance of identity development for meaningful relations to emerge (Rosenberg, Burt, Forehand, & Paysnick, 2016). Third, this distinction provides information for researchers seeking to replicate effects in different samples. Here, we examine if adolescence is a particularly critical developmental period in which personal beliefs such as mindsets are especially relevant for mental health-related outcomes.

### 5.6. Sample characteristics: diagnostic status

We examined whether the diagnostic status of the study sample moderated effects of mindsets on treatment value, active coping, and psychological distress. In the current work, the majority of samples were not diagnosed and were not identified as meeting research criteria for a disorder (79%). On one hand, mindsets may be more strongly related to these outcomes in non-diagnosed samples of participants due to increased variability in both mindsets and outcomes in these samples (i.e., less restriction of range). Yet, from a clinical perspective, it is important to investigate whether relationships between mindsets and outcomes “hold” when considering the types of participants who might arrive at the clinic seeking treatment for mental health problems—i.e., those who are identified as substantially psychologically distressed. It is important *not* to assume that the relationship between mindsets and outcomes of interest will be the same for individuals with and without clinical diagnoses relevant to the mindset domain. Thus, we explore diagnostic status as a moderator.

### 5.7. Sample characteristics: race/ethnicity of sample

Psychologists have a responsibility to consider the influence of culture on research findings and to work towards providing culturally competent and adaptive interventions to clients (American Psychological Association, 2017). Not only do mindsets about the nature of intelligence differ across cultures (e.g., Furnham, Chamorro-Premuzic, & McDougall, 2002), in a recent meta-analysis, culture moderated the link between intelligence mindsets and academic achievement outcomes (Costa & Faria, 2018). We found that the majority of samples in studies of mindsets and psychological distress were from the United States, making a nuanced examination of the effect of culture difficult in the available data. However, samples differed in

race/ethnicity, and thus, as a first step, we tested whether there was a relationship between the percentage of white vs. non-white participants (ranging from 0% to 97% white)<sup>2</sup> in each sample and the size of the mindset to mental-health related outcome relationships.

### 5.8. Summary

Overall, although some work finds fairly robust links between growth mindsets and reduced psychological distress, other studies find no such link, and there are limited cumulative analyses exploring strengths of relations between mindsets and treatment value or active coping within a mental health context, despite the potential importance of these processes for reducing distress. Additionally, we found a great deal of heterogeneity and inconsistent findings depending on mindset domain being studied, how mindsets or distress were assessed, and sample characteristics. Thus, we examine and report if relations are strengthened or weakened as a function of these. In summary, we examine the following main predictions and research questions:

- A. Growth mindsets correlate negatively with psychological distress.
- B. Growth mindsets correlate positively with greater treatment value.
- C. Growth mindsets correlate positively with more active coping.
- D. Does mindset domain, mindset assessment method, outcome assessment time point, psychological distress operationalization, sample developmental stage, sample diagnostic status, or sample race/ethnicity, moderate any of the links?

## 6. Method

### 6.1. Inclusion criteria

We included articles if they met four inclusion criteria (Fig. 1). First, our searches started at the date of the seminal work of Dweck and Leggett (1988) and concluded in September 2019. The first study, chronologically, that met our inclusion criteria was Grand (2001). Eighty-eight percent of included studies were published within the last ten years and 67% within the last five years, illustrating increasing interest in this area of research. Second, we retained only articles published in English. Third, the authors had to report sample sizes and data sufficient to calculate an effect size. Fourth, the study needed to report empirical data including at least one measure of mindsets (also called implicit theories) and at least one qualifying dependent variable.

To further describe this fourth search criteria, we only included studies that assessed beliefs about the changeable nature of the attribute. We did not include related but distinct work on the meaning of experiences as debilitating or enhancing (e.g., stress; Crum, Salovey, & Achor, 2013). That is, we focused on attribute-based mindsets, not experience-based mindsets. We also did not include measures exclusively assessing biomedical or essentialist thinking as we wanted to specifically investigate a mindset framework, and mindsets are postulated to come earlier in the psychological chain than essentialist thinking (e.g., Hoyt, Burnette, Auster-Gussman, Blodorn, & Major, 2017).

Qualifying dependent variables focused on clinical relevance and thus the study had to include psychological distress or treatment value outcomes. We focused on these two clinically-relevant variables in our initial search to avoid capturing studies that examined general coping strategies in the face of academic challenges. This type of relationship between mindsets and coping has been addressed by previous meta-analyses (e.g., Burnette et al., 2013) and is widespread in the literature.

<sup>1</sup> Only two included samples had an age range for childhood (< 12) and thus we did not consider this developmental stage in our analyses.

<sup>2</sup> Given the heterogeneity in how race/ethnicity of samples was reported across samples, this method of coding produced the most reliable results as well as preserved the largest number of samples for analysis. We recognize, however, that it is far from ideal in terms of representing the individuals in these samples.



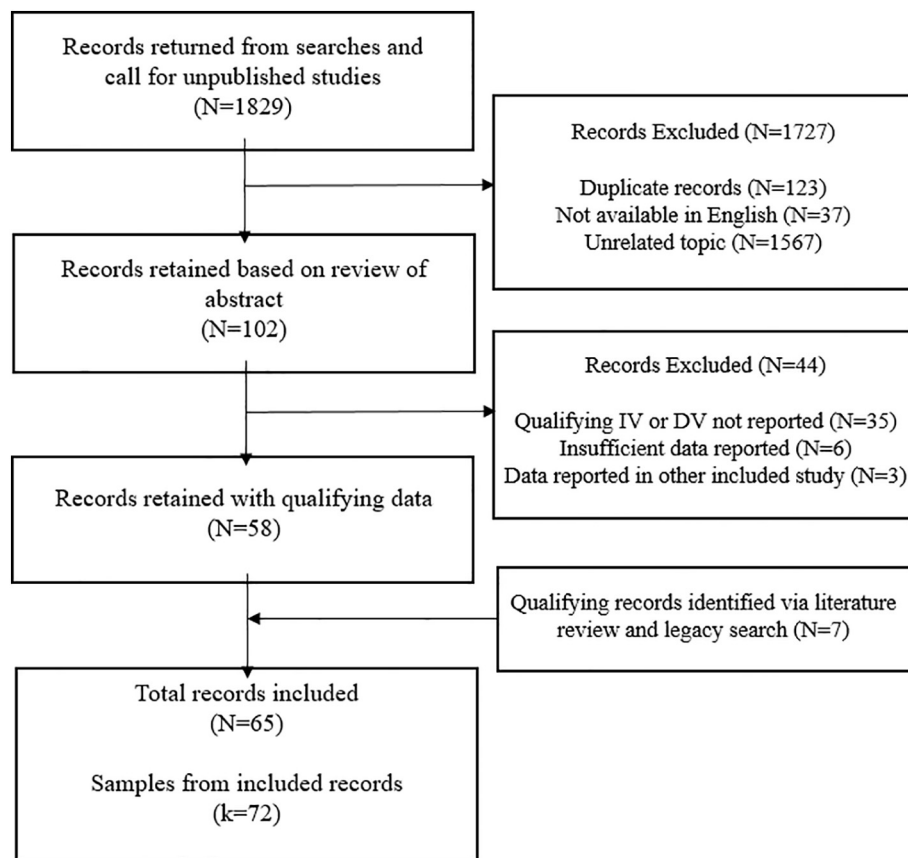


Fig. 1. Results of literature search and record inclusion/exclusion process. N indicates the number of records reviewed, while k denotes the total number of samples from those included records. See Appendix for full reference list of included studies.

Thus, we limited our main inclusion dependent variables to clinically-relevant outcomes of distress and treatment value to avoid capturing a host of non-relevant studies. Additionally, and related, for the variable psychological distress, we did not include measures of anxiety or distress related to specific situations (e.g., anxiety about academic performance or anxiety when interacting with a specific social outgroup) and we did not include effects on in-the-moment negative affect (e.g., PANAS). We also did not include outcomes related to childhood externalizing psychopathology due to the small number of these studies.

## 6.2. Study retrieval and selection

The literature search occurred in two phases using the same methodology. The first search occurred in September 2017 and an updated search was conducted in September 2019 to obtain the most complete and recent data. Searches were conducted using all search fields in PsycNet, all search fields in ProQuest dissertations and theses within psychology disciplines,<sup>3</sup> and Google Scholar.<sup>4</sup> Searches required the presence of at least one term related to the meta-analysis primary predictor variable (self-theories, lay theories, implicit theories, entity

theory, incremental theory, Dweck, mindset) and at least one term related to the outcome variables (mental health, symptom, treatment, clinical, mental illness, diagnosis, disorder, psychopathology, anxiety). To obtain unpublished studies, prior to the initial search, we queried members of the listservs of the Society for Personality and Social Psychology and the Association for Behavioral and Cognitive Therapies to submit unpublished data. We also included additional qualifying studies identified when researching the topic of the meta-analysis and studies identified by reviewing already-included papers (i.e., a legacy search), provided they met our inclusion criteria. See Fig. 1 for search and inclusion coding results and Appendix Table 1A for a full list of the studies included in the meta-analysis.<sup>5</sup>

## 6.3. Coding

For effect size coding, two independent coders extracted statistics required to calculate effect sizes. Coders extracted effect sizes for the relationship between mindsets and the outcome variables of mental health problems, treatment value, and active coping (Cohen's  $Kappa = 0.97$ , 98.61% agreement for these categories). We recoded the direction of all effects as needed to match hypothesized relations (e.g., if fixed mindsets were higher, we recoded such that growth was higher). Values based on mean differences (i.e., Cohen's  $d$ ) were converted to  $r$  values. We checked coding disagreements against the article and discussed to reach consensus.

<sup>3</sup> ProQuest searches initially returned an inordinately large number of hits with a large number of irrelevant results. We decided to exclude the term "mindset" from this search, as it seemed to be frequently used in a non-technical way in the hits we obtained, and added a stopping rule—specifically, results were sorted by relevance and inclusion review terminated when a full page of 100 irrelevant results was encountered.

<sup>4</sup> Because the purpose of the Google Scholar searches was to discover resources that may not have yet been indexed in the other databases and because Google Scholar searches return thousands of hits for each search, we decided a priori to only include the first 100 hits from this search.

<sup>5</sup> A full table of all descriptive information, coding, and effect sizes for each study is available from the first author.

#### 6.4. Moderators

All moderators also were also double-coded. Coders used a codebook developed for the study and met on a regular basis to address challenging coding situations and increase fidelity. Disagreements in the final coding datasets were identified and discussed to reach consensus. Coding occurred in two phases—one on the set of studies from the 2017 search and a second phase using the complete set of studies following the 2019 search. Inter-rater reliability for the first phase of coding was acceptable to excellent (Cohen's  $Kappa = 0.76$ – $1.0$ ; percent agreement =  $78$ – $100\%$ ). The second phase of coding used revised coding definitions as well as additional moderators—these changes were due in large part to reviewer feedback. Thus, reliability data presented in the following paragraph pertains to coding conducted on articles from the 2019 search using the final set of coding definitions.

We had seven moderators. First, for mindset domain, we coded whether the mindset related to the malleability of intelligence (referring to intelligence as well as brain plasticity) people (referring to general personality or kind-of-person mindsets), emotions (referring to a specific emotion, such as anxiety, or emotions in general), addiction, or another attribute-specific trait such as shyness.<sup>6</sup> Inter-rater reliability for this moderator code was excellent (Cohen's  $Kappa = 1.0$ , 100% agreement; Fleiss, 1981). Second, mindset assessment method was coded as whether mindsets were assessed or manipulated (Cohen's  $Kappa = 1.0$ , 100% agreement). Third, we coded whether the mindset-outcome relationship was measured cross-sectionally (i.e., the same day) or longitudinally (Cohen's  $Kappa = 1.0$ , 100% agreement). The fourth moderator related to psychological distress construct type—*anxiety, depression, stress, general well-being or other* (e.g., suicidality) (Cohen's  $Kappa = 1.0$ , 100% agreement). Our fifth, sixth, and seventh moderators related to sample differences. Here, we coded developmental stage (adolescence, emerging adult, adult; Cohen's  $Kappa = 0.95$ , 96.43% agreement), diagnostic status (whether or not all participants in the sample had been diagnosed with a mental health disorder or were categorized as meeting research criteria for a disorder; Cohen's  $Kappa = 0.91$ , 96.3% agreement), and percentage of the sample that was white/Caucasian (92.5% agreement).

#### 6.5. Meta-analytic approach

We used procedures outlined in Lipsey and Wilson (2001) to conduct all meta-analyses and tests of moderation in the R package *metafor* (Viechtbauer, 2010). We used random effects for the bivariate analyses. We report the number of included studies ( $k$ ), the overall sample size ( $N$ ), and the weighted mean correlation and accompanying standard error and 95% confidence interval. We also include an estimate of the true score variance ( $\tau$ ), Q-statistic test of within group heterogeneity, the I-squared, and 80% prediction interval. The within group Q-statistic provides a test of whether the observed heterogeneity exceeds the expected heterogeneity of a distribution where only sampling error was operating on effects (i.e., no moderators). The I-squared statistic provides a similar test but avoids the sensitivity to sample size that can bias the significance test of the Q-statistic. The I-squared ranges from zero to one with higher values indicating more variance in effect sizes. Finally, where there is true score variance ( $\tau > 0.00$ ), the prediction interval provides a range whereby one can estimate the extent that the true correlation varies across different subpopulations.

For the tests of moderators, we used restricted maximum likelihood meta-regression with the Knapp and Hartung (2003) modification for tests of moderation and when significant with three or more groups, we then report the between group F-statistics to determine the specific

groups that were statistically distinct. Consistent with past work indicating the instability of meta-regression results when  $k$  is small, we limited our univariate meta-regressions to those analyses where there were at least 3 included studies and multivariate meta-regressions to ten or more included studies.

#### 6.6. Duplicate cases and nested effect sizes

We used Wood's (2008) detection heuristics to determine any instance where the same data were reported in multiple outlets (e.g., a dissertation or conference paper that was later published in an academic journal). To avoid issues with outcome reporting bias (O'Boyle, Banks, & Gonzalez-Mulé, 2017), when duplicate effects were discovered, we opted for the earlier version of the data. For multiple effects (e.g., a study that used multiple measures of mindsets on a single sample could only be represented in any single analysis once), we averaged the correlates to obtain the effect size (Hunter & Schmidt, 2004). An alternative approach is to create a linear composite based on the intercorrelations of the effects and their correlations to the outcomes. However, in a large percentage of our results, the intercorrelations between treatments and outcomes were not available, resulting in our need to take the arithmetic average. When sample sizes differed across these effects (e.g., pairwise deletion resulted in a slightly different  $N$  across effects), we retained the smaller of the two sample sizes.

In the case where a study used multiple samples, each sample was included as a separate entry as long as it met the other inclusion criteria. However, when authors reported on the same data from the same sample across two different papers, we retained the data from the earlier report (i.e., Schleider & Weisz, 2016a, 2016b). When two papers reported on the same sample but the second paper reported additional (non-overlapping) data such as different outcomes, we retained both effects (e.g., Burnette, Hoyt, Dweck, & Auster-Gussman, 2017; Schleider et al., 2019; Schleider & Weisz, 2016c & Schleider & Weisz, 2018). And, when one paper (Miu & Yeager, 2015), included data from a sample that partially overlapped with samples from another included study (Yeager et al., 2014, studies 2 and 3), we included the larger sample (Miu & Yeager, 2015).

#### 6.7. Sensitivity analyses

Across the three simple relations between mindsets and distress, treatment value, and active coping, we tested for outlier and publication bias using the R package and shiny app *meta-SEN* (Field, Bosco, & Kepes, 2019). This package first seeks out outliers using diagnostics described in Viechtbauer and Cheung (2010) and then conducts publication bias tests with and without the outlier(s). Consistent with calls to take a triangulation approach to publication bias (e.g., Kepes, Banks, McDaniel, & Whetzel, 2012), we conducted three separate tests. The first was Duval and Tweedie's random effects trim and fill test. This is a test of symmetry that determines if small sample studies with either null effects or effects in the opposite direction of the overall effect are as likely to be included in the meta-analysis as similarly small sample studies finding large effects in the direction of the overall effect. The underlying logic is that underpowered studies that do not find either a statistically significant result or at least a result in the direction of what is generally found are disproportionately excluded from the literature (i.e., the file drawer problem). Their exclusion can lead to up an upward bias in the overall estimate. When these types studies are missing from the meta-analysis, the trim and fill technique provides an estimate of how many studies would need to be imputed on the underrepresented side in order to achieve symmetry ( $k_i$ ) and also what the effect size would be if the studies contributing to the asymmetry were excluded ( $r_i$ ). The second test was Orwin's fail safe  $N$  (Orwin, 1983). Unlike the traditional fail-safe  $N$ , this test avoids the reliance on statistical significance by examining how many null results ( $r = 0.00$ ) would be necessary to reduce the overall effect size estimate below a preset trivial

<sup>6</sup> This 5th category also included one intervention study that addressed multiple types of attribute-specific mindsets including for example self-regulation (Burnette, Russell, Hoyt, Orvidas, & Widman, 2018; Schleider et al., 2019).

**Table 1**  
Overall results.

| Outcome  | k  | N     | $\bar{r}$ | SE    | 95% CI         | $Q_{\text{within}}$ | $\tau$ | $I^2$ | 80% CV        | Cohen d |
|----------|----|-------|-----------|-------|----------------|---------------------|--------|-------|---------------|---------|
| Distress | 66 | 16438 | −0.220*** | 0.018 | −0.257; −0.184 | 406.59              | 0.129  | 81.5  | −0.423; 0.004 | −0.453  |
| Coping   | 19 | 5231  | 0.207***  | 0.029 | 0.150; 0.264   | 64.33               | 0.104  | 75.7  | 0.069; 0.345  | 0.423   |
| TxValue  | 15 | 2251  | 0.137***  | 0.028 | 0.081; 0.192   | 23.00               | 0.067  | 40.9  | 0.044; 0.230  | 0.277   |

Note. Distress is psychological distress, Coping is active coping, TxValue is treatment value.

threshold. The threshold chosen for triviality we selected was based on Cohen's (1988) benchmark for a small correlation ( $r = 0.10$ ,  $d = 0.20$ ). The final test used selection models (Vevea & Woods, 2005), which assesses the observed distribution of effect sizes against a hypothetical model with an a priori distribution of moderate publication bias.

## 7. Results

### 7.1. Analysis structure

We first report the direct associations of mindsets with psychological distress, treatment value and active coping (see Table 1). Next, we report our moderation results (see Table 2). Finally, we conclude with a discussion of the results regarding possible publication bias.

### 7.2. Mindsets, distress, treatment, and coping

First, we expected a negative relation between growth mindsets and distress. Consistent with this, results revealed a negative association of growth mindsets with psychological distress ( $r = -0.220$ , 95% CI  $-0.257$ ;  $-0.184$ ). Second, we expected a positive relation between growth mindsets and treatment value and active coping. These associations were positive and significant: treatment value,  $r = 0.137$ , 95% CI  $0.081$ ;  $0.192$  and active coping,  $r = 0.207$ , 95% CI  $0.150$ ;  $0.264$ .

### 7.3. Moderation analyses

We examined 7 moderators, 6 of which pertained to links between growth mindsets and all mental-health related outcomes—namely, psychological distress, treatment value, and active coping. Type of distress assessment (moderator four below) was only relevant for the growth mindset to distress link. We first discuss the overall test of moderation. Specifically, we used mixed-effects analysis with between groups  $F$ -statistic as the indicator of significant differences. The  $F$ -statistic has the same interpretation as it does in a primary data ANOVA (i.e., omnibus test of significant differences between groups). We then review the CI overlap for each outcome.

#### 7.3.1. Mindset domain

First, we examined if mindset domain moderated any of the three links. For this moderator, we had five categories: intelligence, people, emotion, addiction, and attribute-specific.

Due to our minimum threshold of three studies for any given category, we were limited to testing for differences across four categories of domain (intelligence, people, emotion, attribute-specific). For the mindset to psychological distress outcome, the  $F$  statistic is 9.75 ( $p < .001$ ). The relation between growth mindsets and psychological distress for intelligence mindsets is  $r = -0.105$ , 95% CI  $-0.170$ ;  $-0.039$ ; for people mindsets, it is  $r = -0.143$ , 95% CI  $-0.214$ ;  $-0.072$ ; for emotion mindsets it is  $r = -0.291$ , 95% CI  $-0.333$ ;  $-0.249$ ; and for other attribute-specific mindsets it is  $r = -0.179$ , 95% CI  $-0.249$ ;  $-0.109$ . We then compared the 95% confidence intervals at the different levels of the moderator to determine the direction and overlap or lack thereof. In terms of non-CI overlap, the effect for the growth emotion mindset to distress link is larger than that of people and intelligence mindsets and only barely overlaps with attribute-specific

mindsets.

Next, in terms of moderating effects for the growth mindset to treatment value link, we could only compare mindsets of people to mindsets of emotion. For this, we do not find a significant moderation by domain,  $F$ -between statistic = 0.14 ( $p = .720$ ). The relation for mindsets of people,  $r = 0.109$ , 95% CI  $-0.051$ ;  $0.268$ , compared to mindsets of emotion, which is  $r = 0.139$ , 95% CI  $0.049$ ;  $0.230$ , with substantial CI overlap. Finally, we examined if mindset domain moderated the growth mindset to active coping link. For this analysis, the  $k$  is only large enough to compare intelligence, people, and emotion mindsets. We find a significant moderation by domain,  $F$ -between statistic = 3.84 ( $p = .037$ ). The effect for intelligences mindsets,  $r = 0.097$ , 95% CI  $0.001$ ;  $0.193$ , is the smallest, person mindsets is the largest,  $r = 0.284$ , 95% CI  $0.152$ ;  $0.417$ , followed by emotion mindsets,  $r = 0.230$ , 95% CI  $0.169$ ;  $0.291$ . However, there is slight CI overlap between intelligence mindsets and mindsets of emotion and people and extensive overlap between emotion mindsets and people mindsets.

#### 7.3.2. Mindset assessment design

We next examined if type of mindset assessment (measured vs. manipulated) moderated any of the three links. For the mindset to distress link, we find a significant moderation by assessment type ( $F$ -statistic = 16.87,  $p < .001$ ), with effects only emerging in work where mindsets were measured  $r = -0.240$ , 95% CI  $-0.275$ ;  $-0.205$  but not for research using methods to induce growth mindsets,  $r = -0.05$ , 95% CI  $-0.134$ ;  $0.034$ . The CIs did not overlap indicating a significant difference between the two assessment types. For treatment value, we did not find a significant moderation by assessment type, ( $F$ -statistic = 2.27,  $p = .156$ ) with slightly larger effects, albeit not statistically different, emerging for measured mindsets,  $r = 0.169$ , 95% CI  $0.094$ ;  $0.243$  compared to research using methods to induce growth mindsets,  $r = 0.086$ , 95% CI  $-0.008$ ;  $0.179$ . The  $k$  was too small for the active coping outcome as almost all of these studies relied on self-reported mindsets.

#### 7.3.3. Outcome assessment timing

We only had an adequate  $k$  to examine assessment timing as a moderator of the growth mindset to distress and coping links. For psychological distress, we do find a significant moderation by assessment timing,  $F$ -statistic = 5.22,  $p = .025$ . Here, effects are generally small, but slightly larger for cross-sectional effects,  $r = -0.243$ , 95% CI  $-0.282$ ;  $-0.204$ , relative to longitudinal effects,  $r = -0.150$ , 95% CI  $-0.221$ ;  $-0.080$ , with slightly overlapping CIs. For coping, we did not find a significant moderation by assessment timing,  $F$ -statistic = 0.523,  $p = .48$ : cross-sectional effects,  $r = 0.215$ , 95% CI  $0.152$ ;  $0.278$ , relative to longitudinal effects,  $r = 0.148$ , 95% CI  $-0.036$ ;  $0.331$  with overlapping CIs.

#### 7.3.4. Psychological distress assessment type

This moderator is only relevant for the growth mindset to distress link. There is no discernable difference in effect sizes depending on type of distress outcome assessed. The  $F$ -statistic is 0.137,  $p = .97$ . Specifically, effects the following: anxiety,  $r = -0.224$ ; depression,  $r = -0.221$ ; stress,  $r = -0.257$ ; absence of well-being,  $r = -0.237$ , other distress,  $r = -0.247$  with all CIs overlapping.

**Table 2**  
Tests of categorical moderators.

| Moderators           | N      | k samples | $\bar{r}$ | 95% CI         | F-statistic | Group difference |
|----------------------|--------|-----------|-----------|----------------|-------------|------------------|
| 1. Mindset Domain    |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Emotion              | 10,623 | 37        | −0.291    | −0.333; −0.249 | 9.75***     | EMO > PER, IQ    |
| Person               | 3283   | 14        | −0.143    | −0.214; −0.072 |             |                  |
| Intelligence         | 3332   | 16        | −0.105    | −0.170; −0.039 |             |                  |
| Other trait          | 2826   | 15        | −0.179    | −0.249; −0.109 |             |                  |
| Mindset-Coping       |        |           |           |                |             |                  |
| Emotion              | 4995   | 16        | 0.230     | 0.169; 0.291   | 3.84*       |                  |
| Person               | 540    | 4         | 0.284     | 0.152; 0.417   |             |                  |
| Intelligence         | 2387   | 6         | 0.097     | 0.001; 0.193   |             |                  |
| Mindset-TxValue      |        |           |           |                |             |                  |
| Emotion              | 1557   | 9         | 0.139     | 0.049; 0.230   | 0.14        |                  |
| Person               | 438    | 3         | 0.109     | −0.051; 0.268  |             |                  |
| 2. Mindset Method    |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Measured             | 15,534 | 60        | −0.240    | −0.275; −0.205 | 16.87***    | MES > MAN        |
| Manipulated          | 3334   | 12        | −0.050    | −0.134; 0.034  |             |                  |
| Mindset-TxValue      |        |           |           |                |             |                  |
| Measured             | 1248   | 9         | 0.169     | 0.094; 0.243   | 2.27        |                  |
| Manipulated          | 1003   | 6         | 0.086     | −0.008; 0.179  |             |                  |
| 3. Outcome Timing    |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Cross-Sectional      | 14,931 | 59        | −0.243    | −0.282; −0.204 | 5.22*       |                  |
| Longitudinal         | 4829   | 19        | −0.150    | −0.221; −0.080 |             |                  |
| Mindset-Coping       |        |           |           |                |             |                  |
| Cross-Sectional      | 5205   | 18        | 0.215     | 0.152; 0.278   | 0.52        |                  |
| Longitudinal         | 350    | 3         | 0.148     | −0.036; 0.331  |             |                  |
| 4. Distress Type     |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Anxiety              | 6168   | 27        | −0.224    | −0.285; −0.162 | 0.14        |                  |
| Depression           | 10,109 | 40        | −0.221    | −0.270; −0.172 |             |                  |
| Stress               | 2104   | 8         | −0.257    | −0.365; −0.149 |             |                  |
| Well-Being (lack of) | 6459   | 24        | −0.237    | −0.299; −0.175 |             |                  |
| Other                | 2657   | 7         | −0.247    | −0.363; −0.131 |             |                  |
|                      |        |           |           |                |             |                  |
| 5. Development Stage |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Adolescent           | 5139   | 17        | −0.190    | −0.266; −0.115 | 1.22        |                  |
| Emerging Adult       | 5745   | 17        | −0.209    | −0.282; −0.136 |             |                  |
| Adult                | 4456   | 26        | −0.262    | −0.324; −0.199 |             |                  |
| Mindset-Coping       |        |           |           |                |             |                  |
| Emerging Adult       | 2962   | 8         | 0.189     | 0.097; 0.281   | 1.72        |                  |
| Adult                | 1766   | 8         | 0.274     | 0.169; 0.380   |             |                  |
| Mindset-TxValue      |        |           |           |                |             |                  |
| Emerging Adult       | 249    | 3         | 0.102     | −0.073; 0.277  | 0.26        |                  |
| Adult                | 1737   | 11        | 0.147     | 0.067; 0.228   |             |                  |
| 6. Sample Dx Status  |        |           |           |                |             |                  |
| Mindset-Distress     |        |           |           |                |             |                  |
| Not Diagnosed        | 14,776 | 51        | −0.222    | −0.264; −0.180 | 0.05        |                  |
| Diagnosed            | 1662   | 15        | −0.211    | −0.297; −0.126 |             |                  |
| Mindset-Coping       |        |           |           |                |             |                  |
| Not Diagnosed        | 5025   | 16        | 0.191     | 0.128; 0.254   | 2.93        |                  |
| Diagnosed            | 206    | 3         | 0.350     | 0.164; 0.535   |             |                  |
| Mindset-TxValue      |        |           |           |                |             |                  |
| Not Diagnosed        | 1341   | 8         | 0.142     | 0.058; 0.226   | 0.07        |                  |
| Diagnosed            | 910    | 7         | 0.126     | 0.030; 0.222   |             |                  |

Note. Distress is psychological distress, Coping is active coping, TxValue is treatment value.

\*  $p < .05$ .

\*\*\*  $p < .001$ .

### 7.3.5. Sample-level differences

We also explored three sample characteristics as moderators of all the links. For developmental stage, although effects are strongest for adults for all three outcomes of distress, treatment value and active coping, this larger effect is not statistically significant for distress  $F$ -statistic = 1.220,  $p = .30$ ; treatment value,  $F$ -statistic = 0.262,  $p = .618$ ; or active coping,  $F$ -statistic = 1.72,  $p = .211$ . For diagnostic status (yes vs. no), effects are similar for psychological distress,  $F$ -statistic = 0.051,  $p = .82$ ; treatment value,  $F$ -statistic = 0.071,  $p = .79$ , and coping,  $F$ -statistic = 2.93,  $p = .11$ . In terms of the sample race/

ethnicity, none of the meta-regression coefficients were statistically significant when entered individually or in conjunction. That is, regardless of what proportion of the samples were white, the effects between mindsets and outcomes were essentially unchanged.

### 7.4. Publication bias analyses

As described above, we took a triangulation approach. The first test, trim and fill, showed no evidence of publication bias on the hypothesized (i.e., weaker effect) side of the effect size distributions. The



remaining fail-safe N tests showed that in order to negate the observed effects, then it would require 1561, 383, and 192 “file drawer” studies with effect sizes of zero and in order to reduce the observed effects to Cohen standards of small ( $r = 0.10$ ,  $d = 0.20$ ), it would require 215, 21, and 6 file drawer studies, respectively. Given that to negate the effects it would require several orders of magnitude more studies than those identified, the likelihood of this many studies having been conducted but not included in our meta-analysis is quite slim. Regarding treatment value, the relatively small number of included studies ( $k = 15$ ) coupled with a relatively small effect ( $r = 0.137$ ) meant that it would only take 6 unidentified studies to drive the overall effect below the Cohen threshold for small. The final test, [Vevea and Woods \(2005\)](#) selection models also showed little to no bias with no effect size changing by more than  $|0.02|$ .

## 8. Discussion

In the present meta-analysis, we provided an empirical synthesis of the links between mindsets and mental health outcomes. In total, we meta-analyzed results from 72 samples and over 17,000 research participants across all the samples. First, we find a negative and small link between growth mindsets and psychological distress. This effect is similar in strength and size to the earlier findings from the meta-analysis of fixed mindsets and youth mental health problems ([Schleider et al., 2015](#)). Additionally, we find a positive relation between growth mindsets and treatment value as well as active coping. The effects for these two outcomes in the current work are slightly smaller than an earlier meta-analysis examining the link between mindsets and related self-regulatory processes such as negative affect and coping within achievement domains ([Burnette et al., 2013](#)). This discrepancy may be explained by the fact that past cumulative analyses examined responses to self-regulatory failures typically related to achievement goals, such as getting better grades in school. In the current context, our treatment value and active coping outcomes are in the context of potent emotions and longer lasting difficulties that are potentially more stressful.

Of the seven moderators we tested, a few notable differences and similarities emerge. First, in terms of mindset domain, emotion-based mindsets are most strongly related to psychological distress with little to no CI overlap with other types of mindsets. Second, for mindset assessment method (measured vs. manipulated), the relationship between mindsets and psychological distress is stronger for work that uses self-reports relative to when mindsets are manipulated. Third, in terms of outcome assessment timing, cross-sectional effects are more robust than longitudinal effects for psychological distress. In terms of similarities of effects, the link between growth mindsets and psychological distress are very comparable regardless of how distress is operationalized (e.g., anxiety, depression, stress, absence of well-being, other distress). And, effects held across sample characteristics, including development stage, diagnostic status and race/ethnicity.

There are also clear gaps identified by a lack of sufficient studies to test some moderators. For example, more work is needed examining mindsets of addiction. Additionally, studies that investigated links between mindsets and coping rarely, if ever, manipulated mindsets. Furthermore, there are limited studies that explore links to treatment value outcomes using longitudinal designs and assessments. Finally, more work is needed that looks at cultural differences. Overall, the moderator tests highlight the importance of delineating the mindset domain and mindset assessment method for understanding links to psychological distress—the literature on links to treatment value and coping are still developing and more work will be needed to fully examine moderators for these outcomes.

### 8.1. Theoretical and clinical implications

Prior meta-analytic work on mindsets has focused primarily on academic motivation and achievement, although a small-scale meta-

analysis of youth and mental health problems provided an initial look at the evidence linking mindsets to mental health problems for self-reported mindsets in a small sample of youth ([Schleider et al., 2015](#)). We extended this work by examining effects across mindset assessments and populations and by examining two potential processes by which growth mindsets may help to reduce distress—treatment value and active coping. Providing information about process of change is critical for intervention development. We also highlight relevant boundary conditions and gaps in the literature. Overall, additional work is needed to better understand when and why growth mindsets may help to reduce psychological distress.

Notably, the effect size in the current work for the growth mindset to psychological distress link is twice as large as the effect observed in prior analyses for the link between growth mindsets and academic achievement ([Costa & Faria, 2018](#); [Sisk et al., 2018](#)). Also promising from a clinical perspective is our finding that the magnitude of effects is comparable for diagnosed and undiagnosed samples. Furthermore, the magnitude of the mindsets-distress effect is not the only relevant consideration when considering the potential value of mindsets in clinical settings. For example, researchers examining academic performance have indicated that effect sizes of about 0.20 are of policy interest ([Hedges & Hedberg, 2007](#)). In the current work, mental health problems are difficult to impact, and thus the size of the effects we observed suggest that they may be clinically relevant ([Durlak & Wells, 1997](#); [Haney & Durlak, 1998](#); [Wilson & Lipsey, 2007](#)). Importantly, emotion mindsets had the strongest link with psychological distress. If future research confirms the malleability of these mindsets, they could be targeted in interventions. To get an initial glimpse of the potential application of our findings for reducing psychological distress via growth mindset interventions, we examined the mean effect of only the studies that manipulated mindsets and examined distress longitudinally ( $d = 0.22$ ). This effect size is much more promising than that of interventions seeking to improve academic achievement ( $d = 0.04$ ; [Sisk et al., 2018](#)). However, it is important to note that this effect represents only eight studies with six of the samples consisting of adolescents and only one sample diagnosed with a psychological disorder. Given our findings, more research is needed that develops and tests growth mindset interventions targeting adults with elevated distress or a diagnosed disorder.

The current work not only highlights areas of future inquiry but also has potential implications for clinicians. When engaging clients in treatments that require self-regulatory behaviors—such as taking medications, completing cognitive-behavioral therapy homework, and attending treatment sessions—clinicians use various strategies to inspire hope and optimism in order to motivate their clients. The growth mindset literature analyzed here suggests that it may be useful to directly elicit and address clients' beliefs about the degree to which their problematic and distressing emotions and other symptoms are malleable through their efforts, by seeking help from others, and by adopting adaptive coping strategies—that is, clinicians should assess and address the client's mindset about the presenting problem. Such an approach is consistent with several therapeutic approaches including the process of self-liberation in the Transtheoretical Model ([Prochaska, DiClemente, & Norcross, 1993](#)) and the process by which therapists evoke hope and confidence in Motivational Interviewing ([Miller & Rollnick, 2013](#)). Thus, when using the common clinical strategy of assessing barriers to behavior change, clinicians should consider the client's mindset about the problem as one potential barrier to explicitly assess and address.

### 8.2. Limitations and future directions

Before putting findings into practice or policy, we discuss three potential limitations (many of which apply to most meta-analyses) that scholars should consider when interpreting the meta-analytic findings, each of which can serve as a springboard for future research. First, some of the effect sizes, especially those examining moderators, were based

on small sample sizes, and such samples tend to bias the effect size upward (Reynolds & Day, 1984). Along this line, especially for treatment value, we collapsed across various assessments (e.g., treatment attitudes, adherence) to obtain a large enough  $k$  and we had limited data from primary sources that tested actual treatment behavior—thus, this outcome better represents attitudes than behavior.

Second, the extant literature did not allow us to address unique effects or explore how these processes unfold over time. For example, we could not assess the magnitude of the association of mindsets with psychological distress while also controlling for the association through treatment value or coping strategies. Additionally, mindsets are “knowledge structures that follow the basic principles of knowledge activation” and are thus susceptible to similar theoretical processes of change (Plaks, Levy, & Dweck, 2009, p. 1071). And, importantly this means that relations are likely bi-directional. Mindsets can be altered via priming such as through reading an article presenting the case for one type of mindset vs. another or instead via persuasion such as an intervention designed to foster stronger growth mindsets. Mindsets are beliefs, similar to, yet distinct from self-efficacy (Bandura, 1982) and likely also change as a function of personal experiences. For example, within the context of mental health, individuals who are able to change their thought patterns and engage in therapy, likely experience less psychological distress, which in turn fosters a belief in their own potential to change as a person—a growth mindset develops. For example, De Castella et al. (2015) found that growth mindsets of anxiety increased during CBT for social anxiety and that mindsets mediated the effect of treatment on social anxiety symptoms. This type of mindset, in turn, may be linked to motivation to improve, which can help to alleviate symptoms as well. Thus, relations are dynamic with mindsets changing as a function of self-regulatory processes and motivation and these processes and symptoms also changing as a function of one's own mindset. However, we were unable to examine such theoretical underpinnings in the current work and future prospective studies of the relationship between mindsets and treatment are needed.

Third, meta-analyses are dependent on the quality of original studies and their methodology and the utility of meta-analyses is, more generally, under scrutiny (Flather, Farkouh, Pogue, & Yusuf, 1997; Gurevitch, Koricheva, Nakagawa, & Stewart, 2018). For example, much of the work included in this meta-analysis failed to adhere to best practices to avoid false positives and to contribute to replicability (e.g., Hengartner, 2018; Open Science Collaboration, 2015; Pashler & Harris, 2012). To enhance the yield of work examining the link between mindsets and mental health problems, we suggest scholars incorporate adequate power to detect effects, reduce researcher degrees of freedom (Simmons, Nelson, & Simonsohn, 2011), engage in open science practices, pre-register hypotheses, and incorporate a constraint on generality statement (Leichsenring et al., 2017; Simons, Shoda, & Lindsay, 2017; Tackett et al., 2017). Additionally, aggregated syntheses like the one offered here should be a companion to large-scale highly powered primary studies to maximize the ability to draw conclusions (Gurevitch et al., 2018).

Despite the potential limitations related to interpreting effects from the current meta-analysis, the present work also exhibits considerable strengths. It offers a systematic review examining the literature linking mindsets and mental health outcomes. Findings highlight the associations of mindsets with not only psychological distress but also treatment value and active coping, thereby allowing scholars to examine how growth mindsets are likely to promote greater well-being. This is a timely contribution in light of the recent work related to academic outcomes questioning the importance of mindset research (Sisk et al., 2018) and considering the growth in the area of mindsets and mental health. For example, half of the included studies in the current analysis were published in the last five years (2015–2019). Additionally, we examined effects across diverse domains (e.g., intelligence, emotion, addiction), assessments (e.g., correlation and manipulated), and ages (e.g., youth and adults). And, the moderation analyses offer insight into

boundary conditions of relations and identified gaps for future research.

### 8.3. Future research

The limitations and strengths of the current work highlight areas for additional work. For example, more research is needed to address the likely cyclical and recursive nature of links. Researchers should incorporate longitudinal studies with multiple time points to better tease apart the “which came first” question. Recent work has shown that depressive symptoms predict social problems in children, not the other way around (Kochel, Ladd, & Rudolph, 2012). In addition, researchers should control for baseline symptom severity when looking at the relationship between mindsets and psychological distress to assure that fixed mindsets are not simply a marker of more severe and tenacious mental illness and accompanying distress. One recent study (Schroder et al., 2018) found that mindsets predicted future psychological distress when controlling for baseline depression and distress but more work is needed to confirm these findings.

Additionally, future work could investigate the effects of treatment (e.g., CBT, medicine) on mindsets and other regulatory processes (e.g., coping, emotion regulation). Additional clinical research on established strategies to enhance behavior change (e.g., Motivational Interviewing) could examine the extent to which these treatments change mindsets and the extent to which that process of mindset change is necessary for overall treatment effects. And, future work should focus on the extent to which existing clinical approaches (e.g., Transtheoretical Model, Motivational Interviewing) involve addressing and changing mindsets.

Furthermore, although emotion mindsets seem to be the most valuable mindset to target in interventions designed to reduce distress, our moderator tests could not tease apart the effects of trait-based mindsets about emotions (e.g., social anxiety disorder) vs. mindsets about states (e.g., in-the-moment anxiety). We only found one study that addressed this directly by looking at somatic anxiety vs. worry (Schroder, Dawood, Yalch, Donnellan, & Moser, 2016). This is an important avenue for future work and for developing a standard of implementation of mindset interventions designed to reduce mental health problems. It is possible, for example, that for people with anxiety disorders, believing that one's in-the-moment bodily experience of anxiety should be *directly controllable* might be related to increased emotion suppression and decreased acceptance, contributing to lingering emotional distress (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Dan-Glauser & Gross, 2015), whereas targeting trait-based emotions may be a more effective strategy.

Related, a question that often arises, especially in health domains with potential stigma is whether growth mindset messages have costs for some individuals. For example, the stigma asymmetry model illustrates how and when a growth mindset can both decrease and increase stigma. Labeling a stigmatized attribute as changeable, rather than fixed can increase prejudice by enhancing the blame placed on stigmatized individuals for their condition, but also decreases negative attitudes towards overweight individuals via a reduction in essentialist thinking (Hoyt et al., 2017). Recent work found that a growth mindset compensatory message offsets the blame but maintains the self-regulatory benefits (Burnette et al., 2017). This message stressed not blaming oneself or others for the onset of the weight and also highlighted how effortful targeted strategies could still contribute to future weight-loss goals. Such compensatory messaging may be particularly relevant in the mental health domain for clients who have experienced chronic mental health issues, in order to avoid “blaming the victim” and to enhance motivation for treatment-related change. Taken together, we suggest that researchers begin to develop and test carefully crafted compensatory growth mindset interventions focusing specifically on beliefs about emotions and emotional disorders in an effort to improve mental health.

## 9. Conclusions

Across disciplines, recent trends indicate a sustained interest in mindsets, with extensions to numerous novel health contexts (e.g., tobacco use and cessation; Thai, Coa, & Kaufman, 2018). There has been an especially large surge in research related to mindsets and mental health in the past few years. In summarizing this line of work, the present meta-analysis finds that growth mindsets are correlated positively with treatment value and active coping and negatively correlated with psychological distress. Theoretical analyses and results suggest that links are robust when considering sample characteristics. However, the mindset domain and type of assessment are moderators. Thus, one important conclusion from the present meta-analysis is that the associations of mindsets with mental health outcomes are not straightforward and that more work is needed to understand when and how mindsets impact psychological distress. More specifically, we emphasized a need for studies that (a) outline under what conditions findings hold (b) test the effectiveness of interventions aimed at improving mental health, and (c) engage in recommendations for best scientific practices. By providing an empirical summary of the existing literature, the present work provides a platform for researchers and clinicians to sharpen their hypothesis generation process, tailor their approaches, and develop and hone mindset interventions designed to reduce psychological distress.

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## Contributors

Jeni Burnette and Laura Knouse (Authors 1 and 2) designed the study, contributed to coding, and wrote the manuscript. Dylan Vavra, Author 3, conducted literature searches and coding. Ernest O'Boyle, Author 4, conducted the statistical analyses. Milan Brooks, Author 5, helped with article retrieval and coding. All authors approve of final manuscript submission.

## Declaration of Competing Interest

Declarations of interest for all authors: none.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cpr.2020.101816>.

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## Further-reading

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*Neuroscience and Education*, 12, 22–31. <https://doi.org/10.1016/j.tine.2018.07.003>.

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