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# The Metacognitive Processes of Decentering Scale: Development and Initial Validation of Trait and State Versions

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## Abstract

The ability to decenter from internal experiences is important for mental health. Consequently, improving decentering is a common therapeutic target, particularly for mindfulness-based interventions. However, extant decentering measures are limited as they fail to directly assess all three meta-cognitive processes recently theorized to sub-serve decentering. We thus conducted four studies to develop and test the Metacognitive Processes of Decentering – Trait (MPoD-t) and State (MPoD-s) scales. Consistent with the metacognitive processes model, exploratory factor analysis (*N*=355) and then bifactor exploratory structural equation modeling (*N*=275) indicated the MPoD-t was composed of three independent yet inter-related lower-order factors, meta-awareness, (dis)identification with internal experience, and (non)reactivity to internal experience, which sub-served an emergent, higher-order, decentering factor. We next found evidence of the MPoD-t's convergent validity; as well as known-groups criterion validity, wherein mindfulness practitioners reported higher MPoD-t scores than non-practitioners. Item response theory analyses were then used to identify a subset of three MPoD-t items for the MPoD-s. Finally, we found evidence that the MPoD-s was sensitive to changes in state decentering following a brief mindfulness induction relative to an active control condition; and that MPoD-s changes mediated the effect of mindfulness on levels of pain and related outcomes among a sample of preoperative surgery patients (N=82). These studies indicate the trait and state versions of the MPoD may prove useful for the study of decentering and its constituent metacognitive processes. As such, the MPoD may help advance our understanding of how the metacognitive processes of decentering support mental health and well-being.

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**Keywords**

Decentering; Meta-Awareness; (Dis)Identification; (Non)Reactivity; Mindfulness

The tendency to become immersed in internal experiences – such as thoughts, emotions, and physical sensations – differs between individuals, over time, and across contexts (e.g., Davis, Lau, & Cairns, 2009; Fresco et al., 2007; Lau et al., 2006). In moments of immersion, one is often reflexively identified with and reactive to internal experience (e.g., Dorjee, 2016; Kross & Ayduk, 2017). From a phenomenological perspective, immersion often imbues internal experience with veridicality and emotional intensity. Consequently, immersion in internal experience may bias attention, shape thought, and motivate behavior. At other times, one can be decentered from internal experiences, maintaining a third-person perspective on thoughts, emotions and physical sensations (Ayduk & Kross, 2010; Kross & Grossmann, 2012). Decentering is defined as the capacity to shift experiential perspective from being immersed in one's internal experience to objectively observing that experience from a psychological distance (Bernstein et al., 2015). From a decentered perspective, a person observes thoughts, emotions and physical sensations as transient internal experiences, without personally identifying with or automatically reacting to them. This perspective often reduces the maladaptive emotional and behavioral impact of negative internal states. Thus, immersion and decentering may be thought of as polar states on a continuum with distinct emotional and behavioral consequences. For example, whereas immersion may amplify emotional and behavioral reactivity to internal experience, decentering may facilitate equanimity and behavioral choice (Ayduk & Kross, 2010; Bernstein et al., 2015; Kross & Ayduk, 2017; Kross & Grossmann, 2012; Shoham, Hadash, & Bernstein, 2018; Verduyn, Mechelen, Kross, Chezzi, & Bever, 2012).

The ability to decenter appears to be important for mental health (Bernstein, Hadash, & Fresco, 2019; Bernstein et al., 2015; King & Fresco, 2019; Teasdale, 1999), and therefore, is a common target and mechanism of action in mindfulness-based interventions as well as other mental health interventions (e.g., Cognitive Therapy: Beck, 1979; Mindfulness Oriented Recovery Enhancement: Garland, 2013; Acceptance and Commitment Therapy: Hayes et al., 1999; Mindfulness-Based Cognitive Therapy: Segal, Williams, & Teasdale, 2002; Farb et al., 2018). Accordingly, research interest in decentering and its metacognitive processes has grown rapidly over the past three decades (for reviews see: Bernstein, Hadash, & Fresco, 2019; Bernstein et al., 2015). Following Beck's formulation of cognitive distancing (Beck, Rush, Shaw, & Emery, 1979) in the late 1970s, a number of conceptually related metacognitive processes have been proposed such as self-as-context (Grieger, 1985), decentering (Safran & Segal, 1990), cognitive defusion (Hayes et al., 1999), metacognitive mode (Wells, 2000), metacognitive awareness (Segal et al., 2002), self-distanced perspective (Kross, Ayduk, & Mischel, 2005), and reperceiving (Shapiro, Carlson, Astin, & Freedman, 2006).

Given the surge of interest in this metacognitive phenomenon, renewed efforts have been made to more precisely and comprehensively conceptualize and operationally define decentering, as well as integrate and isolate key features of decentering across

a variety of closely related literatures and constructs (e.g., cognitive defusion, self-distanced perspective). Synthesizing these literatures, Bernstein et al. (2015) proposed the metacognitive processes model of decentering. Decentering is conceptualized in this model as an emergent, multidimensional construct, comprised of three core metacognitive processes: meta-awareness, (dis)identification with internal experience, and (non)reactivity to thought content. Bernstein et al. (2015) proposed that *meta-awareness* involves awareness of internal experience or the processes unfolding in consciousness. Indeed, two levels of awareness may be distinguished (Nelson, Stuart, Howard, & Crowley, 1999). The object level of awareness is oriented to the contents of awareness such as awareness of the content of thought, whereas the meta level of awareness is oriented to the process or experience of thinking. For example, one can be aware of a thought's contents (e.g., "I am a failure"), or aware of both the contents as well as the process of thinking (e.g., "'I am a failure' is a thought"). (*Dis)identification with internal experience* involves experiencing internal states, such as thoughts, emotions, and bodily sensations, as separate from one's sense of self ("I am having a feeling of anxiety"). In contrast, identification with internal experience renders the experienced thoughts, emotions and physical sensations as not only owned by oneself but as one's self ("I am anxious"). *(Non)reactivity to thought content* is the degree to which thought content impacts other mental processes such as attention, cognitive elaboration, motivation, or motor planning. Nonreactivity may be expressed in a number of ways such as reduced belief in thought content or dereification of thought content. For example, reduced reactivity to a depressive thought ("I am worthless") may limit the habituated cascade of cognitive (e.g., rumination), emotional (e.g., sadness), bodily (e.g., "heaviness"), and behavioral (e.g., social withdrawal) reactions that reactivity could produce.

A number of extant self-report scales have been developed to measure decentering and/or one or more of the metacognitive processes thought to subserve decentering. A non-exhaustive list of these scales includes the following: the Experiences Questionnaire (Fresco et al., 2007), Toronto Mindfulness Scale (Davis et al., 2009; Lau et al., 2006), Drexel Defusion Scale (Forman et al., 2012), Cognitive Fusion Questionnaire (Gillanders et al., 2014), Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), Self-as-Context Scale (Zettle et al., 2018), Relationship to Internal Experiences Scale (Sorenson, 2016), and State Mindfulness Scale (Tanay & Bernstein, 2013). See Bernstein et al. (2015) for a thorough review of the most commonly used decentering scales. Given the recent proliferation of measurement options, two recent studies (Hadash, Lichtash & Bernstein, 2017; Naragon-Gainey & DeMarree, 2017) used factor analytic techniques to investigate the dimensionality latent in extant decentering scales. Both of these studies identified two distinct, latent factors. Based on item composition, Hadash et al. (2017) labeled their factors Intentional Decentered Perspective (i.e., "intentional states of dis-identified and non-reactive meta-awareness of mental phenomena," p. 1683) and Automatic Reactivity to Thought Content. Naragon-Gainey and DeMarree (2017) labeled their two factors Observer Perspective, which they conceptually linked with two metacognitive processes of decentering, meta-awareness and (dis)identification with internal experience, and Reduced Struggle with Inner Experience, conceptually linked (non)reactivity to thought content.

Findings from Hadash et al. (2017) and Naragon-Gainey and DeMarree (2017) are, in part, consistent with Bernstein et al.'s (2015) proposed metacognitive processes model of decentering. However, these two, factor-analytic studies failed to clearly represent all three metacognitive processes thought to subserve decentering. Neither study revealed a distinct meta-awareness factor or a distinct (dis)identification with internal experience factor. As noted by the authors, this is not entirely surprising in that measures developed to-date were not designed with the metacognitive processes model in mind and no measures of meta-awareness or (dis)identification with internal experience, per se, were included in these factor analytic studies. More pragmatically, neither factor analytic study was designed to identify a sub-set of items to optimally operationalize the proposed metacognitive processes of decentering. A central conclusion of the decentering measurement work to-date is that there is no single, psychometrically-sound self-report measure of the metacognitive processes model of decentering (Bernstein et al., 2019; Hadash, Lichtash, & Bernstein, 2017; Naragon-Gainey & DeMarree, 2017). Development of a psychometrically sound measure of decentering is critical for exploring the role of decentering in wellbeing, mental health, as well as intervention mechanisms and outcomes. Furthermore, developing a measure based on the metacognitive processes model of decentering is important for testing this model, and thereby ultimately improving understanding of the phenomenon (Clark & Watson, 1995; Cronbach & Meehl, 1955).

Building on this theoretical (e.g., Bernstein et al., 2015; Fresco et al., 2007) and empirical (e.g., Hadash, Lichtash & Bernstein, 2017; Naragon-Gainey & DeMarree, 2017) foundation, following best practice in scale development (Worthington & Whittaker, 2006), and employing psychometric strategies employed successfully in previous studies (e.g., Baer et al., 2006; Hanley, Nakamura, & Garland, 2018), the current study was designed to create two psychometrically robust self-report scales for further empirical investigation of decentering broadly, and of the proposed metacognitive processes model more precisely. We report four inter-related studies conducted towards this goal. First, in a large sample ($N$=570) of American adults, we applied exploratory factor analysis (EFA) to a pool of items (140) taken directly from existing scales of decentering-related constructs, adapted from scales of decentering-related constructs, or generated by the authors. This EFA's purpose was to identify a subset of top-performing items measuring individual differences in the trait-level metacognitive processes including meta-awareness, (dis)identification, and (non)reactivity. We refer to this trait scale as the Metacognitive Processes of Decentering Scale (MPoD-t). Second, in a new sample ($N$=509), we used bifactor exploratory structural equation modeling (B-ESEM) to confirm the MPoD-t's multi-dimensionality and determine whether each of the three metacognitive processes of decentering contributed to a higher-order decentering construct. B-ESEM was chosen instead of confirmatory factor analysis (CFA) because it is not bound by the independent cluster model constraints of CFA (Morin et al., 2016). Following B-ESEM, and to begin to test the convergent and known-groups criterion validity of the MPoD-t, we investigated hypothesized correlates of the MPoD-t and the relationship between the MPoD-t and regular mindfulness practice. Third, samples 1 and 2 were combined ($N$=1079) for item response theory analyses designed to identify which MPoD-t items provided the most information about each of the three metacognitive processes of decentering. Then, the three top performing items, one representing each

metacognitive process of decentering, were adapted for use in a brief state version of the Metacognitive Processes of Decentering Scale (MPoD-s). Finally, we employed a randomized, experimental design to examine whether the MPoD-s was sensitive to a brief mindfulness intervention. Among preoperative orthopedic surgery patients', we compared the effect of a 15-minute mindfulness intervention, relative to a 15-minute cognitive-behavioral pain psychoeducation intervention, on MPoD-s scores; and then tested whether changes in MPoD-s scores were associated with changes in pain, pain medication desire, and anxiety.

## STUDY 1: EXPLORATORY FACTOR ANALYSIS

In Study 1, we aimed to develop a multidimensional instrument capable of measuring decentering as operationally defined by Bernstein et al. (2015). Exploratory factor analysis was used to identify highly effective meta-awareness, (dis)identification, and (non)reactivity items. Using methods shown previously to produce highly effective self-report scales (e.g., Baer et al., 2006, Hanley, Nakamura, & Garland, 2018), items were either taken directly or adapted (See below) from 8 extant scales of decentering-related constructs: Drexel Defusion Scale (Forman et al., 2012), Experiences Questionnaire's Decentering Subscale (Fresco et al., 2007), Toronto Mindfulness Scale's Decentering Subscale (Lau et al., 2006), Cognitive Fusion Questionnaire (Gillanders et al., 2014), Five Facet Mindfulness Questionnaire's Non-reacting Subscale (Baer et al., 2006), Self-as-Context Scale (Zettle et al., 2018), Relationship to Internal Experiences Scale (Sorenson, 2016), State Mindfulness Scale (Tanay & Bernstein, 2013). The majority of these items ($n$=82) were taken verbatim and pooled together to ensure the most effective items from extant scales could be identified and retained in the MPoD-t. Upon qualitative inspection of these items, attending to their content validity to reflect the proposed metacognitive processing model of decentering, we concluded that there was a need supplement the original item pool by: a) refining some of the validated item's wording to improve readability and clarity ($n$=40; i.e., "I can actually see that I am not my thoughts" -> "I am not my thoughts"), and b) generating new items reflecting phenomenological descriptions of decentering found in the mindfulness literature ($n$=18; i.e., "I can watch my thoughts drift by like leaves on a stream"). Items measuring (dis)identification with internal experience were noticeably lacking. The final item pool consisted of 140 items.

### Method

#### Participants and Procedures

Participants ($N$=355) were recruited from Mechanical Turk (MTurk), an online participant recruitment platform. To ensure data quality, only MTurk workers with a proven history of providing good quality data were invited to participate in this survey (i.e., successful completion of >500 previous tasks with a task approval rate of >95%). Consistent with standard MTurk compensation rates, respondents were provided 25 cents for completing the survey. Additional data screening procedures were undertaken to further ensure data integrity. First, we excluded participants that did not complete all survey items ($n$=88). Second, we excluded participants ($n$=213) that completed the survey at a reading rate of

300+ words per minute (i.e., in 7 minutes and 30 seconds), as 300 English word per minute is the expected reading rate of a college educated adult (Brysbaert, 2019; Carver, 1982; Taylor, 1965). Finally, IP addresses and geographic coordinates were reviewed to ensure each response was from a unique participant ($n$=2). Average survey completion time was 14 minutes.

After providing consent and demographic information, participants completed all 140 decentering items in an online testing session. A single survey instrument presented the decentering items in random order, and a common set of instructions introduced the items: "We are interested in your day-to-day experiences. **The following questions will ask you about different ways you might experience thoughts, emotions, and sensations**. Please read each statement carefully and indicate how often you have had the following experiences. *There are no "right" or "wrong" answers*, so please answer in a way that reflects your own experiences." Participants responded to these items using a standardized, 5-point Likert type scale ranging from "Never or very rarely" to "Very often or always" (e.g., Baer et al., 2006; Hanley, Nakamura, & Garland, 2018). A large Western university's institutional review board approved this study.

## Measures

The Drexel Defusion Scale (Forman et al., 2012) is a 10-item scale of respondents' abilities to defuse from unpleasant internal experiences (e.g., "You become angry when someone takes your place in a long line. To what extent would you normally be able to defuse from feelings of anger?"). The DDS is originally scored on a 6-point Likert scale (0 = not at all to 5 = very much) and has demonstrated adequate internal reliability ($\alpha$=.75-.86; Forman et al., 2012; Hadash, Lichtash, & Bernstein, 2017; Naragon-Gainey & DeMarree, 2017).

The Experiences Questionnaire's Decentering subscale (EQ-D; Fresco et al., 2007) is an 11-item scale of decentering originally developed to assess mechanisms of Mindfulness Based Cognitive Therapy (e.g., "I can separate myself from my thoughts and feelings."). The EQ-D is originally scored on a 5-point Likert scale (1 = never to 5 = all the time) and has demonstrated adequate internal reliability ($\alpha$=.72-.90; Fresco et al., 2007; Hadash et al., 2017; Naragon-Gainey & DeMarree, 2017).

The trait Toronto Mindfulness Scale's Decentering subscale (TMS-D; Davis, Lau, & Cairns, 2009) is a 7-item scale of decentering, originally developed to assess mindfulness (e.g., "I am receptive to observing unpleasant thoughts and feelings without interfering with them."). The TMS-D is originally scored on a 5-point Likert scale 0 = not at all to 4 = very much) and has demonstrated low to adequate internal reliability ($\alpha$=.49-.85; Davis et al., 2009; Hadash et al., 2017; Naragon-Gainey & DeMarree, 2017).

The Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014) is a 7-item scale of the extent to which a persona acts as though their thoughts were literally true (e.g., "I tend to get very entangled in my thoughts"). The CFQ is originally scored on a 7-point Likert scale (1 = never true to 7 = always true) and has demonstrated good internal reliability ($\alpha$=.88-.93; Gillanders et al., 2014; Hadash et al., 2017; Naragon-Gainey & DeMarree, 2017).

The Five Facet Mindfulness Questionnaire's Non-reacting subscale (FFMQ-NR; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a 7-item scale of non-reactive meta-awareness of internal experience (e.g., "I perceive my feelings and emotions without having to react to them."). The FFMQ-NR is originally scored on a 5-point Likert scale (1 = never or very rarely true to 5=very often or always true) and has demonstrated adequate internal reliability ($\alpha$=.73-.80; Baer et al., 2006; Naragon-Gainey & DeMarree, 2017).

The Self-as-Context Scale (SACS; Zettle et al., 2018) is 10-item scale of the perceived distance or separation between the sense of self and internal experiences (e.g., "I am able to notice my changing thoughts without getting caught up in them."). The SACS is originally scored on a 7-point Likert-type scale (1= strongly disagree to 7= strongly agree) and has demonstrated adequate internal reliability ($\alpha$=.77-.86; Zettle et al., 2018).

The Relationship to Internal Experiences Scale (RIES; Sorenson, 2016) is a 29-item, multidimensional scale of cognitive fusion (e.g., "My thoughts cause me distress or emotional pain."), decentering (e.g., "I notice that my thoughts come and go."), and behavioral reactivity (e.g., "I can make conscious choices about how I behave when I'm emotional."). The RIES is originally scored on a 5-point Likert-type scale (1= Not at all to 5= Vey much) and each dimension has demonstrated adequate internal reliability ($\alpha$=.77-.93; Sorenson, 2016).

The State Mindfulness Scale (SMS; Tanay & Bernstein, 2013) is a 21-item, multidimensional scale of state mindfulness, capturing mindful awareness bodily sensations (e.g., "I noticed physical sensations come and go.") and mental events (e.g., "I noticed pleasant and unpleasant emotions."). The SMS is originally scored on a 5-point Likert-type scale (1= Not at all to 5= very well) and has demonstrated adequate internal reliability and multiple forms of validity ($\alpha$=.92-.97; Tanay & Bernstein, 2013).

## Results

Exploratory Factor analysis (EFA) was conducted on all 140 items using the maximum likelihood method, as the data were relatively normally distributed (Max Skew = −0.76, Average Skew = −0.27; Max Kurtosis = −0.86, Average Kurtosis = −0.32), followed by oblique rotation (Promax) to allow for correlation among the factors. Item factorability was supported by a highly significant Bartlett's Test of Sphericity value (.96), which well exceeded the minimum recommended value (.60; Tabacnick & Fidell, 2007). Results from the initial EFA revealed 19 factors with eigenvalues above 1.0. The number of factors to be retained was guided by theoretical and empirical considerations. Theoretically, Bernstein et al. (2015) suggest decentering is characterized by three metacognitive processes: (1) meta-awareness, (2) (dis)identification with internal experience, and (3) (non)reactivity to thought content. Empirically, parallel analysis (O'connor, 2000) indicated retention of five, theoretically consistent factors (Factor 1: eigenvalue = 53.38 > random data eigenvalue = 2.63; Factor 2: eigenvalue = 6.51 > random data eigenvalue = 2.49; Factor 3: eigenvalue = 5.91 > random data eigenvalue = 2.41; Factor 4: eigenvalue = 3.97 > random data eigenvalue = 2.35: Factor 5: eigenvalue = 2.72 > random data eigenvalue = 2.30; Factor 6: eigenvalue = 1.98 < random data eigenvalue = 2.25, etc.). The first factor reflected (non)reactivity to

internal experience and the second meta-awareness. The remaining three factors reflected variations on (dis)identification with internal experience and explained limited variance independently. Therefore, a second EFA was conducted using the same extraction and rotation methods after constraining the solution to three factors. This three factor solution accounted for 50% of the total variance.

The scale was shortened by removing items that did not load strongly onto any specific factor (hyperplane) or demonstrated large cross-loadings. Consistent with recommended best practices for scale development (Worthington & Whittaker, 2006), only items meeting our predefined criteria -- a minimum loading > .40 on a primary factor and loading < .20 on a secondary factor -- were retained (Baer et al., 2006; Stevens, 2012). Items were removed one at a time and a rotated factor matrix was generated after each removal. Efforts were made to retain an equal number of items for each metacognitive process of decentering. At the end of this iterative process, 15 items remained: 5 measuring meta-awareness, 5 measuring (dis)identification with internal experience, and 5 measuring (non)reactivity to internal experience. The factor structure of the final scale is reported in Table 2. The 15-item, three-factor solution accounted for 71% of the total variance.

Basic statistics, internal reliability, and composite reliability for each factor along with intercorrelations among the three factors are reported in table 3.

## STUDY 2: CONFIRMING THE MPoD-t'S STRUCTURE AND EXPLORING CORRELATIONS BETWEEN THE MPoD-t AND OTHER CONSTRUCTS

In Study 2, we aimed to (1) further investigate the MPoD-t's multidimensional structure, (2) explore the MPoD-t's convergent validity by examining associations between the MPoD-t, extant measures of decentering, and additional, closely related processes, and (3) examine the MPoD-t's known-groups criterion validity by examining whether people practicing mindfulness report higher scores on any of the three metacognitive processes of decentering compared to people who do not practice mindfulness.

First, B-ESEM was used to investigate the MPoD-t's structure. An alternative to confirmatory factor analysis (CFA), B-ESEM is capable of accounting for the likelihood that a MPoD-t item may be associated with multiple sources of true score variance (Morin et al., 2016). B-ESEM tests whether, as predicted by the metacognitive processes model of decentering, the MPoD-t captures a global (i.e., higher order) decentering factor that co-exists with the three analytically derived metacognitive processes of decentering: meta-awareness, (dis)identification with internal experience, and (non)reactivity to internal experience. In this way, B-ESEM can provide confirmation of the MPoD-t multi-dimensionality along with evidence of whether it is hierarchically organized as theorized (i.e., capturing a global decentering construct) or not. Comparing B-ESEM goodness-of-fit indices with CFA allowed us to determine the optimal structure for the MPoD-t. Second, bivariate correlation analyses were used to investigate the MPoD-t's convergent validity. We hypothesized the MPoD-t would be positively associated with extant decentering scales (i.e., TMS, SEQ, EQ, SACS), dispositional mindfulness, the dispositional tendency to experience self-transcendence (i.e., a transient mental state ostensibly fostered by meditation and mindfulness practices characterized by a) profound feelings of unity as the sense of

self is altered and b) expansive emotional states such as awe or bliss; Hanley, Nakamura, & Garland, 2018; Yaden, Haidt, Hood Jr., Vago, & Newberg, 2017), and markers of well-being (i.e., psychological well-being, positive affectivity, and negative affectivity). Third, we used an independent samples t-test to examine the MPoD-t's known-groups criterion validity. As decentering is a mechanism of action identified in models of mindfulness (Bernstein et al., 2015; Dahl, Lutz, & Davidson, 2015; Lau et al., 2006; Shapiro et al., 2006), we hypothesized that mindfulness practitioners would report higher levels of trait decentering and its constituent metacognitive processes than non-practitioners.

## Method

### Participants and Procedures

Table 1 provides participant demographics. The same recruitment and survey procedures used in Study 1 were used in Study 2. To ensure data quality and the independence of this new sample, participants were exclude if they did not fully complete all survey items ($n$=83), completed the survey at a reading rate of 300+ words per minute (n=193), and completed the Study 1 survey (n=41). Average survey completion time was 15 minutes.

### Measures

To reduce participant burden, not all participants completed all measures. The MPoD-t, TMS, FFMQ, and NADA were completed by all participants, but the remaining measures were only completed by random sub-samples.

The MPoD-t and three existing decentering measures (TMS-D, EQ-D, SACS), described above, were also included in this study.

The Self Experiences Questionnaire (SEQ; Yu, McCracken, & Norton, 2016) is a 15-item measure of the respondent's ongoing awareness of internal experiences (e.g., "Although I can get caught up with my own thoughts, emotions and sensations, I can also separate myself from them."). The SEQ is scored on a 7-point Likert-type scale (0= Never true to 6 = Always true) and has demonstrated good internal reliability (Yu et al., 2016; Zettle et al., 2018).

The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) is a 39-item measure of dispositional mindfulness. The FFMQ is scored on a 5-point Likert-type scale (1 = Never or very rarely true to 5 = Very often or always true) and has demonstrated good internal reliability ($\alpha$=.84–88; Hanley, 2016; Hanley & Garland, 2017).

The Nondual Awareness Dimensional Assessment (NADA; Hanley, Nakamura, & Garland, 2018) is a 13-item measure of self-transcendent experiences. The NADA is scored on a 5-point Likert-type scale (1 = Never or very rarely true to 5 = Very often or always true) and has demonstrated good internal reliability ($\alpha$=.93; Hanley, Nakamura, & Garland, 2018)

The Scales of Psychological Well-being (SPWB; Ryff, 1989; Ryff & Keyes, 1995) is a 18-item measure of eudaimonic well-being. The SPWB is scored on a 7-point Likert-type

scale (1 = Strongly agree to 7 = Strongly disagree) and has demonstrated good internal reliability ($\alpha$=.83–88; Hanley & Garland, 2017; Hanley, Warner, & Garland, 2014).

The short form of the Positive and Negative Affect Scale (PANAS; Thompson, 2007; Watson, Clark, & Tellegen, 1988) is a 10-item measure of positive (e.g., “Inspired”) and negative (e.g., “Upset”) affectivity. The PANAS is scored on a 5-point Likert-type scale (1 = Never to 5 = Always) and has demonstrated good internal reliability ($\alpha$=.74–82; Thompson, 2007).

Mindfulness meditation practice involvement was measured with a single item [“Do you currently have a mindfulness practice (e.g., meditation, yoga)?”] scored dichotomously (“Yes” or “No”) ( Hanley, Garland, & Tedeschi, 2017; Hanley et al., 2018).

## Results

### Bifactor Exploratory Equation Modeling

B-ESEM was conducted with MPlus, using maximum likelihood estimation as the data were relatively normally distributed (Max Skew = −0.92, Average Skew = −0.18; Max Kurtosis = −0.96, Average Kurtosis = −0.47). We adhered to Morin et al.’s (2016) B-ESEM approach, specifying the global (i.e., decentering) and specific [i.e., meta-awareness, (dis)identification, and (non)reactivity] factors orthogonally to ensure interpretability and to be consistent with B-ESEM assumptions.

Goodness-of-fit indices for the B-ESEM and CFA are presented in Table 4. B-ESEM produced the best fitting model – the lowest AIC value, a notable CFI increase (CFI Δ=.049) and a marginal RMSEA decrease (RMSEA Δ=.009) (Morin et al., 2016) relative to CFA. These results indicated that 1) the MPoD-t captured a global, higher-order, decentering factor and 2) the three metacognitive process factors explained significant amounts of variance not accounted for by the global factor.

All MPoD-t items accounted for significant amounts of specific factor variance and global factor variance (i.e., decentering). See table 5. These results are in line with the prediction that each of the three MPoD-t subscale scores assesses a distinct metacognitive process of decentering and that the MPoD-t full scale score can be interpreted as a global measure of decentering. In other words, the MPoD-t full scale score reflects not only the unique contribution of each metacognitive processes but an integration between the metacognitive processes that together reflect more than the individual processes.

### Relationships Between the MPoD-t and Other Constructs

Significant positive associations were observed between the MPoD-t total score (i.e., decentering) and each of the MPoD-t metacognitive processes and multiple, previously validated measures of decentering, dispositional mindfulness, self-transcendence, psychological well-being, and positive affectivity (Table 6). Together, this pattern of associations provided evidence of convergent validity in this sample. No association was observed between MPoD-t meta-awareness sub-scale score and psychological well-being,

and (non)reactivity to internal experience was the only MPoD-t subscale to be inversely associated with negative affect.

### Relationships Between the MPoD-t and Mindfulness Meditation Practice

Independent samples t-tests revealed significant between group differences in MPoD-t scores for individuals with and without a current mindfulness practice (Table 7). Mindfulness practitioners reported significantly higher MPoD-t, meta-awareness, (dis)identification, and (non)reactivity scores than non-practitioners. These results suggest that the MPoD-t can discriminate mindfulness practitioners from non-practitioners, and that mindfulness practice is associated with greater levels of trait decentering as measured by the MPoD-t.

## STUDY 3

In Study 3, we aimed to identify a subset of MPoD-t items that could be used to create a very brief (i.e., three item) self-report scale capable of assessing decentered states. This may be particularly relevant for the study of states of decentering in daily living or states of decentering engendered through mindfulness practices – and that may be measured via brief and minimally invasive experience sampling. Item response theory was used to identify the MPoD-t item that provided the most information about each of the metacognitive processes of decentering.

Item response theory (IRT) analysis use item-level data to determine how much information an item provides about a latent construct. First, threshold parameters (*bi*) represent points on the latent construct continuum where the likelihood of choosing adjacent response options is 50%. Thus, for a 5-point Likert scale, four threshold parameters are calculated. Higher threshold parameters indicate respondents must possess more of the latent construct to endorse that item. Second, the item discrimination parameter (*a)* indicates how strongly related an item is to the latent construct. Interpretation guidelines suggest that item discrimination parameters between 0.25–0.63 are low, 0.64–1.34 moderate, 1.35–1.69 high, and >1.7 very high (Baker, 2001).

## Method

### Participants and Procedures

Samples 1 and 2 were combined for study 3 (n=630). IRT analyses were performed using R's mirt package (Chalmers, 2012) on each of the MPoD-t subscales.

### Measures

The MPoD-t, detailed above, was used to measure decentering.

## Results

Data were normally distributed for all individual items (skewness and kurtosis <.88) and each subscale (skewness and kurtosis <.57). Item parameters are reported in Table 8. Item discrimination parameters (*a*) for the meta-awareness dimension ranged from

1.55 to 2.63 [*M*(*SD*)=2.12(0.44)]; the (dis)identification dimension ranged from 0.80 to 2.10 [*M*(*SD*)=1.56(0.56)]; and the (non)reactivity dimension ranged from 1.13 to 2.31 [*M*(*SD*)=1.58(0.46)]. Regardless of sub-scale, threshold parameters were relatively evenly distributed across the latent construct range, suggesting that all MPoD-t items similarly differentiate across the full range of MPoD-t scores – among individuals possessing low through to high levels of decentering. Finally, all MPoD-t items provided relatively equivalent amounts of information about their respective latent construct. However, one item from each of the three MPoD-t subscales provided more information than the other subscale items. The meta-awareness item providing the most information was: "I can watch my thoughts and emotions drift by like leaves on a stream." The (dis)identification item providing the most information was: "My sense of self is separate from my changing thoughts and feelings." The (non)reactivity item providing the most information was: "I can step back and be aware of distressing thoughts and emotions without being taken over by them."

Next, to create the brief state version of the MPoD, we modified the top-performing MPoD-t items – one item reflecting each metacognitive process of decentering – identified through IRT. We re-worded the identified items to refer to a specific state or moment in time in which: 1) "I was able to watch my thoughts, emotions, and sensations drift by like leaves on a stream," 2) "I experienced myself as separate from my changing thoughts, emotions, and sensations," and 3) "I was able to step back and be aware of distressing thoughts, emotions and sensations, without being taken over by them". Utilizing IRT data in this way assures that the items selected to construct the brief state measure of decentering – critical to experience sampling measurement of states of decentering with high temporal- and contextual- resolution (Shoham et al., 2018) – will include the optimal operationalization of each of the metacognitive processes of decentering. IRT is uniquely able to provide this item-level information and thus optimize the psychometric performance of the brief state measure despite its short length.

## STUDY 4

In Study 4 we, first, tested whether the MPoD-s was sensitive to changes in state decentering following a brief mindfulness induction – important to its utility to study decentering as a mechanism of action in MBIs and related interventions. This mindfulness induction was delivered to orthopedic surgery patients as part of a preoperative information meeting designed to improve postoperative outcomes by providing patients with pain and stress management strategies before their procedure. Second, given the clinical context, we evaluated the therapeutic impact of achieving a decentered state, as indexed by the MPoD-s, by testing the extent to which increases in MPoD-s scores mediated the effect of a mindfulness intervention on clinical pain, pain medication desire, and anxiety relative to an active control condition receiving a brief cognitive-behavioral pain psychoeducation intervention.

# Method

## Participants and Procedures

Participants (n=82) were recruited from an orthopedic clinic at a large university in the Western United States. Ages ranged from 28 to 88, with a mean age of 66 (±11). Participants were primarily white ($n$=58, 89%) females ($n$=45, 69%). Demographics were not available for 17 participants' whose Medical Record Numbers were unknown. Randomization was successful – groups did not differ with respect to age ($t_{63}$=0.62, $p$=.54), gender ($X^2$=0.81, $p$=.37), or race ($X^2$=8.74, $p$=.12).

Preoperative orthopedic surgery patients were randomized to one of two, 15-minute pain management interventions embedded in a preoperative informational meeting – a mindfulness intervention or a cognitive-behavioral pain psychoeducation intervention. The mindfulness intervention involved a standardized, mindful breathing practice (e.g., Garland, 2013) that has been previously validated with a clinical pain population (Garland et al., 2017). The cognitive-behavioral pain psychoeducation intervention focused on the relationship between physical sensations, thoughts and emotions. The interventions were matched for length (~15 min). Immediately before and after their respective intervention, participants completed the 3-item MPoD-s, along with measures of pain, pain medication desire, and anxiety. The local university institutional review board approved this study.

## Measures

Decentering was measured with the MPoD-s. The MPoD-s is a 3-item measure of decentering using a single item to capture each of the three metacognitive processes of decentering identified by Bernstein et al (2015). Items were scored on a 11-point Likert scale (0="Not at all" to 10="Very Much") to increase response variability. The MPoD-s demonstrated adequate composite reliability at both time points (Time 1=.79; Time 2=.92).

Pain severity ("How much pain do you have right now"), pain medication desire ("How much pain do you want pain medicine right now"), and anxiety ("How anxious do you feel right now?") were each assessed with a single item scored on an 11-point Likert numerical scale (0="Not at all" to 10="Very Much"). Log transformations were used to normalize pain medication desire data, which was positively skewed (Time 1: 1.82, *S.E.*= .27; Time 2= 2.50, *S.E.*=.27).

# Results

## Between group differences

An independent samples t-test revealed no between-group differences in decentering ($t_{78}$=1.04, $p$=.30), pain ($t_{80}$=0.32, $p$=.75), pain medication desire ($t_{80}$=0.94, $p$=.35), or anxiety ($t_{80}$=0.33, $p$=.74) at baseline (Table 8), indicating that randomization was successful. A MANCOVA – controlling for pre-intervention levels of decentering, pain, pain medication desire, and anxiety – documented that relative to participants in the psychoeducation condition, participants in the mindfulness condition reported significantly greater decentering ($F_{1,70}$=34.81, $p$<.001, $\eta^2$=.332), less pain ($F_{1,70}$=38.60, $p$<.001,

$\eta^2$=.355), pain medication desire ($F_{1,70}$=7.82, $p$=.007, $\eta^2$=.100), and anxiety ($F_{1,70}$=11.88, $p$=.001, $\eta^2$=.145) post-intervention (Table 9).

## Decentering Mediation Model

Using R's Lavaan package (Rosseel, 2012), path analysis was used to model the mindfulness induction's effects on change in decentering from pre- to post-intervention and residualized change in pain, pain medication desire, and anxiety (post-intervention values adjusted for pre-intervention values) using Full Information Likelihood Estimation and bootstrapping ($N$=1,000). We selected this analytic approach so as to not violate temporal assumptions for mediation analysis.

The mindfulness induction (cf. cognitive-behavioral pain psychoeducation) had a significant, positive effect on change in decentering (Figure 1). The mindfulness induction and decentering, measured via MPoD-s, had significant direct effects on pain, pain medication desire, and anxiety. The mindfulness induction also had a significant indirect effect on pain ($\beta$=−.20, $p$=.002), pain medication desire ($\beta$=−.14, $p$=.026), and anxiety ($\beta$=−.16, $p$=.004) via decentering. The model accounted for 26% of the variance in decentering scores, 46% of the variance in pain ratings, 13% of the variance in pain medication desire ratings, and 20% of the variance in anxiety ratings.

## General Discussion

The primary aim of the present research was to develop and test a psychometrically sound self-report approach to measure and quantify traits and states of decentering. We sought to develop a measure of decentering as conceptualized in Bernstein et al's (2015) *metacognitive processes model of decentering*. In this model, decentering is an emergent, multidimensional construct, comprised of three core metacognitive processes: meta-awareness, (dis)identification with internal experience, and (non)reactivity to thought content. We developed a trait Metacognitive Processes of Decentering Scale (MPoD-t) as well as brief, state Metacognitive Processes of Decentering Scale (MPoD-s). The MPoD-t was designed to capture individual differences in each of the theorized metacognitive processes of decentering and the emergent, decentering construct. The MPoD-s was designed to capture time- and context-specific dynamic states of decentering as well as changes in these states (e.g., sensitive to intervention, specific practices). Three separate studies, including a total of 1,079 participants, provided strong initial support for the factor structure, internal reliability, convergent validity, and known-groups criterion validity of the MPoD-t. The fourth study provided strong initial support for the experimental sensitivity and clinical relevance of the MPoD-s. Together, we found that the trait and state version of the MPoD may prove useful to the study and assessment of decentering and its constituent metacognitive processes. Thus it may be used to test the putative salutary functions of the metacognitive processes of decentering for wellbeing and mental health, and the continued examination of the role of decentering in therapeutic change processes broadly, and mindfulness-based interventions more specifically.

First, EFA and B-ESEM results from Studies 1 and 2 indicated that the MPoD-t was multidimensional and could be used to assess a global, higher-order decentering factor and

three independent yet related lower-order metacognitive processes: meta-awareness (e.g., “I can watch my thoughts and emotions drift by like leaves on a stream.”), (dis)identification with internal experience (e.g., “My sense of self is separate from my changing thoughts and feelings.”), (non)reactivity to internal experience (e.g., “I can step back and be aware of distressing thoughts and emotions without being taken over by them.”) – consistent with the Bernstein et al. (2015) metacognitive processes model of decentering. Importantly, and in line with the model, items reflecting constructs conceptually distinct from decentering, such as non-judging, acceptance, and self-compassion, were not retained in the final factor solution (Hadash et al., 2017).

The MPoD-t is the first validated scale explicitly designed to capture the theorized metacognitive processes of decentering. Recent studies indicate that extant measures were not designed to do so nor do any of these measures, individually or together, permit us to assess all three metacognitive processes of decentering (see Bernstein, Hadash, & Fresco, 2019 for a recent review). Furthermore, our understanding of decentering and its putative metacognitive processes may be iteratively advanced by study of the phenomenon through the MPoD-t. Of particular importance, we can now use this new measure to more systematically examine theorized inter-relations between meta-awareness, (dis)identification with internal experience, and (non)reactivity to thought content. For example, Bernstein et al. (2015) and more recently Bernstein, Hadash and Fresco (2019) theorized that meta-awareness may facilitate an experiential distinction (i.e., disidentification) between the observing self and the observed internal experience – and thereby dis-identification with internal experience. Likewise, they theorized that meta-awareness may facilitate reduced reactivity to thought content by enabling the disengagement of attention from one’s thought content to present moment experiences (e.g., the experience of thinking and its effects on the body); and meta-awareness of the thinking processes may change one’s construal of her/his thought content to interpretations of self and reality and, therefore, not necessarily as facts or accurate representations of one’s self or of reality. In turn, they furthermore highlighted that dis-identification with experience and reduced-reactivity to thought content thereby affect one another and may feedback to further potentiate meta-awareness. In this way, by primarily targeting meta-awareness, mindfulness practices may engender disidentification from internal experience and (non)reactivity to thought content. Although Studies 1 & 2 were not prospectively designed to test these inter-relations, MPoD-t sub-scales exhibited significant and high (>.5) correlations. Notably, recent work examining intensive experience sampling, behavioral assessments, and experimental micro-interventions of the metacognitive processes of decentering have provided initial evidence of the theorized inter-relations between the theorized metacognitive processes of decentering (Bernstein, Hadash, & Fresco, 2019). Important to central questions about the nature and function of decentering and its theorized metacognitive processes, we can now apply the MPoD-t and MPoD-s to better understand the various salutary functions of changes in theses metacognitive processes following mindfulness-based interventions (e.g., well-being, mental health outcomes) with respect to the MPoD-t and MPoD-s total decentering scores, individual metacognitive sub-scale scores, and their inter- or trans-actions.

Second, cross-sectional analyses in Study 2 provide preliminary evidence of the MPoD-t’s convergent validity with measures of decentering and related processes. As hypothesized,

relations between three of the four existing decentering scales and the MPoD-t were strong (*r*'s=.62 to .74). The MPoD-t was minimally associated with dispositional mindfulness, a result that emphasizes the fact that these two constructs are related but conceptually distinct and separable (Bernstein et al., 2015, 2019). Notably, MPoD-t demonstrated a moderate association with self-transcendence (e.g., Austin, 1999; Dorjee, 2016). Dorjee's (2016) modes of existential awareness hierarchy situates decentering just below more transcendent modes of awareness (i.e., form and formless absorption, experiential emptiness of self). Using the MPoD-t in conjunction with measures of self-transcendence (e.g., Nondual Awareness Dimensional Assessment: Hanley et al., 2018; Spatial Frame of Reference Continuum: Hanley & Garland, 2019) could facilitate understanding of the theorized role of decentering in nondual states of consciousness.

Third, bivariate associations between the three metacognitive processes of decentering and constructs of interest were largely consistent with those observed for the full scale score, and people practicing mindfulness had higher scores on all three metacognitive processes compared to people who do not practice mindfulness. Collectively, these findings support the construct validity and known-groups criterion validity of the MPoD-t as a measure of decentering.

However, some notable differences in the patterns of correlations with constructs of interest were observed. Generally, (non)reactivity to internal experience demonstrated stronger associations with the constructs of interest than the other two metacognitive processes, particularly with respect to decentering as operationalized by the Experiences Questionnaire (Fresco et al., 2007) and the Self-as-Context Scale (Zettle et al., 2018). One exception to this pattern was a pronounced association between meta-awareness and self-transcendence relative to the other two metacognitive processes. Interestingly, meta-awareness was also the only metacognitive process to demonstrate no significant association with psychological well-being. This is in line with non-significant associations previously found between observing experience and psychological well-being among non-meditators (Baer et al., 2008). It may be that meta-awareness, alone, is not directly associated with psychological well-being, and confers psychological benefit only through, or in combination with, non-reactivity and dis-identification with internal experience (Bernstein et al., 2015; Desrosiers, Vine, Curtiss, Klemanski, 2014). Presumably, one could be meta-aware of anxious or depressive thoughts, while strongly identifying with them and remaining reactive to the content of these thoughts (Hadash, Plonsker, Vago, & Bernstein, 2016). Future studies are needed to further investigate associations between the metacognitive processes of decentering and psychological well-being. This result merits further investigation at a level of granularity made possible by the MPoD-t.

Fourth, we used IRT to identify a brief 3-item measure – one item per metacognitive process – of state decentering (MPoD-s). The MPoD-s may thus be useful to advance emerging efforts to study decentering as a state (e.g., Shoham et al, 2018). For example, using these items for experience sampling, we may examine the relations between trait and states of decentering as well as the specific contexts (e.g., meditation, moments with difficult experiences) in which the cultivation of states of decentering is important for salutary outcomes of MBIs and related interventions (e.g., cognitive behavior therapies).

Fifth, we found that mindfulness-induced decentering was therapeutically beneficial relative to an active control condition (Study 4). Preoperative orthopedic surgery patients who briefly practiced mindfulness reported elevated state of decentering, measured by the MPoD-s, which thereby mediated the therapeutic effects of mindfulness on pain, pain medication desire, and anxiety. These findings provide preliminary evidence of the sensitivity of the MPoD-s to a mindfulness intervention. Future studies may use the MPoD-s in intensive experience sampling to better elucidate the mechanistic function(s) of metacognitive processes of decentering over the course of mindfulness training and practice, in daily living with respect to wellbeing, and in the context of neurophenomenological research aiming to elucidate how transitory and subtle shifts in consciousness may be related to physiological and neurophysiological processes (Varela et al., 1991) .

Finally, while the MPoD-t meta-awareness and (dis)identification with internal experience factors items content correspond directly to the theorized metacognitive processes in the model (Bernstein et al., 2015), the (non)reactivity to *internal experience* factor item content is similar to but also slightly differs from the theorized metacognitive process of (non)reactivity to *thought content*. First, all items in the (non)reactivity to internal experience factor reflect meta-awareness of experience *and* non-reactivity (e.g., “I can be aware of unpleasant thoughts or feelings without immediately reacting to them”). This is in line with the metacognitive processes model of decentering in which non-reactivity to thought content is conceptualized to be initiated by meta-awareness in states of decentering. Second, items in the (non)reactivity to internal experience factor reflect (non)reactivity to thoughts, feelings, and emotions, and therefore reflect reactivity to internal experience beyond *thought content* per se (Bernstein et al., 2015; Hadash et al., 2017). Importantly, recent behavioral evidence suggests that reactivity to feelings and emotions plays an important role in determining the degree of reactivity to thought content. In fact, negative emotional reactivity to negative thought content was found to mediate the effects of negative thought content on internal attention, cognitive vulnerability, depression and anxiety symptoms (Bernstein et al, 2019).

Despite these promising findings, several limitations should be noted in the reported studies. First, as in all similar psychometric and factor analytically-derived measures, the observed factor solution was circumscribed and limited to the pool of items included. Notably, the pool of items included items that we believed reflect each of the proposed metacognitive processes of decentering per Bernstein et al (2015). However, and importantly, many items were included in this pool that reflect other constructs and processes such as non-judging, acceptance, and self-compassion and were not retained in the final factor solution (Hadash et al., 2017). Likewise, identified factors and thereby sub-scale construction was determined empirically using parallel analysis. Second, it is possible that additional metacognitive processes of decentering may exist that are not represented in the MPoD. For example, de-reification (“the degree to which thoughts, feelings, and perceptions are phenomenally interpreted as mental processes rather than as accurate depictions of reality.” p.11) is a metacognitive process identified by Lutz et al. (2015), which appears to have conceptual parallels with Bernstein et al.’s (2015) non-reactivity to thought content, but may be subtly distinct. Alternatively, (de)reification may be one mechanism subserving or leading to reduced reactivity to thought content. As theoretical work continues to develop around

decentering, it may be appropriate and necessary to further develop the MPoD and the metacognitive processes model of decentering over time. Third, these results may not generalize beyond the specific samples used in the current studies. While evidence supports the quality of MTurk data (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012), continued research is needed to investigate the MPoD-t's psychometric properties in other samples. Similarly, the sample used to examine the MPoD-s' sensitivity to intervention in Study 4 was primarily older, white American adults. Validating both versions of the MPoD in more socio-culturally diverse samples, and among mindfulness meditation practitioners, is needed. Fourth, self-report scales were the primary data acquisition method in these studies, raising the possibility that common method variance and related response style similarities influenced results. Moreover, individuals likely differ with respects to their abilities to accurately know and report how frequently they decenter. Future studies utilizing the MPoD should also incorporate alternative measurement approaches, such as behavioral tasks measuring the metacognitive processes of decentering (e.g., Hadash & Berntein, 2019; Hadash, Plonsker, Vago, & Bernstein, 2016; Moeller et al., 2016; Ruimi, Hadash, Zvielli, Amir, Goldstein, & Bernstein, 2018; Smallwood & Schooler, 2015) to determine the extent to which self-reports map onto behavioral and performance-based measures of decentering-related constructs. Efforts to develop behavioral and cognitive assessment methods of the metacognitive processes of decentering is ongoing and an important complement to the self-report MPoD-t and MPoD-s (see Bernstein, Hadash, & Fresco, 2019 for a review).

In summary, the MPoD-t and the MPoD-s appear to be psychometrically sound and useful scales to assess decentering and the metacognitive process of decentering including meta-awareness, (dis)identification with internal experience, and (non)reactivity to internal experience. We believe the MPoD's development: (a) advances the study of decentering as a multidimensional trait and state; (b) contributes to mindfulness and mental health intervention research by providing a sound measurement option for a central mechanism of mindfulness-based and related interventions; (c) allows for direct investigation of state by trait interactions occurring in daily living and in the context of mindfulness training and related interventions; and (d) contributes a psychometrically sound measure to enable study of the metacognitive processes of decentering in wellbeing and mental health. Results from these studies indicate that the MPoD-t and MPoD-s are promising measurement tools with the potential to provide a more nuanced and refined understanding of decentering – an important mental factor for mental health and a valuable therapeutic mechanism.

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**Public Significance Statement:**

This series of four studies developed trait and state versions of the Metacognitive Processes of Decentering Scale (MPoD). Results indicate the MPoD is a promising measurement tool with the potential to provide a more nuanced and refined understanding of decentering – an important factor for mental health and a valuable therapeutic mechanism.

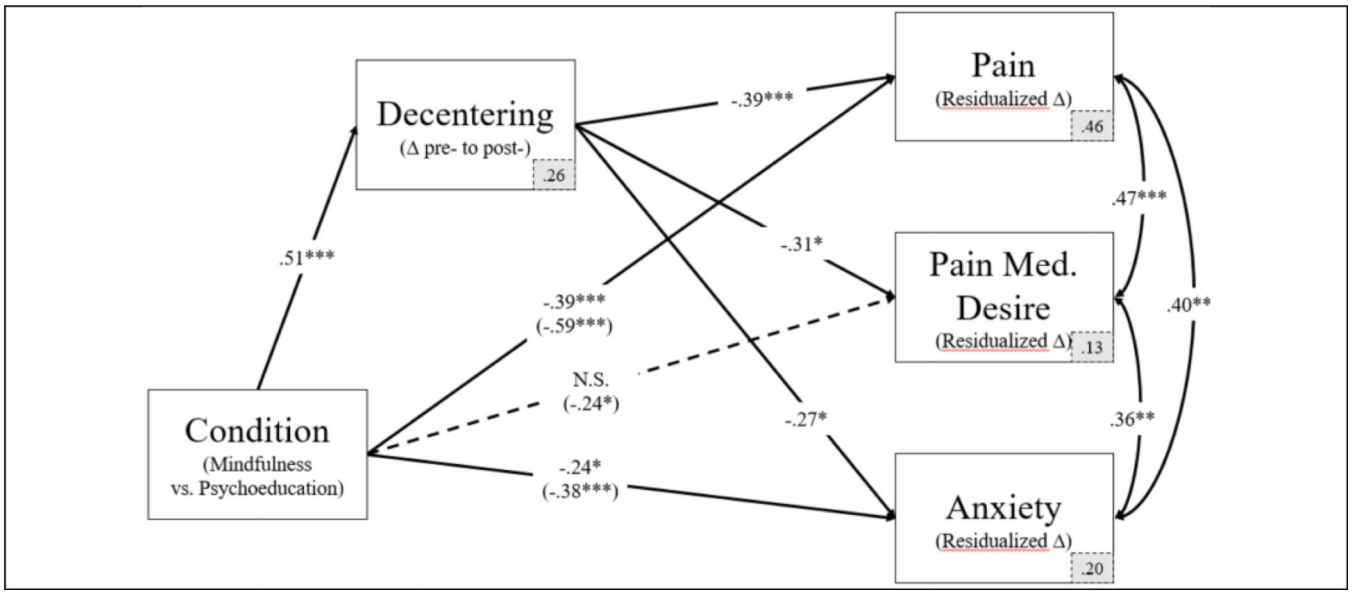


**Figure 1.**

Decentering mediation model. Standardized beta weights are reported. The parenthetic values report the direct effects of condition on pain without decentering in the model. The values in grey boxes in the bottom right corners of the endogenous variables report the amount of variance explained by this model for that variable.

**Table 1.**

Participant demographics by sample

| Measure | Sample 1 | Sample 2 | | | | Sample 3 |
|---|---|---|---|---|---|---|
| | | Full Sample | Non-Practitioners | Mindfulness Practitioners | Test statistic | |
| | *N*=355 | *N*=275 | *N*=140 | *N*=135 | | N=630 |
| Female, N (%) | 231 (65%) | 174 (63%) | 85 (61%) | 89 (66%) | $\chi^2$=0.80, p=.37 | 405 (64%) |
| Age, $\bar{x}$ ± SD | 36.92 ± 12.78 | 43.32 ± 13.86 | 44.95 ± 14.41 | 41.63 ± 13.10 | *t*=1.99, p=.05 | 41.27± 13.74 |
| Race, N (%) | | | | | $\chi^2$=3.34, p=.85 | |
| American Indian/ Alaskan Native | 4 (1%) | 2 (1%) | - | 2 (2%) | | 6 (1%) |
| Asian or South Asian | 24 (7%) | 18 (7%) | 9 (6%) | 9 (7%) | | 42 (7%) |
| African American | 28 (8%) | 26 (10%) | 14 (10%) | 12 (9%) | | 54 (9%) |
| Caucasian | 264 (74%) | 206 (75%) | 105 (75%) | 101 (75%) | | 470 (75%) |
| Latino | 21 (6%) | 11 (4%) | 6 (4%) | 5 (4%) | | 32 (5%) |
| Multiracial | 12 (3%) | 9 (3%) | 5 (4%) | 4 (3%) | | 21 (3%) |
| Other | 2 (1%) | 3 (1%) | 1 (1%) | 2 (1%) | | 5 (1%) |
| Educational Background, N (%) | | | | | $\chi^2$=4.35, p=.36 | |
| Less than High School | 1 (0%) | - | - | - | | 1 (0%) |
| High School or Equivalent | 73 (21%) | 50 (18%) | 24 (17%) | 26 (19%) | | 123 (20%) |
| Trade School | 17 (5%) | 15 (6%) | 9 (6%) | 6 (4%) | | 32 (5%) |
| Associate's Degree | 43 (12%) | 45 (16%) | 19 (14%) | 26 (19%) | | 88 (14%) |
| Bachelor's Degree | 155 (44%) | 124 (45%) | 70 (50%) | 54 (40%) | | 279 (44%) |
| Graduate Degree | 66 (19%) | 41 (15%) | 18 (13%) | 23 (17%) | | 107 (17%) |
| Income level, N (%) | | | | | $\chi^2$=2.25, p=.90 | |
| Under $25,000 | 48 (14%) | 46 (17%) | 22 (16%) | 24 (18%) | | 94 (15%) |
| $25–49,999 | 98 (28%) | 81 (30%) | 41 (29%) | 40 (30%) | | 179 (28%) |
| $50–74,999 | 90 (25%) | 73 (27%) | 38 (27%) | 35 (26%) | | 163 (26%) |
| $75–99,999 | 58 (16%) | 35 (13%) | 19 (14%) | 16 (12%) | | 93 (15%) |
| $100–149,999 | 44 (12%) | 25 (9%) | 12 (9%) | 13 (10%) | | 69 (11%) |
| Over $150,000 | 17 (5%) | 15 (6%) | 8 (56%) | 7 (5%) | | 32 (5%) |

**Table 2.**

Factor structure of the Metacognitive Processes of Decentering Scale – Trait

| Originating Scale | Item | Factor | | |
|---|---|---|---|---|
| | | Meta Awareness | (Dis)Identification with Internal Experience | (Non)Reactivity to Internal Experience |
| EQ-D $^{\Delta}$ | I am able to watch myself thinking. | .844 | .095 | −.148 |
| O. I. | I am able to watch my thoughts and feelings like someone watching a movie. | .857 | −.054 | .033 |
| O. I. | I can watch my thoughts and emotions drift by like leaves on a stream. | .889 | −.044 | .022 |
| O. I. | I can watch my thoughts and emotions come and go like clouds. | .745 | −.007 | .140 |
| SACS $^{\Delta}$ | I am able to step back and watch my mind work. | .775 | .039 | .062 |
| EQ-D$^{\Delta}$ | My sense of self is larger than my thoughts and feelings. | .023 | .840 | −.034 |
| EQ-D$^{\Delta}$ | I am more than my thoughts and feelings. | −.117 | .761 | .119 |
| TMS-D | My sense of self is separate from my changing thoughts and feelings. | .142 | .774 | −.091 |
| EQ-D$^{\Delta}$ | My thoughts and emotions are part of me, but they are not me. | −.068 | .707 | .064 |
| TMS-D | I am separate from my changing thoughts and feelings. | .092 | .673 | .030 |
| SACS $^{\Delta}$ | I can observe unpleasant thoughts and feelings without trying to change them. | .042 | −.003 | .782 |
| FFMQ-NR$^{\Delta}$ | I can step back and be aware of distressing thoughts and emotions without being taken over by them. | .033 | .062 | .802 |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or emotions, I just notice them and let them go. | .087 | −.055 | .764 |
| FFMQ-NR$^{\Delta}$ | I can be aware of unpleasant thoughts or feelings without immediately reacting to them | −.086 | .070 | .668 |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or feelings I am able just to notice them without reacting. | −.002 | .016 | .697 |

Note. EQ-D = Experiences Questionnaire's Decentering subscale; SACS = Self-as-Context Scale; TMS-D = Toronto Mindfulness Scale's Decentering subscale; FFMQ-NR = Five Facet Mindfulness Questionnaire's Non-reacting subscale; O.I. = Original Item.

$^{\Delta}$= Item wording modified

**Table 3.**

Descriptive statistics, reliabilities, and correlations among the metacognitive processes and decentering

| | Meta Awareness | (Dis)Identification with Internal Experience | (Non)Reactivity to Internal Experience | $\bar{x}$ | S.D. | Skewness | Kurtosis | CR |
|---|---|---|---|---|---|---|---|---|
| Meta-Awareness | - | | | 3.48 | 1.19 | −0.16 | −0.54 | .91 |
| (Dis)Identification with Internal Experience | .55*** | – | | 4.19 | 1.01 | −0.38 | −0.04 | .86 |
| (Non)Reactivity to Internal Experience | 60*** | 57*** | – | 3.76 | 0.97 | −0.16 | −0.01 | .87 |
| Decentering Total Score | 87*** | 83*** | 84*** | 3.81 | 0.89 | −0.14 | −0.06 | .93 |

*** p<.001

Note. Composite reliability (CR) is an estimate of internal reliability that is preferable to Cronbach's alpha as it does not assume unidimensionality or equivalent item loadings on the latent factor (Peterson & Kim, 2013; McNeish, 2018).

**Table 4.**

Goodness of fit statistics and information criteria for the Metacognitive Processes of Decentering Scale – Trait models

| | $\chi^2$ | *P* | *df* | CFI | TLI | RMSEA | AIC |
|---|---|---|---|---|---|---|---|
| CFA | 257.74 | <.001 | 87 | .906 | .887 | .084 | 11021.19 |
| B-ESEM | 312.88 | <.001 | 51 | .955 | .908 | .076 | 10968.32 |

Interpretation guidelines suggest that comparative fit index (CFI; Bentler, 1987) > .90, Tucker-Lewis index (TLI; Tucker & Lewis, 1973) > .90, and Root mean square of approximation (RMSEA; Steiger, 1990) < .08 are considered adequate, respectively. Furthermore, when testing nested models, the best fitting model demonstrates the lowest Akaike Information Criteria (AIC: Akaike, 1987).

**Table 5.**

Standardized factor loadings for the bifactor exploratory structural equation modeling solution of the Metacognitive Processes of Decentering Scale - Trait

| | | Global Factor | Specific Factors | | |
|---|---|---|---|---|---|
| | **Item** | **Decentering** | **Meta Awareness** | **(Dis)Identification with Internal Experience** | **(Non)Reactivity to Internal Experience** |
| | | **λ (SE)** | **λ (SE)** | **λ (SE)** | **λ (SE)** |
| EQ-D$^{\Delta}$ | I am able to watch myself thinking. | 40$^{***}$(.08) | .67$^{***}$(.06) | | |
| O.I. | I can watch my thoughts and emotions come and go like clouds. | 60$^{***}$(.06) | .43$^{***}$(.08) | | |
| SACS $^{\Delta}$ | I am able to step back and watch my mind work. | 50$^{***}$(.07) | .69$^{***}$(.05) | | |
| O.I. | I am able to watch my thoughts and feelings like someone watching a movie. | 68$^{***}$(.06) | .44$^{***}$(.09) | | |
| O.I. | I can watch my thoughts and emotions drift by like leaves on a stream. | 79$^{***}$(.07) | .33$^{**}$(.11) | | |
| EQ-D$^{\Delta}$ | My thoughts and emotions are part of me, but they are not me. | 36$^{***}$(.06) | | .29$^{***}$(.07) | |
| EQ-D$^{\Delta}$ | I am more than my thoughts and feelings. | 40$^{***}$(.06) | | .56$^{***}$(.06) | |
| TMS-D | I am separate from my changing thoughts and feelings. | 55$^{***}$(.05) | | .31$^{***}$(.06) | |
| EQ-D$^{\Delta}$ | My sense of self is larger than my thoughts and feelings. | 50$^{***}$(.06) | | .56$^{***}$(.06) | |
| TMS-D | My sense of self is separate from my changing thoughts and feelings. | 60$^{***}$(.05) | | .52$^{***}$(.06) | |
| FFMQ-NR$^{\Delta}$ | I can be aware of unpleasant thoughts or feelings without immediately reacting to them. | 43$^{***}$(.06) | | | .50$^{***}$(.06) |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or feelings I am able to notice them without reacting. | 49$^{***}$(.07) | | | .61$^{***}$(.07) |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or emotions, I just notice them and let them go. | 61$^{***}$(.06) | | | .38$^{***}$(.09) |
| SACS $^{\Delta}$ | I can observe unpleasant thoughts and feelings without trying to change them. | 54$^{***}$(.06) | | | .24$^{***}$(.08) |
| FFMQ-NR $^{\Delta}$ | I can step back and be aware of distressing thoughts and emotions without being taken over by them. | .66$^{***}$(.06) | | | .36$^{***}$(.08) |

$^{**}$ p<.01

$^{***}$ p<.001

Note. To increase table clarity, cross-loadings < .20 are not displayed (cf. Jennrich & Bentler, 2012; Myers et al., 2014; Stenling et al., 2015).

EQ-D = Experiences Questionnaire's Decentering subscale; SACS = Self-as-Context Scale; TMS-D = Toronto Mindfulness Scale's Decentering subscale; FFMQ-NR = Five Facet Mindfulness Questionnaire's Non-reacting subscale; O.I. = Original Item.

$^{\Delta}$ = Item wording modified

**Table 6.**

Basic statistics and correlations among the Metacognitive Processes of Decentering Scale - Trait scores and the primary constructs of interest

| | Meta-Awareness | (Dis)Identification with Internal Experience | (Non)Reactivity to Internal Experience | Decentering Total Score | *n* | $\bar{x}$ | *S.D.* | Skewness | Kurtosis | CR |
|---|---|---|---|---|---|---|---|---|---|---|
| Meta-Awareness | - | | | | 275 | 2.74 | 1.01 | 0.14 | −0.50 | .88 |
| (Dis)Identification with Internal Experience | .50*** | - | - | - | 275 | 3.41 | 0.80 | −0.43 | 0.35 | .76 |
| (Non)Reactivity to Internal Experience | .48*** | .54*** | - | - | 275 | 3.17 | 0.79 | −0.11 | −0.22 | .80 |
| Decentering Total Score | 80*** | 83*** | 76*** | - | 275 | 3.12 | 0.68 | 0.10 | 0.08 | .90 |
| | | | | | | | | | | |
| TMS-D | .56*** | 61*** | .65*** | 73*** | 275 | 3.03 | 0.83 | −0.03 | −0.15 | .85 |
| SEQ | 57*** | .65*** | .63*** | 74*** | 102 | 4.68 | 1.12 | −0.01 | −0.02 | .94 |
| EQ-D | 51*** | 52*** | 74*** | .62*** | 91 | 3.67 | 0.81 | −0.07 | −0.02 | .91 |
| SACS | 32** | 40*** | 54*** | 46*** | 82 | 5.25 | 1.00 | −0.96 | 2.21 | .91 |
| FFMQ | 23*** | 23*** | 42*** | 25*** | 275 | 3.38 | 0.53 | −0.06 | 0.85 | .91 |
| NADA | .56*** | 35*** | 34*** | 48*** | 275 | 2.64 | 0.94 | 0.42 | −0.59 | .95 |
| SPWB | .00 | .24* | 37*** | .20* | 93 | 4.75 | 0.95 | −0.25 | 0.07 | .87 |
| Positive Affect | 32** | .25* | 37*** | .33** | 86 | 3.59 | 0.87 | −0.45 | 0.18 | .83 |
| Negative Affect | −.10 | −.16 | −.27* | −.12 | 86 | 1.91 | 0.94 | 1.15 | 0.76 | .88 |

*p<.05

**p<.01

***p<.001

TMS-D = Toronto Mindfulness Scale's Decentering subscale; SEQ = Self Experiences Questionnaire; EQ-D = Experiences Questionnaire's Decentering subscale; SACS = Self-as-Context Scale; FFMQ = Five Facet Mindfulness Questionnaire; NADA = Nondual Awareness Dimensional Assessment; SPWB = Scales of Psychological Well-Being; CR = Composite Reliability.

**Table 7.**

Between Group Differences in Decentering by Mindfulness Practice Involvement

| | Non-Practitioner (n=140) | | | Practitioner (n=135) | | | *t* | *P* | Cohen's *d* |
|---|---|---|---|---|---|---|---|---|---|
| | $\bar{x}$ | SD | | $\bar{x}$ | SD | | | | |
| Meta-Awareness | 2.47 (2.490) | 0.88 (.081) | | 3.02 (2.997) | 1.05 (.083) | | 4.67 (19.02) | <.001 (<.001) | .568 (.527) |
| (Dis)Identification with Internal Experience | 3.28 (3.291) | 0.75 (.067) | | 3.54 (3.531) | 0.84 (.068) | | 2.65 (6.190) | .008 (.013) | .327 (.300) |
| (Non)Reactivity to Internal Experience | 3.03 (3.024) | 0.77 (.067) | | 3.32 (3.323) | 0.80 (.068) | | 3.12 (9.805) | .002 (.002) | .369 (.381) |
| Decentering Total Score | 2.98 (2.988) | 0.56 (.056) | | 3.27 (3.257) | 0.75 (.057) | | 3.64 (11.372) | <.001 (.001) | .438 (.408) |

**Table 8.**

Item Response Theory parameter estimates for the Metacognitive Processes of Decentering Scale -Trait

| | | *a* | *b*1 | *b*2 | *b*3 | *b*4 | Info | % Info |
|---|---|---|---|---|---|---|---|---|
| | **Meta-Awareness** | | | | | | | |
| EQ-D$^{\Delta}$ | I am able to watch myself thinking. | 1.55 | −0.94 | −0.46 | 0.64 | 1.45 | 6.20 | 14.6% |
| SACS $^{\Delta}$ | I can watch my thoughts and emotions come and go like clouds. | 1.83 | −0.90 | −0.46 | 0.75 | 1.50 | 7.33 | 17.3% |
| SACS $^{\Delta}$ | I am able to step back and watch my mind work. | 2.14 | −1.19 | −0.53 | 0.56 | 1.30 | 8.55 | 20.1% |
| SACS $^{\Delta}$ | I am able to watch my thoughts and feelings like someone watching a movie. | 2.47 | −0.97 | −0.26 | 0.62 | 1.46 | 9.87 | 23.2% |
| SACS $^{\Delta}$ | *I can watch my thoughts and emotions drift by like leaves on a stream.* | 2.63 | −0.92 | −0.30 | 0.60 | 1.55 | 10.53 | 24.5% |
| | **(Dis)Identification with Internal Experience** | | | | | | | |
| EQ-D$^{\Delta}$ | My thoughts and emotions are part of me, but they are not me. | 0.80 | −1.49 | −1.09 | 0.12 | 1.55 | 3.18 | 10.2% |
| EQ-D$^{\Delta}$ | I am more than my thoughts and feelings. | 1.57 | −1.89 | −1.86 | −0.63 | 0.54 | 6.27 | 20.1% |
| TMS-D | I am separate from my changing thoughts and feelings. | 1.25 | −1.55 | −1.23 | 0.36 | 1.67 | 5.00 | 16.1% |
| EQ-D$^{\Delta}$ | My sense of self is larger than my thoughts and feelings. | 2.08 | −1.78 | −1.23 | −0.22 | 0.86 | 8.31 | 26.7% |
| TMS-D | *My sense of self is separate from my changing thoughts and feelings.* | 2.10 | −1.64 | −1.22 | 0.09 | 1.16 | 8.38 | 26.9% |
| | **(Non)Reactivity to Internal Experience** | | | | | | | |
| FFMQ-NR$^{\Delta}$ | I can be aware of unpleasant thoughts or feelings without immediately reacting to them. | 1.13 | −2.14 | −1.39 | 0.19 | 1.79 | 4.53 | 14.3% |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or feelings I am able to notice them without reacting. | 1.47 | −1.75 | −0.80 | 0.59 | 1.89 | 5.89 | 18.6% |
| FFMQ-NR$^{\Delta}$ | When I have distressing thoughts or emotions, I just notice them and let them go. | 1.69 | −1.51 | −0.66 | 0.69 | 1.73 | 6.77 | 21.4% |
| SACS $^{\Delta}$ | I can observe unpleasant thoughts and feelings without trying to change them. | 1.31 | −1.86 | −0.96 | 0.52 | 1.85 | 5.24 | 16.5% |
| FFMQ-NR$^{\Delta}$ | *I can step back and be aware of distressing thoughts and emotions without being taken over by them.* | 2.31 | −1.70 | −0.97 | 0.26 | 1.39 | 9.24 | 29.2% |

Note. Items selected for the MPoD-s italicized.

**Table 9.**

Between Group Differences in Decentering and Clinical Symptoms by Condition

| | Psychoeducation (n=41) | | | Mindfulness (n=40 | | |
|---|---|---|---|---|---|---|
| | Pre- | Post- | | Pre- | Post- | |
| | $\bar{x}$ (SD) | $\bar{x}$ (SD) | % Δ | $\bar{x}$ (SD) | $\bar{x}$ (SD) | % Δ |
| MPoD-s Total Score | 4.15 (2.34) | 4.17 (2.62) | 0% | 4.63 (1.81) | 7.16 (2.33) | 55% ↑ |
| Pain | 4.27 (2.66) | 3.80 (2.64) | 11% ↓ | 4.10 (2.15) | 1.67 (1.87) | 59% ↓ |
| Pain Medication Desire | 1.83 (2.32) | 1.51 (2.30) | 17% ↓ | 1.34 (2.01) | 0.62 (1.74) | 54% ↓ |
| Anxiety | 3.40 (2.97) | 2.69 (2.78) | 21% ↓ | 3.61 (2.73) | 1.59 (1.99) | 56% ↓ |