Psychological Assessment

Examining the Factor Structures of the Five Facet Mindfulness Questionnaire and the Self-Compassion Scale

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The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and the Self-Compassion Scale (SCS; Neff, 2003) are widely used measures of mindfulness and self-compassion in mindfulness-based intervention research. The psychometric properties of the FFMQ and the SCS need to be independently replicated in community samples and relevant clinical samples to support their use. Our primary aim was to establish the factor structures of the FFMQ and SCS in individuals with recurrent depression in remission, since Mindfulness-Based Cognitive Therapy (MBCT) was developed as a treatment for preventing depressive relapse. In order to determine the consistency across populations, we examined the factor structures of the FFMQ and SCS in 3 samples: (1) a convenience sample of adults, (2) a sample of adults who practice meditation, and (3) a sample of adults who suffer from recurrent depression and were recruited to take part in a trial of MBCT. Confirmatory factor analyses (CFAs) showed that a 4-factor hierarchical model of the FFMQ best fits the community sample and the clinical sample but that a 5-factor hierarchical model of the FFMQ best fits the meditator sample. CFA did not endorse the SCS 6-factor hierarchical structure in any of the 3 samples. Clinicians and researchers should be aware of the psychometric properties of the FFMQ to measure mindfulness when comparing meditators and nonmeditators. Further research is needed to develop a more psychometrically robust measure of self-compassion.

Keywords: mindfulness, self-compassion, Mindfulness-Based Cognitive Therapy, mindfulness-based interventions, confirmatory factor analysis

The cultivation of mindfulness meditation skills has been incorporated into a broad range of mindfulness-based interventions (MBIs), perhaps most notably Mindfulness-Based Cognitive Therapy

(MBCT; Segal, Williams, & Teasdale, 2013) and Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990). There is now compelling evidence to support the efficacy of MBCT in treating recurrent depression (see Piet & Hougaard, 2011, for a review) and MBSR in improving mental health among people with chronic physical health problems (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Grossman, Niemann, Schmidt, & Walach, 2004).

MBIs are based on theoretical frameworks that posit that mindfulness plays an important role in mental health (e.g., Kabat-Zinn, 1990; Segal et al., 2013). For example, MBCT is a clinical intervention program designed to reduce depressive relapse or recurrence by means of systematic training in mindfulness meditation combined with cognitive-behavioral skills (Segal et al., 2013). It was developed to target the cognitive reactivity that renders depressed individuals vulnerable to repeated relapse at times of stress. It does this by teaching participants the ability to recognize and step out of reactivity, and over time to respond in more adaptive ways. This theoretical rationale generates questions such as "Does the cultivation of mindfulness skills mediate the relationship between treatment and outcome?" Questions such as this can only be answered if there is some way of operationally defining and measuring mindfulness.

The most cited definition of mindfulness in the psychological literature comes from Jon Kabat-Zinn (1994): Mindfulness is "paying attention in a particular way, on purpose, in the present moment, and non-judgmentally" (p. 4). For pragmatic reasons, the

primary method of measuring mindfulness is by self-report, and a growing research interest has been the development and validation of self-report questionnaires to measure mindfulness (see Table 1 for a summary). Scales aiming to measure mindfulness reflect the diversity of definitions that have been proposed.

The Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; see Table 1) and the Self-Compassion Scale (SCS; Neff, 2003) are two self-report scales that have become commonly used in MBI research to test whether mindfulness and self-compassion mediate the relationship between MBCT and MBSR and improved outcome posttreatment (i.e., a decrease in clinical symptoms, such as depressive symptoms in MBCT for treating recurrent major depressive disorder). In addition, the second edition of the MBCT manual now explicitly states that MBCT aims to cultivate mindfulness *and self-compassion* on the grounds that they have been found to be mechanisms of change in several studies (see Kuyken, Watkins, et al., 2010; Segal et al., 2013). Although recent research has started to investigate the psychometric properties of the FFMQ and SCS (Baer et al., 2006, 2008; Neff, 2003), it is not well established whether scores on these scales in clinical samples have acceptable construct validity to support their use in MBI research (i.e., do scores measure what they aim to measure, in samples relevant to their use?).

An important aspect of establishing the construct validity of a scale's scores is achieved through the examination of the scale's structure in relevant samples using factor analysis (T. A. Brown, 2006). One purpose of factor analysis in the development of a scale that measures a multifaceted construct is to ensure that each of the scale's items adequately captures one of the hypothesized facets of the construct and not an alternate facet of the construct. Factor analysis can also be conducted to ensure that each of the factors that represent facets of a construct load on to one overarching factor, which represents the construct itself. This ensures that the structure of the scale reflects the hypothesized structure of the construct. Confirmatory factor analysis can be used to examine if the structure of the scale reflects the hypothesized structure of the construct when a different population completes the scale. The main aim of the current study was to establish the factor structure of the FFMQ and SCS in a relevant clinical sample where there is a great deal of ongoing research using these scales—MBCT for people with recurrent major depression.

The Five Facet Mindfulness Questionnaire

The FFMQ is a 39-item self-report measure of mindfulness skills that is becoming widely used in psychological research generally and in process-outcome work on MBCT and MBSR specifically. It was developed through factor analyses with the aim of identifying the key facets of mindfulness using items from the five independently developed, theoretically derived mindfulness scales that were available at the time: the Mindfulness Attention Awareness Scale (K. W. Brown & Ryan, 2003), the Freiburg Mindfulness Inventory (Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006), the Cognitive Affective Mindfulness Scale (Hayes & Feldman, 2004), the Mindfulness Questionnaire (Chadwick, Taylor, & Abba, 2005), and the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004). The analyses by Baer et al. (2006) suggested that mindful-

ness is a multifaceted, five-factor construct (however, see Table 1 for additional hypothesized facets of mindfulness not included in the FFMQ). The FFMQ is thus considered to measure five mindfulness skills through these subscales: Non-Reactivity to Inner Experience, Observing/Noticing, Acting With Awareness, Describing, and Non-Judging of Experience.

Although the items of the FFMQ were compiled from five separate mindfulness measures, 24 of its 39 items are from the KIMS and four of the five facets correspond to the four facets that compose the KIMS. The KIMS was developed to measure the cultivation of mindfulness skills in the context of psychological therapies that include some degree of mindfulness training, including MBSR, MBCT, dialectical behavior therapy, and acceptance and commitment therapy (Baer et al., 2004). This underscores the need to demonstrate the validity of commonly used measures such as the FFMQ in clinical samples. Each of the 39 items of the FFMQ is measured using a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). The five facets can be combined to yield a total score, which reflects a global measure of mindfulness. Research has demonstrated that mindfulness can be cultivated through MBCT and MBSR, with several studies suggesting that mindfulness, as measured by the FFMQ pre- to posttreatment, is a mediator of therapeutic change (e.g., Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Carmody & Baer, 2008; McManus, Surawy, Muse, Vazquez-Montes, & Williams, 2012; Nyklíček & Kuijpers, 2008; Vøllestad, Sivertsen, & Nielsen, 2011).

Preliminary psychometric analyses has shown that the English version of the FFMQ has adequate reliability, convergent and discriminant validity, and incremental validity in the prediction of psychological symptoms (Baer et al., 2006). However, those psychometric evaluations that are available to confirm the factor structure of the FFMQ raise important questions regarding the utility of this structure for clinical mindfulness research. Although a five-factor structure emerged in the development of the FFMQ, Baer et al. (2006, 2008) found that a *four-factor hierarchical structure* provided the optimal fit for the data when a student sample, community sample, and sample of highly educated adults were used (i.e., that all subscales except Observing/Noticing are key elements of an overarching mindfulness construct). A core component of MBIs is the use of regular meditation practice as a vehicle to deliver acquisition of mindfulness skills. However, the only published study that explores the factor structure of the FFMQ in a sample with experience of meditation found that a *five-factor hierarchical structure* provided the optimal fit (Baer et al., 2008; all facets including Observing/Noticing).

An explanation could be that the Observing/Noticing items have different meanings for meditators and nonmeditators (Grossman & Van Dam, 2011). Baer et al. (2008) suggested that the Observing/Noticing subscale may be sensitive to changes with meditation practice, such that its relationship with other facets of mindfulness becomes stronger as meditation experience increases. Observing one's experience could therefore be a key facet of the mindfulness construct, but only once a certain level of meditation practice has been established. Using the FFMQ to measure change pre- to post-MBCT could therefore be problematic, if the factor structure changes through respondents' practicing meditation. It would be advantageous to replicate the findings of Baer et al. by replicating the factor structure of the FFMQ in meditators. If meditation

Table 1

Psychological Definitions of Mindfulness, and Mindfulness Operationalized Through Self-Report Scales

Author/source	Definition of *mindfulness* (e.g., "Mindfulness is …")	Measure influenced by definition
Kabat-Zinn (1990, 1994)	"…paying attention in a particular way, on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994, p. 4). Kabat-Zinn (1990) proposed seven principles of mindfulness: acceptance, non-judging, non-striving, beginner's mind, letting-go, patience, and trust.	None
Linehan (1993); Dimidjian & Linehan (2003)	A set of skills/qualities, separated into two types. Three qualities related to what one does when practicing mindfulness: (1) observing/noticing, (2) describing/labeling, (3) participating. Three qualities related to the ways in which one does these activities: (1) non-judgmentally, (2) in the present moment, (3) effectively.	Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith & Allen, 2004); Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006). The KIMS comprises four factors: observing, describing, acting with awareness, accepting without judgment. The FFMQ comprises five factors: observing, describing, acting with awareness, non-reactivity to inner experience, non-judging of inner experience.
Teasdale (1999); Segal et al. (2013)	"…the awareness that emerges through paying attention on purpose in the present moment and non-judgmentally to things as they are" (Segal et al., 2013, p. 132). Particular ways include curiosity, non-judgment, acceptance, allowing, friendliness, kindness.	None
Buchheld et al. (2001)	"…the dispassionate, non-manipulative participant-observation of ongoing mental states, without lapsing into conceptualisations about momentary mental content or becoming lost in emotional reactions…carried out with curiosity and without bias or expectation" (p. 11).	Freiburg Mindfulness Inventory (FMI; Buchheld et al., 2001). Comprises four factors: present-moment dis-identifying attention; non-judgmental/ non-evaluative attitude to self and others; openness to negative mind states; process-oriented insightful understanding.
K. W. Brown & Ryan (2003)	"…attention to and awareness of whatever is occurring in the present" (p. 824).	Mindful Attention Awareness Scale (MAAS; K. W. Brown & Ryan, 2003). Comprises a single factor measuring lapses in attention and awareness.
Bishop et al. (2004)	"…self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment" (p. 232). "Adopting a particular orientation toward one's experience that is characterised by curiosity, openness and acceptance" (p. 232). Two components: (1) self-regulation of attention (skills of sustained attention, switching, inhibition of secondary elaborative processing) and (2) orientation to experience (curiosity, experiential openness and acceptance).	Toronto Mindfulness Scale (Lau et al., 2006). Comprises two factors: curiosity, decentering.
Shapiro et al. (2006)	Three components, based upon Kabat-Zinn's (1994) definition: (1) on purpose (intention), (2) paying attention (attention), (3) in a particular way (attitude, or mindful qualities such as openness and non-judgment). Intention, attention, and attitude lead to "reperceiving" (i.e., a fundamental shift in perspective of the subject-object relationship).	None
Leary & Tate (2007)	Five components: (1) mindful attention, (2) diminished self-talk, (3) non-judgment, (4) non-doing, and (5) a particular set of philosophical, ethical, or therapeutic beliefs.	None
Feldman et al. (2007)	Four components, based upon definitions by Kabat-Zinn (1994) and Bishop et al. (2006): (1) the ability to regulate attention, (2) an orientation to present or immediate experience, (3) awareness of experience, and (4) an attitude of acceptance or non-judgment toward experience.	Cognitive and Affective Mindfulness Scale–Revised (CAMS-R; Feldman et al., 2007). Comprises four factors: attention, present focus, awareness, and acceptance.
Cardaciotto et al. (2008)	"…the tendency to be highly aware of one's internal and external experiences in the context of an accepting, nonjudgmental stance toward those experiences" (p. 205). Two components: what is done (awareness) and how (acceptance).	Philadelphia Mindfulness Scale (PMS; Cardaciotto et al., 2008). Comprises two factors: awareness, acceptance.
Chadwick et al. (2008)	Four related components: (1) decentred awareness, (2) allowing attention to remain with difficult cognitions, (3) accepting difficult thoughts/images and self, (4) letting difficult cognitions pass without reacting.	Southampton Mindfulness Scale (SMS; Chadwick et al., 2008). Comprises a single factor, with items measuring all four hypothesized components.
Feldman (2012)	"…the willingness and capacity to be equally present with all events and experiences with discernment, curiosity and kindness."	None

experience is a prerequisite to the Observing/Noticing items functioning in the way they were intended, it could be that using the Observing/Noticing subscale items as part of the FFMQ in experimental studies comparing meditators and nonmeditators, or assessing change pre- to post-MBIs, produces biased results.

Baer et al. (2006) cautioned that the FFMQ "requires extensive additional validation in a range of samples" (p. 43); yet, to date, the factor structure of the English version of the FFMQ has not been assessed using any clinical samples. This is an important omission, given that the FFMQ has begun to be used in studies to assess change pre- to post-MBIs for clinical conditions (e.g., Bowen & Kurz, 2012; Deckersbach et al., 2012; McManus et al., 2012; Vøllestad et al., 2011). For example, in the context of MBCT, the factor structure of the FFMQ has not been assessed using a sample of individuals who suffer from recurrent depression, thus suggesting caution regarding its use within clinical research or as a clinical tool to assess treatment change. Furthermore, studies have suggested that certain facets of the FFMQ show medium to large correlations with depressive symptoms, highlighting shared variance in these constructs (Baer et al., 2006, 2008; Barnhofer, Duggan, & Griffith, 2011; Bränström, Duncan, & Moskowitz, 2011; Lavender, Gratz, & Tull, 2011). It is unknown how this shared variance influences the factor structure of the FFMQ in a sample of individuals who suffer from recurrent depression.

The Self-Compassion Scale (SCS)

Self-compassion "involves being caring and compassionate toward oneself in the face of hardship or perceived inadequacy . . . having the right amount of distance from one's emotions so that they are fully experienced while being approached with mindful objectivity" (Neff, Kirkpatrick, & Rude, 2007, p. 140). The SCS measures self-compassion through six subscales that address contrasting components: Self-Kindness versus Self-Judgment, Common Humanity versus Isolation, and Mindfulness versus Over-Identification (Neff, 2003). The SCS is a 26-item scale that aims to measure these components of self-compassion using a 5-point Likert scale ranging from 1 (*Almost Never*) to 5 (*Almost Always*). The mean scores from the subscales can be combined to yield a total score, which reflects a global measure of self-compassion.

Empirical research has shown that self-compassion as measured by the SCS can be cultivated through MBIs such as MBCT (Dunn, Hanieh, Roberts, & Powrie, 2012; Kuyken, Watkins, et al., 2010; Rimes & Wingrove, 2011) and MBSR (Birnie, Speca, & Carlson, 2010; Shapiro, Astin, Bishop, & Cordova, 2005; Shapiro, Brown, & Biegel, 2007). Using data from a recent randomized controlled trial of MBCT for recurrent depression that compared MBCT to antidepressant medication (Kuyken et al., 2008), Kuyken, Watkins, et al. (2010) found that MBCT's outcomes in terms of residual depressive symptoms at 1 year follow-up were mediated by the enhancement of self-compassion across MBCT treatment. Kuyken, Watkins, et al. also explored the effect of MBCT on cognitive reactivity, using a sad mood-induction paradigm 1 month after participants had received MBCT. They found that the relationship between greater reactivity and poor outcome after 1 year was attenuated in people who became more self-compassionate during treatment.

The psychometric properties of the SCS have been examined in student samples (Neff, 2003), but to date, its psychometric properties have yet to be established in clinical or meditator samples. As with the FFMQ, this is an important omission since the SCS is being used in studies to examine change following MBIs such as MBCT for recurrent depression (e.g., Kuyken, Watkins, et al., 2010).

Aim of the Present Study

This study addresses an important omission in the literature by examining the factor structures of the FFMQ and SCS in three samples relevant to mindfulness research: (1) an unspecified community sample of adults (e.g., to replicate the findings of Baer et al., 2006, and to establish the factor structure of the SCS given that the SCS was developed using a student sample), (2) a sample of adults who practice meditation (e.g., to replicate the findings of Baer et al., 2008, and to establish the factor structure of the SCS in a meditator sample, which is novel), and (3) a sample of adults who suffer from recurrent depressive disorder in remission recruited to participate in MBCT (novel for both scales).

Method

Participants

Table 2 shows participant characteristics for all three samples. Sample 1 comprised a large convenience sample of adults recruited through the community via online forums ($N = 940$). Sample 1 was not assessed for clinical status or meditation experience. The only criterion was that they had to be 18 years of age or over. Sample 2 comprised an online sample of meditators recruited through the Exeter Mindfulness Network newsletter (www.exeter-mindfulness-network.org), local meditation centers, and online meditation forums ($N = 235$). The clinical status of Sample 2 was unknown. Criteria for this group included being 18 or over and currently practicing meditation (Table 3 shows characteristics of reported meditation practice for Sample 2). Sample 3 comprised individuals who had consented to take part in a trial of MBCT for recurrent depression (PREVENT trial; Kuyken, Byford, et al., 2010; $N = 424$). This clinical sample is representative of the population for whom MBCT was developed, namely people with a history of recurrent depression who are open to trying a psychosocial approach to staying well (Segal et al., 2013). Sample 3 participants were recruited through primary care settings in rural and urban settings in the United Kingdom. Criteria for this group included having a diagnosis of recurrent major depressive disorder in full or partial remission according to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV;* American Psychiatric Association, 1994), having three or more previous major depressive episodes, and being 18 or older. Exclusion criteria included having the following: a current major depressive episode, a comorbid diagnosis of current substance abuse, organic brain damage, current/past psychosis, and current/past bipolar disorder. To establish participants' diagnostic status, the Structured Clinical Interview for *DSM–IV* (SCID-I; First, Spitzer, Gibbon, & Williams, 2002) was administered.

Table 2
Participant Characteristics for Three Adult Samples: Unspecified (Sample 1), Meditator (Sample 2), and Clinical (Sample 3)

Characteristic	Sample 1 (*N* = 940)	Sample 2 (*N* = 235)	Sample 3 (*N* = 424)
Gender (women): *n* (%)	697 (74.1)	153 (65.1)	325 (76.6)
Age (in years): *M* (*SD*)	25.7 (9.8)	46.51 (13.1)	50.16 (11.8)
Level of education: *n* (%)			
No educational qualification	43 (4.6)	1 (0.4)	18 (4.2)
Some school education	69 (7.3)	12 (5.1)	77 (18.2)
High school and/or vocational education	444 (47.3)	51 (21.7)	175 (41.3)
University degree/professional qualification	384 (40.8)	171 (72.8)	136 (32.1)
Missing	0	0	18 (4.2)
Ethnicity: *n* (%)			
White/Caucasian	800 (85.1)	216 (91.9)	410 (96.7)
Other	140 (14.9)	19 (8.1)	4 (0.9)
Missing	0	0	10 (2.4)

Note. The clinical sample had to meet criteria for recurrent major depressive disorder and be currently in remission.

Procedure

Sample 1 participants consented to take part in an online study that involved completion of the FFMQ and SCS. No individual payment was offered for participating, although two participants were selected at random to receive a £40 (US$66.16) prize.

Sample 2 participants consented to take part in an online study that involved completing the FFMQ and SCS along with three questions about their meditation practice: (1) "How many years have you been meditating? (Even if your meditation practice has been off and on)"; (2) "How many years have you been meditating

Table 3
Characteristics of Meditation Practice in Adult Meditator Sample (N = 235)

Variable	%
Years meditated (since starting meditation)	
Less than 1 year	5.2
1–5 years	35.6
6–10 years	21.6
11–15 years	10.8
16–20 years	9.3
21 years or more	17.5
Years meditated[a] (more on than off)	
Less than 1 year	13.9
1–5 years	47.4
6–10 years	14.9
11–15 years	12.9
16–20 years	4.6
21 years or more	6.3
Average meditation amount per week (hr)	
Less than 1 hr	17.0
1–2 hr	19.1
2–3 hr	18.6
3–4 hr	16.5
4–6 hr	11.3
6–8 hr	11.8
8–10 hr	2.1
10 or more hr	3.6

[a] Years meditated was measured in number of years but is presented here in 5-year periods.

fairly regularly? (i.e., more 'on', than 'off and on')"; and (3) "A formal meditation is where you put time aside to perform a specific meditation (such as a sitting meditation). How many minutes or hours do you typically spend carrying out formal meditations per week?" For Questions 1 and 2, participants were given a drop-down menu of options ranging from 0 to 99. For Question 3, participants were given a drop-down menu of options ranging from 0 to 100 hr, split up into 10-min intervals. The questions about their meditation practice were included for information only and were not included in any of the analyses.

Sample 3 participants were asked to complete the FFMQ and SCS in a booklet of measures as part of their intake assessment for a trial of MBCT for recurrent depression (Kuyken, Byford, et al., 2010). Participants were paid £10 (US$16.54) to cover expenses for taking part in this assessment. Participants from all three samples were asked to complete the FFMQ first, followed by the SCS.

Statistical Analyses

Preliminary analyses. Preliminary analyses were conducted in order to prepare the data, check for underlying assumptions about the samples used, and report descriptive statistics and reliability coefficients (Cronbach's alphas). These analyses were carried out using SPSS, Version 18.

Factor analyses. The factor analyses of the FFMQ (Baer et al., 2006, 2008) and SCS (Neff, 2003) were evaluated through conducting confirmatory factor analyses (CFAs) to confirm the factor structures detailed below. The CFAs were conducted using SAS 9.3. The maximum likelihood estimation method was used based upon recommendations of its robust performance in a variety of situations (Kline, 2005).

Five Facet Mindfulness Questionnaire. To replicate the procedure used by Baer et al. (2006), the CFAs of the FFMQ were conducted using item parcels whereby items within subscales were assigned to parcels randomly. A strength of this method is that the reliability of a parcel is greater than the reliability of a single item, so parcels can serve as more stable indicators of a latent construct (Little, Cunningham, Shahar, & Widaman, 2002). Each subscale

comprised three parcels, totaling 15 parcels (see Baer et al., 2006, 2008).

For each sample, five FFMQ factor structures were tested. To replicate Baer et al. (2006, 2008), we tested a single-factor model in which all item parcels are indicators of one, overall mindfulness factor; a five-factor model, in which item parcels are indicators of five distinct but correlated mindfulness factors; a hierarchical model in which the five factors were indicators of an overall mindfulness factor (*five-factor hierarchical model*); and a hierarchical model in which four factors (all except Observing/Noticing) were indicators of an overall mindfulness factor (*four-factor hierarchical model*). Ideally, a five-factor model and a five-factor hierarchical model would be the best fit for all three samples. Since Baer et al. (2006) found that a five-factor model and a four-factor hierarchical model best fit their data, we decided to also test a four-factor model in which all parcels except those of the Observing/Noticing facet were included.

Self-Compassion Scale. To replicate the procedure used by Neff (2003), the CFAs of the SCS were conducted using scale items rather than item parcels. Since the SCS subscales consist of either four or five items, it is not possible to split the items into three or more parcels (the amount needed to perform factor analysis). For each of the four samples, three SCS factor structures were tested: a single-factor model in which all item parcels are indicators of one, overall self-compassion factor; the six-factor model; and a hierarchical model in which the six factors were indicators of an overall self-compassion factor (called *six-factor hierarchical model*). The latter two models were tested by Neff (2003) in the development of the SCS.

Assessing goodness of fit. There are rules of thumb when choosing cutoff points to say that a model fit is acceptable or poor, from the fit indices provided by structural equation modeling statistical software (Hu & Bentler, 1998, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003). Suggested cutoffs for specific fit indices vary and should be used with caution, since indices are influenced by sample size, model parameters, and data normality (e.g., Chen, Curran, Bollen, Kirby, & Paxton, 2008; Marsh, 2004; Nye & Drasgow, 2011). It is recommended that researchers report several indices rather than relying on a single type, since different indices together provide complementary information (e.g., Kline, 2005). We report six indices for the current analyses: the chi-square statistic with degrees of freedom, comparative fit index (CFI; Bentler, 1990); nonnormed fit index (NNFI; Bentler, 1990); root-mean-square error of approximation (RMSEA; Steiger & Lind, 1980); standardized root-mean-square residual (SRMR; Bentler, 1995), and Akaike information criterion (AIC; Akaike, 1974).

Since indices are influenced by sample size, model parameters, and data normality, for the SRMS, RMSEA, CFI, and NNFI we provide both conservative and liberal suggested cutoffs for an acceptable fit and use both when drawing conclusions from the results (Schermelleh-Engel et al., 2003). For a model that fits the data to an acceptable level, CFI and NNFI would be ≥.95 (conservative) or ≥.90 (liberal), RMSEA would be ≤.06 (conservative) or ≤.10 (liberal), and SRMR would be ≤.05 (conservative) or ≤.10 (liberal; Schermelleh-Engel et al., 2003). Collectively, these fit indices are considered to provide satisfactory criteria for overall model evaluation (Schermelleh-Engel et al., 2003), and a very stringent standard would be to satisfy them all. The AIC index

will be used as a descriptive measure of model parsimony in order to further compare the one-, four-, and five-factor models and the four- and five-factor hierarchical models. The lower the AIC, the better the model fit. Additionally, since models for both the FFMQ and SCS are nested (e.g., the four-factor model of the FFMQ is nested in the four-factor hierarchical model of the FFMQ), comparative fit was evaluated using the chi-square difference test to determine whether statistically significant differences existed between CFA models.

Conclusions drawn as to which model provides a superior fit were therefore based upon the combination of four factors: (1) meeting criteria for acceptable fit on the SRMS, RMSEA, CFI, and NNFI (conservative cutoffs as a first choice, liberal as a second); (2) having the lowest AIC; (3) being significantly improved compared to other models, based upon the chi-square difference test; and (4) having items/parcels/facet factors load significantly on to relevant factors at $p = .001$ (the latter procedure used by Baer et al., 2006). Since the chi-square difference test is sensitive to sample size, such that in large samples small differences may be statistically significant but not meaningful, a common rule of thumb is that if other fit indices (i.e., SRMS, RMSEA, CFI, and NNFI) do not differ by a full point at two decimal places (e.g., .94 vs. .93), then the difference is not meaningful even if the chi-square difference test is significant (Schermelleh-Engel et al., 2003).

Results

Preliminary analyses

In preliminary analyses the data were checked for normality. Scale scores in all four samples were normally distributed, as assessed by histograms, box plots, and levels of skewness and kurtosis. The data were next checked for missing values. For Sample 1 (unspecified community sample) and Sample 2 (meditators) there were no missing data, since participants were required to select an answer for each item of the FFMQ and SCS. However, some participants chose to complete only the FFMQ, which was administered first. Among Sample 1 participants, 940 completed the FFMQ and 821 completed the SCS. Among Sample 2 participants, 235 completed the FFMQ and 211 completed the SCS. For Sample 3 (formerly depressed), cases with any missing data were excluded from the analyses. Out of a possible 424 participants, 391 completed the FFMQ with no missing data and 390 completed the SCS with no missing data. The main analyses were run twice, first with univariate and multivariate outliers removed and then again with them included. The main results were not affected by the inclusion of outliers, and so the results presented below are those with outliers included, in order to maximize the sample sizes.

Descriptive Statistics and Reliability

FFMQ. Descriptive statistics and reliability coefficients for the FFMQ facets are presented in Table 4. The Cronbach's alphas were between .77 and .93 and were similar to those found by Baer et al. (2006, 2008).

SCS. Table 4 also shows the descriptive statistics and reliability coefficients for the SCS facets. The Cronbach's alphas were between .71 and .86 and were similar to those found by Neff (2003).

Table 4

Descriptive Statistics and Reliability Coefficients for FFMQ and SCS Facets in Three Adult Samples: Unspecified (Sample 1), Meditator (Sample 2), Clinical (Sample 3)

Scale/subscale	Sample 1 (FFMQ *N* = 940; SCS *N* = 821)			Sample 2 (FFMQ *N* = 235; SCS *N* = 211)			Sample 3 (FFMQ *N* = 391; SCS *N* = 390)		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
FFMQ									
Observing/Noticing	26.47	5.29	.77	30.48	4.56	.82	24.11	5.65	.77
Describing	26.43	6.60	.90	30.45	5.34	.90	26.03	6.79	.91
Acting With Awareness	23.64	5.95	.89	27.43	4.89	.89	24.10	5.44	.86
Non-Judging of Experience	23.62	7.38	.92	30.48	6.21	.93	24.94	6.62	.90
Non-Reactivity to Inner Experience	20.35	4.73	.81	25.01	4.27	.89	19.66	4.80	.82
SCS									
Self-Kindness	13.36	4.50	.86	18.99	3.55	.84	12.53	4.14	.81
Self-Judgment (reverse-scored)	12.10	4.40	.84	17.15	4.29	.82	11.81	3.93	.78
Common Humanity	11.89	3.76	.81	15.10	3.27	.79	11.64	3.78	.79
Isolation (reversed-scored)	9.76	3.83	.81	13.71	3.83	.79	9.36	3.36	.76
Mindfulness	12.52	3.38	.76	15.67	2.65	.73	11.77	3.26	.74
Over-Identification (reversed-scored)	9.75	3.66	.79	13.36	3.71	.80	9.28	3.18	.71

Note. The clinical sample had to meet criteria for recurrent major depressive disorder and be currently in remission. For the FFMQ subscales, scores can range from 8 to 40, except for Non-Reactivity to Inner Experience, which can range from 7 to 35. For the SCS subscales Self-Kindness and Self-Judgment, scores can range from 5 to 25. For all other SCS subscales, scores can range from 4 to 20. For the FFMQ and SCS subscales, higher scores represent higher subscale levels of mindfulness or self-compassion. FFMQ = Five Facet Mindfulness Questionnaire; SCS = Self-Compassion Scale.

Confirmatory Factor Analyses

FFMQ. Table 5 shows the fit indices for the five different FFMQ models that were tested by CFA. Indices in bold are those that meet the suggested liberal cutoff criteria for having acceptable fit (this does not apply for AIC, since it does not have an "acceptable" range, nor for the chi-square statistic, which is included in order to statistically compare models using the chi-square difference test). In all samples the fit indices show that a one-factor model does not fit the data well and that a five-factor model fits the data better than a one-factor model. In all samples, a four-factor model fits the data better than a five-factor model. In all samples, a four-factor hierarchical model (all facets except Observing/Noticing) fits the data better than a five-factor hierarchical model. The AIC index also reflects this pattern of findings.

When examining the findings based upon the liberal cutoff criteria for acceptability outlined in the Method section, the fit indices for the unspecified community adult sample and the meditator sample suggest that the four-factor model, the four-factor hierarchical model, the five-factor model, and the five-factor hierarchical model all fit the data acceptably well. The fit indices for the clinical sample suggest that the four-factor model, four-factor hierarchical model, and the five-factor model all fit the data acceptably well, whereas the five-factor hierarchical model does not. When examining the findings based upon the conservative cutoff criteria for acceptability, none of the models meet the criteria for acceptability across the range of fit indices.

The chi-square difference tests revealed that for all three samples, there was a significant improvement in model fit for the four-factor model compared to the four-factor hierarchical model, and for the five-factor model compared to the five-factor hierarchical model. For the unspecified community adult sample and the meditator sample, the significant chi-square test found for the four-factor and four-factor hierarchical models may be a consequence of sample size, since a rule of thumb suggests that a significant chi-square test is not likely to be meaningful in large samples where other fit indices do not differ (Schermelleh-Engel et al., 2003). For the unspecified community adult sample and the clinical sample, the significant chi-square test and the differences in other fit indices found for the five-factor and five-factor hierarchical models suggest that the five-factor model is superior to the five-factor hierarchical model in these samples. For the meditator sample, the significant chi-square difference test found for the five-factor and five-factor hierarchical models may also be a consequence of sample size, since the SRMR, RMSEA, and CFI indices do not differ in this sample.

Examination of the pattern of loadings for the five-factor hierarchical model revealed that for the unspecified community adult sample and the clinical sample, the loadings of Describing, Acting With Awareness, Non-Judging of Experience, and Non-Reactivity to Inner Experience were all significant at $p > .001$, but Observing/Noticing loaded nonsignificantly onto the overarching mindfulness factor. For the meditator sample, all factors including Observing/Noticing loaded significantly onto the overarching mindfulness factor, at $p > .001$. Examination of the pattern of loadings for the four-factor hierarchical model (all facets except Observing/Noticing) revealed that, for all three samples, all factors loaded significantly onto the overarching mindfulness factor.

SCS. Table 6 shows the fit indices for the three SCS models that were tested by CFA. Indices in bold are those that meet the suggested cutoff criteria for having acceptable fit. Overall, these findings suggest that for the six-factor model, the CFI and NNFI fit indices for the three SCS models in all three samples were below thresholds typically used to represent acceptable model fit when using liberal cutoff criteria for what constitutes "acceptable." In all three samples, the chi-square difference test revealed that the six-factor hierarchical model was a significantly poorer fitting model than the six-factor model. The AIC index also reflected this pattern.

Table 5

CFA Fit Indices for the Five FFMQ Model, Using Three Adult Samples: Unspecified (Sample 1), Meditator (Sample 2), and Clinical (Sample 3)

Model per sample	χ^2	df	$\Delta\chi^2$	SRMR	RMSEA [95% CI]	CFI	NNFI	AIC
			Sample 1 (*N* = 940)					
One-factor: All items load onto one factor	3,877.839	90		.179	.223 [.217, .229]	.401	.302	3,937.839
Four-factor: D, A, NJ, NR items load onto their respective factors	305.679	48		**.053**	**.079 [.071, .088]**	**.953**	**.935**	365.679
Hierarchical: Four factors (D, A, NJ, NR) load onto one factor	315.469	50	9.790*	**.056**	**.079 [.071, .087]**	**.952**	**.936**	371.469
Five-factor: O, D, A, NJ, NR items load onto their respective factors	447.999	80		**.058**	**.074 [.067, .080]**	**.942**	**.924**	527.999
Hierarchical: Five factors (O, D, A, NJ, NR) load onto one factor	575.233	85	127.234*	**.086**	**.082 [.076, .089]**	**.922**	**.904**	645.233
			Sample 2 (*N* = 235)					
One-factor: All items load onto one factor	4,057.696	90		.136	.228 [.222, .234]	.495	.411	4,117.696
Four-factor: D, A, NJ, NR items load onto their respective factors	400.843	48		**.046**	**.093 [.085, .102]**	**.948**	**.928**	460.843
Hierarchical: Four factors (D, A, NJ, NR) load onto one factor	407.093	50	6.250*	**.048**	**.092 [.084, .100]**	**.947**	**.930**	463.093
Five-factor: O, D, A, NJ, NR items load onto their respective factors	544.401	80		**.047**	**.083 [.076, .089]**	**.941**	**.922**	624.401
Hierarchical: Five factors (O, D, A, NJ, NR) load onto one factor	556.342	85	11.941*	**.050**	**.081 [.074, .087]**	**.940**	**.926**	626.342
			Sample 3 (*N* = 391)					
One-factor: All items load onto one factor	3,945.257	90		.181	.225 [.219, .231]	.371	.266	4,005.257
Four-factor: D, A, NJ, NR items load onto their respective factors	375.075	48		**.066**	**.087 [.081, .098]**	**.935**	**.911**	435.075
Hierarchical: Four factors (D, A, NJ, NR) load onto one factor	420.393	50	45.318*	**.079**	**.093 [.085, .102]**	**.927**	**.903**	476.393
Five-factor: O, D, A, NJ, NR items load onto their respective factors	631.832	80		**.074**	**.090 [.084, .097]**	**.910**	.882	711.832
Hierarchical: Five factors (O, D, A, NJ, NR) load onto one factor	870.325	85	238.493*	.121	.104 [.098, .111]	.872	.842	940.326

Note. The clinical sample met criteria for recurrent major depressive disorder and were currently in remission. χ^2 test scores refer to the test of the difference between the two four-factor and two five-factor models. Bold indices signify that data satisfy liberal cutoff criteria when rounded up or down to two decimal places and are therefore considered to be within an acceptable range (Schermelleh-Engel et al., 2003). CFA = confirmatory factor analysis; FFMQ = Five Facet Mindfulness Questionnaire; SRMR = standardized root-mean-square residual; RMSEA = root-mean-square error of approximation; 95% CI = 95% confidence interval; CFI = comparative fit index; NNFI = nonnormed fit index; AIC = Akaike information criterion (Akaike, 1974). O, D, A, NJ, and NR represent facets of the FFMQ (O = Observing/Noticing; D = Describing; A = Acting With Awareness; NJ = Non-Judging of Experience; NR = Non-Reactivity to Inner Experience).
* $p < .001$.

Discussion

Until now, neither the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) nor the Self-Compassion Scale (SCS; Neff, 2003) have had their factor structures examined in a sample of adults who suffer from recurrent depression. Only the FFMQ has had its factor structure examined using a sample of meditators, showing that both a five-factor model and a five-factor hierarchical model fit the data in meditators, whereas a five-factor model and a four-factor hierarchical model fit the data in nonmeditators (Baer et al., 2008). The SCS has only had its factor structure examined in student samples. The aim of the present study was to assess the replicability of the findings of Baer et al. (2006, 2008) by examining the factor structure of the FFMQ in both a convenience community adult sample and a meditator sample. We extend their findings by examining a four-factor model in both samples and by examining the different models in a clinical sample of adults who met diagnostic criteria for recurrent major depressive disorder (not currently depressed). We also aimed to confirm the factor structure of the SCS (Neff, 2003) using the same three samples.

Five Facet Mindfulness Questionnaire

Using an unspecified community sample of adults (Sample 1) and a sample of adult meditators (Sample 2), analyses showed that the four-factor and four-factor hierarchical models were superior to the five-factor and five-factor hierarchical models in terms of model fit. These findings replicate those of (Baer et al., 2006, 2008). Using a clinical sample (Sample 3), analyses showed that only the four-factor and four-factor hierarchical models fit the data to an acceptable level. The fit indices for the five-factor hierarchical model were below what is commonly regarded as acceptable in the clinical sample (including liberal criteria for acceptability). Additionally, in both the unspecified community adult sample and the clinical sample, the Observing/

Table 6

CFA Fit Indices for the Seven SCS Models Tested, Using Three Adult Samples: Unspecified (Sample 1), Meditator (Sample 2), and Clinical (Sample 3)

Model per sample	χ^2	df	$\Delta\chi^2$	SRMR	RMSEA [95% CI]	CFI	NNFI	AIC
Sample 1 ($N = 821$)								
One-factor: All items load onto one factor	3,937.485	298		**.097**	.120 [.117, .123]	.679	.650	4,043.485
Six-factor: Items load onto six factors (SK, SJ, C, I, M, O)	1,471.682	279		**.056**	**.071 [.067, .075]**	.895	.877	1,615.682
Hierarchical: Six factors (SK, SJ, C, I, M, O) load onto one factor	2,142.738	287	671.056*	**.091**	**.087 [.084, .091]**	.836	.814	2,270.738
Sample 2 ($N = 211$)								
One-factor: All items load onto one factor	4,649.683	298		.098	.131 [.128, .134]	.638	.605	4,755.683
Six-factor: Items load onto six factors (SK, SJ, C, I, M, O)	2,629.613	279		**.075**	**.100 [.096, .103]**	.804	.772	2,773.613
Hierarchical: Six factors (SK, SJ, C, I, M, O) load onto one factor	3,104.758	287	475.145*	**.095**	.107 [.104, .111]	.765	.734	3,232.758
Sample 3 ($N = 390$)								
One-factor: All items load onto one factor	3,837.894	298		**.103**	.118 [.115, .122]	.625	.591	3,943.894
Six-factor: Items load onto six factors (SK, SJ, C, I, M, O)	1,673.588	279		**.061**	**.077 [.073, .080]**	.852	.828	1,817.588
Hierarchical: Six factors (SK, SJ, C, I, M, O) load onto one factor	2,450.861	287	777.273*	**.102**	**.094 [.091, .098]**	.771	.740	2,578.861

Note. The clinical sample met criteria for recurrent major depressive disorder and were currently in remission. χ^2 test scores refer to the test of the difference between the two four-factor and two five-factor models. Bold indices signify that data satisfy liberal cutoff criteria when rounded up or down to two decimal places and are therefore considered to be within an acceptable range (Schermelleh-Engel et al., 2003). SCS = Self-Compassion Scale; SRMR = standardized root-mean-square residual; RMSEA = root-mean-square error of approximation; 95% CI = 95% confidence interval; CFI = comparative fit index; NNFI = nonnormed fit index; AIC = Akaike information criterion (Akaike, 1974). SK, SJ, CH, I, M, and OI represent subscales of the SCS (SK = Self-Kindness; SJ = Self-Judgment; C = Common Humanity; I = Isolation; M = Mindfulness; O = Over-Identification).
* $p < .001$.

Noticing factor did not load significantly onto an overarching mindfulness factor, whereas the other four factors did. This pattern of findings suggests that the four-factor hierarchical model is superior in the unspecified community adult sample and the clinical sample, whereas the five-factor hierarchical model is superior in the meditator sample.

In summary, these findings support the growing body of research examining the factor structure of FFMQ scores in adult and meditator samples by suggesting that the FFMQ would be a superior measure of mindfulness with the Describing, Acting With Awareness, Non-Judging of Experience, and Non-Reactivity to Inner Experience subscales but not the Observing/Noticing subscale. This would render the FFMQ the *Four* Facet Mindfulness Questionnaire.

Implications. Baer et al. (2008) suggested that the construct of mindfulness may shift as meditation experience increases. According to Baer and colleagues, for nonmeditators the key facets of mindfulness that are important to well-being are Describing, Acting With Awareness, Non-Judging of Experience, and Non-Reactivity to Inner Experience. As meditation experience increases, other facets of mindfulness, such as Observing/Noticing, emerge and are important to well-being. This is important theoretically, and our findings are supportive. However, our findings have implications for studies that track change in mindfulness using the FFMQ in meditators and nonmeditators, and potentially for studies that compare change pre- to post-MBIs.

When measuring mindfulness, rather than its facets, in order to compare the findings of meditators and nonmeditators, it is im-

portant to include only those facets that evidence suggests are key facets of mindfulness in both samples. Including the Observing/Noticing items when examining mindfulness scores in nonmeditator adult samples may result in biased scores, if observing/noticing means something different to meditators and nonmeditators. Such cross-sample comparisons using the FFMQ without the Observing/Noticing scale would be less likely to produce biased scores, since the four-factor and four-factor hierarchical models fit the data well in both samples, whereas the Observing/Noticing factor did not load significantly onto an overarching mindfulness factor in the unspecified community adult sample. This is important, regardless of whether the construct of mindfulness changes with meditation experience. Since there are other hypothesized facets of mindfulness not included in the FFMQ (see Table 1), the removal of one facet from this scale in order to make it a more structurally acceptable measure of mindfulness is something for researchers and clinicians to consider.

The FFMQ has begun to be used in studies to assess change pre- to post-MBIs for a variety of clinical conditions (e.g., Bowen & Kurz, 2012; Deckersbach et al., 2012; McManus et al., 2012; Vøllestad et al., 2011). In particular, MBCT is a psychotherapeutic intervention that was specifically developed for the prevention of recurrent depression in people who are not currently suffering from depression. We found that only the four-factor and four-factor hierarchical models met criteria for an acceptable fit in this population. Since MBIs such as MBCT teach participants meditation techniques, it could be that the factor structure of the 39-item FFMQ does not remain stable pre- to post-MBCT for recurrent

depression if meditation status alters the Observing/Noticing sub-scale's relationship to the other facets. Further research is needed to examine whether this is the case. Our findings also suggest that further research is needed to examine the factor structure of the FFMQ in other relevant clinical samples being used in MBI research. As with comparing nonmeditators and meditators, a solution could be to remove the Observing/Noticing facet if using the FFMQ to track change in mindfulness pre- to post-MBIs.

Self-Compassion Scale

In all three samples, none of the models fit the data to an acceptable level when using liberal cutoff criteria for what constitutes acceptable fit. Only two of the fit indices used in our analyses were used in the development of the SCS (the CFI and the NNFI), and less stringent cutoffs for these fit indices were also used (e.g., suggesting that an NNFI of .88 is acceptable, as is a CFI of .90). Applying our liberal criteria (e.g., NNFI and CFI should be ≥.90) to the original SCS factor analysis by Neff (2003) suggested that, in that study also, the fit indices were not optimal.

Kenny and McCoach (2003) presented a discussion on the impact of various fit indices and concluded that, with well-fitting models with many indicators, the CFI and NNFI indices may not function well but that this should not be a cause for concern if the SRMR and RMSEA meet suggested criteria for a good model fit. Our finding that the CFI and NNFI fell just below the liberal cutoff for acceptability for the six-factor model in the unspecified community sample may therefore not be a cause for concern. However, taken alongside our finding that the *hierarchical* six-factor model was not acceptable suggests that the SCS may be better suited to measuring six hypothesized facets of self-compassion in this population rather than for measuring an overarching construct (i.e., self-compassion).

Implications. The SCS was developed using two student samples (Neff, 2003), and the SCS has since been used to measure self-compassion in both clinical and nonclinical adult samples. Although the six-factor model was close to meeting liberal criteria for an acceptable fit in the unspecified community sample, in all three samples the six-factor hierarchical model was not. This suggests that further research is needed to develop a more psychometrically robust measure of self-compassion.

Limitations of the Present Study

The clinical status of both the unspecified community adult sample and the meditator sample was not assessed, nor was meditation experience in the convenience adult sample. Had clinical and meditation status been assessed in all samples, it would have been possible to perform multiple group analyses to first establish the factor structure of the FFMQ and SCS using all participants and to second examine their factor structures according to clinical and meditation status. This would have enabled comparisons of fit indices and potential model improvement based upon these groupings (i.e., comparing the factor structures of clinical vs. nonclinical, and meditator vs. nonmeditator). This would be a useful approach for helping to answer the question as to whether the factor structures of FFMQ and SCS are acceptable for their use in comparing nonclinical and clinical samples, and nonmeditator and meditator samples.

In all three samples, the proportion of females was higher than that of males. Sample 2 consisted of participants who were highly educated, and Samples 2 and 3 consisted of participants who were older than those in Sample 1. Further research should attempt to replicate the findings using samples that are more generalizable to the wider population and matching samples in terms of gender, education, and age.

Conclusion

The FFMQ is a widely employed measure of mindfulness in studies using clinical and meditator samples, sometimes with the aim of comparing levels of mindfulness in clinical and nonclinical samples, as well as meditator and nonmeditator samples. However, the present findings suggest that researchers should be cautious about using the FFMQ to measure mindfulness in order to compare meditator and nonmeditator samples, unless the Observing/Noticing facet is excluded (e.g., examining change pre- to post-MBIs that teach meditation techniques to individuals with recurrent depression in remission). Our findings also suggest that the factor structure of the SCS falls below criteria for an acceptable fit for measuring self-compassion. Further research is therefore needed to develop a more psychometrically robust measure of self-compassion.

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