Does Mindfulness Cultivate Social Connectedness? A Narrative Review on a Novel Modality of Social Emotional Learning

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Abstract

The previous decade has witnessed an explosion of mindfulness research in Western psychology. Although most research has been conducted in behavioral medicine and cognitive behavior therapy, only recently have researchers begun investigation into associations between mindfulness and social connectedness. This paper conducted a literature review of fourteen empirical studies on this subject, all with nonclinical population. Findings are: (a) correlational studies demonstrated consistent, moderate positive correlations between mindfulness and connectedness (e.g., relatedness, empathy, compassion); (b) there was also a moderate positive correlation between mindfulness and satisfaction in romantic relationship; (c) interventions modeled after Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) demonstrated positive effects on connectedness (e.g., empathy, spirituality, forgiveness); (d) a mindfulness-based intervention for relationship enhancement (MBRE) confirmed its efficacy in relationship functioning and individual well-being; and (e) no intervention research demonstrated the mediating effect of mindfulness on social outcomes. Future directions are discussed in terms of measurement and research design.

Key Words : mindfulness, empathy, social connectedness, nonclinical population, mindfulness-based stress reduction

1. Introduction

1.1 Mindfulness-Based Intervention

The first decade of this new century has witnessed a burgeoning interest in *mindfulness* in Western psychotherapy. The number of research literature on mindfulness has skyrocketed exponentially by almost twenty times from the year 2000 to 2011, and is still growing (Figure 1). This specific state of consciousness, which stems from ancient Buddhist psychology, now seems to have taken root in contemporary mainstream psychology (Didonna, 2009; Germer, Siegel, & Fulton, 2013; Shapiro & Carlson, 2009).

One of the driving forces that made mindfulness a household notion is arguably Jon Kabat-Zinn (1990)

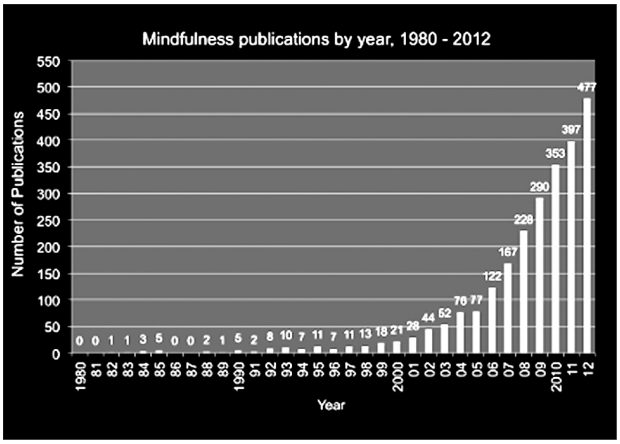

Figure 1　An example of growth in the mindfulness research literature from 1980 to 2012, based on a search of the term "mindfulness" in the abstract and keywords of the ISI Web of Knowledge database. Retrieved on January 17, 2014, from http://www.mindfulexperience.org/mindfo.php

and his development of Mindfulness-Based Stress Reduction (MBSR). Success of this approach caught enough attention as to facilitate other clinical applications of mindfulness in Dialectical Behavior Therapy (DBT; Linehan, 1993), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002), and a host of more domain-specific interventions such as one for eating disorders (Kristeller, Baer, & Quillian-Wolever, 2006), elder care (McBee, 2008), addictive behaviors (Bowen, Chawla, & Marlatt, 2011), and childbirth and parenting (Bardacke, 2012). A wide range of health concerns have been addressed, not just those related to anxiety, depression, or borderline personality disorder (Baer, 2006; Didonna, 2009).

Initially the definition of mindfulness was rather general. For example, Kabat-Zinn's (1994) oft-cited statement is that “Mindfulness means paying attention in a particular way: on purpose, in the present moment, and non-judgmentally” (p. 4). Such broad definition is not necessarily a problem in assessing the efficacy of mindfulness-based interventions, and in fact, meta-analytic reviews so far have evidenced moderate effect sizes (Baer, 2003; Chiesa & Sarretti, 2009; Eberth & Sedlmeier, 2012; Grossman, Niemann, Schmidt, & Walach, 2004). Results of neuroplasticity research in mindfulness training are also promising (Allen et al., 2012; Farb, Segal, & Anderson, 2013; Hölzel et al., 2011; Vago & Silbersweig, 2012).

If the mechanism of intervention is to be elucidated, however, the nature of mindfulness needs to be more specified and operationalized. Recently, a number of psychometrically sound instruments have been developed for that purpose (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003; Buchheld, Grossman, & Walach, 2001; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Lau et al., 2006). There was also an attempt at integrating different measures, which led to the development of a comprehensive, multifaceted measure called the *Five Facet Mindfulness Questionnaire* (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This instrument separately assesses the level of observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience, with 39 items on a 5-point Likert scale.

By employing mindfulness measures, the health benefits of MBSR have been found to be mediated by the level of mindfulness (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Carmody & Baer, 2008; Keng, Smoski, Robins, Ekblad, & Brantley, 2012; Nykliček & Kuijpers, 2008). This line of research is expected to contribute not only to process-oriented studies but also to the foundational examination of mindful consciousness (Bergomi, Tschacher, & Kupper, 2013; Chiesa, 2013; Grossman & Van Dam, 2011).

1.2 Mindfulness and Social Connectedness

It should be noted that major dependent variables in mindfulness research to date have been those of personal psychological well-being and behavioral regulation. This tendency presents a striking contrast to the spiritual origin of mindfulness training, where the sense of no-self and social connectedness is aimed for. In other words, when mindfulness was secularized and incorporated into Western therapy, its inherent relational and transpersonal orientations seem to have been unappreciated. As Walsh (2008) stated in discussing the neglect of social factors in typical psychotherapy, “The suffering individual is all too often seen as an isolated monad whose pain and pathology stem primarily from faulty internal forces such as conditioning, psychodynamics, or neurotransmitters” (p. 476).

It may, then, be no surprise that there was little interest in the relational aspect of mindfulness. However, only recently have we seen a growing body of research that considers social connectedness as a possible concomitant of mindfulness (as to be seen in the Literature Review section). As suggested by Brown, Ryan, and Creswell (2007), mindfulness

involves "a disengagement from self-concern—the perceptions, thoughts, beliefs, evaluations, and related feelings people have about themselves that tend to channel and filter contact with reality in self-serving ways" (p. 227). Such disengagement from self-concern will defuel egoic functioning so that excessive self-attachment may become diluted enough to bring one a sense of interconnectedness. This state of mind will not be a regression to infantile self-other fusion, but a progression to a more fundamental attunement in the social world.

Coinciding with this new movement is a burgeoning cross-cultural discourse between the Buddhist tradition and Western thinking as regards self-construal and compassion (e.g., Davidson & Harrington, 2002; Gilbert, 2010; Kabat-Zinn & Davidson, 2011; Mathers, Miller, & Ando, 2009).

The objective of this paper is to review the current, incipient investigation that links mindfulness and social connectedness. Relevant empirical literature mostly addresses interpersonal connectedness (e.g., empathy), but several take into account transpersonal elements (e.g., spirituality). The review in the next section will look into 14 articles that examined the relationship, either in correlational or causal (interventional) terms. Drawing on a critical summary of the findings, future directions of this new area of mindfulness research will be proposed in the Discussion section.

2. Literature Review

This section reviews the empirical literature investigating the association between mindfulness and social connectedness. Literature search was conducted in fall, 2013, and resulted in 14 quantitative studies, all with nonclinical population. Six of these were non-intervention research (Table 1), six were research on mindfulness-based intervention (Table 2) modeled after Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990), and two were mediation analyses accompanying two of the intervention studies. Due to the paucity of the literature, each study will be examined closely to discuss its implications fully.

Table 1 Non-intervention studies included in the review

Study	Population	*N*	Mean age	% Women	Measure of mindfulness	Measures of social connectedness	Correlations between mindfulness and social connectedness
Brown & Ryan (2003)	College undergraduates	327	19.6	64	MAAS	Ryff's (1989) relatedness scale	r=.31, p<.0001
Beitel, Ferrer, & Cecero (2005)	College undergraduates	103	27	77	MAAS	IRI	Perspective Taking, r=.41, p<.01; Emotional Concern, r=.28, p<.05.
Dekeyser, Raes, Leijssen, Leysen, & Dewulf (2008)	Dutch-speaking graduate students / parents	113 / 246	21.99 / 30.77	90 / 93	KIMS	IRI (pooled score of Perspective Taking, Emotional Concern, and Fantasy)	Student sample: OBS, r=.33, p<.01; DES, r=.32, p<.01; ACT, r=.14, *ns*; and ACC, r=-.15, *ns*. Parent sample: OBS, r=.31, p<.001; DES, r=.05, *ns*; ACT, r=.01, *ns*; and ACC, r=-.07, *ns*.
Kraus & Sears (2009)	College undergraduates	124	21.11	52	CAMS-R	Self-Other Four Immeasurables (SOFI)	Positive Self, r=.39, p<.001; Positive Other, r=.24, p<.01; Negative Self, r=-.35, p<.001; and Negative Other, r=-.29, p<.01.
Wachs & Cordova (2007)	Married couples	33 couples	38 for wives; 40 for husbands	50	MAAS	IRI DAS	Perspective Taking, r=.49, p<.01; Empathic Concern, r=.38, p<.05; marital quality, r=.37, p<.05.
Barnes, Brown, Krusemark, Campbell, & Rogge (2007, Study 1)	Dating college students	89	19.3	73	MAAS	DAS	Time 1 , r=.41, p<.0001; Time 2 (10 weeks after Time 1), r=.24, p<.05.
Barnes, Brown, Krusemark, Campbell, & Rogge (2007, Study 2)	Student couples	57 couples	20.05	50	MAAS	DAS	r=.37, p<.0001

Note. MAAS=Mindful Attention Awareness Scale; KIMS=Kentucky Inventory of Mindfulness Skills; CAMS-R=Cognitive and Affective Mindfulness Scale-Revised; IRI=Interpersonal Reactivity Index; DAS=Dyadic Adjustment Scale; OBS=Observing; DES=Describing; ACT=Acting with awareness; ACC= Accepting without judgment.

Table 2　Intervention studies included in the review

Study	Population	Treatment / control	Design	*N* assigned	Attrition	Age	% Women	Measures of social connectedness	Treatment effects
Astin (1997)	College undergraduates	MBSR / wait-list	RCT	14 / 14	2 / 7	-	94.7	SCI INSPIRIT	Increases in positive yielding or accepting mode of control (F(2,16)=6.2, p<.03) and spirituality (F(2,16)=6.6, p<.03).
Shapiro, Schwartz, & Bonner (1998)	Medical and premedical students	MBSR / wait-list	RCT	37 / 41	1 / 4	-	56.2	ECRS (adapted) INSPIRIT	Increases in empathy (F(1, 69)=4.3, p<.05) and spirituality (F(1, 69)=5.62, p<.02).
Beddoe & Murphy (2004)	Baccalaureate nursing students	MBSR	Pre-post	23	7	*M*age=25, age range: 20-39	100.0	IRI	*ns*.
Oman, Shapiro, Thoresen, Plante, & Flinders (2008)	College undergraduates	MBSR / EPP / wait-list	RCT	17 / 15 / 15	2 / 1 / 0	59% 18 years, age range: 18-24	80.0	Heartland Forgiveness Scale	Increase in forgiveness of others (mean change at posttest and 8-week follow-up, Cohen's d=.34, p<.05), though not mediated by MAAS-measured mindfulness.
Birnie, Speca, & Carlson (2010)	Community adults	MBSR	Pre-post	104	53	*M*age=47.4, age range: 24-77	68.6	IRI (no Fantasy scale)	Increase in Perspective Taking (t=-4.04, p<.01), reduction in Personal Distress (t=7.01, p<.01), but no change in Empathic Concern; Correlations between change scores of MAAS-measured mindfulness and IRI were *ns*.
Carson, Carson, Gil, & Baucom, (2004)	Heterosexual couples	MBRE / wait-list	RCT	29 / 28 couples	7 / 6 couples	*M*age=37, age range: 23-69 for women; *M*age=39, age range: 24-69 for men	50.0	Quality of Marriage Index; Autonomy and Relatedness Inventory; Inclusion of Other in the Self Scale; Acceptance of Partner Index; Marital Satisfaction Inventory-Revised; INSPIRIT	Increases in relationship satisfaction (F(1, 42)=12.11, p<.001), autonomy (F(1, 42)=11.80, p<.001), relatedness (F(1, 42)=16.62, p<.001), closeness (F(1, 42)=5.48, p=.024), acceptance of partner (F(1, 42)=6.25, p=.016), relationship distress (reversed, F(1, 42)=4.95, p=.031), and spirituality (F(1, 42)=10.12, p=.003); All effects generally maintained at 3-month follow-up.

Note. MBSR=Mindfulness-Based Stress Reduction; EPP=Eight-Point Program; MBRE=Mindfulness-Based Relationship Enhancement; RCT=randomized controlled trial; SCI=Shapiro Control Inventory; INSPIRIT=Index of Core Spiritual Experiences; ECRS=Empathy Construct Rating Scale; IRI=Interpersonal Reactivity Index; MAAS=Mindful Attention Awareness Scale.

2.1 Non-Intervention Studies

In the process of constructing one of the earliest mindfulness scales, Brown and Ryan (2003) examined correlations between their *Mindful Attention Awareness Scale* (MAAS) and various well-being measures including relatedness. The MAAS is a 15-item self-report instrument that assesses trait mindfulness, or "individual differences in the frequency of mindful states over time" (p. 824), across cognitive, emotional, physical, interpersonal, and general domains. Response is made on a 6-point Likert scale from 1 (*almost always*) to 6 (*almost never*), where high scores reflect more mindfulness. Sample items include "It seems I am 'running on automatic' without much awareness of what I'm doing", "I rush through activities without being really attentive to them", and "I find myself doing things without paying attention". Sound reliability and validity have been reported in Brown and Ryan (2003).

The relatedness scale that was correlated with the MAAS was drawn from Ryff's (1989) personal well-being scales. The 20-item measure was constructed on a definition that the high scorer "has warm, satisfying, trusting relationships with others; is concerned about the welfare of others; capable of strong empathy, affection, and intimacy; understands give and take of human relationships," whereas the

low scorer “has few close, trusting relationships with others; finds it difficult to be warm, open, and concerned about others; is isolated and frustrated in interpersonal relationships; not willing to make compromises to sustain important ties with others” (Ryff, 1989, p. 1072). A moderate association between mindfulness and social relatedness was found with college undergraduates (r=.31, N=327).

Beitel, Ferrer, and Cecero (2005) reported moderate correlation between the MAAS and a different relatedness measure, the *Interpersonal Reactivity Index* (IRI; Davis, 1980, 1983). The IRI is a 28-item self-report questionnaire consisting of four 7-item subscales, each tapping different aspects of the global concept of empathy. Sample items include: “I sometimes try to understand my friends better by imagining how things look from their perspective” (Perspective-Taking subscale); “I really get involved with the feelings of the characters in a novel” (Fantasy subscale); “I often have tender, concerned feelings for people less fortunate than me” (Empathic Concern subscale); and “Being in a tense emotional situation scares me” (Personal Distress subscale).

Relevant for the present purpose are correlations between the MAAS and the scales of Perspective-Taking (PT) and Empathic Concern (EC), because PT refers to “the tendency to adopt the point of view of other people in everyday life,” and EC reflects “the tendency to experience feelings of warmth, compassion, and concern for other people” (Davis, 1983, p. 117) and these two scales (one cognitive, the other affective) had a moderate correlation (r=.30~38, N=225~392; Davis, 1983, p. 122).

Beitel et al. (2005, p. 746) reported a moderate association between the MAAS and PT (r=.41, p<.01) and a humble one between the MAAS and EC (r=.28, p<.05) in a sample of 103 college undergraduates. Since the authors' intention was to empirically present the uniqueness of the construct of *psychological mindedness (*PM*)*, or awareness and understanding of psychological processes in self and others (Beitel et al., 2005, p. 740), it was only ancillary, yet informative, that IRI correlations with the MAAS were noted in the paper. In passing, the *Psychological Mindedness Scale* (Conte et al., 1990) had correlation with the MAAS (r=.41, p<.01), which is no surprising because PM contains the awareness aspect of mindfulness by definition.

In contrast to the MAAS, there is a multidimensional mindfulness scale called the *Kentucky Inventory of Mindfulness Skills* (KIMS; Baer, Smith, & Allen, 2004). Its Dutch version was correlated with the IRI by a team of Belgian researchers (Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008). The KIMS is a 39-item self-report measure consisting of Observe (OBS), Describe (DES), Act With Awareness (ACT), and Accept Without Judgment (ACC) subscales. Each item is rated on a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*almost always or always true*), where high scores indicate more mindfulness. Sample items include: “I pay attention to sensations, such as the wind in my hair or sun on my face” and “I notice the smells or aromas of things” for OBS; “I'm good at finding the words to describe my feelings” and “I can easily put my beliefs, opinions, and expectations into words” for DES; “When I'm doing something, I'm only focused on what I'm doing, nothing else” and “I tend to do several things at once rather than focusing on one thing at a time” (reversed) for ACT; and “I criticize myself for having irrational or inappropriate emotions” (reversed) and “I tell myself that I shouldn't be thinking the way I'm thinking” (reversed) for ACC. Sound reliability and validity have been reported in Baer et al. (2004), as well as correlations with the MAAS in a sample of 115 college undergraduates (OBS, r=.02, *ns*; DES, r=.24, p<.05; ACT, r=.57, p<.0001; and ACC, r=.30, p<.001), showing a close connection between the MAAS and the Act With Awareness subscale.

After successfully translating the original KIMS, Dekeyser et al. (2008) correlated each of KIMS subscales with a pooled score of the Perspective-Taking, Empathic Concern, and Fantasy subscale

items of the IRI. There were two samples recruited for this study, both mostly women: one was 113 college graduates (M_{age}=21.99 years, *SD*=2.19, age range: 20-37 years), and the other was 246 parents (M_{age}=30.77 years, *SD*=6.51, age range: 20-64 years). Correlations observed in the student sample were: OBS, *r*=.33, *p*<.01; DES, *r*=.32, *p*<.01; ACT, *r*=.14, *ns*; and ACC, *r*=-.15, *ns*. Correlations observed in the parent sample were: OBS, *r*=.31, *p*<.001; DES, *r*=.05, *ns*; ACT, *r*=.01, *ns*; and ACC, *r*=-.07, *ns*.

It appears that only the Observe subscale showed stable, moderate association with engagement in empathy. Considering that the MAAS was reported to show no correlation with this subscale (Baer et al., 2004, p. 202), the sensory awareness feature of mindfulness may account for a different aspect of empathy from what is associated with the frequency of mindful states over time as measured by the MAAS.

Concerned with no compassion scale being available based on Buddhist teachings, Kraus and Sears (2009) developed the *Self-Other Four Immeasurables* (SOFI) scale, and correlated it with yet another mindfulness scale, the *Cognitive and Affective Mindfulness Scale-Revised* (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007).

The SOFI is a 16-item adjective checklist that captures the Four Immeasurables (i. e., loving kindness, compassion, joy, and equanimity) cultivated by Buddhist teachings, as well as part of so-called *far enemie*s of these qualities (hatred, cruelty, jealousy, and anxiety, respectively). Items for self and others are presented in pairs and rated on a 5-point scale, resulting in four scores (positive toward self, positive toward others, negative toward self, and negative toward others). The CAMS-R is a 12-item instrument that assesses attention, present focus, awareness, and acceptance, 3 items each, on a 4-point scale. Its correlation with the MAAS was reported as *r*=.51, *N*=144 (Feldman et al., 2007, p. 186). This study used the 10-item version of this measure.

With a sample of 124 college undergraduates, correlations between the four scores of SOFI and the CAMS-R were: positive self, *r*=.39, *p*<.001; positive other, *r*=.24, *p*<.01; negative self, *r*=-.35, *p*<.001; and negative other, *r*=-.29, *p*<.01.

It is worth noting that positive self and positive other scores had a high correlation (r=.67), suggesting that cultivating an attitude of self-acceptance may favorably affect other-acceptance. In fact, the correlation pattern of the SOFI and the *Self-Compassion Scale* (SCS; Neff, 2003) was: positive self, *r*=.67, *p*<.001; positive other, *r*=.44, *p*<.01; negative self, *r*=-.63, *p*<.001; and negative other, *r*=-.43, *p*<.01. This is consistent with the correlation of *r*=.41 (*N*=391) reported by Neff (2003, p. 233) between the SCS and the *Social Connectedness Scale* (Lee & Robbins, 1995).

The four studies reviewed so far explored simple correlations between mindfulness and connectedness measures. To examine more specifically the role of mindfulness in intimate relationship, a couple of studies explored the association between the level of mindfulness and coping of relationship distress.

Wachs and Cordova (2007) hypothesized that mindfulness would be correlated with marital quality, and that the association would be mediated by emotion repertoire skill, specifically along three dimensions: emotion recognition and identification, empathy, and anger reactivity. The sample was 33 married couples (M_{age}=38 years, *SD*=12.6, for wives; M_{age}=40 years, *SD*=12.9, for husbands; mean duration of marriage: 12 years, *SD*=11.4; range of number of children: 1 to 4, one being the mode). The couples were on average happily married, with mean scores 111 (*SD*=14.2) for wives and 109 (*SD*=16.9) for husbands on the *Dyadic Adjustment Scale* (DAS; Spanier, 1976), a widely used 32-item measure of marital quality.

Mindfulness was assessed with the MAAS and empathy with the IRI. Emotion recognition and identification was measured with the *Toronto Alexithymia Scale* (TAS-20; Bagby, Taylor, & Parker, 1994), a well-known 20-item self-report instrument that contains Identifying and Communicating Emotions subscales. Anger reactivity was assessed

with the Aggression subscale of the *Marital Satisfaction Inventory-Revised* (Snyder & Aikman, 1999), the *Self-Expression and Control Scale* (van Elderen, Verkes, Arkesteijn, & Komproe, 1994) that measures how anger and hostility are expressed and controlled, and the *Emotional Control Questionnaire* (Roger & Najarian, 1989) that contains two impulse management subscales.

The reported correlations were based on couple-wise scores, or the means of husband and wife scores, because the authors "chose to focus on couple-level results as a first step toward understanding mindfulness within the relationship as a global variable" (Wachs & Cordova, 2007, pp. 470-471). As hypothesized, a positive correlation was found between mindfulness and marital quality (r=.37, p<.05), and this association was simultaneously mediated by the composite of anger reactivity scores (β =-.51, p<.01) and difficulty with identifying and communicating emotions (β =-.56, p<.01). Empathy, however, did not significantly correlate with marital quality, hence was dropped as mediator, although this emotion repertoire positively correlated with mindfulness (Empathic Concern, r=.38, p<.05; Perspective-Taking, r=.49, p<.01).

The reason why empathy and marital quality did not correlate was unclear. The authors suspected that given the extant literature, this finding might be anomalous (Wachs & Cordova, 2007, p. 476). There is a possibility, however, that the couples in their study were well adjusted, so much so that the variance on both marriage quality and empathy scales might have been too small to show significant correlations. Another possibility is that, because relationship satisfaction may depend on the perception of the partner's empathy rather than one's own (David & Oathout, 1987), there might be no straightforward association between self-report empathy and marital quality. Future studies will tease out more clearly the elusive connection.

With a sample of dating college students, Barnes, Brown, Krusemark, Campbell, and Rogge (2007) replicated the positive correlations of mindfulness with satisfaction in romantic relationship and constructive responses to relational conflict. This result was found both concurrently and prospectively in a 10-week longitudinal design (Study 1). The association was further corroborated using a conflict discussion paradigm in a laboratory setting (Study 2).

The sample in Study 1 was 89 college students (73% women, M_{age}=19.3 years, age range: 18-23 years; mean length of relationship: 18.6 months, range: 3-85 months). They were seeing their partners 17.4 days per month on average (range 0-31 days), and the majority of the sample were dating steadily. The participants were relatively satisfied with their romantic relationships, with a mean score 121.7 (SD=12.19) on the DAS, slightly modified for use with young, unmarried adults. Besides the DAS, relationship satisfaction was also measured with the Satisfaction subscale of the *Investment Model Scale* (Rusbult, Martz, & Agnew, 1998). To measure self-control and accommodation in relationship conflict, the brief version of the *Self-Control Scale* (SCS; Tangney, Baumeister, & Boone, 2004) and an accommodation scale (Rusbult, Verette, Whitney, Slovik, & Lipkus, 1991) were used respectively. Mindfulness was assessed with the MAAS.

Results mostly confirmed anticipated positive correlations between the MAAS at Time 1 and other variables, including those at Time 2 after 10 weeks (e.g., Time 1 DAS, r=.41, p<.0001; Time 1 SCS, r=.52, p<.0001; Time 1 Accommodation, r=.34, p<.001; Time 2 DAS r=.24, p<.05; Time 2 SCS r=.54, p<.0001; Time 2 Accommodation, r=.15, *ns*).

The sample in Study 2 was 57 heterosexual student couples (M_{age}=20.05 years, age range: 18-25 years; mean length of relationship: 13.48 months, range: 4-38 months), the majority of whom considered their relationship serious. Participants were on average satisfied with their romantic relationships, with mean scores 112.62 (SD=11.29) for women and 109.99 (SD=13.49) for men on the DAS.

In this study, each couple discussed two conflict

topics for 10 minutes in a five-phase interaction sequence, which generally followed the interaction procedures used by Gottman and others for the study of dating and marital couple conflict (e.g., Gottman, Coan, Carrere, & Swanson, 1998). The discussion phase was videotaped and rated using five codes (problem-solving communication, support, withdrawal, negativity, and verbal aggression) from the System for Coding Interactions in Dyads (SCID; Malik & Lindahl, 2004). Preconflict and postconflict discussion measures were the Anger-Hostility and Anxiety subscales of the *Profile of Mood States* (POMS; McNair, Lorr, & Droppleman, 1971). Not only trait mindfulness but state mindfulness during the discussion was also measured with the MAAS (only five items used for state), and changes in perception of the partner and relationship from pre- to postconflict discussion were measured in three domains (felt love or commitment, respect given to and received from the partner, and degree of felt support and open communication toward the partner; Simpson, Rholes, & Phillips, 1996).

Besides replicating the positive correlation between the trait MAAS and DAS (r=.37, p<.0001), results showed that trait mindfulness inversely predicted postconflict discussion anger-hostility and anxiety via corresponding preconflict discussion mood states. Trait mindfulness also predicted positive (or at least less negative) perceived changes in felt love or commitment, respect, and support via state mindfulness during the conflict discussion, although the latter two results were found only for the female members of the couples. Finally, state, but not trait mindfulness was negatively related to such communication quality variables as withdrawal (b=-.06, p<.10), negativity (b=-.25, p<.05), and verbal aggression (b=.09, p<.001, inversely transformed).

In sum, mindfulness was associated with lower levels of negative affective experience in the conflict context, with more positive (or at least less negative) perceptions of one's partner and the relationship after conflict, and with lower levels of overt negativity in the conflict discussion.

To the current author's knowledge, this is the only study to date that employed behavioral observation in a standardized setting and further correlated the coded variables with state mindfulness. Results convincingly demonstrated the positive association between mindfulness and emotion regulation that might lead to relationship satisfaction, although the authors did not report on mediation analysis with the DAS score. This study also suggested gender difference in mindfulness-related perceptions as well as its possible impact on the partner.

One interesting observation from pairwise (male-female) correlations is that mindfulness scores did not significantly correlate (trait MAAS, r=-.17, *ns*; state MAAS, r=.18, *ns*) whereas relationship satisfaction did (r=.53, p<.0001). How discrepancy in mindfulness within a couple may affect relationship health and longevity will be a stimulating question to be addressed in future investigation.

2.2 Intervention Studies

In each of the following six studies, intervention was closely modeled on the Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn, 1990). Its health benefits have been well documented (Brown et al., 2007; Chiesa & Sarretti, 2009; Eberth & Sedlmeier, 2012; Keng, Smoski, & Robins, 2011), so the current review will only focus on the outcome variables pertinent to social connectedness.

MBSR was originally designed for patients with chronic pain (Kabat-Zinn, 1982). But the model has subsequently been applied to a broad spectrum of physical and mental disorders as well as to stress management in healthy people (Chiesa & Serretti, 2009; Didonna, 2009; Eberth & Sedlmeier, 2012). The intervention is usually programmed as eight weekly meetings of 2 to 2.5 hours each, and one full-day retreat. Main practices are (a) body scan, a progressive movement of attention through the body from toes to head, focusing on proprioception, practiced in the supine position, (b) sitting meditation, involving awareness of sensations, thoughts, and emotions,

while continually returning the attention focus to breathing, practiced in the sitting position on a cushion or chair, and (c) Hatha Yoga, or mindful movement, involving simple stretches and postures designed to balance and strengthen the musculoskeletal system and enhance greater awareness during movement. Meditations on breathing and walking as well as a guided meditation on loving-kindness to cultivate compassion are also practiced. Inherent to all the training is an emphasis on mindfulness, continually bringing attention to the present moment. Didactics and discussions on the psychophysiology of stress response and coping in daily life are also included. As homework, participants are asked to practice mindfulness skills with instructional audiotapes, 30 to 45 minutes per day, 6 times a week, and also to keep daily journals (Kabat-Zinn, 1990; Astin, 1997).

One of the first randomized controlled trials (RCTs) with MBSR was conducted by Astin (1997). Twenty-eight college undergraduates, all women but one, were randomly assigned to an intervention group or a wait-list control group. To adapt to the nonclinical population, whose motivation to practice might not be as high, the intervention was slightly modified from the original (e.g., no full-day retreat; homework assignment 5 times a week, not 6 times).

In addition to a widely used mental health checklist (SCL-90-R; Derogatis, 1977), outcome measures included the *Shapiro Control Inventory* (SCI; Shapiro, 1994) and the *Index of Core Spiritual Experience* (INSPIRIT; Kass, Friedman, Leserman, Zuttermeister, & Benson, 1991). The SCI is a 187-item instrument that measures one's sense of control (in the general and seven specific domains), mode of control (positive assertive, positive yielding, negative assertive, and negative yielding), motivation for control, and agency of control. The INSPIRIT is a 7-item scale designed to assess the experience of a personal conviction of God's existence (or of some form of Higher Power as defined by the person) and the perception of a highly internalized relationship between God and the person.

The intervention group showed increases in overall sense of control in specific domains ($F(2,16)=7.29$, $p<.02$), positive yielding or accepting mode of control ($F(2,16)=6.2$, $p<.03$), self as source of control ($F(2,16)=9.30$, $p<.008$), overall satisfaction with one's modes of control ($F(2,16)=7.30$, $p<.02$), and acceptance as the preferred response mode ($F(2,16)=5.02$, $p<.04$). The core spiritual experience was also observed to increase ($F(2,16)=6.6$, $p<.03$).

This study was a trailblazer in the RCT examination of MBSR with nonclinical populations. However, the small, gender-biased sample as well as a lack of control for family-wise Type I error requires caution in interpreting the reported results. Astin's (1997) creative contribution is that he included a multidimensional scale of control to demonstrate enhancement in positive yielding or accepting mode of control, one of the central manifestations of mindfulness. The preliminary results are promising and suggestive of accepting attitude also enhanced in interpersonal domain.

Shapiro, Schwartz, and Bonner (1998) also conducted an RCT with MBSR, which included a measure of empathy instead of control and examined intervention effects in the milieu of stressful medical education. Seventy-eight students were randomly assigned to an intervention group or a wait-list control group. Randomization was matched for gender, ethnicity, and medical versus premedical status. The intervention group was further split into two classes of 18 and 19 participants, to be led by different facilitators. The intervention was presented as an 8-week "Stress Reduction and Relaxation" elective and slightly modified from the original as follows: no full-day retreat; forgiveness meditation, uniquely added to loving-kindness meditation; and incorporation of experiential exercises designed to cultivate mindful listening skills and empathy.

To assess the intervention outcome, the *Empathy Construct Rating Scale* (ECRS; La Monica, 1981) and the INSPIRIT were included in addition to mental health measures. The ECRS is an 84-item instrument designed to measure overall empathy in one's self or

another person, but was adapted for this research using half of the original items.

The intervention group showed increases in both empathy ($F(1,69)=4.3$, $p<.05$) and spirituality ($F(1,69)=5.62$, $p<.02$), even though the post-measures were administered during the exam period, conceivably an extremely stressful situation. Furthermore, path analysis indicated that compliance with treatment had a negative effect on the level of trait anxiety ($\beta=-.440$, $p<.001$), which in turn had a negative effect on empathy ($\beta=-.390$, $p<.001$). Trait anxiety also had a positive effect on depression ($\beta=.525$, $p<.001$) and state anxiety ($\beta=.541$, $p<.001$), both of which then had a negative effect on spirituality ($\beta=-.308$, $p<.01$; $\beta=-.249$, $p<.033$, respectively), suggesting that the increase in spirituality was possibly preceded by decreases in depression and anxiety. Treatment effects were later replicated with the wait-list control group, who attended the identical program after the first group (empathy, $F(2,62)=15.5$, $p<.001$; spirituality, $F(2,62)=10.83$, $p<.002$). In each intervention, no experimenter effects were found.

The authors discussed that the mediating effect of trait anxiety was consistent with Lesh's (1970) findings that reductions in stress and anxiety through meditation enhanced compassion and empathy in counselors (Shapiro et al., 1998, p. 592). However, if this is the case, there may be no need of meditation or mindfulness; relaxation and other traditional methods may do well to lower anxiety level. In fact, according to an RCT study that compared mindfulness-based and relaxation-based interventions (Jain et al., 2007), both demonstrated significant decreases in distress as well as increases in positive mood states. Whether empathy and spirituality increase as much in somatic relaxation will be an interesting question.

Shapiro et al. (1998) used an exceptionally well-controlled design with a relatively large sample ($N=73$, final count), low attrition (1 in treatment, 4 in control), little gender bias (41 women, 32 men) and balanced status of students (35 premedical, 38 medical). Posttest was deliberately administered during a highly stressful exam period, and yet, results were in the anticipated direction and significant. The findings may be robust and generalizable to other similar contexts in medical education.

This study, however, was not one that directly addressed the relation between standard mindfulness training and empathy and spirituality; their program incorporated forgiveness meditation and experiential exercises of empathic skills to effectively enhance empathy and spirituality. It is unclear how much of the beneficial effect was due to mindfulness training per se. Inclusion of mindfulness measures will be required to answer this question.

Interest in cultivating empathy through mindfulness-based intervention is also shared in nursing education. Beddoe and Murphy (2004) conducted a pilot study in a pretest-posttest design, with a convenience sample of 23 Baccalaureate nursing students (all women, 74% first semester, $M_{age}=25$ years, age range: 20-39 years). However, attrition was not negligible, with 18 completing the course and 16 completing both the pretest and posttest. Intervention closely followed MBSR guidelines except that participants followed 30-minute guided meditation audiotapes at home 5 days per week (not 6 days), and there was no full-day retreat.

Outcome measures included a stress inventory and the IRI. Participants' pretest mean scores in all four IRI dimensions (Perspective-Taking, Fantasy, Empathic Concern, and Personal Distress) were 40% to 50 % higher than comparable data (Davis, 1980), suggesting that the students were much more empathic than the standard population and that there could be a ceiling effect for Perspective-Taking and Empathic Concern. Posttest revealed that Personal Distress and Fantasy strongly trended downward, though nonsignificant, whereas Perspective-Taking and Empathic Concern remained high and even trended upward. Coupled with a significant, favorable change observed in anxiety, such opposite pattern on empathy scales was considered to reflect the difference between emotional contagion and empathic concern (Beddoe &

Murphy, 2004, p. 310).

Their speculation is consistent with Davis' (1983) findings. Davis reported that both Personal Distress (PD) and Fantasy (FS) were associated (more so for PD) with emotional reactivity characterized by fearfulness and vulnerability, although the correlation between PD and FS was negligible. Correlations with anxiety scales were also negligible for FS, but moderate for PD (r=.34~43, N=204~225; Davis, 1983, p. 118). FS, on the other hand, was strongly correlated with the *Mehrabian and Epstein Emotional Empathy Scale* (Mehrabian & Epstein, 1972), part of which was used by Omdahl and O'Donnell (1999) as an emotional contagion measure (r=.48~56, N=225~235; Davis, 1983, p. 122).

Mindfulness and PD have consistently shown negative correlation (e.g., r=-.49, p<.01, with the MAAS; Beitel et el., 2005), but no available report exists regarding FS. Because the distinction between emotional contagion and empathic concern is critical, especially in healthcare profession, a psychometrically sound measure of emotional contagion is essential. The two aspects of emotional empathy also reflect the quality of interpersonal boundaries, so future research should clarify whether mindfulness fosters healthy boundaries despite enhanced connectedness.

With a view to promoting effective stress reduction in college students at large, Oman, Shapiro, Thoresen, Plante, and Flinders (2008) advocated meditation management of stress (MMS), of which MBSR was considered a strong example. The authors introduced another strong example called the Eight-Point Program (EPP; Easwaran, 1991), which had many similarities in design and intent with MBSR and had its efficacy recently demonstrated in RCTs (e.g., Oman, Hedberg, & Thoresen, 2006). Core EPP practices consist of (a) *passage meditation*, a concentrative method of sitting meditation on a memorized inspirational passage, (b) repetition of a mantram, (c) slowing down, (d) one-pointed attention, (e) training the senses, (f) putting others first, (g) spiritual companionship, and (h) spiritual reading (Easwaran, 1991). The authors hypothesized no differences between the effects of the two MMS examples—and, indeed found no significant differences—but expected common favorable impact on college students' stress and well-being outcomes.

Forty-four college undergraduates (80% women, 66% first-year, 59% 18 years, age range: 18-24 years) were randomly allocated into the MBSR (n=15) and EPP (n=14) training groups and a wait-list control group (n=15). Both trainings took place in eight weekly meetings of 90 minutes each. MBSR was, therefore, shortened from the standard session length of 2 to 2.5 hours, with no full-day retreat. Outcome measures included perceived stress, rumination, hope, and forgiveness of others that was assessed with a 6-item subscale of the *Heartland Forgiveness Scale* (Thompson et al., 2005). Its sample items include "With time I am understanding of others for the mistakes they've made" and "I continue to be hard on others who have hurt me" (reversed). Mindfulness was measured with the MAAS for mediation analysis.

In the time-constant treatment effect model, where data from posttest and 8-week follow-up were collapsed, training groups demonstrated larger decreases in perceived stress (Cohen's d=-.45 pretest SDs, p<.05), but only marginally in rumination (d=-.34, p<.10). Training groups also demonstrated larger increases in forgiveness (d=.34, p<.05). Changes in hope were nonsignificant.

To examine whether mindfulness intervened between the treatment and the observed effects, mediation analyses were conducted (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). Compared to controls, participants in both training groups demonstrated increases in mindfulness at 8-week follow-up (MBSR, d=0.93, p<.05; EPP, d=1.08, p<.01). However, mindfulness only mediated the effects on perceived stress and rumination, not on forgiveness of others. It seems that forgiveness might have been related to other aspects of mindfulness that were not captured by the MAAS (e.g., acceptance). Future research should better use a multidimensional

measure of mindfulness, such as the FFMQ that assesses observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience (Baer et al., 2006).

Oman et al. (2008) successfully expanded the scope of MBSR-led intervention research to other types of meditation. As long as the mediation effects of mindfulness are observed, diverse ways of cultivating mindfulness should be explored to match prognostic individual differences among participants. Within MBSR also, there is a study that examined the effects of home practice, and showed relative efficacy of mindful Yoga (as compared to body scan and sitting meditation) on all facets of the FFMQ but describing, which then mediated treatment effects on perceived stress, psychological symptoms, and partly on psychological well-being, positive relations with others included (Carmody & Baer, 2008). Although with an adult clinical population, this study suggests that all training in MBSR may not be equally effective or favored, and that a mindful movement practice as Yoga might more easily bring mindfulness to the body "while it is moving or stretching as the yoga requires, than while it is still as in the body scan or sitting meditation, and this feature may also facilitate the transfer of the resultant mindfulness into everyday life" (Carmody & Baer, 2008, p. 31). It is interesting to note that the standard format of mindfulness-based intervention might begin to be redesigned, both from inside and outside the MBSR model, toward more effective delivery of matched training.

A pre-post exploratory study with a community sample has been reported by Birnie, Speca, and Carlson (2010). Fifty-one adults (35 women, 16 men, M_{age}=47.4 years, *SD*=10.87, age range: 24-77 years) completed an MBSR program, slightly modified from the standard version (90-min sessions, not 2- to 2.5-hour, and no full-day retreat). Note that attrition was high in this study for no clear reason—out of 104 participants, 53 either dropped out or did not provide post-intervention data; hence the generalizability of the results may be in question.

In addition to the scales of stress symptoms and mood disturbance, outcome measures included the MAAS, the IRI, the *Functional Assessment of Chronic Illness Therapy － Spiritual Well-Being Scale* (FACIT-Sp; Peterman, Fitchett, Brady, Hernandez, & Cella, 2002), which captures meaning/peace and faith with 12 items, and the *Self-Compassion Scale* (SCS; Neff, 2003), a 26-item instrument that consists of six subscales (self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification).

Results demonstrated favorable effects on all measures but the Empathic Concern subscale of the IRI. Pre-post change scores showed significant correlations between the MAAS, the SCS, stress symptoms and mood disturbance; but no significant correlations were found between the MAAS and IRI subscales and between the MAAS and the FACIT-Sp, suggesting little mediation by enhanced mindfulness for the treatment effects on empathy and spirituality. Since corrections for multiple comparisons were not made, the results should be interpreted even more conservatively.

The reason why there was no change in empathic concern is unclear. The authors attributed this to a ceiling effect due to a relatively high pretest mean in this sample (Birnie et al., 2010, p. 368). Further research is warranted to examine whether MBSR impacts the Perspective-Taking and Empathic Concern subscales differently. As regards the absence of correlations in change scores between the MAAS and IRI subscales, there is a possibility again that the MAAS did not capture the quality of mindfulness that may closely relate to empathy.

The lack of correlation in change scores between the MAAS and FACIT-Sp runs counter to a result obtained by Carmody, Reed, Kristeller, and Merriam (2008) using the same scales (β=.28, p=.005) with a sample of similar characteristics (33 women, 11 men, M_{age}=47.8 years, age range: 20-72 years), except that the sample in Carmody et al. was from a clinical population. Another difference is that their program

followed the standard MBSR format, with eight weekly 2.5-hour sessions and one full-day class. Conditions that determine the association between mindfulness and spirituality are to be identified.

There is a specific mindfulness-based program tailored to intimate relationships, called Mindfulness-Based Relationship Enhancement (MBRE; Carson, Carson, Gil, & Baucom, 2004). MBRE was directly modeled on MBSR in terms of format, teaching style, sequence of techniques, composition of topics, and homework assignments. Principal modifications to specifically aim at enhancing couples' relationships included: (a) greater emphasis on loving-kindness meditations, with a particular focus on one's partner; (b) incorporation of partner versions of exercises, in which partners physically supported and facilitated one another; (c) mindful touch exercises; (d) a dyadic eye-gazing exercise; (e) application of mindfulness to both emotion-focused and problem-focused approaches to relationship difficulties; and (f) the context for practicing various mindfulness skills, both in-session and at home, was tailored to bring couples' relationships into focus (Carson et al., 2004, p. 479).

An RCT was conducted to assess treatment efficacy with 44 nondistressed heterosexual couples (M_{age}=37 years, *SD*=10.9, age range: 23-69 years for women; M_{age}=39 years, *SD*=12.4, age range: 24-69 years for men; mean duration of relationships 11 years; having at least one child). Both the women and men were mostly very well-educated (82% of women and 63% of men had done graduate-level studies). Participating couples were randomly assigned to the MBRE condition (6 to 8 couples per group) or the wait-list control condition.

A number of outcome measures were selected to capture relationship functioning and individual well-being. Relationship measures included: the *Quality of Marriage Index* (Norton, 1983) to assess global relationship satisfaction; the Autonomy and Relatedness subscales of the *Autonomy and Relatedness Inventory* (Shaefer & Burnett, 1987) that assess perceived partner behavior contributing to a sense of the respondent's independence and togetherness, respectively; the *Inclusion of Other in the Self Scale* (Aron, Aron, & Smollan, 1992), a single-item pictorial instrument that measures interpersonal closeness; the *Acceptance of Partner Index*, which was devised for this study as an index of perception of ability to accept difficult characteristics in the partner or relationship; and the Global Distress Scale from the *Marital Satisfaction Inventory-Revised* (Snyder & Aikman, 1999) that assesses relationship distress in couples.

Individual measures included: the *Revised Life Orientation Test* (Scheir, Carver, & Bridges, 1994) that assesses dispositional optimism versus pessimism; the *Individual Relaxation Index*, which was devised for this study as an index of each individual's perception of his or her ability to relax; the General Severity Index from the *Brief Symptom Inventory* (Derogatis & Melisaratos, 1983), a weighted frequency score based on the sum of the ratings of all items of psychological distress; and the INSPIRIT, a spirituality measure.

Participants were also asked to complete a daily diary sheet as a global prospective measure of relationship happiness, relationship stress, stress coping efficacy, and overall stress. Diary measures were completed for two weeks before the intervention (baseline period), and during the final three weeks of the intervention (treatment period).

Results revealed that the intervention favorably impacted all outcome measures. Furthermore, posttreatment effects were generally maintained at 3-month follow-up. The intervention also improved all diary measures. In the MBRE condition, diary measures (except overall stress) were found to be predicted by the length of mindfulness practice a day or two before, suggesting a causal influence of mindfulness. In addition, mindfulness practice rates predicted improvements of all individual measures, and autonomy and acceptance of partner from relationship measures as well.

As with changes in relationship satisfaction and

relationship distress, however, multiple mediation analyses suggested that it was partners' sense of participating in exciting activities together that mediated the beneficial effects, rather than acceptance of partner or individual relaxation (Carson, Carson, Gil, & Baucom, 2007). Depending on the correlation with the excitement variable, mindfulness might have contributed to excitement and subsumed itself as a mediator. A direct measure of state mindfulness (e.g., *Toronto Mindfulness Scale*; Lau et al., 2006) may need to be incorporated to unravel the complex causal process in mindfulness-based intervention.

Although generalizability is in question due to the sample population being nondistressed and highly educated, MBRE proved to be a quite successful intervention. Significant beneficial effects were observed on all measures of relationship functioning and individual well-being, and the effects were maintained at 3-month follow-up. A clear dose/response relationship was observed, and greater mindfulness practice on a given day was associated on a few consecutive days with improved levels of relationship happiness, relationship stress, and stress coping efficacy. It is unclear, however, that these changes were indeed caused by enhanced mindfulness. Once again, multiple mediation analyses involving mindfulness measures will be required in future research.

3. Discussion

3.1 Summary of Review

The literature review in terms of the relationship between mindfulness and social connectedness can be summarized as follows: (a) correlational studies demonstrated consistent, moderate positive correlations between mindfulness and connectedness (e.g., relatedness, empathy, compassion); (b) there was also a moderate positive correlation between mindfulness and satisfaction in romantic relationship; (c) interventions modeled after MBSR demonstrated positive effects on connectedness (e.g., empathy, spirituality, forgiveness); (d) a mindfulness-based intervention for relationship enhancement (MBRE) confirmed its efficacy in relationship functioning and individual well-being; and (e) no intervention research demonstrated the mediating effect of mindfulness on social outcomes.

In the middle of an explosion of mindfulness studies, research that addressed the relation between mindfulness and social connectedness is surprisingly scarce. In addition, participants in many of these studies tended to be female Caucasian students in the U.S. Because gender difference as well as cultural variance should not be underestimated in social functioning, the above results are to be received with caution.

Two further issues merit attention. First, although perspective-taking and empathic concern are key components to interpersonal well-being, their correlations with mindfulness are not consistent, depending on measurement instruments.

For example, Block-Lerner, Adair, Plumb, Rhatigan, and Orsillo (2007) briefly introduced the results of their own study with a community sample of 40 women, correlating empathy as measured by the IRI and several mindfulness scales, including the MAAS and the CAMS-R. What they found were moderate associations between the CAMS-R and Perspective-Taking and Empathic Concern subscales (r=.35, p<.05; r=.33, p<.05, respectively), and no significant correlations between the MAAS and the two IRI subscales. The major difference between the CAMS-R and MAAS is whether or not the acceptance aspect of mindfulness is captured, so it is possible that acceptance may be related to the central elements of empathy. However, according to Dekeyser et al. (2008), acceptance as measured by the KIMS showed no correlation with empathy, which in their study was a composite of Perspective-Taking, Empathic Concern, and Fantasy scores. Instead, it was the sensory awareness aspect of mindfulness that was found to correlate with the empathy composite.

In view of the elusive nature of the mindfulness construct, multidimensional measures of mindfulness

are to be utilized, but at the same time the conceptual and psychometric uniqueness of each measure needs clarifying. The FFMQ (Baer et al., 2006), which integrated different mindfulness measures and separately assesses five facets (observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience), may be most suitable for future research, albeit not necessarily ideal (e.g., Bergomi et al, 2013).

A second issue to be addressed is the relationship between anxiety and mindfulness. As was suggested by Shapiro et al. (1998), anxiety may mediate treatment effects on empathy level. However, due to the absence of the mindfulness variable in their path model, it is not clear whether decreased anxiety facilitates mindfulness that in turn enhances empathy, or increased mindfulness reduces anxiety that leads to more empathy. It can also be argued that mindfulness and anxiety affect each other and together impact empathy level.

Negative association between mindfulness and anxiety has been consistently reported (e.g., r=-.34, N=313; Brown & Ryan, 2003). There is also some evidence from attachment literature that attachment anxiety (and avoidance) negatively correlates to mindfulness (Shaver, Lavy, Saron, & Mikulincer, 2007; Walsh, Balint, Smolira Sj, Fredericksen, & Madsen, 2009). Therefore, it is not difficult to imagine possible resistance and frustration that may occur in anxious individuals, at least at the beginning stage of mindfulness training. Although mediation effects of mindfulness onto psychological symptoms (including anxiety) have been demonstrated (e.g., Carmody & Baer, 2008), an appropriate amount of initial reduction in anxiety is expected to facilitate mindfulness practice, which may further help to decrease anxiety. Such bidirectional nature between mindfulness and anxiety deserves a close look.

3.2 Future Directions

It is clear that there is as yet no definitive answer to the question, “Does mindfulness cultivate social connectedness?” However, there were promising results obtained from both correlational and interventional studies. Building on those preliminary findings, there may be three directions for future research.

First, more basic research on the mindfulness construct is required. Most studies to date are focused on various concomitants of mindfulness, whatever defined, and not as much concerned about theoretical coherence. One of the few exceptions is Brown and Ryan (2003, Study 3), in which the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) was used to examine the connection between mindfulness and self-concordance. Results demonstrated that MAAS-measured trait mindfulness significantly moderated the relation between implicit and explicit affect valance, suggesting high mindful individuals are more aware of implicit (subliminal) affective experience. In another study, high mindful individuals were also observed to override an implicit process, if so chosen (Levesque & Brown, 2007). A dual process theory of self-regulation employed by these studies can enrich the neurobiological examination into mindfulness, especially in relation to the integrative function of the prefrontal cortex (e.g., Allen et al., 2012; Hölzel et al., 2011).

In contrast to such third-person perspective, more qualitative analyses based on first-person narrative accounts will also be informative. Exploratory studies into the experience of long-term meditators (e.g., Haimerl & Valentine, 2001; Pruitt & McCollum, 2010) and that of participants in mindfulness-based interventions (e.g., Dobkin, 2008) may offer a rich resource toward comprehending the nature of mindfulness practice. Indeed, a recent meta-ethnographic synthesis of qualitative studies suggested that the emergence of observing self may be the common therapeutic outcome in mindfulness-based interventions (Malpass et al., 2011). This study supported the *reperceiving* mechanism, or the hypothesized emergence of an ability through the process of mindfulness to “disidentify from the contents of consciousness (i.e., one’s thoughts) and

view his or her moment-by-moment experience with greater clarity and objectivity" (Shapiro, Carlson, Astin, & Freedman, 2006, p. 377).

Second, drawing on such profound remarks as "Qualities of compassion and loving kindness are seen as inherent in human nature, uncovered by the practice of meditation" (Beddoe & Murphy, 2004, p. 307) or "Mindfulness meditation may not only connect one with him/herself, it may also foster a sense of connectedness with others and with a greater *whole*" (Shapiro et al., 1998, p. 584, italics in original), broader correlational studies with relevant scales of social connectedness may reveal a more comprehensive picture surrounding mindfulness. In addition to the widely-used IRI (for empathy) and INSPIRIT (for spirituality), the *Self-Other Four Immeasurables Scale*, the *Heartland Forgiveness Scale*, and the *Compassionate Love Scales* (Sprecher & Fehr, 2005), among others, may also be useful. Because the Agreeableness subscale of Big Five personality measures (Costa & McCrae, 1992) has been reported to moderately correlate with mindfulness (ρ =.30, 95% CI [.15, .45]; Giluk, 2009), items from that scale can also serve exploratory purposes.

Lastly, in intervention research, active controls and mediation analyses using mindfulness measures are to be employed. Many specific and nonspecific components in MBSR are potentially conducive to outcome: various formal practices (body scan, sitting meditation, mindful movement, loving-kindness meditation, walking meditation, etc.), relationship with the facilitator, self-expression and social support in group, didactic material, home practice, and probably more. Although the foundation of each component may be mindfulness, it will be hard to determine to what degree each of them uniquely (or in combination) contributes to specific (or overall) effects of an intervention. Therefore, active controls and multiple mediation analyses will be desirable to examine causal relations and explore the likely correspondence between mindfulness facets and beneficial outcomes. Only with such methodology can we provide a substantive answer to the question, "Does mindfulness cultivate social connectedness?"

Whereas the intervention studies reviewed here were only those modeled after MBSR, many simpler programs might exist that can also be studied in terms of the relationship between mindfulness and connectedness (e.g., Gale, 2009). One interesting finding in MBSR is a relative efficacy of mindful Yoga on mindfulness and outcome measures, which indicates that mindful movement such as Yoga might bring mindfulness to the body and action more easily than body scan or sitting meditation (Carmody & Baer, 2008). Given this observation, more movement-oriented modalities could be incorporated into mindfulness training. There are a wide range of mindful practices developed in somatic education, such as Sensory Awareness, Feldenkrais Method, and Authentic Movement (Johnson, 1995), so that future mindfulness interventions may choose from a large arsenal. Creative programs have already been designed using movement and art expression (Caldwell, Harrison, Adams, Quin, & Greeson, 2010; Fernros, Furhoff, & Wändell, 2008; Monti et al., 2006). Measures of both mindfulness and social connectedness are hoped to be included in these new, often more simply structured programs when evaluating their efficacy.

In conclusion, it would be fair to state that although there seems moderate positive correlation between mindfulness and social connectedness, there is little evidence so far of the mediating effect of mindfulness on social outcome, at least within MBSR interventions. Future research is warranted especially in terms of the measurement of mindfulness, in-depth analysis of the nature of mindfulness, and exploration of social outcomes in different types of mindfulness practice.

Research that links mindfulness and social connectedness is still rudimentary, yet quite promising at the crossroads of Western psychology and Buddhist psychology. In the previous decade, the main focus of attention was on the psychophysiological benefits of

mindfulness. In the next decade, this research field will hopefully evolve into a rich forum of the dialogue between the two traditions, not only for personal well-being but also for social cohesion and mutual caring.

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