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An experiment

Ridderinkhof, A.; de Bruin, E.I.; Brummelman, E.; Bögels, S.M.

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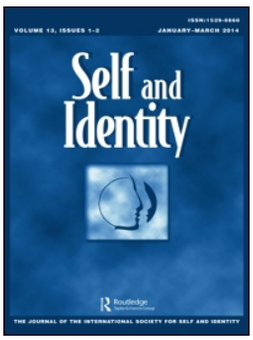

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Does mindfulness meditation increase empathy? An experiment

Anna Ridderinkhof[a§], Esther I. de Bruin[a,c], Eddie Brummelman[a,b] and Susan M. Bögels[a,c]

[a]Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, The Netherlands; [b]Department of Psychology, Stanford University, Stanford, CA, USA; [c]UvA minds, Academic Outpatient Child and Adolescent Treatment Center, Amsterdam, The Netherlands

ABSTRACT

Cultivating empathy is a presumed benefit of mindfulness, but this possibility has rarely been investigated experimentally. We examined whether a five-minute mindfulness exercise would cultivate empathy relative to two equally brief control exercises: relaxation and mind-wandering. We further examined whether mindfulness would be especially beneficial for people with autistic or narcissistic traits. Results showed no effect of mindfulness relative to both control conditions on mind reading, empathic responding, or prosocial behavior. Mindfulness effects were independent of autistic traits. Unexpectedly, people higher in autistic traits did show increased prosocial behavior across conditions. Intriguingly, mindfulness improved mind reading in non-narcissistic people, but reduced it in narcissistic people. These findings question whether a brief mindfulness exercise is sufficient for building empathy.

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Mindfulness means being nonjudgmentally aware of the present moment (Kabat-Zinn, 1994). Mindfulness training is becoming increasingly popular in modern Western society, as reflected in the numerous initiatives to offer mindfulness at workplaces, schools, and in magazines, as well as to incorporate mindfulness in traditional mental-health interventions. One of the presumed benefits of mindfulness is fostering empathy. Cultivating compassion, which includes empathy, is one of the main aspects of the Buddhist traditions from which mindfulness arose (e.g., Feldman & Kuyken, 2011; Kabat-Zinn, 2011). Scholars have raised the possibility that being aware of the present moment enables humans to be aware of the experiences of others – that is, to empathize with others (e.g., Andersen, 2005; Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo, 2007; Kristeller & Johnson, 2005). Surprisingly, the impact of mindfulness on empathy has rarely been investigated experimentally.

Empathy and mindfulness

Empathy refers to "the capacity to (a) be affected by and share the emotional state of another, (b) assess the reasons for the other's state, and (c) identify with the other, adopting his or

CONTACT Anna Ridderinkhof A.Ridderinkhof@uva.nl
[§]Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, The Netherlands
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her perspective" (De Waal, 2008, p. 281). Empathy includes both cognitive and affective processes that strengthen each other (Duan & Hill, 1996). Cognitive empathy refers to understanding other people's mental states (e.g., thoughts, feelings) and taking other people's perspective. Cognitive empathy is closely related to theory of mind (or mind reading), which is the ability to infer and reflect upon the mental states that underlie other people's actions (Baron-Cohen, 2001). Affective empathy refers to sharing other people's feelings and to feel emotional concern for other people's emotions or experiences (Davis, 1983; Duan & Hill, 1996). By contrast, responding to other people's emotion or experiences with personal distress – self-oriented negative feelings such as anxiety or disgust – is related to reduced perspective taking ability, and unrelated to emotional concern or the motivation to help others (FeldmanHall, Dalgleish, Evans, & Mobbs, 2015; Pulos, Elison, & Lennon, 2004). Cognitively taking the perspective of others, however, does increase emotional concern, which in turn sparks the motivation to help others in a selfless attempt to increase their welfare (Batson, Ahmad, & Lisner, 2009; Coke, Batson, & McDavis, 1978). Empathy underlies a wide range of prosocial and altruistic behaviors, such as sharing, helping others in need, consoling those who are distressed, and sacrificing one's own resources to help others (Batson et al., 1991; Burks, Youll, & Durtschi, 2012; Eisenberg & Miller, 1987; FeldmanHall et al., 2015; Pavey, Greitemeyer, & Sparks, 2012; Prot et al., 2014). Thus, enhancing empathy has great societal relevance.

According to theorists, mindfulness cultivates empathy (e.g., Andersen, 2005; Block-Lerner et al., 2007; Kristeller & Johnson, 2005). Mindfulness can be practiced with mindfulness meditation, originating from Buddhist traditions. Mindfulness meditation is designed to foster awareness of present-moment experiences by redirecting people's attention to an object, such as their breathing, while taking a nonjudgmental stance toward distractions. These practices are incorporated in a variety of training programs, the most well-known being mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982) and mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2013). Meta-analyses show that mindfulness-based training benefits both mental and physical health in a broad range of populations (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Zoogman, Goldberg, Hoyt, & Miller, 2014). For example, mindfulness-based training reduces stress, depression, and anxiety (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Chiesa & Serreti, 2009; Hofmann, Sawyer, Witt, & Oh, 2010).

Preliminary evidence of mindfulness enhancing empathy

Preliminary evidence suggests that mindfulness may indeed enhance empathy. Self-reported mindfulness is associated with self-reported empathy (Beitel, Ferrer, & Cecero, 2005; Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; Greason & Cashwell, 2009) and self-reported helping behavior (Cameron & Fredrickson, 2015). Also, practicing mindfulness seems to activate brain regions that underlie empathy. For example, in experienced meditators, practicing mindfulness meditation activates the prefrontal cortex, anterior cingulate cortex, and anterior insula (Chiesa & Serretti, 2010), areas that are part of a core network activated during empathy (Fan, Duncan, de Greck, & Northoff, 2011; Masten, Morelli, & Eisenberger, 2011). Collectively, these studies provide empirical evidence for the link between mindfulness and empathy.

Furthermore, some intervention studies have found that mindfulness-based training increases empathy. An MBSR training of seven weekly sessions with home practice increased medical students' self-reported empathy compared to a waiting list control group (Shapiro, Schwartz, & Bonner, 1998). Also, over the course of an MBSR training of eight weekly sessions and home practice, people's self-reported perspective taking increased while their personal distress decreased (Birnie, Speca, & Carlson, 2010). Other studies found no such benefits, however. One study found no change in self-reported empathy from before to after a mindfulness-meditation training of eight weekly sessions and daily home practice (Galantino, Baime, Maguire, Szapary, & Farrar, 2005). Another study found over the course of an eight-week MBSR training for nursing students that self-reported personal distress decreased, whereas self-reported empathic concern and perspective taking did not change (Beddoe & Murphy, 2004). In another study, a three-week app-based mindfulness training consisting of 10-min sessions increased prosocial behavior (i.e., the likelihood of offering one's seat to a person in need) compared to cognitive therapy. However, the same mindfulness training did not affect facial and vocal emotion recognition (Lim, Condon, & DeSteno, 2015). Although intervention studies suggest potential empathy-enhancing effects of mindfulness, most of these studies lacked rigorous, active control conditions and relied mainly on self-report questionnaires to index empathy.

According to recent studies, interventions need not to consist of multiple sessions to increase empathy. A five-minute mindfulness exercise, compared to a mind-wandering exercise, increased accuracy on a mind reading test and made people respond more empathically in a letter toward victims of social exclusion (Tan, Lo, & Macrae, 2014). Similarly, a 15-minute mindfulness exercise, compared to a mind-wandering exercise, increased accuracy on a mind reading test, but only among individuals with low conscientiousness and extraversion (Winning & Boag, 2015). Thus, even very brief mindfulness exercises have the potential to enhance empathy. However, these studies are not conclusive, as they lack an active, treatment-based control condition. It is unclear whether the effects were due to mindfulness per se, or to engaging in any intervention.

How does mindfulness enhance empathy?

There are multiple mechanisms through which mindfulness can enhance empathy. One possibility is that mindfulness meditation does so by increasing mindful awareness. When people become nonjudgmentally aware of the present moment, they shift their attention from being immersed in their thoughts and feelings and viewing them as fixed parts of the self, to dis-identifying with their thoughts and feelings and viewing them from a distance as floating states of the mind (i.e., decentering; Shapiro, Carlson, Astin, & Freedman, 2006; Teasdale et al., 2002). When people perceive their own thoughts and feelings as floating states of mind, they are less likely to be caught up in them, which helps them become more broadly aware of the present moment, including the possible mental states of others (Block-Lerner et al., 2007). Moreover, mindful awareness of one's own emotions leads to a better understanding of emotional processes in general. Such understanding helps people understand the emotions of others (Block-Lerner et al., 2007; Salzberg, 2011). For example, when people witness another person being socially rejected, being mindfully aware helps them understand their own worry, anger, and disgust in there here-and-now, and prevents them from getting caught up in these emotions. This makes them broadening their awareness to include the other person and makes

them nonjudgmentally aware of how the rejected person must be feeling. Thus, mindful awareness could be the vehicle by which mindfulness meditation fosters empathy.

There is another possibility, however. Perhaps the mechanisms through which mindfulness meditation enhances empathy are not unique to mindfulness, but hold for stress-reduction interventions in general. When people are stressed, they come to rely on lower level, biologically ingrained automatic responses and decision-making processes (e.g., Schneiderman, Ironson, & Siegel, 2005; Starcke & Brand, 2012). This stress response takes away resources from higher cognitive processes (Starcke & Brand, 2012), potentially thwarting people's ability to empathize with others. There are indeed indications that people are less empathic when they feel stressed (Passalacqua & Segrin, 2012; Thomas et al., 2007). One study showed that people are generally less empathic toward strangers than toward familiar individuals, mainly because interacting with strangers is stressful. Blocking people's endocrine stress response, then, increased people's empathy toward strangers (Martin et al., 2015). Thus, mindfulness-based training could increase empathy simply by reducing stress (Chiesa & Serretti, 2009), a process that is not unique to mindfulness meditation. Previous experimental studies lack an active stress-reducing control exercise, and were therefore unable to test whether mindfulness enhances empathy through mindfulness-specific mechanisms (e.g., decentering) or nonspecific mechanisms (e.g., stress reduction). Overcoming this limitation, we will compare a mindfulness exercise with both a relaxation exercise and a regular control exercise.

Autistic and narcissistic traits

Mindfulness meditation may not benefit all people equally, and may be especially beneficial for individuals whose empathy is impaired, such as people with high levels of autistic or narcissistic traits. Autistic traits are continuously distributed in the general population; only people with extremely high levels of autistic traits meet the criteria of autism spectrum disorder (ASD; Constantino & Todd, 2003). People with high levels of autistic traits have problems in social interaction and communication, including difficulties in socio-emotional reciprocity (e.g., sharing of emotions), using and understanding nonverbal communication, as well as developing and maintaining social relationships. In addition, people with autistic traits display restricted behavior patterns and interests (American Psychiatric Association, 2013). Importantly, their cognitive empathy is impaired (Baron-Cohen, 2001; Dziobek et al., 2008; Uljarevic & Hamilton, 2013), but their affective empathy seems to be intact (Dziobek et al., 2008; Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007).

Mindfulness meditation may help people with autistic traits become more empathic. First, these people are less aware of their own feelings, which hampers their understanding of others' feelings. By fostering awareness of their own feelings, mindfulness meditation may enable them to become aware of other people's feelings (Sequeira & Ahmed, 2012). Second, individuals with autistic traits have difficulties in filtering sensory stimuli (e.g., sounds, bodily sensations), thoughts, and feelings, so everyday experiences are often overwhelming for them. For example, they may feel overwhelmed by emotions of others, which seems to prevent them from responding empathically (Markram & Markram, 2010; Markram, Rinaldi, & Markram, 2007; Smith, 2009). Mindfulness meditation may help them feel less overwhelmed by helping them take an accepting and nonjudgmental stance toward overwhelming stimuli, and by helping them control their attention (Samuel, 2009). Feeling less overwhelmed, in turn, may enable them to respond more empathically to others. Together,

this indicates that mindfulness meditation may increase empathy in particular for people with autistic traits.

Emerging evidence shows that mindfulness-based training might be beneficial for individuals with ASD. Different forms of mindfulness-based training have been found to reduce depressive symptoms, anxiety, rumination, and aggression, as well as to increase positive affect and quality of life in individuals with ASD (De Bruin, Blom, Smit, van Steensel, & Bögels, 2015; Hwang, Kearney, Klieve, Lang, & Roberts, 2015; Singh, Lancioni, Manikam, et al., 2011; Singh, Lancioni, Singh, et al., 2011; Spek, van Ham, & Nyklíček, 2013); these benefits can translate into higher empathy. Moreover, studies found that participating in a mindfulness training can improve social responsiveness in adolescents with ASD (De Bruin et al., 2015), and can improve trust and feelings of security in social interactions in adults with ASD (Kiep, Spek, & Hoeben, 2015). However, to our knowledge, these prior studies did not examine potential mindfulness effects on empathy.

Narcissism is a personality trait on which individuals from the general population gradually differ from one another. In its extreme form, narcissism can develop into Narcissistic Personality Disorder (American Psychology Association, 2013). Narcissistic people (i.e., those with high levels of narcissistic traits) feel superior to others, believe they are entitled to privileges, and strongly desire to be admired by others (Brummelman, Thomaes, & Sedikides, 2016). They do not desire to get along with others; rather, they want to feel superior to others, to have power over others, and to use others to gain admiration (Campbell, Rudich, & Sedikides, 2002). They may feel little need to attend to the emotions of others. Indeed, narcissism is associated with reduced affective empathy (Ehrenberg, Hunter, & Elterman, 1996; Gurtman, 1992; Hepper, Hart, Meek, Cisek, & Sedikides, 2014; Vonk, Zeigler-Hill, Mayhew, & Mercer, 2013; Wai & Tiliopoulos, 2012; Watson, Grisham, Trotter, & Biderman, 1984; Watson & Morris, 1991). Mindfulness meditation could make narcissistic people more empathic by quieting their egos – by making them less involved with creating a grandiose image of themselves, thus opening them up to the emotions of others (Thomaes & Brummelman, 2016). Thus, mindfulness meditation might be especially beneficial for narcissistic individuals. To our knowledge, no prior research has investigated the effects of mindfulness-based interventions on empathy in narcissistic individuals.

The present study

The present experimental study investigated whether mindfulness meditation increases empathy. Extending previous research, we compared a brief mindfulness exercise to a relaxation exercise, to address whether the benefits of mindfulness meditation are due to mindfulness-specific mechanisms or generalize to other stress-reduction approaches. Further extending previous research, we investigated whether the benefits of mindfulness depend on people's autistic or narcissistic traits. Participants rated their autistic and narcissistic traits prior to the experiment and were then randomly assigned to complete a five-minute mindfulness exercise, relaxation exercise, or control exercise. Participants subsequently performed a mind-reading task and took part in an online ball-tossing game where they witnessed another player being excluded. Participants' empathic responding and prosocial behavior toward this victim were indexed. We hypothesized that mindfulness would increase empathy compared to relaxation and control. Furthermore, we expected

that this effect would be especially pronounced in individuals with autistic or narcissistic traits.

Method

Participants

Participants were 161 adults. Three participants were excluded from the analyses; one participant did not hear the auditory instructions; one seemed non-compliant; and another accidentally participated twice, and we retained data from his first participation. Mean age of the remaining 158 participants was 22.55 years (SD = 3.87, age range = 18–44) and 61.4% was female. Sample size was based on a priori power calculation (Analysis of Variance [ANOVA] fixed effects special main and interactions; power = .80; $\alpha = .05$; effect size $F = 0.25$; # groups = 3). Of all participants, 14 (9%) had previously followed a mindfulness or meditation training. Participants were recruited at the authors' university, provided written informed consent, and received financial compensation (€10). The study was approved by the authors' university ethics review board (2014-CDE-3972).

Materials and procedure

A between-subjects design with three groups was used. Participants were told that this study investigates the effects of brief interventions on attention and concentration; they were not told that it investigates mindfulness or relaxation. Participants were placed in separate soundproof rooms and read the instructions that appeared on the computer screen. First, they completed the 28-item Autism-Spectrum Quotient – Short version (AQ-Short; Hoekstra et al., 2011) indexing autistic traits (e.g., "I find it hard to make new friends"). Items were rated on four-point Likert scales (1 = *definitely disagree* to 4 = *definitely agree*). Scores were summed across items (Cronbach's $\alpha = .79$), with higher scores indexing higher levels of autistic traits. Then, participants completed the 16-item Narcissistic Personality Inventory (NPI-16; Ames, Rose, & Anderson, 2006) indexing narcissistic traits. Each item contained a pair of two statements: one narcissistic statement (e.g., "I know that I am good because everybody keeps telling me so") and one non-narcissistic statement (e.g., "When people compliment me I sometimes get embarrassed"); participants selected the statement that best described them. The number of selected narcissistic statements was summed (Cronbach's $\alpha = .67$), with higher scores indexing higher levels of narcissistic traits.

Exercises

Participants were randomly assigned to the mindfulness, relaxation, or control condition. Experimenters were blind to condition assignment and participants were blind to which condition was the primary focus of the study. Participants listened to prerecorded five-minute auditory instructions (see Supplemental Materials for exact wording of the instructions). Importantly, these recorded instructions were spoken by the same person and consisted of a comparable number of words and periods of silence for each condition.

The mindfulness condition consisted of a mindfulness meditation of the breath (Williams & Penman, 2011). Participants were invited to sit in an upright position that supports them to be open and alert, and then to bring their attention to the breath and the bodily sensations

that come with breathing. Participants were told that there is no need to change their breathing in any way. Participants were told that their mind may wander away from the breath, and that such mind wandering is natural so there is no need to judge themselves. They were guided to gently bring the attention back to the sensations of breathing whenever they noticed their mind was wandering.

The relaxation condition consisted of release-only and cue-controlled relaxation based on applied relaxation techniques (Öst, 1987). Similar to mindfulness meditation, these procedures are incorporated in multi-week clinical trainings, but can also be adopted as short exercises in experimental studies (e.g., Carlbring, Björnstjerna, Bergström, Waara, & Andersson, 2007). Participants were invited to relax their body part by part (e.g., their face, arms, fingertips, thighs, and knees). Participants were asked to breathe slowly and to relax every time they exhaled. Then, they were guided to inhale in three seconds and exhale in six seconds. Participants were asked to think "inhale" with every inhale, and to think "relax" (while simultaneously relaxing their entire body) with every exhale.

The control condition, based on Tan et al. (2014), was designed to control for non-specific aspects of the mindfulness condition such as sitting quietly and listening to a voice giving guided instructions. Participants were invited to let their mind wander and to be fully engaged with whatever came up in their minds. Participants were told that mind wandering is natural for the mind, and they were guided to be completely immersed in their thoughts and feelings.

Manipulation checks

Participants rated their level of attention to the present moment, relaxation, and affect on separate 100-point visual analog scales both before and after the exercise. The scales ranged from negative to positive (i.e., from inattentive to attentive, from stressed to relaxed, and from unpleasant to pleasant, respectively). After the exercise, participants completed the five-item Mindfulness Attention and Awareness Scale-State (MAAS-state; Brown & Ryan, 2003), adapted to index mindful awareness during the exercise (e.g., "I found it difficult to stay focused on what was happening in the present [reverse-scored]"). Participants rated items on seven-point scales (0 = *not at all* to 6 = *very much*). Scores were summed across items (Cronbach's $\alpha = .51$), with higher scores indicating higher mindful awareness.

Empathy

The mind reading aspect of empathy was assessed by the Reading the Mind in the Eye Test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). After completing one practice item, participants were shown 36 black-and-white pictures of the eye region of different people (18 male and 18 female), each subtly displaying a specific state of mind (e.g., nervous, regretful, interested, suspicious). Written descriptions of four mental states were presented along with the picture. Participants were asked to select the mental state that best described what the person in the picture was thinking or feeling. Number of correct responses (Cronbach's $\alpha = .52$) was used as index of mind reading accuracy.

To assess empathic responding and prosocial behavior, participants first observed and then played a game of Cyberball: a ball-tossing game in which one of the players is excluded (Williams & Jarvis, 2006). Participants watched three other players throw a ball to one another. Participants were told that the players (Sanne, Lisa, and Emma – typical Dutch names) were other students participating in the study. In reality, however, the players did not exist, the

game was controlled by the computer, and the order of throws of the three computerized players was randomized. In the first round, one player (Lisa) was excluded by the other players. Sanne and Emma each threw the ball to Lisa only once, while throwing 20 times to each other in total. In the second round, the participant joined the game as the fourth player. Again, Sanne and Emma each threw to Lisa only once. The proportion of throws of the participant to the excluded player (Lisa) was used as an index of prosocial behavior (range: 0–1).

After the first round, participants were asked to write an email to Lisa about their thoughts and feelings while watching the Cyberball game. The emails were scored by two independent raters: the first author and a second rater who was not involved in this study, both of whom were blind to participants' condition assignment. The first rater divided emails in phrases containing a subject and a finite verb or verb phrase. Then, both raters scored the number of phrases with empathic content using a well-established definition of empathy (De Waal, 2008), which included sharing the emotional state of the excluded player, feeling emotional concern for her, mentioning the reasons for her emotional state, and taking her perspective. Then, using the same definition, raters globally rated each email on empathy (1 = *not at all empathic* to 6 = *very empathic*). The number of empathic phrases and the global empathy ratings, both averaged across raters, were used as indices of empathic responding. Inter-rater reliability was excellent (Cicchetti, 1994), both for empathic phrases (Intraclass correlation coefficient [ICC] = .89, 95% CI .85–.92) and for global empathy ratings (ICC = .83, 95% CI .76–0.87). Afterwards, participants were thoroughly debriefed and thanked for participation.

Results

Confirming successful random assignment, there were no differences between condition in gender, age, prior mindfulness experience, autistic traits, narcissistic traits, or pre-intervention attention, relaxation, or affect (see Table 1 for descriptive statistics). Autistic traits in this sample ($M = 55.70$, SD = 8.77) were similar to those found in Dutch and English community samples ($M = 52.79$, SD = 8.06, and $M = 59.73$, SD = 9.32, respectively; Hoekstra et al., 2011). Table 2 displays correlations. One participant was excluded from analyses of the Cyberball outcome variables; by coincidence she had the same first name as one of the computerized players, and she therefore mistakenly believed that she herself took part in the first round of the game.

Manipulation checks

There was a significant difference between conditions in mindful awareness, $F(2, 155) = 22.87$, $p < .001$, $\eta_p^2 = .23$. Confirming our prediction, mindful awareness was higher after the mindfulness exercise than after the control exercise, $p = .002$, Cohen's $d = 0.61$. Contrary to our prediction, mindful awareness was even higher after the relaxation exercise than after the mindfulness exercise, $p < .001$, Cohen's $d = 0.70$, and the control exercise, $p < .001$, Cohen's $d = 1.39$.

Controlling for pre-intervention attention, post-intervention attention differed significantly between conditions, $F(2, 154) = 6.75$, $p = .002$, $\eta_p^2 = .08$. Attention was higher after the mindfulness exercise than after the control exercise, $p = .001$, Cohen's $d = 0.60$, and higher after the relaxation exercise than after the control exercise, $p = .003$, Cohen's $d = 0.70$.

Table 1. Descriptive statistics per condition.

	Mindfulness (n = 54)		Relaxation (n = 51)		Control (n = 53)	
	M	(SD)	*M*	(SD)	*M*	(SD)
Age	23.17	(4.29)	22.18	(3.35)	22.28	(3.87)
AQ	56.89	(8.35)	54.35	(8.89)	55.77	(9.05)
NPI-16	4.69	(3.01)	5.12	(3.18)	5.62	(2.64)
Pre-intervention						
Attention	68.98	(22.10)	73.02	(18.58)	65.30	(23.04)
Relaxation	64.59	(25.37)	64.59	(21.02)	56.00	(24.78)
Affect	64.98	(18.24)	68.94	(17.62)	62.32	(20.80)
Post-intervention						
Attention	72.72	(20.84)	73.80	(16.70)	58.81	(25.46)
Relaxation	79.78	(20.31)	84.25	(14.16)	77.36	(20.27)
Affect	73.06	(19.10)	79.35	(14.47)	71.79	(20.38)
MAAS-state	18.69	(4.44)	21.69	(4.21)	16.19	(3.76)
Empathy						
Mind reading accuracy	25.89	(3.82)	26.14	(3.62)	25.45	(3.50)
Empathic phrases	3.71	(2.14)	3.58	(1.93)	3.25	(1.69)
Global empathy score	3.48	(0.97)	3.44	(1.11)	3.26	(1.07)
Proportion of throws to excluded player	0.53	(0.16)	0.51	(0.14)	0.47	(0.13)

Note. AQ = Autism Quotient, NPI-16 = Narcissistic Personality Inventory 16 items, MAAS-state = Mindfulness Attention and Awareness Scale – State.

Table 2. Correlation coefficients (Pearson's r) between autistic traits, narcissistic traits, mindful awareness, and empathy variables.

	AQ	NPI-16	MAAS-state	Mind reading accuracy	Empathic phrases	Global empathy score
AQ						
NPI-16	−.09					
MAAS-state	−.22**	−.17*				
Mind reading accuracy	−.00	−.01	.11			
Empathic phrases	−.11	−.15	.12	.08		
Global empathy score	−.11	−.06	.06	.06	.70**	
Proportion of throws to excluded player	.22**	−.00	−.01	−.06	−.04	.02

Note. AQ = Autism Quotient, MAAS-state = Mindfulness Attention and Awareness Scale – State version, NPI-16 = Narcissistic Personality Inventory 16 items.
*$p < .05$; **$p < .01$.

Attention did not differ between the mindfulness and relaxation exercise, $p = .839$. Relaxation and affect increased significantly from pre- to post-intervention for all exercises, but there were no between-condition differences in these increases (Table 1).

Thus, the mindfulness and relaxation exercises both raised mindful awareness and attention to the present moment, but the relaxation exercise raised mindful awareness even more strongly than did the mindfulness exercise.

Effects of mindfulness meditation on empathy

We analyzed condition effects on mind reading accuracy, empathic responding, and prosocial behavior using separate ANOVAs. There was no overall effect of condition on mind reading accuracy, $F(2, 155) = 0.47$, $p = .626$, $\eta_p^2 = .01$, the number of empathic phrases, $F(2, 154) = 0.83$, $p = .438$, $\eta_p^2 = .01$, global empathy rating, $F(2, 154) = 0.64$, $p = .528$, $\eta_p^2 = .01$, or the proportion of throws to the excluded player, $F(2, 154) = 2.24$, $p = .110$, $\eta_p^2 = .03$. Thus, the mindfulness exercise did not increase empathy.

Moderation by autistic and narcissistic traits

We analyzed interactions between condition and autistic and narcissistic traits on empathy with separate ANCOVAs. We entered autistic traits or narcissistic traits (both centered) as continuous predictor, condition as between-subjects variable, and their interaction as predictor. There was no interaction between autistic traits and condition on mind reading accuracy, $F(2, 152) = 0.42$, $p = .660$, $\eta_p^2 = .01$, empathic phrases, $F(2, 151) = 1.44$, $p = .239$, $\eta_p^2 = .001$, global empathy score, $F(2, 151) = 1.86$, $p = .159$, $\eta_p^2 = .001$, or proportion of throws, $F(2, 151) = 0.18$, $p = .832$, $\eta_p^2 = .002$. However, there was a significant main effect of autistic traits on proportion of throws to the excluded player, $F(1, 151) = 8.06$, $p = .005$, $\eta_p^2 = .05$, indicating that participants with higher levels of autistic traits threw the ball more frequently to the excluded player than did participants with lower levels of autistic traits. There were three outliers ($z > 3.29$, $p < .001$), who threw the ball exclusively to the excluded player. However, even when these cases were excluded from the analysis, the main effect of autistic traits on proportion of throws to the excluded player remained significant, $F(1, 148) = 11.04$, $p = .001$.

There were no significant interactions between narcissistic traits and condition on empathic phrases, $F(2, 151) = 0.46$, $p = .630$, $\eta_p^2 = .02$, global empathy score, $F(2, 151) = 0.18$, $p = .835$, $\eta_p^2 = .02$, or proportion of throws, $F(2, 151) = 1.09$, $p = .339$, $\eta_p^2 = .01$. However, there was a significant interaction between narcissistic traits and condition on mind reading accuracy, $F(2, 152) = 8.17$, $p < .001$, $\eta_p^2 = .10$. The association between narcissistic traits and mind reading differed significantly between the mindfulness condition and the relaxation and control conditions, $t(103) = 3.36$, $p = .001$ and $t(105) = 3.56$, $p < .001$, respectively. Simple-slope analyses (Holmbeck, 2002) revealed that, compared with the pooled relaxation and control conditions, the mindfulness exercise *increased* mind reading accuracy in non-narcissistic participants ($M - 1$ SD), $\beta = .29$, $t = 2.80$, $p = .006$, but *decreased* mind reading accuracy in narcissistic participants ($M + 1$ SD), $\beta = -.31$, $t = -2.78$, $p = .006$ (Figure 1). Thus, contrary to what we predicted, the mindfulness exercise lowered rather than raised mind reading in narcissistic individuals.

Robustness check

We repeated all analyses with exclusion of the 14 participants who had previously followed a mindfulness or meditation training. Results were the same as in the total group, suggesting that prior mindfulness or meditation experience did not influence the effects of the exercises. Also, results were similar when we repeated the interaction analyses only including participants who scored very low ($< M - 1$ SD) and very high ($> M + 1$ SD) on autistic or narcissistic traits.

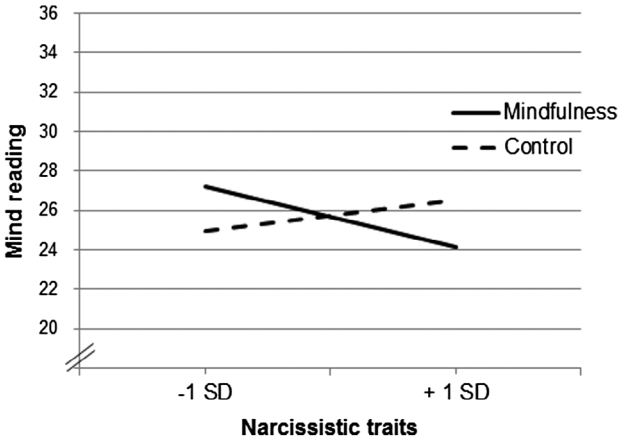

Figure 1. Interaction effect between narcissistic traits and condition on mind reading accuracy, for narcissistic (M + 1 SD) and non-narcissistic (M – 1 SD) individuals. Control = pooled relaxation and control condition.

Discussion

This randomized experiment investigated whether a brief mindfulness exercise fosters empathy. To examine whether the potential benefits of mindfulness are due to mechanisms that are unique to mindfulness (e.g., decentering) or shared with other interventions (e.g., stress reduction), we compared a mindfulness exercise to relaxation and regular control exercises. The mindfulness exercise did not affect mind reading, empathic responding, and prosocial behavior, and neither did the relaxation exercise. Contrary to what we expected, individuals with higher levels of autistic traits did not benefit more from the mindfulness exercise than did others. Surprisingly, in all conditions, individuals with higher levels of autistic traits showed increased prosocial behavior (i.e., in Cyberball, they threw the ball more frequently toward the excluded individual). Moreover, the mindfulness exercise increased mind reading in non-narcissistic individuals, but ironically *decreased* mind reading in their narcissistic counterparts. Thus, mindfulness backfired among those who seemed to need it the most.

Theoretical implications

Our study does not corroborate the theorized beneficial effect of mindfulness on empathy (e.g., Block-Lerner et al., 2007), and it contrasts with previous research showing that a short mindfulness exercise can enhance mind reading and empathic responding (Tan et al., 2014). What may explain our finding that mindfulness did not raise empathy overall? One possible explanation is that the mechanisms that we theorized to be unique to mindfulness are actually not unique to mindfulness after all. In our study, the relaxation exercise raised mindful awareness even more strongly than did the mindfulness exercise. This might explain why these exercises did not differ in their effects on empathy. Indeed, although scholars have suggested that decentering is unique to mindfulness-based interventions (e.g., Feldman, Greeson, & Senville, 2010), an intervention study has demonstrated that applied-relaxation training can similarly increase decentering, as well as raise acceptance and mindful awareness (Hayes-Skelton, Usmani, Lee, Roemer, & Orsillo, 2012). Moreover, in our study, the mindfulness

and relaxation exercise similarly raised relaxation, which suggests that increased relaxation might cause these exercises to have similar outcomes. Hence, our study supports the idea that mindfulness training and relaxation training have similar mechanisms of change.

Another explanation of why our brief mindfulness exercise did not raise empathy overall is that witnessing social exclusion in the Cyberball task may have increased empathy for all participants so strongly, that the mindfulness exercise could have had no additional effect. Being socially excluded in the Cyberball task is known to provoke strong negative feelings, even when participants know the players are computer-generated (Williams & Jarvis, 2006; Zadro, Williams, & Richardson, 2004). At the same time, a previous study did find mindfulness effects on empathic responses to witnessing someone being excluded in Cyberball (Tan et al., 2014).

A third explanation is that a mindfulness exercise with focus on the breath does not fully capture the mindfulness construct. This exercise does not include explicit instructions to increase acceptance of one's mental states, nor explicit guidance to engage in compassion toward others. There has been considerable debate about whether mindfulness can cultivate compassion, including empathy, when applied in the secular mainstream context without teaching the specific cultural and philosophical perspectives and purposes of the ancient Buddhist framework (Williams & Kabat-Zinn, 2011). Some argue that mindfulness is able to raise compassion even without teaching it directly; according to them, compassion can be cultivated through the practice of mindfulness meditation itself (e.g. Feldman & Kuyken, 2011; Salzberg, 2011). However, others argue that mindfulness raises compassion only when it explicitly teaches people to be compassionate (e.g., being loving and kind to themselves and others; Greenberg & Mitra, 2015; Monteiro, Musten, & Compson, 2015). Our findings suggest that a mindfulness meditation of the breath in itself is insufficient to raise empathy. Although practicing mindful awareness may be required as a basic step, a second step in which compassion is explicitly practiced might be required for cultivating empathy effectively (Hutcherson, Seppala, & Gross, 2008; Kristeller & Johnson, 2005). Further research should examine this possibility directly.

Future research

Our study generates novel questions for future research. One question is whether mindfulness might raise empathy under certain conditions. The practice of mindfulness teaches people to be aware of automatic reaction tendencies in stressful situations, teaching them how to respond deliberately rather than impulsively (Bögels & Restifo, 2014; Segal et al., 2013). Mindfulness meditation may thus counteract the harmful effect of stress on empathy. Indeed, when people are stressed, blocking their stress response restores their empathy (Martin et al., 2015). Since participants in our study were not in a stressful situation (e.g., they were not socially excluded themselves), this might explain why the mindfulness exercise did not improve empathy overall. Future experiments should investigate this by assessing the benefits of mindfulness in stressful vs. non-stressful settings.

Another question is whether mindfulness is only effective for certain subgroups (e.g., Winning & Boag, 2015). In our study, the mindfulness exercise – but not the relaxation exercise – increased mind reading in non-narcissistic individuals, but ironically *decreased* mind-reading in narcissistic individuals. What may explain this surprising finding? The mindfulness exercise encouraged individuals to be nonjudgmental toward their mind wandering

(i.e., "You don't need to criticize yourself for [a wandering mind]"). This nonjudgmental stance may have encouraged non-narcissistic individuals to let go of their self-critical thoughts about a wandering mind, enabling them to pay more attention to the mental states of others. By contrast, it may have ironically "licensed" narcissistic individuals to focus more exclusively on their self-aggrandizing thoughts, at the expense of focusing on the mental states of others. In our study, the mindfulness exercise did not teach participants to be compassionate toward others, which includes the act of taking another person's perspective. Emerging research shows that even a simple instruction to take another person's perspective can make narcissistic individuals more empathic (Hepper, Hart, & Sedikides, 2014). Future research should replicate our findings, and explore whether a mindfulness exercise that teaches compassion does make narcissistic individuals more empathic.

Contrary to our expectations, the brief mindfulness exercise did not raise empathy in individuals with higher levels of autistic traits. We theorized that mindfulness might help individuals with autistic traits become more empathic by preventing them from feeling overwhelmed in distressing social situations (Samuel, 2009). Perhaps the current experimental setting – a low-stimulus environment – was not overwhelming enough to test this hypothesis. Surprisingly, our results show that, in all conditions, individuals with higher levels of autistic traits behaved more prosocially than individuals with lower levels of autistic traits. Although this contrasts with extant literature (e.g., Baron-Cohen, 2001), there is an explanation for it. Individuals with autistic traits have a strong desire for consistency, sameness, and repetition (Gal, 2011), so they might throw the ball to the excluded player more frequently to ensure that ball throws are systematically (or fairly) divided over all players. This also raises the possibility that simple fairness considerations, rather than empathy toward the excluded victim, might have motivated all participants to throw the ball more frequently to the excluded player. However, participants' emails reflected empathy for the player's hurt feelings (e.g., "you must be feeling bad right now" and "I felt sorry for you"), so fairness concerns do not seem to be the main underlying process. Another explanation is that individuals with autistic traits may be more empathic toward socially excluded individuals because they have often experienced social exclusion themselves (Little, 2002; Rowley et al., 2012). Future research should investigate why people with autistic traits sometimes show increased prosocial behavior.

Strengths and limitations

This study has several methodological strengths. We conducted a well-powered experimental test of a mindfulness exercise in which experimenters were blind to condition assignment and participants were uninformed about the aim of the study. We used stringent control conditions, which were similar to the mindfulness condition in their surface features (e.g., length and instructor), and we included an active treatment-based control condition that could have beneficial effects as well. Such a stringent approach has rarely been employed by previous research on mindfulness and empathy, and is crucial for investigating mindfulness-based interventions (Davidson & Kaszniak, 2015). Additionally, we used several objective behavioral, non-self-report measures of both cognitive and affective aspects of empathy, and we examined the effects of a mindfulness exercise for subgroups who are at-risk for impaired empathy.

This study also has limitations. First, the mindfulness exercise lasted five minutes. Previous research found that such a brief intervention period can be effective (e.g., Hutcherson et al., 2008; Lee & Orsillo, 2014; Tan et al., 2014; Winning & Boag, 2015). Yet, this duration stands in contrast to regular mindfulness-based trainings, where recipients practice mindfulness daily for several weeks (e.g., Kabat-Zinn, 1982; Segal et al., 2013). Perhaps such extended training is needed to help individuals decenter from their thoughts and feelings effectively, and better understand emotional processes in general. Future research should examine whether increasing the intervention duration would make mindfulness meditation more effective. Second, we investigated empathy in a highly controlled laboratory setting. Future research should examine whether our findings generalize to more naturalistic settings (e.g., prosocial behavior in real-life settings; e.g., Lim et al., 2015).

Conclusion

Cultivating empathy is one of the main goals of mindfulness, but the present study found that a brief mindfulness exercise did not raise empathy overall. In fact, the mindfulness exercise even decreased empathy among narcissistic individuals. The present study therefore questions whether a brief mindfulness exercise is sufficient for building empathy, and indicates that such an exercise could even be detrimental for some.

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References

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Ames, D. R., Rose, P., & Anderson, C. P. (2006). The NPI-16 as a short measure of narcissism. *Journal of Research in Personality, 40*, 440–450. doi:10.1016/j.jrp.2005.03.002

Andersen, D. T. (2005). Empathy, psychotherapy integration, and meditation: A buddhist contribution to the common factors movement. *Journal of Humanistic Psychology, 45*, 483–502. doi:10.1177/0022167805280264

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143. doi:10.1093/clipsy.bpg015

Baron-Cohen, S. (2001). Theory of mind and autism: A review. *International Review of Research in Mental Retardation: Autism, 23*, 169–184. doi:10.1016/S0074-7750(00)80010-5

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" test revised version: A study with normal adults, and adults with Asperger syndrome or high-

functioning autism. *Journal of Child Psychology and Psychiatry, 42*, 241–251. doi:10.1111/1469-7610.00715
Batson, C. D., Ahmad, N., & Lisner, D. A. (2009). Empathy and Altruism. In C.R. Snyder & S.J. Lopez (Eds.), *Oxford Handbook of Positive Psychology* (pp. 417–426). Oxford: Oxford University Press.
Batson, C. D., Batson, J. G., Slingsby, J. K., Harrell, K. L., Peekna, H. M., & Todd, R. M. (1991). Empathic joy and the empathy-altruism hypothesis. *Journal of Personality and Social Psychology, 61*, 413. doi:10.1037/0022-3514.61.3.413
Beddoe, A. E., & Murphy, S. O. (2004). Does mindfulness decrease stress and foster empathy among nursing students? *Journal of Nursing Education, 43*, 305–312. doi:10.3928/01484834-20040701-07
Beitel, M., Ferrer, E., & Cecero, J. J. (2005). Psychological mindedness and awareness of self and others. *Journal of Clinical Psychology, 61*, 739–750. doi:10.1002/jclp.20095
Birnie, K., Speca, M., & Carlson, L. E. (2010). Exploring self-compassion and empathy in the context of mindfulness-based stress reduction (MBSR). *Stress and Health, 26*, 359–371. doi:10.1002/smi.1305
Block-Lerner, J., Adair, C., Plumb, J. C., Rhatigan, D. L., & Orsillo, S. M. (2007). The case for mindfulness-based approaches in the cultivation of empathy: Does nonjudgmental, present-moment awareness increase capacity for perspective-taking and empathic concern? *Journal of Marital and Family Therapy, 33*, 501–516. doi:10.1111/j.1752-0606.2007.00034
Bögels, S., & Restifo, K. (2014). *Mindful parenting: A guide for mental health practitioners*. New York, NY: Springer Science & Business Media.
Bohlmeijer, E., Prenger, R., Taal, E., & Cuijpers, P. (2010). The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: A meta-analysis. *Journal of Psychosomatic Research, 68*, 539–544. doi:10.1016/j.jpsychores.2009.10.005
Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848. doi:10.1037/0022-3514.84.4.822
Brummelman, E., Thomaes, S., & Sedikides, C. (2016). Separating narcissism from self-esteem. *Current Directions in Psychological Science, 25*, 8–13. doi:10.1177/0963721415619737
Burks, D. J., Youll, L. K., & Durtschi, J. P. (2012). The empathy-altruism association and its relevance to health care professions. *Social Behavior and Personality, 40*, 395–400. doi:10.2224/sbp.2012.40.3.395
Cameron, C. D., & Fredrickson, B. L. (2015). Mindfulness facets predict helping behavior and distinct helping-related emotions. *Mindfulness, 6*, 1211–1218. doi:10.1007/s12671-014-0383-2
Campbell, W. K., Rudich, E. A., & Sedikides, C. (2002). Narcissism, self-esteem, and the positivity of self-views: Two portraits of self-love. *Personality and Social Psychology Bulletin, 28*, 358–368. doi:10.1177/0146167202286007
Carlbring, P., Björnstjerna, E., Bergström, A. F., Waara, J., & Andersson, G. (2007). Applied relaxation: an experimental analogue study of therapist vs. computer administration. *Computers in Human Behavior, 23*, 2–10. doi:10.1016/j.chb.2004.03.032
Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine, 15*, 593–600. doi:10.1089/acm.2008.0495
Chiesa, A., & Serretti, A. (2010). A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine, 40*, 1239–1252. doi:10.1017/S0033291709991747
Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment, 6*, 284–290. doi:1040-3590/94/$3.00
Coke, J. S., Batson, C. D., & McDavis, K. (1978). Empathic mediation of helping: A two-stage model. *Journal of Personality and Social Psychology, 36*, 752–766. doi:10.1037/0022-3514.36.7.752
Constantino, J. N., & Todd, R. D. (2003). Autistic traits in the general population: A twin study. *Archives of General Psychiatry, 60*, 524–530. doi:10.1001/archpsyc.60.5.524
Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *American Psychologist, 70*, 581–592. doi:10.1037/a0039512
Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44*, 113–126. doi:10.1037/0022-3514.44.1.113
De Bruin, E. I., Blom, R., Smit, F. M., van Steensel, F. J., & Bögels, S. M. (2015). MYmind: Mindfulness training for Youngsters with autism spectrum disorders and their parents. *Autism, 19*, 906–914. doi:10.1177/1362361314553279

De Waal, F. B. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Review of Psychology, 59*, 279–300. doi:10.1146/annurev.psych.59.103006.093625

Dekeyser, M., Raes, F., Leijssen, M., Leysen, S., & Dewulf, D. (2008). Mindfulness skills and interpersonal behaviour. *Personality and Individual Differences, 44*, 1235–1245. doi:10.1016/j.paid.2007.11.018

Duan, C., & Hill, C. E. (1996). The current state of empathy research. *Journal of Counseling Psychology, 43*, 261–274. doi:10.1037/0022-0167.43.3.261

Dziobek, I., Rogers, K., Fleck, S., Bahnemann, M., Heekeren, H. R., Wolf, O. T., & Convit, A. (2008). Dissociation of cognitive and emotional empathy in adults with asperger syndrome using the multifaceted empathy test (MET). *Journal of Autism and Developmental Disorders, 38*, 464–473. doi:10.1007/s10803-007-0486-x

Ehrenberg, M. F., Hunter, M. A., & Elterman, M. F. (1996). Shared parenting agreements after marital separation: The roles of empathy and narcissism. *Journal of Consulting and Clinical Psychology, 64*, 808–818. doi:10.1037/0022-006X.64.4.808

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin, 101*, 91–119. doi:10.1037/0033-2909.101.1.91

Fan, Y., Duncan, N. W., de Greck, M., & Northoff, G. (2011). Is there a core neural network in empathy? An fMRI based quantitative meta-analysis. *Neuroscience & Biobehavioral Reviews, 35*, 903–911. doi:10.1016/j.neubiorev.2010.10.009

Feldman, G., Greeson, J., & Senville, J. (2010). Differential effects of mindful breathing, progressive muscle relaxation, and loving-kindness meditation on decentering and negative reactions to repetitive thoughts. *Behaviour Research and Therapy, 48*, 1002–1011. doi:10.1016/j.brat.2010.06.006

Feldman, C., & Kuyken, W. (2011). Compassion in the landscape of suffering. *Contemporary Buddhism, 12*, 143–155. doi:10.1080/14639947.2011.564831

FeldmanHall, O., Dalgleish, T., Evans, D., & Mobbs, D. (2015). Empathic concern drives costly altruism. *NeuroImage, 105*, 347–356. doi:10.1016/j.neuroimage.2014.10.043

Gal, E. (2011). Nosology and theories of repetitive and restricted behaviours and interests. In J. L. Matson & P. Sturmey (Eds.), *International handbook of autism and pervasive developmental disorders* (pp. 115–125). New York, NY: Springer.

Galantino, M. L., Baime, M., Maguire, M., Szapary, P. O., & Farrar, J. T. (2005). Association of psychological and physiological measures of stress in health-care professionals during an 8-week mindfulness meditation program: Mindfulness in practice. *Stress and Health, 21*, 255–261. doi:10.1002/smi.1062

Greason, P. B., & Cashwell, C. S. (2009). Mindfulness and counseling self-efficacy: The mediating role of attention and empathy. *Counselor Education and Supervision, 49*, 2–19. doi:10.1002/j.1556-6978.2009.tb00083.x

Greenberg, M. T., & Mitra, J. L. (2015). From mindfulness to right mindfulness: The intersection of awareness and ethics. *Mindfulness, 6*, 74–78. doi:10.1007/s12671-014-0384-1

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43. doi:10.1016/S0022-3999(03)00573-7

Gurtman, M. B. (1992). Construct validity of interpersonal personality measures: The interpersonal circumplex as a nomological net. *Journal of Personality and Social Psychology, 63*, 105–118. doi:10.1037/0022-3514.63.1.105

Hayes-Skelton, S. A., Usmani, A., Lee, J. K., Roemer, L., & Orsillo, S. M. (2012). A fresh look at potential mechanisms of change in applied relaxation for generalized anxiety disorder: A case series. *Cognitive and Behavioral Practice, 19*, 451–462. doi:10.1016/j.cbpra.2011.12.005

Hepper, E. G., Hart, C. M., Meek, R., Cisek, S. Z., & Sedikides, C. (2014). Narcissism and empathy in young offenders and non-offenders. *European Journal of Personality, 28*, 201–210. doi:201-210.10.1002/per.1939

Hepper, E. G., Hart, C. M., & Sedikides, C. (2014). Moving narcissus: Can narcissists be empathic? *Personality and Social Psychology Bulletin, 40*, 1079–1091. doi:10.1177/0146167214535812

Hoekstra, R. A., Vinkhuyzen, A. A., Wheelwright, S., Bartels, M., Boomsma, D. I., Baron-Cohen, S., … van der Sluis, S. (2011). The construction and validation of an abridged version of the autism-spectrum quotient (AQ-Short). *Journal of Autism and Developmental Disorders, 41*, 589–596. doi:10.1007/s10803-010-1073-0

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183. doi:10.1037/a0018555

Holmbeck, G. N. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology, 27*, 87–96. doi:10.1093/jpepsy/27.1.87

Hutcherson, C. A., Seppala, E. M., & Gross, J. J. (2008). Loving-kindness meditation increases social connectedness. *Emotion, 8*, 720–724. doi:10.1037/a0013237

Hwang, Y. S., Kearney, P., Klieve, H., Lang, W., & Roberts, J. (2015). Cultivating mind: Mindfulness interventions for children with autism spectrum disorder and problem behaviours, and their mothers. *Journal of Child and Family Studies, 24*, 3093–3106. doi:10.1007/s10826-015-0114-x

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47. doi:10.1016/0163-8343(82)90026-3

Kabat-Zinn, J. (1994). *Where ever you go, there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion.

Kabat-Zinn, J. (2011). Some reflections on the origins of MBSR, skillful means, and the trouble with maps. *Contemporary Buddhism, 12*, 281–306. doi:10.1080/14639947.2011.564844

Kiep, M., Spek, A. A., & Hoeben, L. (2015). Mindfulness-based therapy in adults with an autism spectrum disorder: Do treatment effects last? *Mindfulness, 6*, 637–644. doi:10.1007/s12671-014-0299-x

Kristeller, J. L., & Johnson, T. (2005). Cultivating loving kindness: A two-stage model of the effects of meditation on empathy, compassion, and altruism. *Zygon, 40*, 391–408. doi:10.1111/j.1467-9744.2005.00671.x

Lee, J. K., & Orsillo, S. M. (2014). Investigating cognitive flexibility as a potential mechanism of mindfulness in Generalized Anxiety Disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 45*, 208–216. doi:10.1016/j.jbtep.2013.10.008

Lim, D., Condon, P., & DeSteno, D. (2015). Mindfulness and compassion: An examination of mechanism and scalability. *PLoS One, 10*, 1–8. doi:10.1371/journal.pone.0118221

Little, L. (2002). Middle-class mothers' perceptions of peer and sibling victimization among children with asperger's syndrome and nonverbal learning disorders. *Issues in Comprehensive Pediatric Nursing, 25*, 43–57. doi:10.1080/014608602753504847

Markram, K., & Markram, H. (2010). The intense world theory – A unifying theory of the neurobiology of autism. *Frontiers in human neuroscience, 4*, 1–29. doi:10.3389/fnhum.2010.00224

Markram, H., Rinaldi, T., & Markram, K. (2007). The intense world syndrome – An alternative hypothesis for autism. *Frontiers in Neuroscience, 1*, 77–96. doi:10.3389/neuro.01.1.1.006.2007

Martin, L. J., Hathaway, G., Isbester, K., Mirali, S., Acland, E. L., Niederstrasser, N., … Mogil, J. S. (2015). Reducing social stress elicits emotional contagion of pain in mouse and human strangers. *Current Biology, 25*, 326–332. doi:10.1016/j.cub.2014.11.028

Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). An fMRI investigation of empathy for 'social pain' and subsequent prosocial behavior. *NeuroImage, 55*, 381–388. doi:10.1016/j.neuroimage.2010.11.060

Monteiro, L. M., Musten, R. F., & Compson, J. (2015). Traditional and contemporary mindfulness: Finding the middle path in the tangle of concerns. *Mindfulness, 6*, 1–13. doi:10.1007/s12671-014-0384-1

Öst, L. G. (1987). Applied relaxation: Description of a coping technique and review of controlled studies. *Behaviour Research and Therapy, 25*, 397–409. doi:10.1016/0005-7967(87)90017-9

Passalacqua, S. A., & Segrin, C. (2012). The effect of resident physician stress, burnout, and empathy on patient-centered communication during the long-call shift. *Health Communication, 27*, 449–456. doi:10.1080/10410236.2011.606527

Pavey, L., Greitemeyer, T., & Sparks, P. (2012). "I help because I want to, not because you tell me to": Empathy increases autonomously motivated helping. *Personality and Social Psychology Bulletin, 38*, 681–689. doi:10.1177/0146167211435940

Prot, S., Gentile, D. A., Anderson, C. A., Suzuki, K., Swing, E., Lim, K. M., … Liau, A. K. (2014). Long-term relations among prosocial-media use, empathy, and prosocial behavior. *Psychological Science, 25*, 358–368. doi:10.1177/0956797613503854

Pulos, S., Elison, J., & Lennon, R. (2004). The hierarchical structure of the interpersonal reactivity index. *Social Behavior and Personality: an international journal, 32*, 355–359. doi:10.2224/sbp.2004.32.4.355

Rogers, K., Dziobek, I., Hassenstab, J., Wolf, O. T., & Convit, A. (2007). Who cares? Revisiting empathy in asperger syndrome. *Journal of Autism and Developmental Disorders, 37*, 709–715. doi:10.1007/s10803-006-0197-8

Rowley, E., Chandler, S., Baird, G., Simonoff, E., Pickles, A., Loucas, T., & Charman, T. (2012). The experience of friendship, victimization and bullying in children with an autism spectrum disorder: Associations with child characteristics and school placement. *Research in Autism Spectrum Disorders, 6*, 1126–1134. doi:10.1016/j.rasd.2012.03.004

Salzberg, S. (2011). Mindfulness and loving-kindness. *Contemporary Buddhism, 12*, 177–182. doi:10.1080/14639947.2011.564837

Samuel, G. (2009). Autism and meditation: Some reflections. *Journal of Religion, Disability & Health, 13*, 85–93. doi:10.1080/15228960802581487

Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology, 1*, 607–628. doi:10.1146/annurev.clinpsy.1.102803.144141

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression*. New York, NY: Guilford Press.

Sequeira, S., & Ahmed, M. (2012). Meditation as a potential therapy for autism: A review. *Autism Research and Treatment, 2012*, 1–11. doi:10.1155/2012/835847

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386. doi:10.1002/jclp.20237

Shapiro, S. L., Schwartz, G. E., & Bonner, G. (1998). Effects of mindfulness-based stress reduction on medical and premedical students. *Journal of Behavioral Medicine, 21*, 581–599. doi:10.1023/A:1018700829825

Singh, N. N., Lancioni, G. E., Manikam, R., Winton, A. S., Singh, A. N., Singh, J., & Singh, A. D. (2011). A mindfulness-based strategy for self-management of aggressive behavior in adolescents with autism. *Research in Autism Spectrum Disorders, 5*, 1153–1158. doi:10.1016/j.rasd.2010.12.012

Singh, N. N., Lancioni, G. E., Singh, A. D., Winton, A. S., Singh, A. N., & Singh, J. (2011). Adolescents with Asperger syndrome can use a mindfulness-based strategy to control their aggressive behavior. *Research in Autism Spectrum Disorders, 5*, 1103–1109. doi:10.1016/j.rasd.2010.12.006

Smith, A. (2009). The empathy imbalance hypothesis of autism: A theoretical approach to cognitive and emotional empathy in autistic development. *The Psychological Record, 59*, 489–510.

Spek, A. A., van Ham, N. C., & Nyklíček, I. (2013). Mindfulness-based therapy in adults with an autism spectrum disorder: A randomized controlled trial. *Research in Developmental Disabilities, 34*, 246–253. doi:10.1016/j.ridd.2012.08.009

Starcke, K., & Brand, M. (2012). Decision making under stress: A selective review. *Neuroscience & Biobehavioral Reviews, 36*, 1228–1248. doi:10.1016/j.neubiorev.2012.02.003

Tan, L. B., Lo, B. C., & Macrae, C. N. (2014). Brief mindfulness meditation improves mental state attribution and empathizing. *PLoS One, 9*, 1–5. doi:10.1371/journal.pone.0110510.

Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: Empirical evidence. *Journal of Consulting and Clinical Psychology, 70*, 275–287. doi:10.1037/0022-006X.70.2.275

Thomaes, S., & Brummelman, E. (2016). Narcissism. In D. Cicchetti (Ed.), *Developmental psychopathology* (3rd ed., Vol. 4, pp. 679–725). Hoboken, NJ: Wiley.

Thomas, M. R., Dyrbye, L. N., Huntington, J. L., Lawson, K. L., Novotny, P. J., Sloan, J. A., & Shanafelt, T. D. (2007). How do distress and well-being relate to medical student empathy? A multicenter study. *Journal of General Internal Medicine, 22*, 177–183. doi:10.1007/s11606-006-0039-6

Uljarevic, M., & Hamilton, A. (2013). Recognition of emotions in autism: A formal meta-analysis. *Journal of Autism and Developmental Disorders, 43*, 1517–1526. doi:10.1007/s10803-012-1695-5

Vonk, J., Zeigler-Hill, V., Mayhew, P., & Mercer, S. (2013). Mirror, mirror on the wall, which form of narcissist knows self and others best of all? *Personality and Individual Differences, 54*, 396–401. doi:10.1016/j.paid.2012.10.010

Wai, M., & Tiliopoulos, N. (2012). The affective and cognitive empathic nature of the dark triad of personality. *Personality and Individual Differences, 52*, 794–799. doi:10.1016/j.paid.2012.01.008

Watson, P. J., Grisham, S. O., Trotter, M. V., & Biderman, M. D. (1984). Narcissism and empathy: Validity evidence for the narcissistic personality inventory. *Journal of Personality Assessment, 48*, 301–305. doi:10.1207/s15327752jpa4803_12

Watson, P. J., & Morris, R. J. (1991). Narcissism, empathy and social desirability. *Personality and Individual Differences, 12*, 575–579. doi:10.1016/0191-8869(91)90253-8

Williams, K. D., & Jarvis, B. (2006). Cyberball: A program for use in research on interpersonal ostracism and acceptance. *Behavior Research Methods, 38*, 174–180. doi:10.3758/BF03192765

Williams, J. M. G., & Kabat-Zinn, J. (2011). Mindfulness: Diverse perspectives on its meaning, origins, and multiple applications at the intersection of science and dharma. *Contemporary Buddhism, 12*, 1–18. doi:10.1080/14639947.2011.564811

Williams, J. M. G. & Penman, D. (2011). *Mindfulness: A practical guide to finding peace in a frantic world*. London: Hachette Digital.

Winning, A. P., & Boag, S. (2015). Does brief mindfulness training increase empathy? The role of personality. *Personality and Individual Differences, 86*, 492–498. doi:10.1016/j.paid.2015.07.011

Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology, 40*, 560–567. doi:10.1016/j.jesp.2003.11.006

Zoogman, S., Goldberg, S. B., Hoyt, W. T., & Miller, L. (2014). Mindfulness interventions with youth: A meta-analysis. *Mindfulness, 6*, 290–302. doi:10.1007/s12671-013-0260-4