



Mind full of ideas: A meta-analysis of the mindfulness–creativity link

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ABSTRACT

Mindfulness improves people's functioning in many areas, but its relationship with creativity is equivocal. To assess the link between mindfulness and creativity, we present a multilevel meta-analysis of 89 correlations obtained from 20 samples in studies published between 1977 and 2015 and demonstrate a statistically significant, but relatively weak correlation ($r = .22$) between these two constructs. This effect was moderated by the type of mindfulness, being significantly lower in case of the awareness aspect of mindfulness, than in the case of the open-monitoring aspect. We discuss the theoretical and practical implications of these findings.

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Mindfulness is a state of nonjudgmental, sustained, and alert awareness resulting from living in the moment (Brown & Ryan, 2003), which improves people's cognitive, emotional, and interpersonal functioning (Carson & Langer, 2006; Sedlmeier et al., 2012) and positively affects the efficacy of stress regulation. In previous studies authors have found that mindfulness also improves the ability to concentrate (Sedlmeier et al., 2012), decreases the fear of being judged, as well as reduces aversive self-conscious experience (Brown, Ryan, & Creswell, 2007), and helps to deal with thoughts and feelings (Shapiro, Carlson, Astin, & Freedman, 2006). The enhancement of mindfulness through practicing meditation (Lutz, Dunne, & Davidson, 2007) as well as high level of self-reported mindfulness have previously been linked to processes important to creativity (Ball, 1980; Colzato, Ozturk, & Hommel, 2012). Creativity, understood as the ability to produce ideas that are both novel and appropriate (Amabile, 1996; Sternberg & Lubart, 1996), is typically measured by the divergent thinking tests, during which participants are asked to name as many uses for a common object (e.g., brick) as possible within a limited amount of time (Guilford, 1967). Responses are scored in terms of fluency (number of ideas), flexibility (number of categories), originality (statistical novelty of responses), and elaboration (level of details). Other measures of creativity include self-report scales concerning creative behavior, personality, and activities (Baas, De Dreu, & Nijstad, 2008; Simonton, 2012), or creative achievement (Carson, Peterson, & Higgins, 2005). Less commonly, creativity researchers use tasks with a single correct answer, such as insight problems — for example, remote association tests (RAT; Mednick & Mednick, 1967).

A number of abilities which are associated with trait mindfulness, or facilitated by mindfulness training are also linked with creativity (De Dreu, Nijstad, Baas, Wolsink, & Roskes, 2012). For instance, mindfulness is associated with the increased ability to switch perspectives (Carson & Langer, 2006; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007), while mindfulness training leads to the improvement of working memory (Chiesa, Calati, & Serretti, 2011), as well as increases the ability to respond in a non-habitual fashion (Moore & Malinowski, 2009). Practicing mindfulness also reduces the fear of judgment (Carson & Langer, 2006), which is conducive to creativity (Baas et al., 2008; Nijstad, De Dreu, Rietzschel, & Baas, 2010). Consequently, mindfulness may be both directly and indirectly related to creative thinking (Davis, 2009; De Dreu, Baas, & Nijstad, 2008), and to creative achievement (Langer, 2014).

A wide body of research has indeed shown that meditation training enhances creative thinking and creative performance as well as improves the ability to solve insight problems (Colzato et al., 2012; Ding, Tang, Deng, Tang, & Posner, 2015; Ding, Tang, Tang, & Posner, 2014; Ostafin & Kassman, 2012; Ren et al., 2011) and facilitates creative elaboration (Zabelina, Robinson, Ostafin, & Council, 2011). Experienced meditators also outperform others in verbal fluency and are better at finding novel solutions to a given problem (Grenberg, Reiner, & Meiran, 2012). Importantly, meditation has a positive effect on creativity regardless of the length of practice (Jedrczak, Beresford, & Clements, 1985), which means that even short meditation can effectively stimulate creative abilities (Ding et al., 2014).

However, although the findings of several studies support the positive link between mindfulness and creativity, some inconsistencies exist. For example, while meditation was clearly demonstrated to improve verbal fluency, flexibility, and originality (Justo, 2009), longitudinal examination of groups practicing transcendental meditation for

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five months did not show any significant gains in verbal creativity, but did reveal a significant improvement in figural flexibility and originality (Travis, 1979). Such inconsistencies may be attributed to a number of moderators, among them the type of meditation (Colzato, Szapora, Lippelt, & Hommel, 2014), and the multidimensional character of mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baas, Nevicka, & Ten Velden, 2014). Mindfulness is a complex phenomenon, composed of a set of different skills: the ability to pay attention to various stimuli (observation), the ability to focus with full awareness (acting with awareness), the ability to give a nonevaluative verbal description of the observed phenomena (description), and the ability to avoid immediate evaluation (Baer et al., 2006). These skills may be differentially related to creativity – for example, while open-monitoring meditation (so-called targeting observation) may tend to increase creative thinking, focused-attention meditation (aimed at acting with awareness) may be either unrelated to creativity (Colzato et al., 2012), or may even impede performance on creativity tasks (Baas et al., 2014; Zedelius & Schooler, 2015). Additionally, phenomena contrary to mindfulness, such as disinhibition and mind-wandering, predict creative thinking and creative achievement (Baird et al., 2012; Carson, Peterson, & Higgins, 2003; Eysenck, 1995; Schooler, Reichle, & Halpern, 2004; Zabelina, O'Leary, Pornpattananangkul, Nusslock, & Beeman, 2015; Zedelius & Schooler, 2015). Thus it is possible that the facets of mindfulness may moderate the mindfulness–creativity association.¹

Despite inconsistencies, both the general pattern of empirical results as well as theoretical arguments (Langer, 2014) provide a rationale to hypothesize a positive association between mindfulness and creativity. Although empirical studies do not always confirm this link (e.g., Domino, 1977; O'Haire & Marcia, 1980), the higher statistical power of meta-analysis enables a more robust estimation of this relationship. It also allows us to explore the role of potential moderators.

The scarcity of published studies makes it impossible to investigate all of the theoretically relevant moderators. However, it is possible to examine the role of study design (correlational versus experimental studies showing the influence of meditation on creativity), the creativity aspects measured (insight problem solving versus divergent thinking), as well as the aspects of mindfulness measured. Both existing theories (Fink, Slamar-Halbedl, Unterrainer, & Weiss, 2012) and previous research (Zedelius & Schooler, 2015) lead to the expectation that the attention aspect of the mindfulness – measured, for example, by the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) – will be significantly less strongly (or even negatively – see Baas et al., 2014) related to creativity than other aspects of mindfulness.

1. Method

1.1. The selection of studies

We performed a literature search in the Google Scholar, PsycInfo, Ebsco, and Scopus databases as well as at ResearchGate.net and Academia.edu. The first stage involved a search for articles by means of the following keywords: creativity and mindfulness, creativity and meditation, creative problem solving and mindfulness, and creative problem solving and meditation. In the second stage, we scanned the databases for all the authors of the publications found. In the last stage, the query involved an analysis of the references from each of the papers. The first author found and analyzed 33 articles. The third author conducted an independent review of all the identified articles. This meta-analysis includes papers published in peer-reviewed journals and based on quantitative research; we excluded theoretical or review papers (e.g., Horan, 2009; Mooneyham & Schooler, 2013), and those in which only one of the main variables (creativity or mindfulness)

was directly measured (e.g., Langer, Russell, & Eisenkraft, 2009). We also excluded publications that concerned constructs closely related to, but not identical with creativity, such as openness to experience or cognitive flexibility (e.g., Moore & Malinowski, 2009).

We included articles devoted to both trait and state mindfulness (Bishop et al., 2004). In the case of experimental studies, we did not exclude any of the types of meditation (e.g., focused attention or open-monitoring). One study that lacked a control group or baseline level of creativity was excluded from the analysis (Colzato et al., 2014). This procedure resulted in 20 independent samples and 89 correlations obtained in a total sample of 1549 participants.

1.2. Data analysis

We applied three-level meta-analysis (Cheung, 2014a; Cheung, 2014b) in the metaSEM package (Cheung, 2014a) for the R environment (R Development Core Team, 2013). Level 1 describes the participants in studies, Level 2 describes effects within studies, and Level 3 describes the studies themselves. Three-level meta-analysis allows us to give unbiased estimates of standard errors, Level 2 (within-study) variance, and Level 3 (between-study) variance. Three-level meta-analysis has an advantage over traditional random-effect meta-analysis (which should be considered a two-level model) because averaging the effects, which is necessary in random-effects models, reduces the statistical power of the analysis.

We converted all the obtained effects (i.e., mean differences between experimental and control groups in experimental designs) to Pearson's r , applying widely used formulas (Lipsey & Wilson, 2001). All correlations were corrected for unreliability: they were divided by the square root of the reliabilities of the variables (Hunter & Schmidt, 1990). When reliability estimates were not provided, we used average reliabilities. For comparison purposes, Table 1 contains both reliability-corrected and uncorrected correlations. All studies and correlations are included in the online supplementary material.

2. Results

We processed data in three-steps. First, we estimated overall effect sizes for the relationship between mindfulness and creativity. Second, we fitted three three-level models to assess the role of potential moderators. Finally, we performed an analysis of publication bias to examine whether selective reporting may have influenced the results.

2.1. The overall relationship

The effect sizes obtained using three-level meta-analysis are presented in Table 1.

The correlation between mindfulness and creativity was estimated at $r = .22$ ($r = .18$ without correction for attenuation). This correlation is significant but heterogeneous. We found more between-study than within-study variability, which means moderators are more likely to exist between than within studies. Despite this heterogeneity, our main hypothesis finds support – creativity does correlate with mindfulness significantly, with a “small-to-medium” effect size (Cohen, 1992; Lipsey & Wilson, 2001).

2.2. Moderator analysis

In the first model testing the role of moderators, we included: (1) study design, coded: 0 = *correlational*, 1 = *experimental*; (2) creativity measurement, coded: 0 = *self-reported*, 1 = *test*; (3) the aspect of creativity, coded: 0 = *achievement*, 1 = *potential*, and (4) gender (the percentage of females). This model was not characterized by a significantly improved fit compared to the baseline model, $-2LL(df = 6) = 5.93$, $\Delta-2LL(\Delta df = 3) = 6.57$, $p = .09$, and none of the moderators were significant, $p > .05$. Consequently, the effect was stable across

¹ We are grateful to the anonymous reviewer for bringing this to our attention.

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