Mindfulness and creativity: Implications for thinking and learning

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ABSTRACT

Mindfulness and creativity have both come to the forefront of educational interest—but a better understanding of their relationship and the implications for education is needed. This article reviews the literature on the intersection of these topics in order to understand where and how these two related but distinctive areas of research connect, and how this pertains to the complexity of education settings. Our goal is to understand findings from the literature and consider the implications for educational practice and research, with an eye to how mindfulness can be supportive to learners' creativity. This thematic review and qualitative analysis of extant literature identifies four themes that speak to the connection between mindfulness and creativity. There is solid evidence to show a generally beneficial and supportive relationship, in that practicing mindfulness can support creativity—but many factors affect this and there are a range of considerations for practice. This article reflects on the key findings of scholarly work on the mindfulness-creativity relationship with interpretative discussion and implications for educational research and practice.

1. Introduction

Existing research on creativity has examined its different relationships, connections, or variables—such as personality skills, neuroscientific or cognitive correlates of creativity, disciplinary knowledge, imagination, bodily thinking, or the ways that creativity emerges in real-world design settings, among others (Runco, 2014). One relatively recent and growing area of literature involves the relationship between mindfulness and creativity (Kudesia, 2015). These two areas have been increasingly discussed in education settings, yet there is little research-based guidance to help consider their interrelationship for teaching and learning. Here, we explore the relationship, and also seek to explore the practical applications and implications for education contexts.

Mindfulness has recently received attention across scholarly and popular discourse (King & Badham, 2018). It is defined as a state of "nonjudgmental, moment-to-moment awareness" (Kabat-Zinn, 1990, p.2), and has been studied across varied disciplines such as psychology, physiology, healthcare, neuroscience, the arts, and others. Most mindfulness research has examined its potential to regulate stress and improve cognitive, emotional, and interpersonal functioning (Sedlmeier et al., 2012). Scholars have suggested that the effects of mindfulness also relate to other skills and abilities, such as creativity (Carson & Langer, 2006). Creativity is frequently defined as the ability to develop novel and effective ideas, artifacts, or solutions (Runco, 2014). While this so-called 'standard definition' represents many existing research definitions, it does not embody the diversity and divergence of ways that creativity has been defined across a range of practices, disciplines and traditions (Henriksen, Creely, & Henderson, 2019). Creativity is a complex area of research and practice, yet neoliberal perspectives have often driven educational discourse on creativity, emphasizing

instrumentalist and societal drive toward innovation (Mehta, Creely, & Henriksen, 2020). But perhaps more importantly, creativity is a way of being in the world with substantive value for human-centered wellbeing and expression (Goff & Torrance, 1991).

Both mindfulness and creativity are complex areas that have been independently touted in education practices. Yet there is a need for a synthesis of extant research findings in understanding the mindfulness-creativity relationship and how it matters in learning settings. There is a theoretical reason for presuming an important relationship between them. These are broad ideas with unique connections to emotions, attention, stress, wellness, and awareness of one's self and the world (Baas, Nevicka, & Ten Velden, 2014). Given the importance both areas have to thinking and learning, and their increasing presence in educational contexts, it is important to understand research on their relationship.

For our purposes in this thematic literature review, we seek to identify themes and trends in the research, and then discuss the implications for educational settings. While mindfulness and creativity individually arise in education discourses, they are rarely linked and there is little to guide teachers in identifying research takeaways for the complexity of learning settings. Very little existing research on the intersection of these topics is actually embedded in classrooms—so we aim to distill significant aspects of the relationship and share implications for teachers and learners.

In a world awash in distraction, stress, and often, distress—all of which can affect creativity and wellbeing—mindfulness becomes a valuable consideration for supporting learners in educational practice. Particularly in light of the recent COVID-19 pandemic, many teachers and learners are experiencing a sense of uncertainty, discomfort, or even trauma. While we do not suggest that mindfulness offers a "fix" for the kinds of systemic inequities or difficulties that many are facing—situations of stress or trauma underscore the value in paying attention to issues that relate to our sense of wellness and humanity, such as mindfulness and creativity.

We begin with background context about mindfulness, then we describe our literature review approach on the creativity-mindfulness relationship. We then qualitatively analyze and describe thematic findings and takeaways from this review. Finally, we discuss the implications for thinking and learning, with conclusions for educational practice and research.

1.1. Background on mindfulness

Mindfulness has roots in longstanding Eastern spiritual traditions, particularly Buddhist philosophy. Buddhist philosophy and practices teach a way of being present in the moment and letting go of the overreliance that humans tend to have on a sense of individualized identity (as a 'thinker of thoughts') in favor of a broader connection to a sense of oneness and integration with all things (Shonin, Van Gordon, & Griffiths, 2014). However, Trammel (2017) notes that *mindfulness* has entered into secular practice and mainstream culture in recent decades. There has been valid concern about the ways in which the authenticity of Buddhist truths might be stripped of their original values through this mainstreaming of mindfulness. However, scholars such as Sun (2014) have noted that this secular recontextualization of mindfulness has supported the emergence of the concept for use in broader social contexts or organizations such as schools, where they can benefit wellbeing for learning. Williams and Kabat-Zinn (2011) suggest that since Buddhist meditative practices are concerned with embodied awareness and cultivating clarity, emotional balance, equanimity, and compassion—all of which can be developed by intentional deployment of attention—that "the roots of Buddhist meditation practices are de facto universal" (p. 1).

The work of Kabat-Zinn (1990) and his Mindfulness-Based Stress Reduction (MBSR) program (developed at University of Massachusetts Medical School) are partly responsible for bringing mindfulness to broader audiences, with intentional development of secular-based practices for health and wellbeing needs. Since then, many programs and studies have documented the physical and mental benefits of mindfulness, inspiring adaptations into schools, prisons, hospitals, veterans centers, and more.

The previously-noted definition of mindfulness can be elaborated as the ability to be fully present, and aware of where we are and what we are doing, without becoming overly reactive or overwhelmed by the present.. Mindfulness is often associated with meditation practices, aimed at building skills for present-moment awareness as a mental habit (e.g. just as physical exercise aims to make the body more healthy even beyond exercise sessions—meditation or mindfulness practices aim to cultivate healthy psychological awareness and wellbeing, beyond the practices themselves). Berkley's Greater Good Science Center (n.d.) suggests, "Mindfulness means maintaining a moment-by-moment awareness of our thoughts, feelings, bodily sensations, and surrounding environment, through a gentle, nurturing lens." Despite the simple, intuitive nature of such definitions, achieving it is often not simple or intuitive.

O'Donnell (2015) suggests that mindfulness has gained widespread interest precisely because states of distraction, anxiety, suffering, and lack of connection are so common and detrimental. As society veers toward more chaotic, techno-centric, globally-connected and distracted modes, mindfulness offers an antidote to internalized unrest—particularly for learners who face ever expanding sources of difficulty from stress and distraction. The buzz of popular interest and excitement around the concept has increased, such that mindfulness appears ubiquitous, from healthcare or corporate settings, to schools and classrooms (Shapiro, 2009).

Researchers have sought to study interventions related to different components of mindfulness, often through the central practice of meditation. Because meditation offers specific practices for awareness of one's own thoughts, it provides an intervention to study the development and effects of mindful states, helping people connect with thoughts and emotions in the present moment (Shapiro, 2009). Research has demonstrated that by developing awareness about one's own mind and the present moment, people experience less anxiety, more positive emotions and engagement, and other mental and emotional benefits (Weinstein, Brown, & Ryan, 2009). In becoming more aware of their thinking, learners in particular become more skilled at navigating thought processes in psychologically healthy ways (Bennett & Dorjee, 2016). Importantly, it also connects to creative thinking skills (Kudesia, 2015).

While creativity and mindfulness may work synergistically, the relationship is complex. Researchers and practitioners in educational contexts require a better sense of a nascent but growing body of literature to understand implications for the future of

research and practice.

2. Methods for review

We explore scholarly literature at the intersection of mindfulness and creativity to understand how it relates to thinking and learning settings. This is a thematic literature review and our work is guided by the following questions:

- What is the nature of the mindfulness-creativity relationship as outlined in existing research and literature?
- Based on the literature on mindfulness and creativity, what are the implications for teaching and learning settings? And what takeaways and ideas can be used to inform educational practice?

2.1. Approach and rationale for review

A thematic literature review is not based around the progression of time in a body of work as a chronological review might be (Yun, Lee, & Kim, 2019), nor does it describe the emergence of a body of work as a narrative review might (Bower & Gilbody, 2005). Instead, a thematic review is organized based on topics, issues, ideas, or takeaways from within a relevant body of work (Hart, 2018). Unlike meta-reviews or systematic reviews, such as the one conducted by Lebuda, Zabelina, and Karwowski (2016), we do not aim to extract empirical data findings to quantify the relationship.

We elected a thematic approach for important reasons. Our purpose was to narrow the scope of inquiry and dive into a qualitative exploratory analysis of relevant work on creativity and mindfulness skills. Such an approach provides space to explore insights from literature and then consider how broader takeaways might be used to inform practice. A thematic review was also deemed most appropriate because extant literature on this topic is not fully representable as systematized data, constraining the ability to present literature as a quantified 'dataset' for empirical dissection (Tranfield, Denyer, & Smart, 2003). Although high-quality, quantifiable studies do exist in this space [see Lebuda et al. (2016)] we wished to consider a more open swath of literature, including not only quantitative, but also theoretical, practical or qualitative works that are not amenable to systematic analysis. To allow for a comprehensive stance toward relevant literature, our review is framed in an exploratory, thematic way. This allowed us to go deeper into varied stances to later use these in discussion of implications and applications. We also aimed to be methodical about our search processes, using review criteria/approach as described.

2.2. Criteria and process for literature search

The research we reviewed is situated mostly within psychology or education. Our sources of literature were primarily drawn from two main databases, those being: 1.) *Science Direct*, and 2.) *Scopus*—as these two databases comprise a significant swath of 'mainstream' research papers in English. Additionally, we performed a search of both Google and Google Scholar to ensure that nothing was missed in the primary research database searches and to identify any useful non-empirical pieces.

We began by identifying keywords and search terms, which we selected based on the scope of study and the literature; we then chose the search strings most appropriate for the study (Charmaz, 2003). We were able to keep the search relatively straightforward by pairing keywords and terms that precisely defined one of four areas: '*mindfulness*', '*meditation*', '*creativity*,' or '*creative thinking*.' This yielded articles or studies that specifically referenced the theory/terminology within the text (Grant & Booth, 2009).

This initial scoping process produced copious results, many of which were outside the scope of our topics (Paré & Kitsiou, 2016). Common search terms of "mindfulness" and/or "meditation" and "creativity" yielded hundreds, in some instances thousands, of articles. By narrowing the scope using database functions, to include only articles that used *both* key terms as foci in titles and/or abstracts, we were able to clarify and tighten the search. This makes sense, as inquiry-driven intersection of these constructs has mostly emerged within recent decades and is a comparatively small space in the larger arena of creativity research. We then sifted through articles to identify work exploring the relationship between the constructs.

Our review criteria were agnostic as to the types of sources included, and this article explores varied academic sources, including books, chapters, and peer-reviewed journal articles. However, peer-reviewed empirical journal articles encompass most of the sources reviewed, allowing us to focus on understanding the state of the field of research findings, without entirely excluding important ideas that emerged in other sources.

2.3. Approach to thematic analysis

To assess and distill the key ideas from the literature into useful takeaways, we sought to extract ideas/findings and categorize them into "meaning units" (Moustakas, 1994). Therefore, we engaged in several rounds of collective thematic coding from the articles identified, using a shared digital space to collectively document key findings identified in every piece of literature used (Saldaña, 2015).

We first familiarized ourselves with the 'data,' which in this case were the key ideas/findings in varied studies or papers (Moustakas, 1994). Through shared discussions of meaning-making, we coded thematically, by looking across the findings for patterns of organization (Braun & Clarke, 2006). This resulted in takeaways that were less specific than most thematic coding, because the documented findings tended to focus around several broad areas that categorized the research on mindfulness and creativity—such as the generally positive nature of the relationship, or the observed lack of applied research. Several iterations of organized

coding brought us to four themes that emerged from the literature. These were driven by our stated questions and are shared in the findings and discussion.

2.4. Limitations

There are limitations in this work. First, we limited most of our examination to two databases, including Science Direct and Scopus, supplemented by peripheral searches of Google and Google Scholar as supplementary sources to check for additional work. Although these were selected because they are comprehensive sources of academic scholarship in English, encompassing most major and smaller journals that cover creativity research, there is still a limitation of scope.

Further, we would note that personal bias is always a potential issue in thematic review, and transparency is important. Our own interest in the topics as educational researchers could have influenced the process of analysis, as researchers naturally bring in their own preconceptions, assumptions or interests. Though we tried to minimize this effect through multiple rounds of reading and discussion, the possibility of bias influencing analysis exists.

3. Findings

We identified four broad thematic areas. The first theme describes how *mindfulness enhances creativity*. The second theme addresses *the factors that complicate the nature of the relationship*. The third theme addresses the relationship between *mindfulness, mind-wandering and creativity*; and finally, the fourth theme concerns the *need for more applied educational research on mindfulness and creativity*. These are described in greater detail in the sections below.

3.1. Theme 1: mindfulness enhances creativity

Much literature suggests that the nature of the mindfulness-creativity relationship is positive and promising—in that mindfulness can enhance creativity. Research demonstrates that mindfulness improves a person's ability to concentrate (Sedlmeier et al., 2012), decreases the fear of being judged, and enhances open-minded thinking while reducing aversive self-conscious thinking (Brown, Ryan, & Creswell, 2007). These points map directly onto key characteristics of creative habits of working, thinking, and being in the world, including: relaxation or flow states (improved concentration), risk-taking (requiring a lack of fear about judgment), and curiosity or open-mindedness/openness to experience (reducing self-conscious experience) (Prabhu, Sutton, & Sauser, 2008). Logically, these effects suggest that mindfulness supports the skills associated with creativity, and research findings suggest that high levels of self-reported mindfulness correlate to creative practices (Colzato, Szapora, & Hommel, 2012).

Many aspects of 'trait mindfulness,' or skills that are facilitated by mindfulness training, increase creativity. For example, mindfulness is associated with the ability to change perspectives by expanding empathy and open-mindedness (Carson & Langer, 2006). It also increases a person's capacity to respond to situations in a non-habitual fashion—which is at the crux of creativity (Moore & Malinowski, 2009). Mindfulness training's ability to reduce fear of judgment is conducive to creativity; as is its ability to improve working memory (Chiesa, Calati, & Serretti, 2011). Specifically, experienced meditators are better problem solvers and have better verbal creativity (Greenberg, Reiner, & Meiran, 2012). Jedrczak, Beresford, and Clements (1985)) found that meditation of any length strengthens creativity—even short meditation breaks. Thus, ontologically, mindfulness has the potential effect of improving or enhancing creativity by building skills or ways of being that support creativity. The ontological nature of the relationship show promise for educational settings where developing creativity is challenging. Anxiety, fear of risk or failure, and self-consciousness about one's own thinking are often detrimental to classroom creativity—which opens up the possibility that mindfulness might offer practices that ameliorate barriers to learner's creativity.

In their meta-review, Lebuda et al. (2016) hypothesized a positive relationship between mindfulness and creativity, wherein the former supports the latter. Their meta-analysis examined peer-reviewed, quantitative studies with direct measures of mindfulness and creativity—aiming to measure the relationship between the two and consider the role of moderators. Their study estimated the correlation between mindfulness and creativity at $r = .22$ ($r = .18$ without correction for attenuation). This suggests a significant correlation, with a small-to-medium effect size. Across all studies they found no evidence of publication bias, concluding that the estimation of the relationship is accurate and robust. This aligns with the proposed beneficial role of mindful meditation in creative thinking. The moderators included in their analysis clarify some important questions about the nature of this relationship. For instance, there were no differences between correlational and experimental studies—in both types of studies the effect size of the association was the same. This suggests not only a correlation between mindfulness and creativity, but more importantly reveals that developing mindfulness through meditation increases creativity—e.g. it goes beyond correlation into causation. This causal connection is something that educators and schools can potentially look to as they seek to address mounting calls to support students' creativity, and as they also try to manage the socio-emotional needs of students in our tense and distractible society.

Despite this, varied kinds of moderators, such as the type of meditation practiced and the multifaceted character of mindfulness, create challenges in untangling the mindfulness creativity relationship (Baas et al., 2014). The inherent complexity and emergent or experiential nature of both mindfulness and creativity could also be a confounding factor. Much like creativity, mindfulness is complex and involves different skills, such as: attention/observation, ability to act with awareness, capacity for nonjudgmental description, and ability to refrain from immediate evaluation. There is also no commonly agreed-upon mechanistic model of creative processes that could confirm how different types of meditations might affect such processes. All of this leaves educational practitioners with some foundations to work from in that mindfulness does seem to support creativity—but also some contested ground to

navigate, in which the relationship can be nuanced by different contextual factors.

3.2. Theme 2: a relationship with complicating factors

Given the complexity of these areas it is not surprising that research also indicates a complicated relationship between the two. Different types of meditation (which are a vehicle for mindfulness) have differential relationships to creativity. Two of the main techniques discussed frequently in the literature on mindfulness include *open-monitoring meditation* and *focused-attention meditation.* Open-monitoring is the practice of observing and attending to any sensation or thought without focusing on any specific task or concept. Focused-attention meditation instead trains the participant to focus their attention and awareness to a particular task, item, thought or stimuli (Colzato et al., 2012). These mindfulness skills can influence creativity differently. For example, while open-monitoring may increase creative thinking, some have found that focused-attention meditation may be either unrelated to creativity, or in certain instances may impede performance on creativity tests (Zedelius & Schooler, 2015). For educators interested in facilitating a kind of mindfulness-supported creativity, that may leave questions as to which types of meditation to use in classrooms.

The Lebuda et al. (2016) meta-analysis noted that beyond the positive connection where mindfulness enhances creativity, there are areas of uncertainty. For instance, the Horan (2009) longitudinal study showed inconsistencies in the meditation-creativity relationship using the Torrance Test of Creative Thinking, a measure that distinguishes between verbal and figural dimensions of creativity. Specifically, groups practicing transcendental meditation showed significant gains in figural flexibility and originality, but no improvements in verbal creativity. This is interesting in teasing apart the relationship, however, it begs the question: To what degree would or should such individualized tests of creativity matter within the sociocultural dynamics of many learning settings?

Colzato et al. (2012) dissected the complexities by evaluating the impact of both types of meditation upon creativity tasks for either *divergent* or *convergent thinking.* Divergent thinking involves solving problems with many possible solutions—as opposed to convergent thinking, which involves solving problems with a more focused and narrowing approach. The researchers studied whether different types of meditation induce people toward particular cognitive-control states related to creativity. They hypothesized that open-monitoring meditation encourages divergent thinking and focused-attention meditation induces convergent thinking. Thus, open-monitoring meditation would be expected to improve divergent thinking but not convergent thinking (both of which were assessed by the AUT (Alternative Uses Task) creativity assessment).

Their data demonstrated that people excelled in the divergent thinking task after doing open-monitoring meditation. Although convergent thinking performance improved after focused-attention meditation, the increase was not significant. Interestingly, their measures of mood scores showed that both types of meditation elevated mood. Because elevated mood facilitates divergent rather than convergent thinking (elevated mood may even interfere with convergent thinking) mood effects might have been a confounding factor. In short, the focused-attention meditation may have improved convergent thinking, while the relaxing aspect of the procedure potentially could hamper it. Regardless, they identified a key mindfulness-creativity connection, showing the relationship between open-monitoring meditation and divergent thinking.

These findings point to some degree of nuance beyond the general assertion that mindfulness strengthens creativity. This suggests that if we are to seek more mindful creativity practices in schools, then it is important to consider what types of creative tasks or thinking might be called for in the given context, and consider what types of meditation practices might be beneficial.

3.3. Theme 3: mindfulness, mind-wandering and creativity

We have focused on the nature of the mindfulness-creativity relationship, which raises an important issue for this relationship—namely, mind-wandering. The relationship between mind-wandering to these areas is more uncertain and complicated than the relationship between mindfulness and creativity. Mind-wandering seemingly runs contrary to mindfulness, yet mind-wandering reliably correlates with creative thinking and creative achievement (Baird et al., 2012). This is an issue for educators considering different facets of mindfulness practices, as it may affect creativity and related factors.

Mind-wandering is "a common everyday experience in which attention becomes disengaged from the immediate external environment and focused on internal trains of thought" (Schooler et al. 2014, p. 1). It is differently important to both mindfulness and creativity. If mind-wandering is associated with getting lost in thought without realizing it—then mindfulness has an inverse purpose, bringing attention and awareness to thoughts in order to disentangle from them. Creativity has been positively associated with mind-wandering that stimulates novel ideas or fresh connections (Baird et al., 2012).

Existing research points to a connection between mind-wandering and deficits in task performance or problems with task completion. However, mind-wandering may be beneficial in some areas, such as planning for the future, positive stimulation via interesting thoughts, and notably, creativity. Learners with ADHD often score higher on laboratory measures of creativity and assessments of creative arts achievement (White & Shah, 2011), though they may struggle with some traditional tasks and outcomes of schooling.

Schooler et al. (2014) tested the mindfulness-creativity relationship directly, by assessing individual differences in mindfulness (via the Mindful Attention Awareness Scale or MAAS) as compared to measures of creative problem-solving performance (via the Remote Associates Test or RAT). They showed a negative correlation between mindfulness scores and RAT performance, and at first assumed that being less mindful helps one be more creative. However, they refined this interpretation by considering different strategies that can be used to solve the RAT problems. Creativity researchers have long been intrigued by the fact that the same creative problems can either be solved through analytic thought, *or* through spontaneous insight referred to as "Aha" experiences of insight/intuition (Fleck & Kounios, 2009). Prior research has shown that analytic and insight problem-solving methods are associated

with markedly different patterns of brain activity. For instance, default mode network activity in the brain is related to solving problems with insight/intuition (Kounios et al., 2008)—while the default mode network tends to quiet down through mindfulness.

Schooler et al. (2014) hypothesized that mindfulness might be related to creative analytic problem solving. To test this, after each problem they asked participants whether they had solved it mostly analytically or mostly with insight. They found that trait mindfulness correlated negatively with insight problem solving, but not with analytic creativity—suggesting that creative solutions can benefit from mindfulness, but specifically through a more analytically creative process. Others have actually found that insight problem solving *can* be enhanced through mindfulness. Ostafin and Kassman (2012) found that certain types of open-monitoring meditation improved insight problem solving. They noted that:

Insight problem solving is hindered by automated verbal-conceptual processes. Because mindfulness meditation training aims at "non-conceptual awareness," which involves a reduced influence of habitual verbal–conceptual processes on the interpretation of ongoing experience, mindfulness may facilitate insight problem solving.

This helps to clarify how mindfulness can support creativity in terms of mind-wandering. The Schooler et al. (2014) body of work also makes assumptions which may limit the scope of their findings. For instance, they position mindfulness and mind-wandering in opposition to each other, and then carry this assumption out experimentally. However, while mindfulness and mind-wandering are often very different, they need not be mutually exclusive across all forms of practice—and in the messy spaces of implementation and educational practice, it is very possible that such ideas could coalesce. It might suggest that mindful meditations involving both conscious awareness and nonjudgment of thoughts could allow mindful mind-wandering in learning practices.

Certain forms of mind-wandering can be mindful/deliberate, while others are more uncontrolled/spontaneous. The role of these mental states on creativity was explored by Agnoli, Vanucci, Pelagatti, and Corazza (2018)), who distinguished five constitutional dimensions of mindfulness: observing, acting with awareness, describing, nonreactivity, and non-judging. Results showed that mind-wandering and mindfulness predicted creative behavior both alone and in combination. Via path analysis they explored the value in distinguishing between deliberate and spontaneous mind-wandering. Deliberate mind-wandering *positively* predicted creative performance; however, spontaneous mind-wandering *negatively* associated with creative performance. Interestingly, more deliberative mind-wandering showed beneficial interaction effects with mindfulness toward producing creative and original ideas. This suggests that *deliberate* mind-wandering is a productive characteristic for creative work and potentially for creative learning in classrooms, which is supported by mindfulness.

Preiss and Cosmelli (2017) explored mindful mind-wandering for creativity using illustrative cases of creative writers and their processes. They noted that while their writers discussed the concepts of mind-wandering and creating in different ways, these were most often characterized by deliberation and awareness of their own mind. They termed this as, "mindful mind-wandering," which nurtures creativity and differs from the absent-minded daydreaming of other mind-wandering:

Professional creators develop a sense of identity that is strongly grounded on their *awareness* of the mind wandering process. As authors become more expert, they gain a better understanding of the creative process and apprehend its phenomenological nature. Specifically, they become *mindful* mind wanderers (p. 303).

Research and practice suggest that despite what initially appears to be conflicting dynamics, mind-wandering and mindfulness can enhance each other toward creativity. Mindfulness in conjunction with mind-wandering may allow the mental wanderer more awareness and potential to imagine and think creatively—which may benefit creative imagination in learners' skills and practices.

3.4. Theme 4: a need for applied and educational research

Finally, in reviewing the mindfulness-creativity relationship in scholarly literature for praxis, we noted a lack of educational literature in this space, which signals a need for more applied but still empirical research for thinking and learning settings. Fisher (2006) suggests that these topics may be most vital for young people in schooling:

For many children childhood is not a carefree time. In a materialistic, competitive world they are subject to many of the same stresses and strains as adults. They are bombarded by an information overload of words, images and noise. They are prey to the frustration and anger of others and often experience negative emotions more deeply and intensely than adults (p. 148).

Fisher notes that these kinds of stressors are commonly recognized as blocks to learning and creativity, making mindfulness a potentially beneficial approach and psychological support for creativity. He highlights a historical link harkening to the ancient Greeks and Romans, who believed that a quiet mind offered an opening to the creative muse.

Notably, meditation engages the mind in non-verbal ways, which learners do not always have the opportunity to use in schools. While the conscious mind is caught up in language, the brain's linguistic structures can restrict the scope of human knowledge and action. Meditation may offer an experience of the mind that is not purely linguistic, expanding learners' creativity by tapping into subconscious and intuitive thought. Claxton (1997) called this the "under-mind" and Malcolm Gladwell (2005) referred to it as the "adaptive subconscious." Such intuitive experience is essential to learners' creativity and requires a present-moment focus and freedom from distracting fears and desires.

Much of this connection between children in schools and mindfulness and creativity is still theoretical; and while the existing research is promising, it is greatly limited in volume and scope. As mindfulness has become more prevalent in real-world learning settings, more empirical research is needed to understand the mindfulness-creativity link and practices for learning settings (Osten-Gerszberg, 2017).

A limited number of studies have considered the connection between increased creative outcomes and mindfulness in applied settings outside of university labs or psychological experiments, across disciplines. In education, Justo, Mañas, and Ayala (2014)) studied this with high school students, to analyze the impact of an extracurricular mindfulness program upon the figural creativity levels of a group of 50 teenagers. The authors used an experimental group of high school students who participated in the mindfulness training program, and a control group who did not. The results of the Torrance Test showed significantly higher levels of creativity in the treatment group, after a 10-week mindfulness intervention (of 1.5 h of training a week, with 30 min of daily meditation).

The school-based intervention focused on flow meditation (Franco, 2009), which is meant to set thoughts free rather than control them, by nonjudgmentally noting any spontaneous thoughts that appear in mind. This technique does not aim to redirect thoughts back to an object of foci (the breath, etc.), but to develop attention and allow full awareness of whatever appears in consciousness, noticing the transience and impermanence of thoughts (e.g. a kind of meditation on thoughts). Though the study did not provide an effect size, their results are still promising as a step toward empirical support for mindfulness and creativity in educational environments. In their work, achievement goals and self-determination influenced mastery experience in creativity via mindful learning, which also has implications for teaching.

Yeh, Chang, and Chen (2019) investigated mindful learning and creativity among a younger school population of elementary students. They sought to understand mindfulness within digital game-based creative learning, using the Langer (2000) concept of mindful learning as a flexible state of mind in which people are actively engaged with the present, aware of new things, and sensitive to context. They developed an original training program for creativity and an instrument for measuring mindful learning during game-based learning. Their study focused on how players' traits would influence their mastery experience during digital creativity game-based learning. Results suggested that mindful learning can support creativity within a game-based learning system; and participating students became more confident in their own creativity competences. This is interesting, because creative confidence has been found to be a driver of creative potential (Beghetto, 2006). In educational settings, the notion of creative confidence is not often addressed, as many traditional education contexts are uncomfortable with the kinds of risk of failure associated with creativity, or do not promote the confidence to work through such discomfort toward creative ends. Thus, support for creative confidence, via mindfulness, may be an interesting pathway for future study.

4. Discussion of findings for education

The research we have described can serve to provide the field of education with ideas to utilize mindfulness to support learner creativity and well-being in educational settings. While the connection between mindfulness and creativity is complex, there is enough evidence to show a generally beneficial and supportive relationship between the two, wherein practicing mindfulness can support creativity. In the next section we discuss implications for the field of education.

4.1. Allowing purposeful mind-wandering

One way that educators can support students is through the teaching of mindful mind-wandering strategies. Preiss and Cosmelli (2017) describe how an awareness of the mind-wandering process is an essential component of the creative process. The more aware people are of these processes and of their own mind's activities, the more capable they become to notice and attend to creative ideas in productive ways. Educators can help students become mindful mind-wanderers by teaching a creative process that includes stages where students purposefully diverge from the task or topic at hand. Rather than being "off-task" students may be purposefully led through activities that guide them through deliberate acts of mind-wandering (Agnoli et al., 2018).

Intentional mind-wandering can stimulate novel ideas or fresh connections. The most important component here is intentionality. Open-monitoring meditation and flow meditation, as described earlier, allow the mind to notice thoughts or sensory stimuli without trying to change them. This awareness component of noticing may be beneficial for giving the mind space to expand, while also cultivating present moment awareness and observation. If educators can support students in being more aware of the type of mind-wandering they engage in they may be able to provide a valuable skill for metacognitive awareness.

While focused attention has its benefits and is necessary for concentration particularly around analytic creative problem solving, in terms of insight problem solving it can potentially be limiting to "Aha" moments or bursts of creative thought. Therefore, breaking up time used to solve problems with more open mindfulness inspired activities can be helpful when learners in any context get stuck. This may, in fact, be a metacognitive skill that educators can explicitly teach— in understanding how to allow for mental breaks or a shift in awareness, which may lead to higher levels of insight-related creative thought, helping learners to overcome challenges where they get stuck. Dijksterhuis and Meurs (2006) found that too much focused deliberation on problems blocks creativity, whereas strategic distraction improves it. Thus, there may be creative potential to mindfully observe one's own mind-wandering, and allow it, observing where it goes and what it does.

Agnoli et al. (2018) found that high levels of originality were also associated with high levels of deliberate mind-wandering. Therefore, generating creative and original ideas is linked with the re-creation, redirection and reflection of thought. This has implications for how educators engage students in creative processes, suggesting consideration of how they are supporting students' mind-wandering.

4.2. Time and space for meditation in curriculum

The simple act of meditating has been shown to benefit creativity in learning settings (Holm, 2015). Practicing being more

mindfully aware through meditation, even for a short amount of time each day, impacts learning holistically. Brief meditation breaks provide the downtime needed for creativity to be enhanced after returning to the task at hand. These breaks also may positively impact teachers who struggle to maintain their students' focus in the midst of increasing curricular demands. Puccio et al. (2017) suggest that mindfulness involves the self-awareness of individuals within organizations, communities and group practices. Therefore is not just an individual pursuit, but it impacts the sociocultural settings and complex ecosystems in which people live, work, learn, and play—which underscores its importance within the ecologies of classrooms and schools.

Supporting the development of learners through the mindfulness-creativity connection, Fisher (2006) lays out the case for mindful meditation for children in schools, predicated upon the ways that mindfulness can expand creative thinking—and the degree to which young people often need these kinds of skills for wellbeing. The more general positive effects on student well-being may have other unmeasured values for creative thinking. It could be argued that in a stressful world, being able to learn strategies to increase well-being are an essential part of social-emotional learning and productive creativity.

4.3. Supporting creative thinking and reducing judgment or fear

There are more experiences and strategies that potentially support creativity and divergent thinking than we could cover here. Ideation to guide learners through processes of generating creative and original ideas may also be supported by intentional and mindful mind-wandering. In addition, open-ended tasks are an approach to supporting creativity in content learning, in that multiple solutions are both allowed and expected. Yet while such approaches have been identified as a key way to support student creativity (Jeffrey & Craft, 2004), simply doing such types of activities in learning settings does not guarantee that learners will engage in creative thinking or even feel comfortable doing so.

Some of the most notable barriers to creativity are either fear or judgment—or fear *of* judgment—which is often the case for learners in school settings. Creativity inherently brings social risk, and people frequently report feeling uncertain about offering up new ideas for fear they might be judged or thought to be strange (Beghetto, 2007). Given the social pressures for students in K12 and higher education contexts, it is critical that creative environments reduce fear or anxiety around judgment. The nonjudgmental awareness of mindfulness meditation is an important skill supporting this.

Educators often note that in attempting more creative lessons, students may be uncomfortable in open-ended, project-based spaces that lack single-correct-answer approaches. Since learners today grow up in standards-based high-stakes testing environments, teachers sometimes report that they can be nervous or uncomfortable with ambiguity (Olivant, 2015). Opening up thinking and allowing for more divergent elements is important, and the connection between divergent thinking and open-monitoring meditation suggests that this might be a useful practice, particularly for instances when ideation and multiple possibilities are important.

By aiming to non-judgmentally expand awareness, mindfulness presents opportunities to open social acceptance of creative thinking and intellectual risk-taking in learning settings. As learners come to expect different ideas and solutions from themselves and their peers without judgment, there may be a decrease in the fear or risk associated with presenting novel ideas, thus enhancing creative thinking (Brown et al., 2007).

5. Conclusion

This literature review investigated findings around the relationship between mindfulness and creativity with focus on educational contexts—scoping the field in a thematic, qualitative exploration of the research into mindfulness and creativity. Summing up the relationship between these two areas is challenging due to their complexity. The most accurate summation may be to point to the generally positive but also complex nature of the relationship—with much research suggesting that mindfulness enhances creativity, as well as areas that are more nuanced depending on contextual factors. We have explored the connection to mind-wandering around mindfulness and creativity—and the possibility of using mindfulness to support deliberative mind-wandering (vs. spontaneous mind-wandering) toward expanded creativity in learning. Finally, we have emphasized the relative lack of applied and/or educational studies around mindfulness and creativity, and the need for more research in this area to inform educational practice across contexts.

The theoretical foundations connecting mindfulness and creativity are strong, with regard to observing and understanding the world and noticing more possibilities without being clouded by mental blinders. This is exemplified by Justo et al. (2014):

Mindfulness is a technique which allows introspective and perceptual awareness, encouraging the awareness towards our psychological processes and habits. It increases the interhemispheric communication, which is typical of creativity states, since the individual who meditates is able to perceive more and more subtle details of the stream of consciousness and mental processes (p. 233).

Empirically, research in this area has demonstrated promise but there is much room to develop a more nuanced understanding of the relationship. Going beyond correlation, meta-analysis has empirically inferred causation, suggesting that mindfulness training supports, strengthens, and expands creative thinking (Lebuda et al., 2016). Mindfulness and creativity are not yet fully understood in many ways, and both are inherently complicated and variable areas unto themselves.

In investigating the relationship, the context, variables, and moderators or potential interactions are important. For instance, mindfulness generally supports creativity—but there are some concerns about the way it affects mind-wandering and the resultant effects on creativity. More nuanced and recent research has teased this apart to further break down mind-wandering into different types (spontaneous and deliberate) each of which affect creativity differently (Agnoli et al., 2018). This remains a somewhat new and still relatively unexplored area of empirical work.

The number of potential moderators, such as different types of mindfulness and meditation, is a challenge for researchers seeking to dissect the relationship. For instance, it is likely that different practices, such as open-monitoring vs. focused-awareness meditations, play a role at different stages of the creative process. Thus, there are gaps in the literature in regards to fully understanding these different roles and different moderators. In order to apply mindfulness and creativity in practical education settings, more sustained, applied and ongoing research is needed.

For educators, it is vital to see more research on mindfulness and creativity embedded in real-world contexts, particularly in learning settings. This would support better understanding of the intersection of these constructs in-situ—or a more robust understanding of mindfulness and creativity 'in the wild,' beyond labs or testing situations. When we combine the correlational and causal links between creativity and mindfulness, there are important implications for learning psychology around creativity and creative education—both for creative abilities and self-concept.

In practice, helping educators to understand how different types of mindfulness might support their students across different needs and tasks could be beneficial; and this may be true in other contexts of thinking, learning and development. Existing research points to a promising intersectionbut we would suggest that more action research approaches in classroom settings could benefit our empirical-practical understandings. Mindfulness and creativity are critical to wellbeing and development at individual and societal levels, so understanding them in context is essential. The future of human thinking, wellness, and progress demands no less.

CRediT authorship contribution statement

Danah Henriksen: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing - original draft, Writing - review & editing. **Carmen Richardson:** Conceptualization, Formal analysis, Writing - original draft, Writing - review & editing. **Kyle Shack:** Conceptualization, Formal analysis, Writing - original draft, Writing - review & editing.

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