

At the Intersection of Mindfulness and Sustainability

*An overview of the emerging field of Mindfulness within
Sustainability Science*

Lison Mavon

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A thesis submitted in partial fulfillment of the requirements of Lund University
International Master's Programme in Environmental Studies and Sustainability Science
(30hp/credits)



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Lund University Centre for
Sustainability Studies



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Abstract

Climate change is a people-made crisis which requires a shift in our mindsets. Early studies in the field of mindfulness within sustainability science show the potential of mindfulness to influence consciousness, beliefs, and values for sustainability. However, the field is still at its early stages and scattered over various topics and methods. The aim of this thesis is to assess how the concept of mindfulness has been academically studied within the field of sustainability science over the past ten years and what essential next step could foster its development. This study employs a systematic literature review using demographic data analysis and content analysis. The results demonstrate that despite a growing contribution to the field, the empirical evidence linking mindfulness to sustainability remains insufficient. Research recommendations suggest fostering an inter- and trans-disciplinary approach, clarifying some of the key elements, diversifying research methodologies, theorizing further knowledge, and potentially leading to a consensus about mindfulness measurements metrics.

Keywords: Sustainability Science, Mindfulness, Transformation, Interdisciplinary Research, Systematic Literature Review

Word count: 11,730 words

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Abbreviations List

PEB: Pro-environmental Behaviours

IPCC: Intergovernmental Panel on Climate Change

SS: Sustainability Science

1 Introduction

Climate change is a vast and urgent issue driven by unsustainable societies requiring societal transformation to achieve sustainable solutions (IPCC, 2022; United Nations, n.d). It is a people-made crisis deeply rooted within a complex social, economic, technological, political, cultural, and environmental web of human behaviours (IPCC, 2022; Trencher et al., 2014). Despite the growing awareness of climate change and sustainability challenges, no shift away from the current hegemonic and destructive capitalist societies has yet been achieved. With the current trend of CO₂ emissions, resource depletion, and environmental pollution, the 2 degrees target assessed by the latest Intergovernmental Panel on Climate Change (IPCC) report is harder to reach every day (IPCC, 2022). It is becoming increasingly evident that a drastic and holistic societal transformation is required to achieve global environmental goals (Ostrom & Basurto, 2010; Thiermann & Sheate, 2021). The term “transformation” is used, as opposed to “transition”, to emphasize the physical and permanent sociotechnical change required (Trencher et al., 2014). The mechanism for socio-technical change implies changing the current norms and rules to transform people’s behaviours upon which society is constructed (Ostrom & Basurto, 2010).

Therefore, a deep change in mindset is necessary to successfully implement a sustainable transformation (Ives et al., 2020; Ostrom & Basurto, 2010; Wamsler, 2018). Such behavioural change on an individual and community level, requires strategies that affect people at the very core of their consciousness, worldviews, values, and their connectedness with nature (Thiermann & Sheate, 2021; Wamsler et al. 2017; Woiwode et al., 2021). A transformation at the individual level refers to a change in their inner dimension, which refers to our emotions, thoughts, identities, and beliefs (Ives et al., 2020; Wamsler, 2018; 2020). It is suggested that inner dimensions can help us address complex and persistent problems such as climate change and accelerate the transition towards a sustainable society (Ericson et al., 2014; Ives et al., 2020; Wamsler & Brink, 2018; Wamsler, 2019; Woiwode et al., 2021).

In practice, inner transformation can be fostered with the exercise of mindfulness which activates individual’s core values, narrows down the value-action gaps, and engages us in self-reflection, awareness, and emotional intelligence (Brown and Kasser 2005; Ericson et al., 2014; Wamsler et al. 2017). Thus, with mindfulness, inner transformation can be translated into concrete action and eventually behavioural change (Geiger et al., 2019; Thiermann & Sheate, 2021). This behavioural change can foster pro-environmental behaviours and environmentally friendly lifestyles, such as conscious choices in terms of sustainable consumption and by limiting automatic reactions and routines that may result in environmentally harmful behaviours (Valerio, 2016; Wamsler & Brink, 2018; Wamsler, 2018). Additionally, mindfulness may also increase pro-social behaviours and individuals’

well-being by helping us reconnect with ourselves, our communities and nature (Ericson et al., 2014; Valerio, 2016; Wamsler & Brink, 2018). Although the behavioural change mentioned above focuses on an individual level, it can also have an impact at other scales from a local to a global level when widely implemented (Wamsler et al., 2017; Sajjad & Shahbaz, 2020). Mindfulness could become a public policy spread at all levels of society to help us address the current issues we are facing (Thiermann & Sheate, 2021).

The field of Sustainability Science (SS) investigates mindfulness as a potential accelerator of the sustainable transition. SS has gained more attention over the last decades as the partnership and collaboration between various actors, such as academia, industry, government, civil society, has increased the integration of different perspectives and understanding of wicked sustainability challenges (Lang et al., 2017; Talwar et al., 2011; Whitmer et al., 2010). However, the emerging field of mindfulness research within SS is currently scattered over various sustainability issues and methods, making it hard to get an overall understanding of the knowledge acquired in the field and the existing gaps (Fischer et al., 2017; Valerio, 2016; Wamsler et al., 2017). Considering it is an emerging field, there is still research to be done, and issues to address for the field to develop further. With time pressing for climate action, strategic research is crucial to efficiently develop the field of mindfulness for societal benefits (Crow, 2010; Wamsler et al., 2021). More context-based research is needed to better understand how mindfulness may influence sustainability; and more importantly how to concretely put it into practice for greater positive impact (Geiger et al., 2019). Few studies have evaluated the current state of the field and the research gaps that may need to be addressed (Ericson et al., 2014; Thiermann & Sheate, 2021). However, no research has investigated the institutions and the scientists doing research on the topic to understand the current research dynamic around mindfulness studies within SS.

This study aims at assessing how the concept of mindfulness has been academically studied within the field of SS over the past ten years, and what next steps could foster its development. The data collection process is based on a systematic literature review. A demographic data analysis of the authors and institutions contributing to the field will allow us to understand the current research dynamics happening in the field of mindfulness within SS. The content analysis will enable us to understand where the field is currently at, regarding the topics it addresses, the research methodologies and the main research gaps stated in the literature. It will allow the discussion to present concrete future research recommendations that may help the field of mindfulness within SS development further. This research contributes to the field of SS by suggesting some of the next steps researchers and universities

can undertake to foster the development of mindfulness research and potentially accelerate the sustainable transition. Three sub-questions will help guide this research:

1. How has the concept of mindfulness evolved within the sustainability science research field?
2. What are some the current identified research gaps?
3. In what ways can future sustainability science research address existing research gaps?

2 Theory

2.1 Sustainability science and inter- and trans-disciplinary research

The field of SS developed quickly and became institutionalized within academia over the last two decades (Kajikawa, 2008; Ostrom et al. 2007). The institutionalization of a field is an essential step to gain recognition and legitimacy, in order to foster knowledge production (Stephens & Graham, 2010; Yarime et al., 2012). It requires universities to develop educational and research programs, academic societies, and associations, as well as scientific journals and textbooks (Yarime et al., 2012). Regarding SS, this process happened in the 1990s, when the number of articles published annually increased by 15 to 20% every year across a wide range of fields, such as the natural and social sciences, engineering, and medicine (Clark & Dickson, 2003). Overtime, the growing trend of cross-disciplinary collaboration, and collaboration amongst authors from different backgrounds was observed until the point that “pure” academic disciplines were being phased out (Rokaya et al., 2017). Spangenberg (2011) makes a clear distinction between science for sustainability, which is rather monodisciplinary, and SS, which implies inter- and trans-disciplinary research. Therefore, SS is considered a “distinctive, vibrant and maturing field of research, defined by problems rather than by the disciplines it employs” (Spangenberg, 2011, p. 276).

SS is a problem-driven and solution-oriented field which aims to understand the fundamental character of the interactions between nature and society, from a local to a global scale (Clark & Dickson, 2003; Kates et al., 2001; Lang et al., 2017). The field being purpose-bound, aims to take actions, and develop tools to make sustainability operational in the current world (Kauffman, 2009; Spangenberg, 2011). However, the high uncertainty, the limited information, and the urgent transformational agenda, requires the field of SS to combine different ways of learning and allow various actors to work together across disciplines (interdisciplinary) and beyond science (transdisciplinary) (Hummel et al., 2013; Kates et al., 2001; Schlüter et al., 2022). Transdisciplinary approaches allow research to integrate different perspectives and knowledge to develop new ways to address society relevant problems (Spangenberg, 2011; Jerneck et al., 2011; Lang et al. 2017).

Transdisciplinary favours a mutual and joint learning process between both science and society, embedded within a societal and scientific discourse, so that solutions can become adaptive to its context and environment (Lang et al., 2012; Schlüter et al., 2022). This approach involves interactive and participatory research methods which meet the goals of SS as a transformational scientific field (Lang et al., 2012; 2017). Therefore, transdisciplinary is one of the main characteristics of SS. However, if the transdisciplinary level of integration cannot be achieved, it is essential for the knowledge to be at least interdisciplinary, meaning that the research involves multiple disciplines and that the results can easily be integrated within an interdisciplinary context (Kauffman, 2009; Spangenberg, 2011).

The structures, methods and content found in SS research differs from traditional science as it aims at developing complex operational tools (Kates et al., 2001; Yarime et al., 2012). Institutional arrangements are necessary and need to be coordinated to favour the inter- and trans-disciplinary approaches allowing the integration of various academic programs, scientific journals, workshops, network, conferences needed (Yarime et al., 2012). These institutional arrangements allow for SS to research new ways to approach complex socio-ecological interdependencies and develop potential solutions (Kates et al., 2001; Schlüter et al., 2022; Stephens et al., 2008). Therefore, as knowledge comes from actor both inside and outside of academia, the integration of non-scientific knowledge into the research process is essential (Funtowicz & Ravetz, 1993; Jerneck et al. 2011; Kates et al., 2001; Lang et al., 2017). Furthermore, the research process needs to be objective and should not idealize its findings (Funtowicz & Ravetz, 1993), while reflecting on the specific limitations the construction of disciplines creates (Spangenberg, 2011). Due to the wide range of uncertainties present in the natural and socioeconomic systems, the theories developed are continuously evolving. Thus, they are perpetually informed by new worldviews, values, and goals, through collaborative deliberation and joint sense-making, to ensure the reflexive process necessary to SS (Schlüter et al., 2022).

However, some scholars highlight gaps in the implementation of transdisciplinary approaches. Rokaya et al. (2017) mentions the lack of clarity when using transdisciplinary methods. They suggest further clarifying the guidelines to better link the divergent concepts and perspectives, in order to integrate scientific and practical knowledge in a more rigorous way (Hummel et al. 2013; Rokaya et al., 2017). Meanwhile, Schlüter et al. (2022) observe an overall reluctance to engage with theories, which they explain either by the disciplinary origins of the researchers, or the difficulty of developing theories illustrating the complex interactions of the systems, or by the perception of urgency for action which does not give room and time for theorizing. Lang et al. (2017) recognizes the lack of SS's methods and transdisciplinary approaches applied in practice: "The challenge here is that sustainability scientists often do not lead by example regarding collaboration, mindfulness, and solution orientation." (p. 877).

They explain that it could be caused by the highly competitive environment and the search by scientist and administrator for citations and third-party fundings instead.

2.2 Mindfulness in sustainability science research

The term mindfulness started being used in the 1980s in relation to Buddhism-oriented literature, often referring to meditation (Valerio, 2016). Later, and for multiple decades, the notion of mindfulness was taken up by psychological disciplines looking into its benefits for mental well-being and medicine (Ericson et al., 2014). Kajikawa (2008) mentions fifteen different research clusters within sustainability science but so far, none are focused on mindfulness or mental well-being. It was in 1999, that for the first time an academic and peer-reviewed journal article referred to the term “mindfulness” and “sustainability” together (Jacob & Brinkerhoff, 1999). In their article Jacob & Brinkerhoff (1999) use the theoretical groundwork of deep ecology to study mindfulness and subject well-being within the sustainability movement. Deep ecology refers to Eastern religions and meditation approaches to overcome the separation between humans and nature (Thiermann & Sheate, 2021). The study concluded that mindfulness is associated with a higher quality of life as well as ecological values, which may contribute to promoting non-materialistic well-being, incentivizing a more sustainable lifestyle (Jacob & Brinkerhoff, 1999).

Since 2009, 10 years after the first mentioning of “mindfulness” in relation to “sustainability” in academia, the number of publications on mindfulness has quadrupled and the empirical evidence for their connection is increasing (Thiermann & Sheate, 2021; Valerio, 2016). This emerging transdisciplinary field attracts attention from various domains and research areas (Valerio, 2016). The American Psychological Association investigated the influence of mindfulness to increase awareness in order to ease consumerism and foster sustainable consumption (Bjelajac et al., 2021; Fischer et al., 2017; U. B. Thiermann & Sheate, 2022). A follow up study showed that intrinsic values orientation and mindfulness can be linked with subjective well-being and pro-environmental behaviour (PEB) indicators (Brown & Kasser, 2005). Ericson et al. (2014) provided the first comprehensive literature review on mindfulness and sustainability. Their study identified key arguments linking both concepts contributing to a change at the individual level. Furthermore, it is argued in the study that emotional awareness, self-regulation, and greater attention could possibly disrupt unsustainable habits (Ericson et al., 2014). So far, the research has shown that mindfulness may increase subject well-being, prosocial behaviour, awareness of one’s intrinsic values and strengthen PEB, all implying a change at the individual level (Ericson et al., 2014).

As the notion of mindfulness attracts more attention and gains in recognition, a growing base of researchers, from various fields of studies, started exploring the benefits of mindfulness at the society level, within different environments (Ericson et al., 2014; U. Thiermann & Sheate, 2021; Sajjad & Shahbaz, 2020). Wamsler et al. (2017) published an article exploring how the change at the individual level can influence and emphasize the change at all other levels of society. Some studies further investigate the implementation of mindfulness within education for sustainable development as well as in mainstream education (Delgado-Montoro et al., 2022; Frank et al., 2019; Pacis & VanWynsberghe, 2020; Wamsler, 2019, 2020). Other studies research the implementation of mindfulness within organizations, as mindfulness could have a beneficial influence on organizational productivity, creativity, and employees' well-being; while being a new strategy to deal with global sustainability issues (Haider et al., 2022; Sajjad & Shahbaz, 2020; Siqueira & Pitassi, 2016; Wolever et al., 2018). Since Jacob and Brinkerhoff research in 1999, additional research has investigated the positive influences of mindfulness on PEB and nature connectedness (Andrews, 2018; Ericson et al., 2014; Fischer et al., 2017; Haider et al., 2022).

Most of the early studies highlight the complex linkages between mindfulness and sustainability; however, empirical evidence is still missing to fully understand and explain their relationship and its integration in SS (Ericson et al., 2014; Wamsler et al., 2017, 2021). Wamsler et al. (2017) acknowledges the growing contribution in the field, however their literature review revealed the scarce and fragmented research on the topic and highlights a "blind spot in the academic debate on mindfulness in sustainability research" (Wamsler et al., 2017, p.145). Further critical validation and empirical testing are necessary to move forward (Wamsler, 2018). Research needs to use different method designs and approaches, as well as different data collection methods and sample sizes, to cross-check results and get more in-depth findings (Fischer et al., 2017; Wamsler et al., 2021).

2.3 Universities role for sustainability science and societal transformation

Universities are the lead and main contributing actor in the field of SS, and so it is essential to investigate which universities engage and lead the research on mindfulness within SS (Stephens et al., 2008; Whitmer et al., 2010). Universities are a powerful generator of social and technological innovation essential to develop solutions and drive societal transformation (Disterheft et al., 2013; Kates et al., 2001; Trencher et al., 2014). Their non-profit focus and their capacity to foster long-term thinking is critical for the development of SS (Stephens et al., 2008; Trencher et al., 2014). Universities have achieved their first and second mission in teaching and fostering research about SS. They have started integrating sustainability within educational programs and curriculums to promote sustainable

values and principles to the next generations (Clark & Dickson, 2003; Kates et al., 2001; Stephens & Graham, 2010). Educating the future generations of sustainability scientists is an essential step to achieve the paradigm shift needed for sustainable development and society transformation (Disterheft et al., 2013; Killion et al., 2018; Whitmer et al., 2010). Additionally, they have been supporting the growing flow of research and publications within specific journals and disciplines fostering the development of mindfulness within SS (Clark & Dickson, 2003; Frei et al., 2022; Yarime et al., 2012). Nevertheless, there is a growing consensus pushing universities to go even further and tie their overall research agendas to real world sustainability issues and regional development needs (Crow, 2010; Frei et al., 2022; Trencher et al., 2014). Yarime et al., (2012) even talk about an upcoming “third academic revolution” where universities would be transformed into institutions committed to address the urgent sustainability issues. According to the author, this transformation would have the significant impact sustainable development is promising to society by deepening and expanding the collaboration and networking with society’s stakeholders (Crow, 2010; Yarime et al., 2012).

Many scholars have argued the importance and the significance of cross-sector university collaboration to contribute to local and regional sustainability transitions (Stephens et al., 2008; Yarime et al., 2012). Local governments, industries and civic organisations can support universities in materialising societal transformation to achieve sustainable development in a specific location or region, always with the ambition of influencing broader society (Talwar et al., 2011; Trencher et al., 2014). Thus, researchers have attempted to develop a term to describe this transdisciplinary process built upon sustainability values (Trencher et al., 2014). It aims at incorporating the recent, ambitious, and systematic synergising of research and social engagement in driving technological, social and environmental transformation (Trencher et al., 2014). The main terms used over the last decade are “university-community partnerships for sustainability” (Stephens et al., 2008), “urban sustainability extension service” (Molnar et al., 2011), “regional sustainability initiatives” (Zilahy and Huisingsh, 2009), and “co-creation for sustainability” (Trencher et al., 2014). The term “co-creation for sustainability is the most recent term, and the one emphasizing the most the co-creation process of permanent transformation; in opposition to the co-production of scientific knowledge which does not necessarily guarantee transformation (Trencher et al., 2014; Frei et al., 2022). For “co-creation for sustainability” to happen, it is essential to deepen the inter- and transdisciplinary approach involving different universities’ departments, multi-stakeholders, and actors from outside academia (Talwar et al., 2011). Then, the research needs to find out the type of joint initiatives that best contribute to accelerating local, regional and global transition processes; what mechanisms and research methods are the most applicable; what factors contribute to, or obstruct the successful implementation of solutions; what are the next steps to incentivise and promote transdisciplinary in universities and other institutions (Pacis & VanWynsberghe, 2020; Yarime

et al., 2012). Thus, universities need to commit to their mission of interacting with society and further developing their “co-creation for sustainability” (Frei et al., 2022; Pacis & VanWynsberghe, 2020).

3 Methodology

3.1 Epistemological and ontological considerations

The following study follows an inductive approach to theorize and conceptualize the research. An inductive approach lets the data lead the theoretical framing instead of having a pre-established theory which guides the research design (Bryman, 2012; Graneheim et al., 2017; Kondracki et al., 2002). Thus, the interpretation and observations made throughout the data analysis will be guiding the study. The epistemological consideration of this research is based upon an interpretivism philosophy which take the stance that reality is subjective, multiple, and socially constructed (Bryman, 2012). It aims at understanding how a specific social group, here the sustainability scientists, interpret the environment around them, such as the notion of mindfulness in SS. Therefore, the interpretivism philosophy allows the researcher to come up with unexpected and/or surprising findings. The ontological considerations are at the baseline of the research question formulation and structure (Shannon-Baker, 2023). The aim of the study and its research questions takes a constructivist position. Constructivism asserts that “social phenomena and their meanings are continually being accomplished by social actors. [...] phenomena and categories are not only produced through social interactions, but they are in a constant state of revision” (Byrman, 2012 p.33). Thus, a constructivist ontology allows the researcher to present a specific version of reality at a specific point in time without making it definitive (ShannonBaker, 2023).

3.2 Research strategy and research design

The study draws on a qualitative research strategy with a case study design. A case study design is employed to allow an in-depth investigation highlighting nuances in the results and patterns of association (Bryman, 2012). To do so, the data set needs to meet three key requirements (Bryman, 2012; Graneheim & Lundman, 2003). First, it is necessary for this study to select multiple articles which can give an overview of the field of mindfulness within SS, to allow more accurate findings and finer distinctions in the results. Using a systematic literature review as the data collection method (see *section 3.3*) enables one to systematically select all the articles meeting the pre-assessed criteria, thus limiting selection biases (Ham-Baloyi and Jordan, 2015). Second, the dataset of articles needs to be selected during the same period of time. The articles selected were published during the last ten years and were analysed at the same time, from February to April 2023, allowing for a consistent approach.

Third, it is essential for the data selection process and analysis to follow a systematic and standardized method to evaluate variations and highlight patterns (*see section 3.2.4*) (Graneheim et al., 2017). It is adopted in this study through a systematic literature review and a content analysis, which enables data to be classified following codes, proportions, and ranking.

3.3 Data collection method: systematic literature review

A systematic literature review method is chosen for gathering the data due to its rigorous and systematic method (Ham-Baloyi and Jordan, 2015). It allows an in-depth assessment of all the relevant articles of a chosen topic as well as the identification of under-researched areas (Anlesinya & Susomrith, 2020). Considering that different fields have studied mindfulness within SS and from very different perspectives, this method allows the discovery of all relevant literature across different fields. Its systematic approach is based on keywords and filters, which reduces potential selection biases (Haddaway et al. 2015).

The first phase of the systematic literature review is the data identification achieved with the formulation of a search string (Thiermann & Sheate, 2021). A keyword-based document selection and specific filters are selected to identify the relevant literature for the topic. The search string used is as follows (“mindful*” AND “sustainab*”) AND (“transdisciplinary” OR “interdisciplinary”). All the different declinations of the words mindful and sustainable are included in the search and so the asterix (“*”) was used. Additionally, the keywords “transdisciplinary” and “interdisciplinary” were added to ensure that the articles are published within the field of SS. It is essential to keep in mind that although many articles mention the keyword “sustainability” in their title or abstract, they do not always fall into the field of SS (Kajikawa, 2008). Most tend to take a sustainability lens onto traditional disciplines (Kajikawa, 2008; Spangenberg, 2011). Therefore, sustainability science is differentiated from sustainability by systematically using an inter- or trans-disciplinary approach in its research. The keywords were filtered to appear either in the titles, the abstracts, and/or the articles’ keywords (Bouncken et al., 2015). Further filters are added to increase the accuracy of the results using peer reviewed articles and a specific time frame. Thus, only articles published in international peer reviewed journals between 2012 and 2022 and written in English were considered. Peer reviewed articles were selected as it is considered the most reliable source (Bouncken et al., 2015). The time frame allowed to increase the accuracy of the findings as the field is quite recent. According to Harzing and Alakangas (2016), literature reviews within sustainability science should use at least three databases to get a good coverage and allow for cross-disciplinary comparison. Thus, the search string was run through eight different databases. Out of the eight, five databases gave relevant results; the other ones were

excluded due to no results or solely duplicates. The databases kept were MDPI, Scopus, Web of Science, Sustainability Science Journal of Link Springer, and LubSearch. At this stage, a total of 97 articles were found (see Figure 1 inspired by Haider et al., 2022).

The second phase of the systematic literature review regards the initial data filtering. The articles' duplicates are excluded, as well as books, and papers that are not accessible. The books were excluded from the database as some were not fully retrievable, and others only mentioned specific book chapters. Including solely research papers has been considered critical to ensuring a systematic analysis of comparable data in the overall database. Additionally, non-accessible articles are excluded, resulting in a total of 72 articles (see Figure 1). Once the initial filtering is done, the secondary filtering takes place. The systematic literature review selects all the articles that meet the previously identified requirements, however, not all the articles meeting these criteria fall within the scope under-research which is SS (Thiermann & Sheate, 2021). Thus, these false positive results are excluded after a manual abstract screening, leading to the inclusion of 22 articles in the review (see Figure 1 & Table 1).

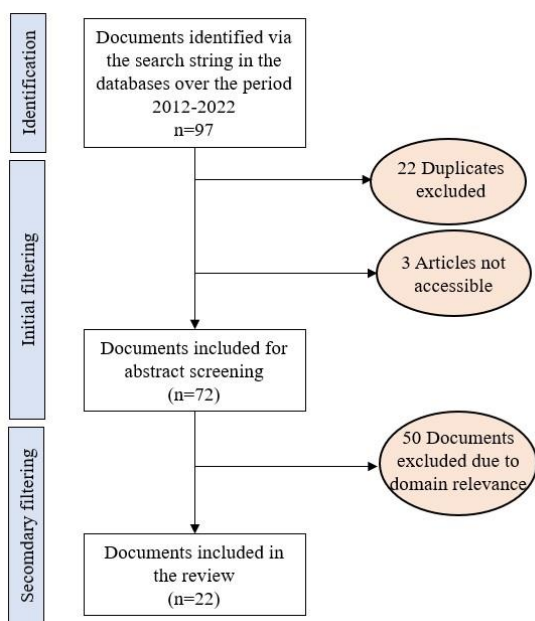


Figure 1. PRISMA flow chart of the systematic literature review process (source: author based on Haider et al., 2022)

Authors	Titles	Years	DOI
Benz, A.; Formuli, A.; Jeong, G.; Mu, N.; Rizvanovic, N.	Environmental psychology: Challenges and opportunities for a sustainable future	2022	10.1002/pchj.585
Ejelajac, D.; Berčan, B.; Kovatić, S.	Dark skies and dark screens as a precondition for astronomy tourism and general well-being	2021	10.1007/s40568-020-00189-9
Delgado-Montoro, Roberto; Ferriz-Valero, Alberto; García-Taibo, Olalla; Baena-Morales, Salvador	Integrating Mindfulness into the Subject of Physical Education—An Opportunity for the Development of Students' Mental Health	2022	10.3390/healthcare10122551
Haider, Murtaza; Shannon, Randall; Moschis, George P.	Sustainable Consumption Research and the Role of Marketing: A Review of the Literature (1976–2021)	2022	10.3390/su14073999
Hensley, N	Educating for sustainable development: Cultivating creativity through mindfulness	2020	10.1016/j.jclepro.2019.118542
Howell, RA	Engaging students in education for sustainable development: The benefits of active learning, reflective practices and flipped classroom pedagogies	2021	10.1016/j.jclepro.2021.129318
Kaufmann, Nadine; Sanders, Christoph; Wortmann, Julian	Building new foundations: the future of education from a degrowth perspective	2019	10.1007/s11625-019-00699-4
Lang, D.J.; Wiek, A.; von Wehrden, H.	Bridging divides in sustainability science	2017	10.1007/s11625-017-0497-2
Lee, PE; Lorenzo, E.; Szeszulski, J; Arriola, A; Bruening, M; Estabrooks, PA; Hill, J; Marsiglia, FF; O'Connor, T; Pollins, KS; Shaibi, GQ; Soltero, E; Todd, M	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	10.1016/j.cct.2018.12.003
Pacis, M.; VanWynsberghe, R.	Key sustainability competencies for education for sustainability: Creating a living, learning and adaptive tool for widespread use	2020	10.1108/JSHE-12-2018-0234
Renowden, C.; Beer, T.; Mata, L.	Exploring integrated ArtScience experiences to foster nature connectedness through head, heart and hand	2022	10.1002/pan3.10301
Sajjad, Aymen; Shahbaz, Wahab	Mindfulness and Social Sustainability: An Integrative Review	2020	10.1007/s12055-020-02297-9
Schroder, A	Aesthetic strategies to explore beyond the models of sustainable development: An analysis of Lisa Simpson's Musical Sewing	2018	10.1002/sd.1729
Siqueira, R.P.; Pitassi, C.	Sustainability-oriented innovations: Can mindfulness make a difference?	2016	10.1016/j.jclepro.2016.08.056
Thiermann, UB; Sheate, WR	How Does Mindfulness Affect Pro-environmental Behaviors? A Qualitative Analysis of the Mechanisms of Change in a Sample of Active Practitioners	2022	10.1007/s12671-022-02004-4
Thiermann, UB; Sheate, WR	Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour	2020	10.1016/j.ecolecon.2020.106668
Thiermann, UB; Sheate, WR	The Way Forward in Mindfulness and Sustainability: a Critical Review and Research Agenda	2021	10.1007/s41465-020-00180-6
Thiermann, UB; Sheate, WR; Vercaemmen, A	Practice Matters: Pro-environmental Motivations and Diet-Related Impact Vary With Meditation Experience	2020	10.3389/fpsyg.2020.584353
Wamsler, Christine	Mind the gap: The role of mindfulness in adapting to increasing risk and climate change	2018	10.1007/s11625-017-0524-3
Wamsler, Christine; Brossmann, Johannes; Henderson, Heidi; Kristjansdotir, Rakel; McDonald, Colin; Scarampi, Phil	Mindfulness in sustainability science, practice, and teaching	2017	10.1007/s11625-017-0428-2
Weber, H; Loschelder, DD; Lang, DJ; Wiek, A	Connecting consumers to producers to foster sustainable consumption in international coffee supply - a marketing intervention study	2021	10.1080/0267257X.2021.1897650
Wong, C.W.; Carlson, C.H.	Resilience within and resilience without: Mindfulness and sustainability programming using an embedded engineering librarian approach	2020	10.18260/1-2--35153

Table 1. List of the articles included in the study with their respective authors, date and DOI (source: author based on the systematic literature review)

3.4 Data analysis

3.4.1 Demographic data analysis

The demographic data analysis aims to answer the first research question to give an overview of the current state of the field. To do so, the study examines the articles' publication date; the number of universities contributing per country (based on the authors' affiliated university as provided in each published article); the number of authors contributing per country (based on the authors' affiliated university's location as opposed to the authors' nationality); the universities' departments studying mindfulness within SS (based on the authors' affiliated departments as provided in each published article); and the authors' gender distribution. For this analysis all the authors and co-authors of each article were referenced in Excel with the aforementioned variables (publication date, universities, departments, countries, gender) (see appendix C). This data is retrieved using the universities websites, and the journals' publication pages such as ResearchGate (*ResearchGate*, n.d.) or SciProfiles (*MDPI SciProfiles*, n.d.). Considering universities' departments may refer to different names and combined different disciplines together, the departments were streamlined and classified based on the field they referred to according to the level 2 of the Universitetskanslersämbetet (UKÄ) standard for Swedish categorization for research topics (Rokaya et al., 2017; Statistikmyndigheten, 2016). UKÄ standard is used as it is responsible to analyse and establish official statistics on universities and their development, as well as exercise legal supervision over them (Regeringskansliet, 2014). The gender variable required

to be cautious. The authors are first found through the referenced article on ResearchGate, SciProfiles, their universities' website and/or on LinkedIn. When possible, two of these reference websites are used to cross-check the personal information and ensure the credibility of the data. The gender, to which the authors refer themselves to, could be stated with confidence when their gender or their pronoun is clearly stated on LinkedIn or Facebook. If this information is not available, then the gender is based on the pronoun used in the description of the authors' work on ResearchGate and/or on their universities' website. It is assumed that their work descriptions have been written by themselves or has been approved by them. For one person none of these two methods worked and their gender was kept as unknown.

3.4.2 Content analysis

The qualitative content analysis method meets the requirement of my research design as it is adequate to study different fields of research and methodological approaches (Graneheim & Lundman, 2003). The qualitative content analysis emphasizes the differences and similarities between categories, "a category is a group of content that shares a commonality" (Graneheim & Lundman, 2003, p.3) to easily compare the manifest content of the articles (DeFranco & Laplante, 2017; Graneheim et al., 2017). The manifest content focuses on what the text says, by describing what is visible in the text and the obvious component (Kondracki et al., 2002). It enables the researcher to study many articles efficiently to get an overview of the field and assess if the research is scattered. This method enables to understand the evolution of a field by mapping the research, highlighting the various methods used, finding the key gaps as well as the main topics tackled in the literature.

According to Graneheim & Lundman (2003), the first step in the content analysis is the process of reduction which refers to reducing the size of the literature's content without looking at the quality (Cho & Lee, 2014). The content analysis process requires to select a protocol to code and categorise the data (Bryman, 2012; Graneheim & Lundman, 2017). The establishment of the protocol was carried out in Nvivo using categories, called nodes on the software, to categorise a constellation of words or phrases relating to the same key meaning (see Figure 2) (Papaioannou et al., 2010). Nvivo was selected as it is a software that helps organize and structure qualitative content according to specific categories, while allowing the researcher to always go back to the original text (Kaefer et al., 2015). Categories mostly divide descriptive information and often include several sub-categories at various levels of abstraction. Krippendorff (1980) highlights that categories must be exhaustive and mutually exclusive. In other words, it is essential that all relevant information is suitable in one category and no data fit in between two categories or fit into more than one in order to get an accurate categorization of the data

(Cho & Lee, 2014; Graneheim & Lundman, 2003). The literature agrees that using codes to label a condensed meaning unit allows for examining the data in a different way (Graneheim et al., 2017). This process also enables the replication of a study by other researchers, thereby, increasing the validity, credibility, and trustworthiness of the research and its findings (Graneheim & Lundman, 2003).

In this study, the protocol’s nodes are identified based on the research questions. To examine the way the notion of mindfulness has evolved in the field of SS, the methodology used, and the gaps mentioned in the literature, six nodes are created (see Figure 2). The first category references the definitions of mindfulness found in text. The second one, addresses the topics the articles focus on, based on the theory section (see the result section 4.2.1 and Table 2). Due to the holistic aspect of SS and the integration of mindfulness research within a wider context, most articles touched upon two of these topics and thus both are referenced. The third node references the Research Methodologies, which included different sub-categorises such as Geographical locations, Measurement of mindfulness, Research approach, Research design and Data collection method. The Theory node references the mention of theories in the literature. Lastly, two more nodes address the gaps and the future recommendations stated in the literature.

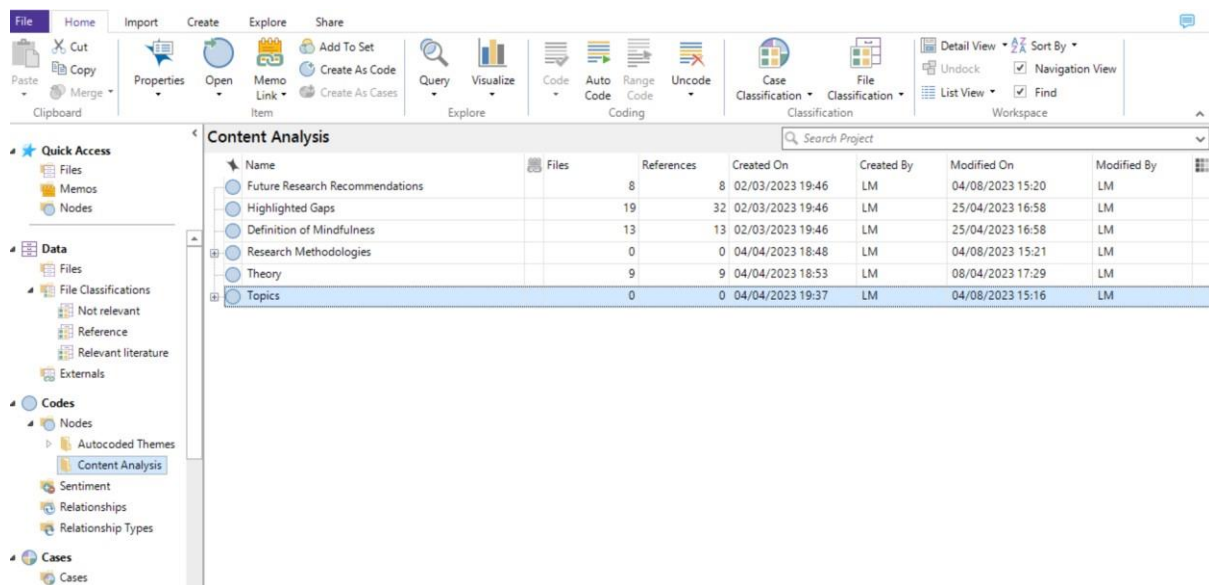


Figure 2. Print screen of Nvivo’s codes for the content analysis (source: author)

The second step of the content analysis is the “distillation process” (Graneheim & Lundman, 2003). The distillation process deals with analysing the quality of the text and understanding its abstract meaning (Cavanagh, 1997). The first part of the distillation process is done using the Word Frequency Query tool in Nvivo, to highlight the most frequent words used in the literature (see appendix A) as well as more specifically in the “Mindfulness definition” node (see appendix B). The keywords found in the definition

node are then highlighted in each definition following a colour coding system (see Appendix B). The distillation process for the other nodes is done using Excel. The other nodes are analysed and visualized using the filtering function in Excel to summarize the findings for each article and draw the final results (see Appendix D for the “Topics”; the Appendix E for the “Research Methodologies”, “Theory” and the aforementioned variables; and the Appendix F for the “Research gaps” and “Future research recommendations”).

The last step of the content analysis is the “aggregation process” which emphasizes the description and interpretation of the text using categories and themes (Barroso, 1997). The concept of themes is used to link the underlying meaning together with categories (Graneheim et al., 2017). The theme gives an overview of the categories allowing to answer the question “how?”. The idea is to create a clear and structured categorization for data to be manageable and easily understood. At this stage, the data is gathered into different categories which allows then, for a better visualization of the findings using graphs. The most relevant findings from the “Research Approach” are selected and categorized into themes following the research approach, design and method used in the literature. These findings were then plotted into an alluvial diagram enabling a better visualization of the articles’ research methodologies (RAWGraphs, n.d.). For the “Research gaps” and “Future research recommendations” the data are plotted into a bar chart according to the number of mentions in the literature and classified following the topics of Mindfulness research in SS (see the result section 4.2.1 and Table 2). A third category was added to classify the gaps and future research recommendations regarding the methodologies.

3.5 Scope and data limitation

The scope of this study is to look at scientific literature published in the field mindfulness within SS, using selected keywords and filters applied in the search string. The selection criteria in a systematic review give a specific dataset of articles, which differ as soon as one of the filters is changed which implies data limitations. Regarding the keywords selected, only the word “mindfulness” is considered, when other similar concepts, such as inner-transformation or inner-world, exist. Mindfulness was chosen as it is an “older” concept in comparison to inner transformation for example, and thus more results are expected (Ives et al., 2020). Although the words “interdisciplinary” and “transdisciplinary” may sometimes be spelled in the literature with a dash, the search string only considered the spelling without it, as it is the official spelling according to Cambridge Dictionary (Cambridge Dictionary, n.d.a, n.d.-b). To follow the research philosophy a period is selected, the latest decade 2012-2022 captures most of the publications however, potentially relevant literature published prior to 2012 are not

considered. Similarly, only English literature was considered, meaning that potentially relevant researched published in another language is disregarded. Additionally, the choice of including only peer-reviewed articles is done to ensure a systematic analysis of them. This means that books are excluded which could have repercussions on the findings, as they could have given a more in-depth perspective on the topic.

Regarding the demographic and content analysis certain limitations also need to be acknowledged. This study includes a total of 22 articles; thus, it is difficult for this study to be conclusive. The findings are time bound as new papers are published constantly, especially in such a fast-growing field. Additionally, qualitative research always comes with a certain level of interpretation of the author's words, as a text has multiple meanings, there is always some kind of bias that can take place when analysing a text and coding it (Graneheim & Lundman, 2003; Graneheim et al., 2017). A content analysis allows an in-depth evaluation of a sample stating facts, however, no "why" question can be answered with that method. The protocol and categories used also come with limitations. For example, few articles mentioned with clarity their research approach, design, and method. Therefore, for most it was deduced according to the type of research and data collection they conducted. When looking at the universities departments it varies between universities, as some have a SS department when others do not. In practice, the SS departments can engage in interdisciplinary practices without officially including researchers from other departments which then is not considered in this study. Similarly, when it comes to the authors' genders it cannot be assumed that it is correct as it has not been confirmed by themselves. Although a case study design based on a systematic literature review and a content analysis using a specific protocol can be easily replicable, the validity can be limited (Bryman, 2012).

4 Results

The results are organised in two sub-sections. First the demographic data analysis is presented, followed by the content analysis.

4.1 Exploring the growing trend of mindfulness research within SS

This section presents the results found through the demographic analysis. First, it will investigate the temporal and geographical trend of the publications based on the universities' location and authors' place of work. It will then, investigate who is leading the research in terms of the authors' gender, and the universities' departments researching the topic of mindfulness within SS assessing if interdisciplinary research is applied among them.

4.1.1 Temporal and geographical trends

All the articles meeting the selection criteria were published between 2016 and 2022. Although the search time frame allowed for articles from 2012, none of the relevant articles for this study were published prior to 2016 (see Figure 3). From 2016 to 2019 few articles were published. However, in 2020 the number of publications within the field tripled and stayed rather high in 2021 and 2022.

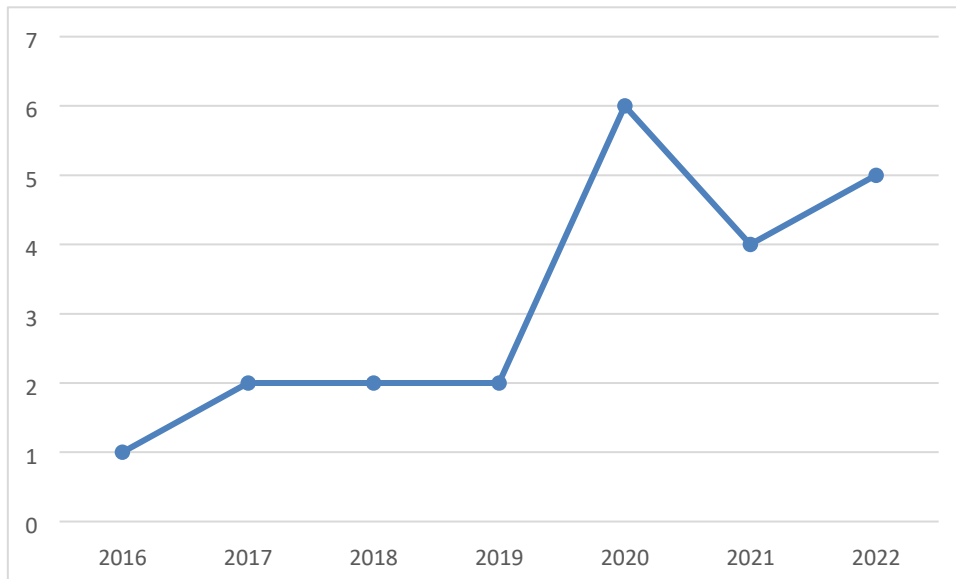


Figure 3. Number of publications per year (source: author based on the demographic analysis of the systematic literature review)

When looking at the geographical trend, countries from all around the world have contributed to research the field of mindfulness within SS. Although a total of thirteen countries from North and South America, Europe, Asia, and Oceania have contributed to the 22 publications included in this analysis, 90% of the publications were published by universities in the global north (see Figure 4). Additionally, the universities from which the articles were published from, are included to see if all the publications in a same country come from the same university, or if multiple show interest in the topic. These results have shown that the leading country with the most authors and universities contributing is the USA (with 24 authors and 9 contributing universities). From these nine universities a clear hub can be identified in the Arizona State University which include 14 authors in the field. Then, European countries follow, with in the lead Germany (with 15 authors and 4 contributing universities) and the UK (with 10 authors and 2 contributing universities). Thus, the publications included in the database come from a diversity of universities and countries.

Number of Universities contributing per country

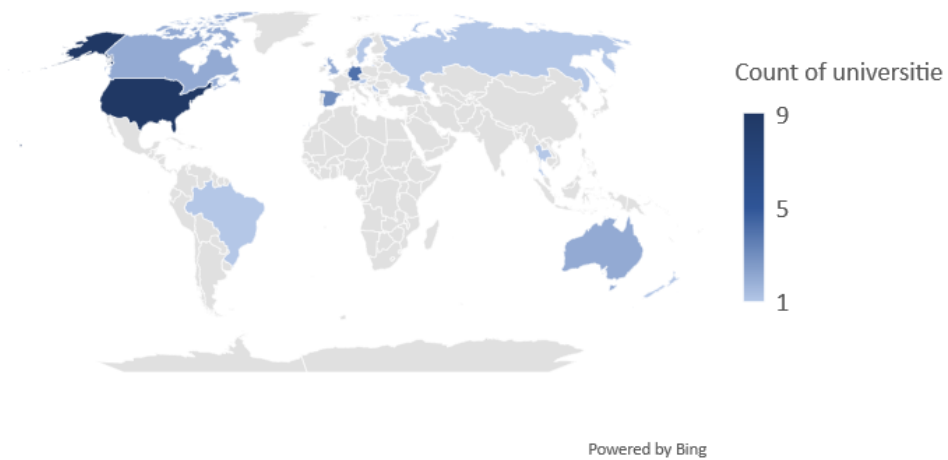


Figure 4. Number of universities contributing per country (source: author based on the demographic analysis of the systematic literature review)

The following trend looks at the number of authors contributing to the field in each country, regardless of the universities they work for. It gives a clear trend of the authors' interest in the topic over time, according to the country and continent they are working in. Thus, we can see that North America and Europe have been the regions hosting the largest number of researchers. It is more recently, since 2020, that researchers based in Asia and Oceania have started contributing to the research field. In contrary, in 2022, the USA have not published a single article. Overall, although the global north is the largest contributing region, there is an increasing number of authors from a larger number of countries and continents publishing articles about mindfulness within SS in the world (see Figure 5).

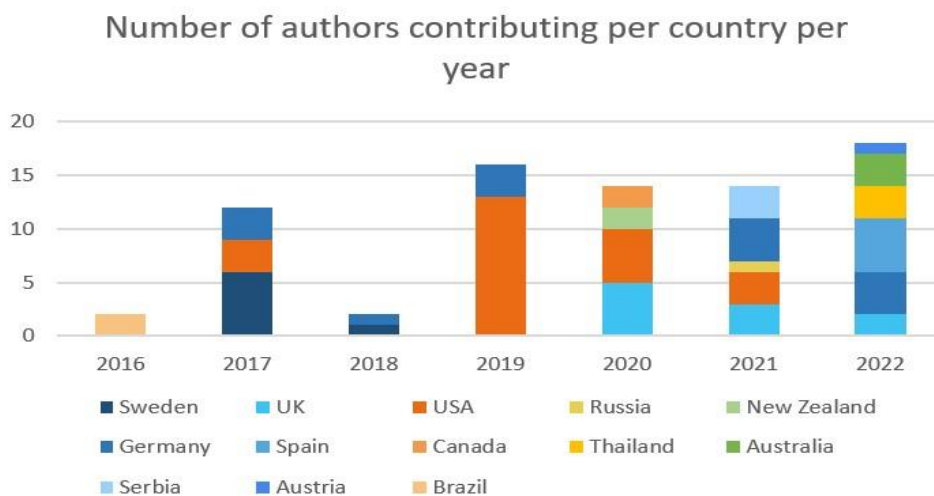


Figure 5. Number of authors per country per year (source: author based on the demographic analysis of the systematic literature review)

4.1.2 Author's gender and interdisciplinary research trends

First, this section explores the researchers' collaboration with one-another and the authors' gender trend. In this study, there is a total of 59 authors and co-authors for 22 articles. Two of these authors have written together four of the papers present in the database (Thiermann Ute B and Sheate William R), and only three other authors appear twice in the database (Wamsler Christine, Lang Daniel J., Wiek Arnim). The Figure 6 shows the distribution of the lead authors and co-authors' gender according to the year in which their article was published (see Figure 6). Overall, there is almost parity between the number of female and male authors in the database, with twenty-eight female and thirty male, and one unknown. However, when it comes to the lead authors there is twice the number of women than men, with fifteen women for seven men (see Figure 7). When looking over time, the trend is not so linear. In 2016 there were no female authors, nevertheless in 2018 and 2019 they became a majority as co-authors and lead authors. In 2020 and 2021 women remain the main lead authors, but parity was reached within the co-authors. In 2022, men authors are more present as co-authors and lead authors. The field attracts quite many researchers, although it was dominated by women over a couple of years, it seems like this trend is evolving and that both genders show a growing interest into the field.

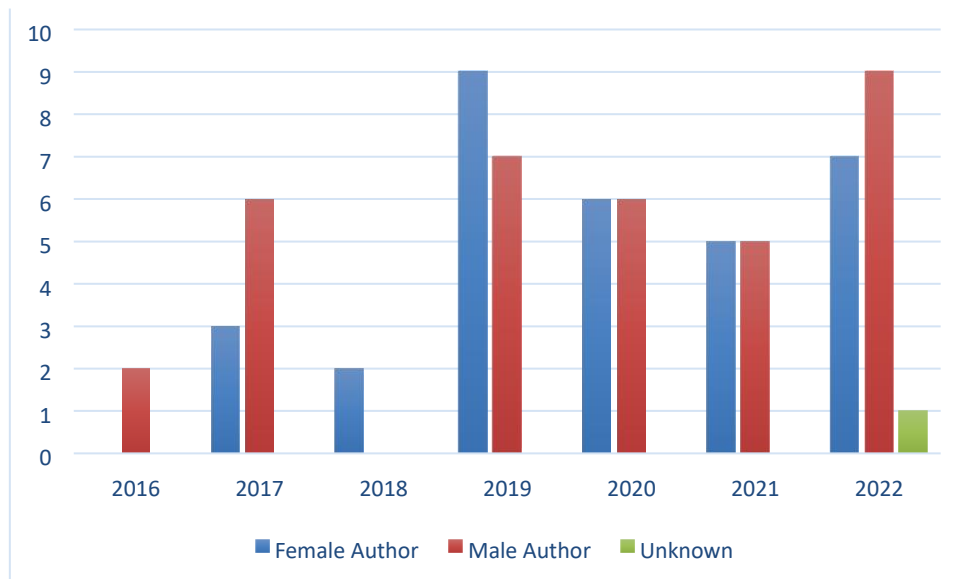


Figure 6. Authors' gender distribution over time (source: author based on the demographic analysis of the systematic literature review)

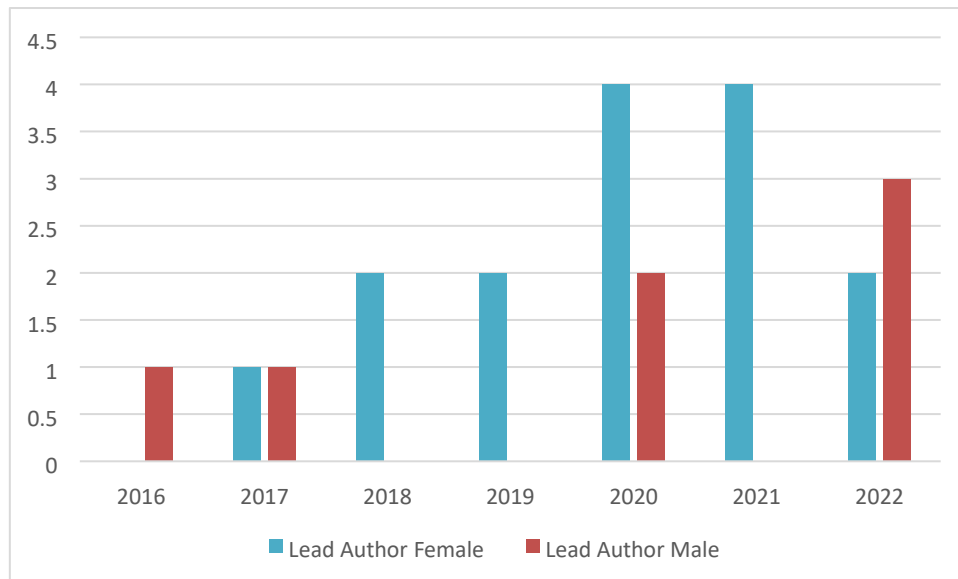


Figure 7. Lead author’s gender distribution over time (source: author based on the demographic analysis of the systematic literature review)

Second, we will examine the universities’ departments contributing to the research and the interdisciplinary research trend in the dataset (see Figure 8). Overall, and as expected the main research category looking at mindfulness within SS is, according to the UKÄ standard, “Other Social Sciences” which includes Sustainability Science. Other main categories are “Health Science”, “Environmental Policy”, and “Economic and Business”. In 2016, “Psychology” stood out as the only department looking at mindfulness within SS, as depicted in Figure 8. However, by 2022, eleven new fields of study have explored mindfulness, and psychology only contributes to around a fourth of the investigated mindfulness studies within SS. SS field has been contributing since 2017, and while in its early years it was the main contributing field, since 2019 the share of interest attract twice as many departments (4 in 2019 to 8 in 2022). This shows a growing diversity of departments showing interest and contributing to the field of mindfulness within SS over time.

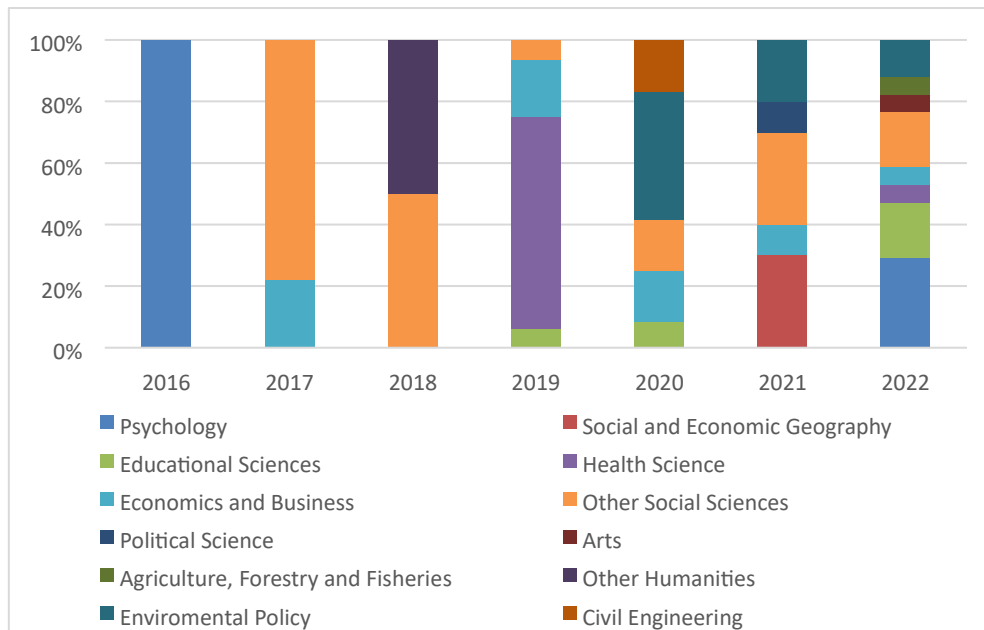


Figure 8. Universities’ Departments researching mindfulness within SS (source: author based on the demographic analysis of the systematic literature review)

Considering the increasing number of departments contributing to the field, it could be expected that much interdisciplinary research have taken place. However, out of the seventeen articles written by more than one author, only five are written by authors from different disciplines. Although a slight improvement can be noticed over the years, as in 2019, 2020, and 2021 one interdisciplinary article was published per year, and in 2022 this number increased to three. Nonetheless, most articles continue to be authored by researchers from the same department, indicating a lack of interdisciplinary collaboration among the authors.

4.2 Exploring the topics, methodologies and research gaps of mindfulness research within SS

This section presents the results of the content analysis. First will be presented the topics that can be found in the literature, then comes the definitions of mindfulness and the research methodologies used in the database. Finally, the research gaps stated in the literature will be presented.

4.2.1 Mindfulness as a driver of change

To start with, a word frequency count, illustrated here as a Word Cloud includes the 25 most common words used in the literature (see Figure 9) (see appendix A). Most of the words refer to the notion of development and transformation. Listed in descending order of frequency, these terms are: “changing”, “develops”, “practice”, “transforms”, “approach”, “knowledge”, “differently”, “system”, “impact”. The notion of society is mentioned with “social”, “valuing”, “participative”, “community”.

The three main topics found using the Word Cloud are: *Education* with the words “educators”, “learning”, “practice” and, *PEB* and *Nature Connectedness* with “environmentally” and “naturing”.



Figure 9. Word Cloud of the most common words found in the literature (source: author based on the content analysis)

The theory section about Mindfulness in sustainability science research (2.2), highlights different research topics that echoes with some of the Word Clouds’ findings and enable to categorise the articles’ topics according to it (see Table 2). A summary of the literature review, based on the research history of mindfulness within SS, enabled this study to highlight two main categories: research that looks at mindfulness at the individual level and research that looks at mindfulness at a societal level. The literature review allowed to identify four sub-topics at the individual level (see Table 2). The first topic, which is the starting point in the field, investigates the benefits of mindfulness for *Subject wellbeing*. This includes the health-related benefits of mindfulness for the individual, such as dealing with anxiety and depression, but also reconnecting with community and developing healthy relationships, also referred to as pro-social behaviours (Brown & Kasser, 2005; Lee et al., 2019; Sajjad & Shahbaz, 2020). The second topic is *Awareness*. Awareness relates to the personal, affective, spiritual, and emotional affinity people share with the natural world (Bjelajac et al., 2021; Renowden et al., 2022; Schroder, 2018). It also addresses one’s capacity to connect with intrinsic values and recognize the interrelation between the micro and the macro environment (Wamsler et al., 2017). The third topic regards the individual use of mindfulness to develop *PEB* to limit one’s impact on the environment. The fourth one is *Nature connectedness*, which implies bridging the gap between human and nature (Andrews, 2018; Renowden et al., 2022; U. Thiermann & Sheate, 2022). It favours individual’s understanding of their connection and dependency with the surrounding environment.

There are three main topics that look at the impact mindfulness can have at a societal level (see Table 2). The first centre of interest focuses on the role of *Education*. Mindfulness integration within the educational system can be a tool to help future actors better understand and implement change in society (Delgado-Montoro et al., 2022; Howell, 2021; Kauffman, 2009; Pacis & VanWynsberghe, 2020).

Second, mindfulness is also looked at from an *Organizational productivity* perspective (Sajjad & Shahbaz, 2020; Siqueira & Pitassi, 2016). It is seen by many as a tool to help companies transform their business model, help their employees, and adapt their economy within a transitioning society. Lastly, and maybe the most common and important topic this field addresses is *Mindfulness as a driver of change* (Schroder, 2018; Wamsler, 2018). Scholars research if the concept of mindfulness could be linked to sustainability at large and thus, help us transform our society, better adapt to current sustainability challenges, induce creativity and new perspectives (Hensley, 2020; Siqueira & Pitassi, 2016).

Change at the Individual Level	Subject well-being
	Awareness
	Pro-environmental behaviours
	Nature connectedness
Change at the Society Level	Education
	Organizational productivity
	Mindfulness as a driver of change

Table 2. Topics identifies based on the literature review of Mindfulness in Sustainability Science Research (source: author based on the Theory section 2.2)

Therefore, the content analysis shows that at the society level, two main topics are tackled in the literature database (see Figure 10). First, it is *Mindfulness as a driver of change* which is addressed by almost half of the articles. Second, it is the *Education* which is a centre of interest for almost a third of the articles. This topic is often discussed in relation to the topic *Subject well-being*, the second largest topic at the individual level as it can help implement a positive and beneficial change for the individuals. The fourth and last main topic, also at the individual level, is PEB. An additional category was added when analysing the literature, as one article focused only on the theoretical basis of inter- and transdisciplinary for SS and mindfulness.

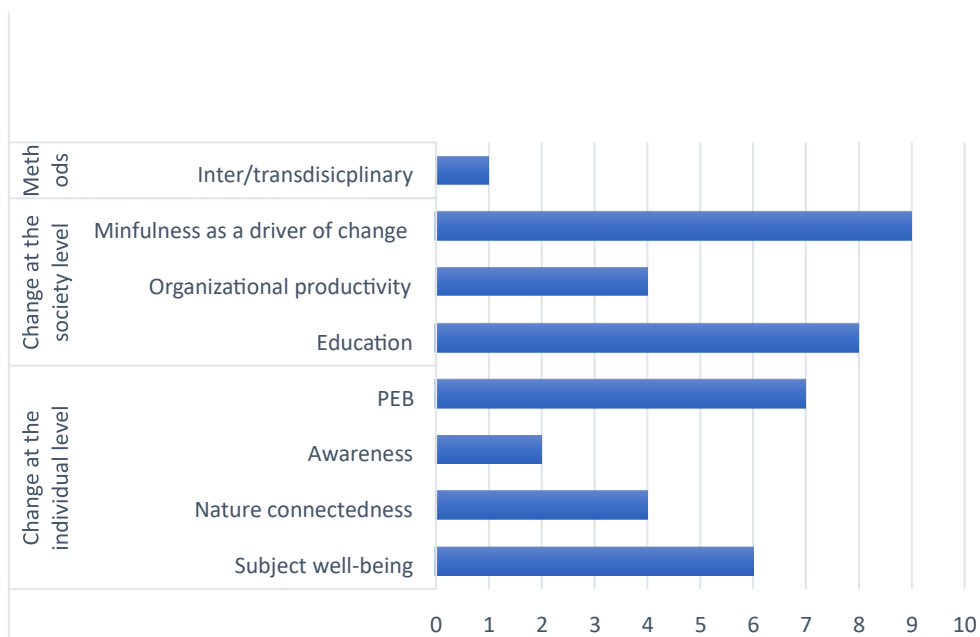


Figure 10. Topics researched in the literature (source: author based on the theory section 2.2 and the content analysis)

4.2.2 Defining Mindfulness and examining the research methodologies

Firstly, this section looks at the definition of mindfulness used in the literature. Out of the 22 articles, 12 do not actually define mindfulness, instead, they explained its benefits and how it is used. For the 10 articles that do define mindfulness, Kabat-Zinn articles are referenced four times (Siqueira & Pitassi, 2016; Wamsler, 2018; Wamsler et al., 2017; Weber et al., 2021). Otherwise, a variety of sources are used from articles published since the 1980s, and many did come up with their own definition. Thus, for the existing definitions, some keywords could be highlighted using a world cloud (see Figure 11) and colour coding (see appendix B). Every definition of mindfulness includes either the word “attention”/“ attentiveness” or “awareness” which are synonyms for one another. Then, almost all of them set this awareness in the context of the “present moment”. It is either referred to as “present

reality”, “present in the moment”, or “in the present”. Furthermore, many adjectives are used to qualify this awareness in the present moment, such as “non-judgmental” or “open”/“openness”.

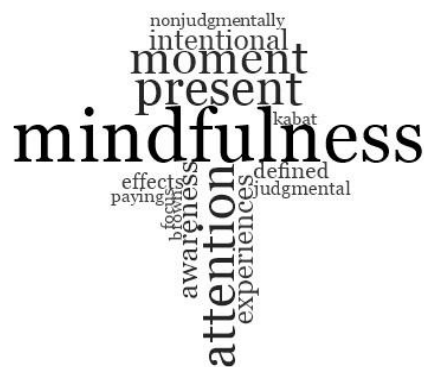


Figure 11. Word Cloud of the most common words found in the definitions of mindfulness (source: author based on the content analysis)

Secondly, the research methodologies, investigate the research approach, design and methods used, the geographical location where case studies took place, the measurement of mindfulness applied, and the main theories or models mentioned in the literature (*see appendix E*).

The research approach, design and method used in mindfulness studies within SS are depicted in the alluvial diagram (*see Figure 12*). Most articles used a qualitative research approach and addressed mindfulness within SS from a theoretical perspective. The most common research design used in qualitative research was the case study design, using literature review as its main research method. Four of the qualitative research articles are in fact perspective papers, which use secondary data in their research method to base their theoretical framing and opinions. Seven articles used a quantitative approach either with a case study design or an experimental study design, based almost exclusively on interviews/surveys for their data collection. Additionally, only two quantitative research aimed to measure mindfulness. One article used two different measurements in their research, the Mindfulness at School Scale (MSS) and the Child and Adolescent Mindfulness Measure (CAMM). The other article used the Comprehensive Inventory of Mindfulness Experiences (CHIME).

The eight studies that conducted physical data collection happened only in the global north, with two in the UK (Edinburgh, and one at the country scale), two in the US (Boston and Phoenix), one in Germany (Hannover), one in Australia (Melbourn), one in Spain (Alicante) and one in Sweden (Lomma). Furthermore, these studies were conducted over a period of one day up to three months maximum. In addition, most articles did not mention or refer to any specific theories. For the ones who did, only two

articles referred to the same theory Education for Sustainable Development (ESD) (Delgado-Montoro et al., 2022; Kauffman, 2009) (see appendix E).

SS express the need to apply transdisciplinary research in this field and most of these articles mentioned the need to include actors from outside academia in their studies. Yet only one out of the 22 articles used a transdisciplinary research approach. This article, by Renowden et al (2022), included indigenous communities at the core of their study. They looked at a project led by the indigenous community aimed to develop a transdisciplinary project with the university of Melbourne. The other eight articles, which conducted physical data collection through interviews and/or surveys, based their study on students from kindergarten to college, at a fair about sustainable consumption, and through shared online survey to their population of interest, but no actors from outside academia were involved in their research. This information allows to investigate what research strategies, designs, and methods are most used within this field and compare with the stated gaps mentioned in the literature.

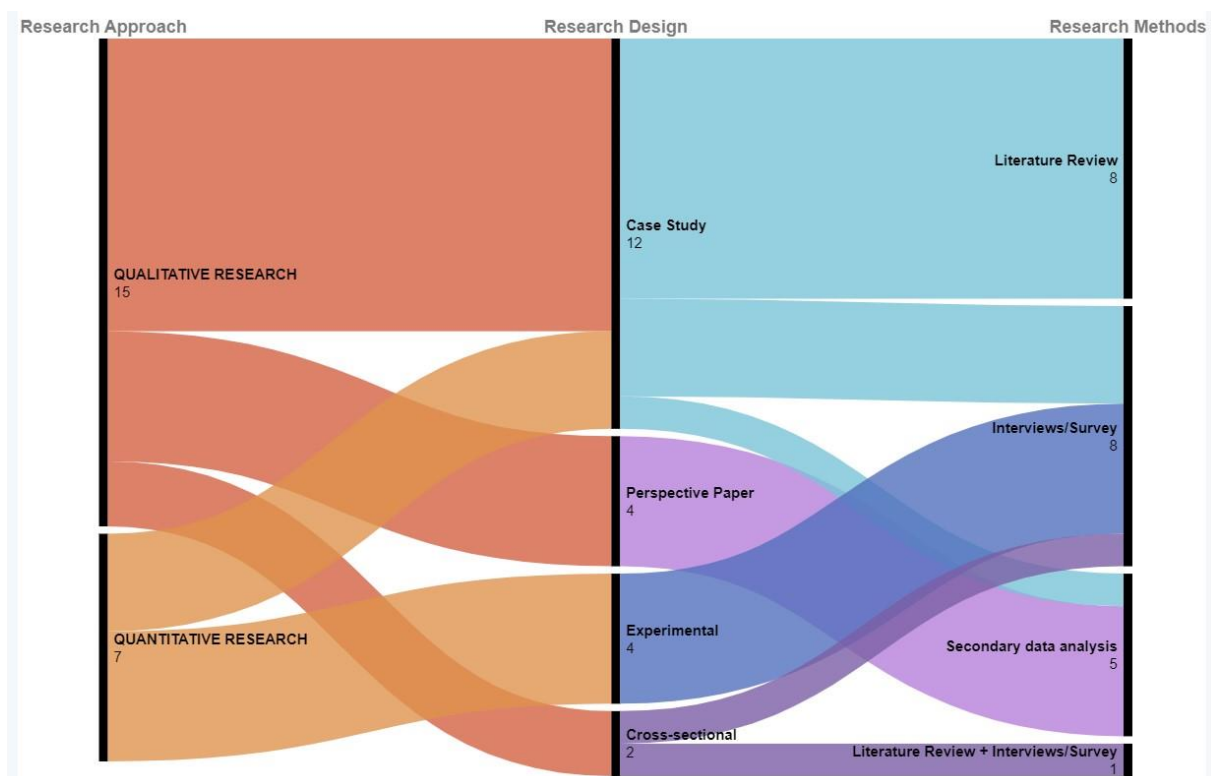


Figure 12. Alluvial diagram of the type of research conducted about mindfulness within SS (source: author based on the content analysis)

4.2.3 Stated research gaps

The key identified research gaps found in the literature on mindfulness within SS are presented in Figure 13. First will be presented the gaps mentioned in relations to the topic *Change at the society level*,

followed by the ones regarding the *Change at the individual level*, and lastly the gaps presented regarding the research methodologies (see appendix F).

The main research gap highlighted in the literature addresses *Mindfulness as a driver of change*, which is part of *Change at the society level*. Almost half of the articles mention the lack of empirical evidence to prove that mindfulness is linked to sustainability and that it could help achieve societal transformation by fostering sustainable behaviours (Sajjad & Shahbaz, 2020; Thiermann & Sheate, 2020, 2021; Wamsler, 2018). Although, most research highlights a potential positive link, no sufficient empirical evidence are supporting this assumption yet (Delgado-Montoro et al., 2022; Sajjad & Shahbaz, 2020; Thiermann & Sheate, 2020, 2021). The third main gaps highlighted in the literature regards the lack of research on the implementation of mindfulness into the *Education* system. The literature mentions the need to further investigate the link between mindfulness and creativity to educate future generations for sustainable development (Hensley, 2020; Howell, 2021). This evidence is essential to integrate mindfulness interventions in educational programs and curriculums (Lee et al., 2019; Thiermann & Sheate, 2020; Wong & Carlson, 2020). The next subtopic in this section is *Organizational productivity*. There, two articles mentioned the lack of research about mindfulness' benefits for organizational leaders and sustainable development, as well as the lack of research investigating social sustainability within organization and society at large (Sajjad & Shahbaz, 2020; Siqueira & Pitassi, 2016).

When it comes to Change at the individual level, only three subtopics were found instead of the four belonging to this category. The sub-topic that was not found is *Subject well-being*. This can be explained as it has often been explored in the past, thus it may not appear as a research gap for mindfulness within SS anymore (Bjelajac et al., 2021; Renowden et al., 2022; Sajjad & Shahbaz, 2020; Thiermann & Sheate, 2021). *PEB* is the second main gap stated in the literature with seven mentions. Similarly, there is a lack of empirical evidence to show and measure a potential link between mindfulness practices and PEB (Benz et al., 2022; Haider et al., 2022; Thiermann et al., 2020; Thiermann & Sheate, 2022; Weber et al., 2021). The next research gap highlighted, addresses the lack of understanding of deep interconnection between humans' emotions, values, and nature. This gap falls under *Awareness*, where authors call for sustainability research to further acknowledge and investigate the personal, spiritual, affective, and emotional connection people share with nature (Renowden et al., 2022; Wamsler et al., 2017). It is also mentioned the need to be more aware of the ethical dimension in the conventional sustainability models and the values mindfulness can bring into the picture (Schroder, 2018; Wamsler et al., 2017). Lastly, only one article mentions a research gap regarding *Nature*

Connectedness, it addresses the lack of human acknowledgement for natural darkness (Bjelajac et al., 2021).

The third category highlights the main gaps stated regarding the research methodologies used within the field. Overall, there is a lack of methodology explanation in most articles, which complexify the assessment of the articles' research approach, design, and methods. First comes the *Research Design* with 5 mentions. Some scholars suggest going beyond the current epistemological and ontological assumptions used (Thiermann & Sheate, 2021). Others point out that more research should implement transdisciplinary methods, especially for projects focused on educational practices for sustainability (Kaufmann et al., 2019). Lang et al. (2017) also incentivizes sustainability scientists to lead more by example by collaborating further, being more mindful and solution oriented in their research. Two articles highlight the lack of qualitative studies in mindfulness research within SS (Thiermann & Sheate, 2020, 2022). Second comes the *Research Method* where two key gaps are highlighted, the time frame and the sampling structure of the research. First the time frame is too short to properly assess behaviours change linked to mindfulness practices. Second, the samples used in the research are often too small; there is no control group to test mindfulness impact, there is no comparison between genders, and it is mostly self-reporting measure used which can lead to biases. The last category of this section addresses the theories used in research. The lack of clear definition of mindfulness results in a fragmented observation which misses the robust and empirical evidence to demonstrate a link between mindfulness and sustainability (Haider et al., 2022). Then, further research could investigate other theories, and address the weaknesses that can be found in these rather new concepts (Pacis & VanWynsberghe, 2020).

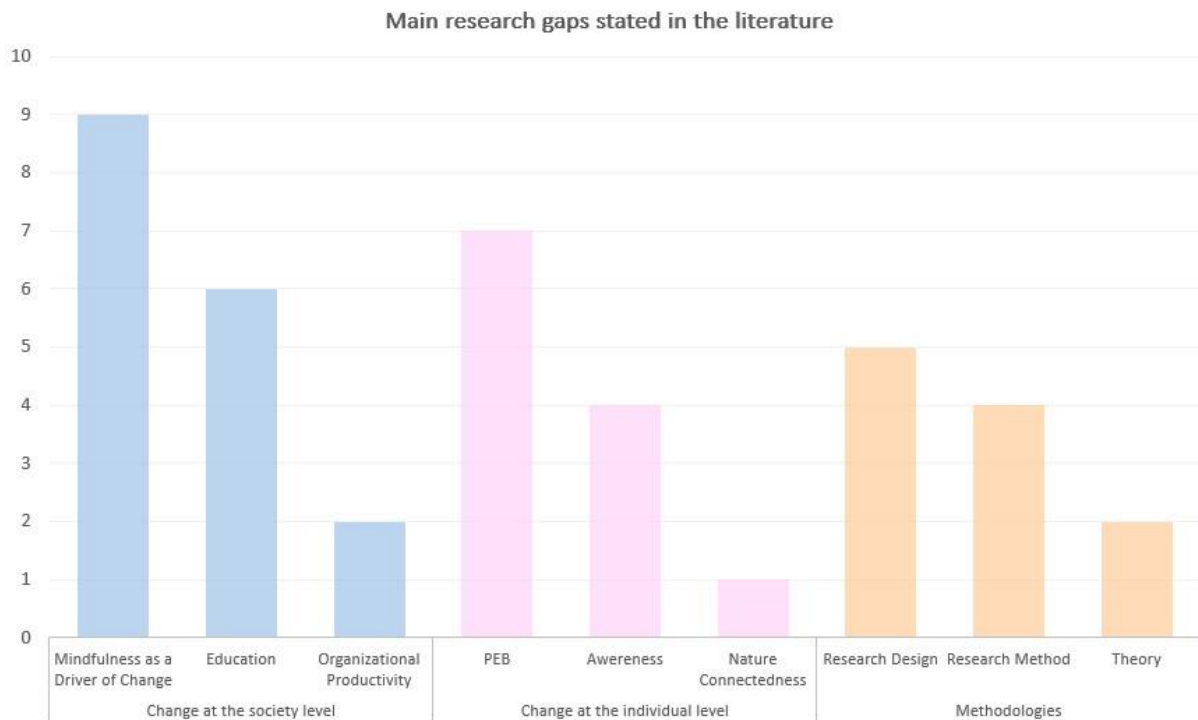


Figure 13. Bar chart of the main research gap stated in Sustainability Science literature about mindfulness (source: author based on the content analysis)

5 Discussion

The discussion aims at assessing how the concept of mindfulness within SS has been academically studied while suggesting future research paths to eventually address some of the existing gaps. First, will be discussed how the field is growing across time and space, followed by what makes it a solution-oriented field, and finally the research gaps and methodological challenges future research could focus on.

5.1 A growing field across time and space

Based on the demographic data analysis, we can say that the field of mindfulness within SS is an emerging field, as the earliest article included in this study was published in 2016. Nevertheless, the field shows a growing interest with an increasing number of publications over time and across space. The largest number of publications was published in 2020, in just four years the number of publications tripled and almost all the continents have conducted research in the field, as expected USA and Europe are in the lead. However, having so many countries contributing to the research over such a short period of time, indicates that mindfulness within SS is a topic that interest various cultures and societies which may see a potential benefit in it. This widespread attention demonstrates a fast-growing field, which may favour a greater diversity of approaches and perspectives onto the topic.

On top of being a field that attracts a growing diversity of countries and continents, it attracts a growing diversity of universities' departments and authors. The results show that the authors contributing to the field belong to various departments and that it is now detached from its origins in psychology. Mindfulness within SS is receiving interest from all kinds of fields and disciplines, which emphasize that mindfulness can be applied and could have a positive influence within various environment. Appertaining the diversity of countries and universities' departments that have published articles on the topic many authors have been taking part in this process (59 authors for 22 articles). A growing number of researchers are participating in the research; thus, it is still too early to identify any research leader in the field. However, we can say that out of the 58 authors included in this research (to which a gender could be attributed) there is almost parity, which shows a clear interest in the topic from both genders. Nonetheless, the findings display that this parity is not applicable when only looking at the lead authors, which count twice as many women than men. From this result it can be assessed that women show stronger curiosity in the topic and thus are more prone to engage in the research. Nevertheless, when it comes to collaborating and working on the topic both genders are likely to show interest.

5.2 Mindfulness: an operational tool for a solutions-oriented field

The findings show that mindfulness within SS is a purpose bound, problem-driven and solution-oriented field which justifies why it is embedded within the large field of SS. Although, some scholars tend to find the field of SS to be an environment in which researchers evolve within a problem-focused paradigm, missing on orienting their research on the solutions and positive outcome it can have for the society (Lang et al., 2017). This study reveals that so far, the field does have a strong solution-oriented focus. The Word Cloud done on the overall database shows a strong focus for the notion of development and transformation. Additionally, mindfulness research within SS implies a participative development of different practices, approaches, and knowledge to transform the current system and lead the desired change of values at the individual and societal level (Brown & Kasser, 2005; Ericson et al., 2014; U. B. Thiermann & Sheate, 2021; Wamsler et al., 2021). When looking at the main theme addressed in the literature, *Mindfulness as a driver of change*, *PEB*, and *Education* take a solution-oriented stance on the topic of mindfulness. These topics already investigate how to make mindfulness an operational tool in the current world. *Mindfulness as a driver of change* aims at researching empirical evidence to prove the potential link between mindfulness and sustainability on various levels. *PEB* research aims to understand the impact mindfulness can have on individuals' behaviours, and if it could foster a more mindful and reasonable way of consuming resources in society (Fischer et al., 2017; Hedin et al., 2019; U. Thiermann & Sheate, 2022). The emphasis on education is also needed, to eventually incorporate mindfulness into school's curriculum and university, as mindfulness could foster a proactive and solution-oriented mindset for the future generations of

sustainability scientists, by nurturing creativity and enhancing connectedness to nature. Meanwhile helping posterity deal with their mental well-being, as a growing proportion of youth suffer from anxiety and/or depression that could be eased with mindfulness practices (Delgado-Montoro et al., 2022; Haider et al., 2022; Lee et al., 2019). Consequently, the early findings point out, mindfulness within SS is a solution-oriented field focused on developing mindfulness as an operational tool potentially applicable at many levels of society, to help us engage in the necessary societal transformation required to address climate change (Killion et al., 2018; Wamsler et al., 2021; Whitmer et al., 2010). We can also conclude that universities are achieving their first and second mission of teaching and researching this new field. It is an important aspect to ensure the institutionalisation of this emerging field, and hopefully, contribute to further research in this direction.

5.3 Addressing research gaps and methodological challenges of mindfulness within SS

The findings show that one of the main current gaps is the lack of empirical evidence proving that mindfulness can have a positive influence on sustainability. Dedicating more time and resources in proving this link could help the field to develop further and with more confidence. Thus, future research could focus on understanding the deep interconnection between humans and nature to assess if mindfulness practices do increase socio-environmental behaviours. Once there will be empirical evidence to support this link, the field may gain more legitimacy and attract a wider attention, allowing it to develop further in its applications (Wamsler et al., 2021). Additionally, this next step would allow the research to develop concrete mindfulness application, enabling universities to reach their third mission, which is to tie their research agenda to real world sustainability issues (Crow, 2010; Frei et al., 2022; Trencher et al., 2014).

However, this gap lead to the question: how can we concretely assess a potential link between mindfulness and sustainability? Both aspects are holistic and integrate many perspectives making their interrelations complex to study. To address this complexity, the study identifies 5 methodological challenges that may be addressed to help future research assess if a link between mindfulness and sustainability exists.

First and foremost, future research should better implement inter- and trans-disciplinary methods in their studies. As mentioned in the theory, SS encourages researchers from different departments to work together to produce interdisciplinary research and favour knowledge integration across different fields and disciplines (Cairns et al., 2020; Clark & Dickson, 2003). Although the results display many disciplines showing interest in the field, the analysis also demonstrates that only five out of the

seventeen articles, written by more than one author, involve authors from different universities' departments. In other words, these results show a low level of interdisciplinary research as most researchers working together come from the same department. The use of interdisciplinary methods in the future could favour a more holistic approach to mindfulness, by integrating together different knowledge from various departments and allowing the field to develop further across disciplines (Lang et al., 2017; Wamsler et al., 2021). Similarly, transdisciplinary method is key for SS research and thus was expected to be found in the literature. However, only one article out of the 22 did conduct its research with the collaboration of an actor from outside academia. This is an essential point as the essence of SS is its transdisciplinary approach, however, in practice, it is rarely applied. These are surprising missing elements in the field, as all these articles mention the need to use inter- and transdisciplinary approach in SS research. The "co-creation for sustainability" process defined in the theory cannot be achieved if inter- and trans-disciplinary research methods are not commonly applied. It requires universities to work with the society to enable this creation process to happen and be applicable in the real world (Frei et al., 2022; Pacis & VanWynsberghe, 2020; Trencher et al., 2014) Second, a stronger focus on the theory could help develop a consensus around the understanding of mindfulness and its applications. Theories are a great tool to facilitate the understanding of complex phenomenon and thus, a theoretical background is necessary to synthesize and simplify the interrelations between different factors under study (Schlüter et al., 2022; Wamsler et al., 2021). A couple of articles included different theories in their research, however those were not the majority. At this point, there is not a strong focus nor a consensus around any theory. Various theories are applied and there is not a specific theoretical background established in this field yet. Some scholars argue that it may be because of the recent development of the field, meaning that the theoretical background is under development or that it is because of the urgency and the time pressure under which the field of SS is (Schlüter et al., 2022). Thus, the field might be more oriented towards practical research than theoretical understanding with the aim to act quickly and address climate change issues in time. Nonetheless, theoretical background is always helpful in the development of a new field, thus it is an aspect of the field that could be further developed (Schlüter et al., 2022; Trencher et al., 2014).

Third, comes the clarity of the methods used in the research and the often unclear methodologies, which affect the studies' replicability, validity, and legitimacy (Bryman, 2012; Graneheim & Lundman, 2003). It could help the research develop further if future studies include a clearer methodology section, and review some of their epistemological assumptions. In addition, many scholars, in the theory, highlight a lack of clarity regarding the definition of mindfulness. It is true that most articles did not define this key concept and for the ones who did different definitions and references were used. Yet, some clear keywords appeared almost every time in the articles that did define it, showing a

consensus in the overall meaning of the concept of mindfulness. Thus, based on the dataset's keywords it could be concluded that the definition of mindfulness is the non-judgmental and open awareness (or attentiveness) of the present moment.

Fourth, the research approach, design, and method, in particular the sample size and the time frame of the research needs to be expanded to prove a potential link between mindfulness and SS. It would be valuable for future research to run over at least one year period, or longer, to properly assess if there could be an influence of mindfulness on sustainability and understand the potential changes meditators might experience in terms of worldviews, lifestyle, and values (Thiermann et al., 2020; Thiermann and Sheate, 2021). No studies were conducted over a period long enough, to use a longitudinal research design. This could be an interesting research design to better understand the impact of mindfulness on the individuals and the society in the long run. Regarding the sample size, these should be larger and more representative of the population. It was surprising to see that although many countries showed interest in the research no case studies were done in the global south. Additionally, studies could also include a control group to be able to compare the impact with and without mindfulness practices; a comparison between genders could also be introduced; and the reporting measures could be based on a protocol and not only rely on self-reporting measure as it reduces the accuracy and the validity of the data (Delgado-Montoro et al., 2022; Rokaya et al., 2017; Thiermann & Sheate, 2021). No mix-method approach was used in the database, and only two used a cross-sectional design. This approach and design could be further investigated in the research and could give a new perspective on the field. In contrast, scholars mentioned the lack of qualitative studies, however, this database includes twice the number of qualitative studies compared to quantitative studies. The increasing number of qualitative research, literature reviews, and perspective papers, could potentially be explained by the COVID-19 pandemic. The possibility to do field work for the researchers was very limited during this time, thus it may explain the large number of qualitative research doable from home. This period hindered the research to happen as usual and engage in more case studies on the ground. Now, future research may have more possibility to engage in more prolonged studies and go more in-depth using different research approaches, design, and data collection methods to conclude whether a link between mindfulness and SS exists.

Fifth and last point, although it is not stated as a gap or methodological challenge in the literature, the analysis pointed at the measurement of mindfulness in SS as a potential limitation to prove a positive influence of mindfulness over sustainability. In the literature, mindfulness has rarely been measured, and for the two articles that did measure it, they used various methods and different metrics. It can be argued that the lack of consensus on the measurement method of mindfulness is an element that

might be hindering the research. It may be valuable to have a clear metric to reach the empirical evidence the field requires and potentially establish a link between mindfulness and sustainability. Therefore, it could be interesting for future research to focus on the assessment and reach consensus around mindfulness measurement.

5.4 Limitations

Although the findings highlight the lack of transdisciplinary research done in SS, this study acknowledges the absence of transdisciplinary approach in its research. Furthermore, based on early research, this study assumes that a potential link between mindfulness and sustainability may exist. Therefore, and until proven otherwise, further research should be conducted in this field. Nonetheless, mindfulness should not be considered as the only viable solution against the climate change crisis. Some researchers warn of the danger of seeing it as the only strategy against our ill societies, other solutions and actions need to be researched and taken (Creswell, 2017; Thiermann and Sheate, 2020). Therefore, it is essential to keep in mind these limitations when concluding the results and discussion.

6 Conclusion

In conclusion, we can say that the field of mindfulness within SS is growing at a fast pace, attracting the interest of universities and researchers around the world and from various departments. The field is problem-driven and solution-oriented, and its purpose is to develop operational tools to address real world sustainability issues using mindfulness. However, future research may want to investigate if a potential link between mindfulness and sustainability exists. Addressing this current gap could enable the field to engage in further in-depth studies about the application of mindfulness in society. For this step to be achieved, five suggestions were made in this study to potentially address the existing gap. First, future research could focus on a better implementation of inter- and trans-disciplinary approaches to integrate different perspectives and knowledge from various actors. Second, some scholars suggest setting a stronger focus on the theory, as the theorization of new knowledge is essential for a field's development. Third, more clarity and consensus could be brought to the key concepts, definitions and methods used in the field to emphasize a common ground and understanding. Fourth, more diverse methodologies could be used, with an emphasis on longer studies, of at least a year, and more representative sample of the population, by conducting case studies in the global south. Fifth and last recommendation could be the development of a metrics to better measure the influence mindfulness could have on sustainability. Once this step is achieved, the field may gain in legitimacy and validity, which could attract a wider audience, and interest from the society and the universities. These could help the field to develop further into the "co-creation for

sustainability” process with applicable solutions for society. By doing so the universities would reach their third mission, as being responsible to develop concrete solutions and engage society into the sustainable transformation.

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8 Appendix

Appendix A - List of the 25 most common words and their stemmed words in the reviewed literature

Word	Length	Count	Weighted Percentage (%)	Similar Words
sustaining	10	7967	1.18	sustain, sustainabilities, sustainabilities', sustainability, sustainability', sustainable, sustainable', sustainably, sustained, sustaining, sustains
research"	10	4773	0.71	research, research', research", researchable, researched, researched', researcher, researcher', researchers, researchers', researches, researching
social'	7	2850	0.42	social, social', sociale, sociales, socialism, sociality, socialization, socialize, socialized, socializing, socializing'sustainability, socially
mindfulness'	12	2778	0.41	minded, minded', mindful, mindful', mindfully, mindfulness, 'mindfulness, mindfulness', minding
changing	8	2576	0.38	change, change', changed, changed', changes, changing
develops	8	2524	0.37	develop, developed, developed', developed", developer, developers, developing, developing", development, development', development", developments, develops
practicing	10	2180	0.32	practicability, practicable, practical, practicalities, practicality, practically, practice, practice', practice", practiced, practices, practices', practicing
environmentally	15	2171	0.32	environmental, environmentalism, environmentalisms, environmentality, environmentally
science"	9	2070	0.31	scienc, science, science', science", sciences
relations	9	1933	0.29	relatable, relate, related, relatedly, relates, relating, relation, relational, relationality, relationality', relationally, relations, relations', relative, relatively, relatives, relativity
naturing	8	1807	0.27	natural, naturalizes, naturally, naturalness, nature, nature', nature", natures, nature
transforms	10	1756	0.26	transform, transformation, transformation', transformational, transformational', transformations, transformations', transformative, transformatively, transformatives, transformed, transforming
processing	10	1721	0.25	process, process', processed, processes, processing
educators	9	1671	0.25	educate, educated, educating, education, education', educational, educationally, educative, educator
valuing	7	1600	0.24	value', valued, values, values', valuing
participative	13	1527	0.23	particip, participant, participants, participants', participants', participate, participate', participated, participates, participating, participation, participation', participative
community	9	1517	0.22	commun, communal, communally, commune, communicate, communicated, communicates, communicating, communication, communication", communications, communicative, communicators, communities, communities', community, community', community", communis
activity	8	1508	0.22	activate, activated, activates, activating, activation, activation', activator, active, actively, activism, activities, activities", activity
knowledge'	10	1494	0.22	knowledge, knowledge', knowledgeable, knowledges, knowledges'
approach'	9	1483	0.22	approach, approach', approachable, approached, approaches, approaching
differently	11	1470	0.22	differ, differed, difference, differences, different, differently, differently', differing, differs
learning'	9	1456	0.22	learn', learned, learning, learning', learnings, learns
system'	7	1456	0.22	system, system', systemic, systemically, systems, systems', systems'37
including	9	1422	0.21	include, included, includes, including
impact	6	1309	0.19	impact, impacted, impactful, impactfully, impacting, impacts, impacts'

Appendix B –

B.1 List of the 15 words that appear the most in the definition of mindfulness and their stemmed words

Word	Length	Count	Weighted Percentage (%)	Similar Words
mindfulness	11	32	7.48	aware, awareness, judgmental, judgmentally, mindful, mindfulness
attention	9	15	4.67	attention, attentive, attentiveness, thought, thoughts
present	7	15	4.67	present
moment	6	14	4.36	moment
awareness	9	13	2.34	aware, awareness, conscious, consciousness
experiences	11	7	2.18	experience, experience', experiences, feelings
intentional	11	7	2.18	intentional, intentionally, purpose
defined	6	5	1.56	define, defined, defines
effects	7	5	1.40	effects, established, events
judgmental	10	6	1.09	discerning, judgmental, judgmentally
brown	5	3	0.93	brown
focus	5	3	0.93	focus, focusing
kabat	5	3	0.93	kabat
nonjudgmentally	15	3	0.93	nonjudgmental, nonjudgmentally
paying	6	3	0.93	paying

B.2 Articles' definitions of Mindfulness and the highlighted keywords

Authors	Definition of Mindfulness
Benz, A; Formuli, A; Jeong, G; Mu, N; Rizvanovic, N	"There are two fundamental constituents of mindfulness: one refers to the self-regulation of attention toward the present reality ; the other concerns how one's experiences of the present moment are processed. More specifically, a curious, open and nonjudgmental attitude toward one's own feelings and thoughts characterizes a mindful orientation (Hölzel et al., 2011)."
Delgado-Montoro, Roberto; Ferriz-Valero, Alberto; García-Taibo, Olalla; Baena-Morales, Salvador	"Mindfulness is defined as a person's ability to focus attention on events, experiences , and states of the present moment , both external and internal [11]. Mindfulness refers to the state of bringing non-judgmental awareness to the present moment and implies two components: (1) self-regulation of attention and (2) orientating an individual to the present moment with curiosity, openness , and acceptance."
Haider, Murtaza; Shannon, Randall; Moschis, George P.	"Mindfulness implies an awareness of [217] or an enhanced focus on experiences , feelings, and thoughts [218–220], to be a conscious part of everyday mundane activities"
Hensley, Nathan	"Mindfulness, defined as "the awareness that arises by paying attention on purpose in the present moment nonjudgmentally " (Barbezat and Bush, 2014, p. 95), promotes creativity, reflection, and integrated thought. Mindfulness is non-reactive awareness that enables one to be fully present in the moment (Kwee, 2015)."
Howell, RA	"mindfulness ("intentional, compassionate, and non-judgmental attentiveness to the present moment "; Wamsler et al., 2018: 144)."
Sajjad, Aymen; Shahbaz, Wahab	"Mindfulness is broadly defined as "being attentive to and aware of what is taking place in the present " (Brown and Ryan 2003)."
Siqueira, Rodrigo P.; Pitassi, Claudio	"Brown and Ryan (2003) define mindfulness as receptive attention to, and awareness of, events and present experience. KabatZinn (2003, p.145) defines it as "the awareness that emerges through paying attention on purpose, in the present moment , and non-judgmentally to the unfolding of experience moment by moment."
Thiermann, UB; Sheate, WR (2020)	"Mindfulness is an experiential strategy which has documented effects along most elements of the 2 pathway model and provides deep transformative effects on the inner dimensions of individuals 25 26 (Wamsler, 2019)."
Thiermann, UB; Sheate, WR; Vercammen, A (2020)	"Mindfulness is a universal human capacity defined as "the awareness that arises when we intentionally pay attention in a kind, open discerning way" (Shapiro et al., 2018, p. 1694)."
Wamsler, Christine (2018)	"Mindfulness is intentional, non-judgmental attentiveness to the present moment . This inherent capacity of the human organism is rooted in the fundamental activities of consciousness (Baer 2003; Condon et al. 2013; Kabat-Zinn 1990), and is linked to established theories of attention , awareness , and emotional intelligence (Buss 1980; Brown et al. 2007; Carroll 2016; Goleman 2011)"
Wamsler, Christine; Brossmann, Johannes; Hendersson, Heidi; Kristjansdottir, Rakel; McDonald, Colin; Scarampi, Phil	"Mindfulness is generally understood as intentional, compassionate, and non-judgmental attentiveness to the present moment (Baer 2003; Condon et al. 2013; Kabat-Zinn 1990), which is associated with greater emotional intelligence (Schutte and Malouff 2011)."
Weber, Hanna; Loschelder, David D.; Lang, Daniel J.; Wiek, Arnim	"Mindfulness is ' awareness that emerges through paying attention on purpose, in the present moment , and nonjudgmentally to the unfolding of experience' (Kabat-Zinn, 2003, p. 145)."
Wong, Catherine; Carlson, Cynthia	"Mindfulness is the ability to bring awareness to the present moment , often through focusing on the breath, and has been a spiritual technique utilized by religious practitioners for centuries."

Appendix C – Demographic data analysis

Authors	Articles' Titles	Year	Gender	References	Authors' university	University's Country	University's Departments
Benz, Alexander	Environmental psychology: Challenges and opportunities for a sustainable future	2022	Male	FB, LinkedIn	Ludwig Maximilian University Munich	Germany	Institute of Medical Psychology
Formuli, Arusu	Environmental psychology: Challenges and opportunities for a sustainable future	2022	Unknown	/	Ludwig Maximilian University Munich	Germany	Institute of Medical Psychology
Jeong, Garam	Environmental psychology: Challenges and opportunities for a sustainable future	2022	Female	FB, LinkedIn	Ludwig Maximilian University Munich	Germany	Institute of Medical Psychology
Mu, Nan	Environmental psychology: Challenges and opportunities for a sustainable future	2022	Female	FB, Research Gate	Ludwig Maximilian University Munich	Germany	Institute of Medical Psychology
Rizvanovic, Nejra	Environmental psychology: Challenges and opportunities for a sustainable future	2022	Female	FB, LinkedIn	Central European University, Vienna	Austria	Department of cognitive science
Bjelajac, Dajana	Dark skies and dark screens as a precondition for astronomy tourism and general well-being	2021	Female	LinkedIn, Research Gate	University of Novi Sad	Serbia	Department of Geography

Dercan, Bojan	Dark skies and dark screens as a precondition for astronomy tourism and general well-being	2021	Male	FB, Linkedin,	University of Novi Sad	Serbia	Department of Geography
Kovacic, Sanja	Dark skies and dark screens as a precondition for astronomy tourism and general well-being	2021	Female	Research Gate	University of Novi Sad/ South Ural State University	Serbia / Russia	Department of Geography

Delgado-Montoro, Roberto	Integrating Mindfulness into the Subject of Physical Education—An Opportunity for the Development of Students' Mental Health	2022	Male	Linkedin	University of Alicante	Spain	Department of General and Specific Didactics
Ferriz-Valero, Alberto	Integrating Mindfulness into the Subject of Physical Education—An Opportunity for the Development of Students' Mental Health	2022	Male	SciProfiles	University of Alicante	Spain	Department of General and Specific Didactics
García-Taibo, Olalla	Integrating Mindfulness into the Subject of Physical Education—An Opportunity for the Development of Students' Mental Health	2022	Female	Linkedin	Pontifical University of Comillas, Mallorca	Spain	Departments of Physical Education and Sport
Baena-Morales, Salvador	Integrating Mindfulness into the Subject of Physical Education—An Opportunity for the Development of Students' Mental Health	2022	Male	SciProfile	University of Alicante / Valencian International University	Spain	Faculty of Education
Haider, Murtaza	Sustainable Consumption Research and the Role of Marketing: A Review of the Literature (1976–2021)	2022	Male	Linkedin, Research Gate	Mahidol University, Bangkok	Thailand	College of Management

Shannon, Randall	Sustainable Consumption Research and the Role of Marketing: A Review of the Literature (1976–2021)	2022	Male	Linkedin, Research Gate	Mahidol University, Bangkok	Thailand	Center for Research on Sustainable Leadership
Moschis, George P.	Sustainable Consumption Research and the Role of Marketing: A Review of the Literature (1976–2021)	2022	Male	Personal webpage	Mahidol University, Bangkok	Thailand	Center for Research on Sustainable Leadership
Hensley, Nathan	Educating for sustainable development: Cultivating creativity through mindfulness	2020	Male	University's webpage	Bowling Green State University	USA	School of the Earth, Environment and Society
Howell, RA	Engaging students in education for sustainable development: The benefits of active learning, reflective practices and flipped classroom pedagogies	2021	Female	Linkedine, Research gate	The University of Edinburgh	UK	School of Social and Political Science,

Kaufmann, Nadine	Building new foundations: the future of education from a degrowth perspective	2019	Female	NGO's website	Konzeptwerk Neue Ökonomie e., Leipzig	Germany	Non-profit organisation
Sanders, Christoph	Building new foundations: the future of education from a degrowth perspective	2019	Male	NGO's website	Konzeptwerk Neue Ökonomie e., Leipzig	Germany	Non-profit organisation
Wortmann, Julian	Building new foundations: the future of education from a degrowth perspective	2019	Male	NGO's website	Konzeptwerk Neue Ökonomie e., Leipzig	Germany	Non-profit organisation

Lang, Daniel J.	Bridging divides in sustainability science	2017	Male	University's webpage, Research Gate	Leuphana University of Lüneburg / Arizona State University	Germany / USA	Center for Global Sustainability and Cultural Transformation / Faculty of Sustainability
Wiek, Arnim	Bridging divides in sustainability science	2017	Male	University's webpage, LinkedIn	Leuphana University of Lüneburg / Arizona State University	Germany / USA	Center for Global Sustainability and Cultural Transformation / Faculty of Sustainability
Von Wehrden, Henrik	Bridging divides in sustainability science	2017	Male	LinkedIn	Leuphana University of Lüneburg / Arizona State University	Germany / USA	Center for Global Sustainability and Cultural Transformation / Faculty of Sustainability
Lee, Rebecca E	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	University's webpage	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation
Lorenzo, Elizabeth	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	LinkedIn	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation

Szeszulski, Jacob	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Male	Linkeding, Research Gate	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation
Arriola, Anel	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	University's webpage, LinkedIn	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation
Bruening, Meg	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	Research Gate	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation
Estabrooks, Paul A	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Male	University's webpage, LinkedIn	University of Nebraska Medical Center, Omaha	USA	College of Public Health
Hill, Jennie	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	University's webpage	University of Nebraska Medical Center, Omaha	USA	College of Public Health

Marsiglia, Flavio F	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Male	University's webpage	Arizona State University, Phoenix	USA	Southwest Interdisciplinary Research Center,
O'Connor, Teresia	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	Research Gate	Baylor College of Medicine, Houston	USA	USDA/ARS Children's Nutrition Research Center
Pollins, Kim Sellers	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	Linkedin	Booker T. Washington Early Childhood Learning Center, Phoenix	USA	Booker T. Washington Early Childhood Learning Center, Phoenix
Shaibi, Gabriel Q	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Male	University's webpage	College of Nursing and Health Innovation,	USA	College of Nursing and Health Innovation,
Soltero, Erica	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Female	University's webpage, Linkedin	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation,

Todd, Michael	Design and methodology of a cluster-randomized trial in early care and education centers to meet physical activity guidelines: Sustainability via Active Garden Education (SAGE)	2019	Male	University's webpage, Research Gate	Arizona State University, Phoenix	USA	College of Nursing and Health Innovation,
Pacis, Margarita	Key sustainability competencies for education for sustainability: Creating a living, learning and adaptive tool for widespread use	2020	Female	Linkedin	<i>City of Vancouver</i>	Canada	<i>Department of Planning Analyst</i>
VanWynsberghe, Robert	Key sustainability competencies for education for sustainability: Creating a living, learning and adaptive tool for widespread use	2020	Male	University's webpage, Linkedin	<i>University of British Columbia, Vancouver</i>	Canada	<i>Department of Educational Studies</i>

Renowden, Christina	Exploring integrated ArtScience experiences to foster nature connectedness through head, heart and hand	2022	Female	Research Gate	The University of Melbourne	Australia	Office for Environmental Programs,
Beer, Tanja	Exploring integrated ArtScience experiences to foster nature connectedness through head, heart and hand	2022	Female	University's website, Linkedin	Griffith University, Southport,	Australia	Queensland College of Art
Mata, Luis	Exploring integrated ArtScience experiences to foster nature connectedness through head, heart and hand	2022	Male	Research Gate	The University of Melbourne	Australia	School of Ecosystem and Forest Sciences

Sajjad, Aymen	Mindfulness and Social Sustainability: An Integrative Review	2020	Male	University's website, LinkedIn	Massey University, Auckland	New Zealand	Massey Business School
Shahbaz, Wahab	Mindfulness and Social Sustainability: An Integrative Review	2020	Male	LinkedIn	Massey University, Auckland	New Zealand	Massey Business School
Schroder, Andressa	Aesthetic strategies to explore beyond the models of sustainable development: An analysis of Lisa Simpson's Musical Sewing	2018	Female	University's webpage, LinkedIn	Justus-Liebig-University Giessen	Germany	International Graduate Center for the Study of Culture (GCSC),
Siqueira, Rodrigo P.	Sustainability-oriented innovations: Can mindfulness make a difference?	2016	Male	University's webpage, LinkedIn	Faculdades Ibmecc, Rio de Janeiro	Brazil	Instituto de Psicologia
Pitassi, Claudio	Sustainability-oriented innovations: Can mindfulness make a difference?	2016	Male	University's webpage, LinkedIn	Faculdades Ibmecc, Rio de Janeiro	Brazil	Instituto de Psicologia
Thiermann, Ute B	How Does Mindfulness Affect Pro-environmental Behaviors? A Qualitative Analysis of the Mechanisms of Change in a Sample of Active Practitioners	2022	Female	University's webpage, LinkedIn	Imperial College London	UK	Centre for Environmental Policy
Sheate, William R	How Does Mindfulness Affect Pro-environmental Behaviors? A Qualitative Analysis of the Mechanisms of Change in a Sample of Active Practitioners	2022	Male	University's webpage	Imperial College London	UK	Centre for Environmental Policy

Thiermann, Ute B	Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour	2020	Female	University's webpage, LinkedIn	Imperial College London	UK	Centre for Environmental Policy
Sheate, William R	Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour	2020	Male	University's webpage	Imperial College London	UK	Centre for Environmental Policy
Thiermann, Ute B	The Way Forward in Mindfulness and Sustainability: a Critical Review and Research Agenda	2021	Female	University's webpage, LinkedIn	Imperial College London	UK	Centre for Environmental Policy
Sheate, William R	The Way Forward in Mindfulness and Sustainability: a Critical Review and Research Agenda	2021	Male	University's webpage	Imperial College London	UK	Centre for Environmental Policy
Thiermann, Ute B	Practice Matters: Pro-environmental Motivations and Diet-Related Impact Vary With Meditation Experience	2020	Female	University's webpage, LinkedIn	Imperial College London / Cambridge Health Alliance	UK / USA	Centre for Environmental Policy / Center for Mindfulness and Compassion
Sheate, William R	Practice Matters: Pro-environmental Motivations and Diet-Related Impact Vary With Meditation Experience	2020	Male	University's webpage	Imperial College London	UK	Centre for Environmental Policy
Vercammen, Ans	Practice Matters: Pro-environmental Motivations and Diet-Related Impact Vary With Meditation Experience	2020	Female	University's webpage, LinkedIn	Imperial College London	UK	Centre for Environmental Policy

Wamsler, Christine	Mind the gap: The role of mindfulness in adapting to increasing risk and climate change	2018	Female	University's webpage, LinkedIn	Lund University	Sweden	Lund University Centre for Sustainability Studies
Wamsler, Christine	Mindfulness in sustainability science, practice, and teaching	2018	Female	University's website, LinkedIn	Lund University	Sweden	Lund University Centre for Sustainability Studies
Brossmann, Johannes	Mindfulness in sustainability science, practice, and teaching	2018	Male	University's website, LinkedIn	Lund University	Sweden	Lund University Centre for Sustainability Studies
Hendersson, Heidi	Mindfulness in sustainability science, practice, and teaching	2018	Female	LinkedIn	Lund University	Sweden	Lund University Centre for Sustainability Studies
Kristjansdottir, Rakel	Mindfulness in sustainability science, practice, and teaching	2018	Female	LinkedIn	Lund University	Sweden	Lund University Centre for Sustainability Studies
McDonald, Colin	Mindfulness in sustainability science, practice, and teaching	2018	Male	LinkedIn, Research Gate	Lund University	Sweden	Lund University Centre for Sustainability Studies
Scarampi, Phil	Mindfulness in sustainability science, practice, and teaching	2018	Male	University's webpage	Lund University	Sweden	Lund University Centre for Sustainability Studies

Weber, Hanna	Connecting consumers to producers to foster sustainable consumption in international coffee supply - a marketing intervention study	2021	Female	University's webpage, Research Gate	University of Lüneburg / Arizona State University	Germany / USA	Faculty of Sustainability / Center for Global Sustainability and Cultural Transformation
Loschelder, David D.	Connecting consumers to producers to foster sustainable consumption in international coffee supply - a marketing intervention study	2021	Male	University's webpage,	University of Lüneburg	Germany	Institute of Management and Organization
				Research Gate			
Lang, Daniel J.	Connecting consumers to producers to foster sustainable consumption in international coffee supply - a marketing intervention study	2021	Male	University's webpage, Research Gate	University of Lüneburg / Arizona State University	Germany / USA	Faculty of Sustainability / Center for Global Sustainability and Cultural Transformation
Wiek, Arnim	Connecting consumers to producers to foster sustainable consumption in international coffee supply - a marketing intervention study	2021	Male	University's webpage, LinkedIn	University of Lüneburg / Arizona State University	Germany / USA	Faculty of Sustainability / Center for Global Sustainability and Cultural Transformation
Wong, Catherine	Resilience within and resilience without: Mindfulness and sustainability programming using an embedded engineering librarian approach	2020	Female	LinkedIn, Research Gate	<i>Merrimack College / University of New Hampshire</i>	USA	Science and Engineering Librarian

Carlson, Cynthia	Resilience within and resilience without: Mindfulness and sustainability programming using an embedded engineering librarian approach	2020	Female	Linkedin	Merrimack College	USA	Civil Engineering
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Appendix D – Themes found in the reviewed literature

Authors	Articles' Keywords	Quotation example	Theme A	Them B	Theme C
Benz, A; Formuli, A; Jeong, G; Mu, N; Rizvanovic, N	Climate change, environmental psychology, imprinting, mindfulness, sustainability	"Empirical evidence has found that mindfulness has positive relationships with connectedness to nature and engagement in pro-environmental behaviors. For instance, mindfulness is significantly related to lower self-reported ecological footprints concerning diet, transportation, and housing, which suggests that mindfulness focuses attention on available sustainable options. A component of mindfulness termed "acting with awareness" is associated with stronger tendencies toward proenvironmental behaviors." (Benz et al., 2022)	Nature Connectedness	PEB	

Bjelajac, D; Dercan, B; Kovacic, S	Astronomy tourism · ICTs · Light pollution · Dark skies · Well-being · Mindfulness	"However, a simple stargazing experience in the natural setting could trigger an authentic mindfulness experience for people that are deprived of dark starry skies in the urban areas (Fig. 5) [...] Also, certain anthropological studies suggested that night sky watching influenced early humans to gain spiritual and aesthetic inspiration (Hoskin 1999) as well as a trancelike state for mystical experiences [...]Therefore, astronomy tourism can be considered as one of the unexpected driving forces of rural tourism." (Bjelajac et al., 2021)	Organizational productivity	Awareness	
DelgadoMontoro, Roberto; FerrizValero, Alberto; García-Taibo, Olalla; BaenaMorales, Salvador	health; physical education; mindfulness; attention; sustainability	"However, the analysis of the secondary physical education curriculum (Real Decreto 217/2022) suggests a close relationship between this subject and mindfulness. This newest approach for the physical education subject in Spain sets out a holistic perspective that highlights physical, psychological, social, and environmental aspects." (Delgado-Montoro et al., 2022)	Education	Subject Wellbeing	
Haider, Murtaza; Shannon, Randall; Moschis, George P.	sustainable consumption; bibliometric review; integrative review; quality of life; mindfulness mindset; mindful consumption	"Mindfulness encourages more pro-environmental behavior by inducing benevolent attitudes and compassion toward others and by inhibiting materialistic hedonic values [223,224]. Mindfulness promotes subjective well-being [225,226], a sustainability behavior pre-condition, and positively moderates intentions into actual behaviors [...] Therefore, mindful consumption can be an umbrella term covering all micro-level	PEB	Subject Wellbeing	
		sustainable consumption behaviors (Figure 5). A consumer with a mindfulness mindset will be a responsible and ethical consumer." (Haider et al., 2022)			

Hensley, Nathan 2020	Sustainability education, Mindfulness, Higher education for sustainable development, Contemplative education, Creativity, Curriculum studies for sustainability	"By opening the mind to creativity, new (and flexible) solutions begin to emerge. Mindfulness offers this path to creativity, allowing students a new way of thinking to equip them to face wicked problems. Considering the wickedness of the sustainability challenges that we face, Wiek et al. (2016) implore that, A large-scale educational transformation is needed to equip a new generation of professionals (not only sustainability professionals!) to address sustainability challenges through problemsolving approaches that integrate systems thinking, structured anticipation, valueladen deliberation, evidencesupported strategies, and strong collaboration across government, business and civil society" (Hensley, 2020)	Education	Mindfulness as a driver of change	
Howell, RA	Education for Sustainable Development; sustainability education; flipped classroom; active learning; reflective learning; transformative learning; student engagement	"This paper discusses student experiences and perceptions of an interdisciplinary social science ESD course at a UK university that incorporated reflective and active learning by using a 'flipped classroom' (FC) design and innovative assessments. FC creates time in class for reflective and active learning by moving content acquisition to pre-class study." (Howell, 2021)	Education		
Kaufmann, Nadine; Sanders, Christoph; Wortmann, Julian	Economic paradigm, Imperial modes of living, Transformative learning, Reflective learning processes, Politicization of education, Psychological resources	"The currently dominant capitalist economic paradigm is seen as one such powerful belief that generates imaginaries which cannot accommodate sustainable futures. At the same time, in educational practice, social movements, and academic discussion, the perspective of degrowth has gained attention as an approach which challenges this paradigm." (Kaufmann et al., 2019)	Education	Mindfulness as a driver of change	

Lang, Daniel J.; Wiek, Arnim; von Wehrden, Henrik	Sustainability science theory, Solutions, Impact, Stakeholders, Engagement, Transformations	"Transdisciplinary research between diverse academic and societal actors is a core practice in sustainability science. However, it often seems to fail in delivering new scientific insights while also significantly contributing to sustainability transformations. It is also often experienced as a burden instead of adding value, which leads to fatigue and disengagement." (Lang et al., 2017)	Inter/Transdisciplinary		
Lee, RE; Lorenzo, E; Szeszulski, J; Arriola, A; Bruening, M; Estabrooks, PA; Hill, J; Marsiglia, FF; O'Connor, T; Pollins, KS; Shaibi, GQ; Soltero, E; Todd, M	Child, Preschool, Diet, Exercise, Health, Policy	"The SAGE curriculum uses the plant lifecycle as a metaphor for human development. Children learn how to plant, water, weed, harvest, and do simple food preparation involving washing, cleaning, and sampling fruit and vegetables along with active learning songs, games, science experiments [...] Additional activities in the curriculum include 3 science experiments, a mindful eating exercise in every session (a taste test including either store bought or garden grown produce), and 22 interactive discussions to reinforce various healthy lifestyle topics" (Lee et al., 2019)	Education	Subject Wellbeing	
Pacis, Margarita; VanWynsberghe, Robert	Teaching, Sustainability, Learning, Education for sustainability, Key sustainability competencies	"Many of our compulsive or unsustainable behaviours lead to overconsumption, but an aware, mindful, and slow pace of life would allow us to be reduce the habit of buying/using too much [...] The message being delivered is that to co-create a future that is truly socially, economically and environmentally sustainable, we must reimagine the entire social institution of education; making one of its keys aim the equipping of students with the values, skills and knowledge necessary to become selfmotivated change agents (Glasser and Hirsh, 2016; Scott, 2013; Sterling et al., 2017). We believe that the KSC could help guide education to do so."	Education	Minfulness as a driver of change	

Renowden, Christina; Beer, Tanja; Mata, Luis	biodiversity, conservation, ecological awareness, flow, human– nature relations, science communication, sustainability	"However, we suggest that encouraging connections to nature through mindfulness, compassion, empathy and sensorial interactions are the underpinnings for disrupting habitual practices and opening pathways to prosustainability behaviours. [...] Art can provide alternative pathways of knowing and understanding the ecological crisis through provoking embodied, mindful and emotional responses. The arts create a dais for personal expression and reflection that traditional education and outreach methods typically cannot." (Renowden et al., 2020)	Nature connectedness	Minfulness as a driver of change	
Sajjad, Aymen; Shahbaz, Wahab	Mindfulness · Mindfulness-based training programs · Social sustainability · Human sustainability · Societal development · Systems theory	"In this regard, we first discuss how mindfulness is related to social sustainability at the individual (e.g., employee health and well-being) and organizational (e.g., ethical behavior, employee performance, workplace spirituality) levels. [...] we examine how individual and organizational social sustainability might relate to some wider societal sustainability outcomes (e.g., social justice, collective social capital)." (Sajjad and Shahbaz, 2020)	Subject Wellbeing	Organizational productivity	
Schroder, A	environmental perception, aesthetic experience, Lisa Simpson– Agente Costura, multisensorial aesthetics, sustainability ethics, sustainable development	"In the moment of the spontaneous transformation of the materiality of the clothes combined with the improvised musical act, participants and artist are fully engaged with(in) this process and mindfully present in the space of the performance. In this sense, there is no other way of grasping such ephemeral moment and space unless by expanding this experience up to the climax of energy that it requires.[...] Thus, the ethical dimension of sustainability also varies in its degrees of transparency and accessibility in geopolitical negotiations about the understanding of anthropogenic environmental impacts and shared environmental responsibilities. In hegemonic models of sustainable development (Leff, 1994; Santos, 2010), different nuances of the ethical dilemmas that should emerge and be considered for the topic, such as the paradigm of domination and control of nature, the hyper-commodification of all dimensions of life, and the imposition of very specific (and elitist) value systems as a universal standard, are overshadowed or completely disregarded" (Schroder, 2018)	Awereness	Minfulness as a driver of change	

Siqueira, Rodrigo P.; Pitassi, Claudio	Cognition, Mindfulness, Creativity, Sustainability, Sustainability-oriented innovation	"To help influence management actions in favor of sustainability-oriented innovation, this paper offers a research agenda that combines the following five fields of study: sufficiency-driven business models, inclusive capitalism, sustainability-oriented innovation capability, mindfulness in organizations and interdisciplinary and qualitative mindfulness. [...] Based on the framework that we have derived from the literature review based on concepts that are anchored in robust clinical and psychological research, it is plausible to infer that the use of mindfulness training can favor creativity and ecological concerns." (Siqueira and Pitassi, 2016)	Organizational productivity	Minfulness as a driver of change	
Thiermann, UB; Sheate, WR (2021)	Mindfulness . Methods . Sustainability . Environment . Proenvironmental behaviours . Nature connectedness	"We identified six leading theoretical links between mindfulness and sustainability which find backing in empirical work: reduced automaticity, enhanced health and subjective well-being, greater connectedness with nature, improved pro-sociality, recognition of intrinsic values and openness to new experiences. [...] One year later, a survey of two different samples, 200 students and 250 adults, confirmed that intrinsic	Nature connectedness	PEB	Subject Well-being
		value orientation and mindfulness are correlated with subjective well-being and proenvironmental behaviour (PEB) indicators" (Thiermann and Sheate, 2021)			
Thiermann, UB; Sheate, WR (2022)	Mindfulness · Compassion · Informal mindfulness · Sustainability · Proenvironmental behaviors · Motivation	"The objective of this qualitative research was to study the potential mechanisms linking mindfulness practices and individual engagement in pro-environmental behaviors in a sample of meditators." (Thiermann and Sheate, 2022)	PEB		

Thiermann, UB; Sheate, WR (2020)	Environmental interventions, proenvironmental behaviour, sustainable transition, mindfulness, eudaimonic well-being, relational values	"Section 5 proposes a new category of environmental interventions - experiential strategies - aimed at reinforcing the relational pathway of PEB and lending themselves theoretically to explain the link between mindfulness and sustainable lifestyles"(Thiermann and Sheate, 2020)	PEB		
Thiermann, UB; Sheate, WR; Vercammen, A (2020)	mindfulness, compassion, connectedness with nature, sustainability, proenvironmental behavior, animal-protein consumption, motivation, self-determination theory	"We also lack information about the significance of meditators' behavioral differences in terms of their measurable environmental impact and the motivational processes underlying these differences in pro-environmental performance. [...] This nuanced view on mindfulness practice reveals that advanced meditators, who reported high levels of connectedness with nature (CWN), subjective happiness and dispositional mindfulness showed significantly more concern for the environment. They also demonstrated the lowest levels of greenhouse gas emissions, land occupation and water use related to their animal-protein consumption." (Thiermann et al., 2020)	PEB	Nature conectedness	

<p>Wamsler, Christine (2018)</p>	<p>Climate change · Inner transition · Inner transformation · Organisational mindfulness · Political mindfulness · Compassion · Sustainability · Wellbeing · Emotions · Urban governance · Planning · Risk reduction · Adaptation · Urban transformation · Traditional knowledge · Native knowledge · Mindful climate adaptation</p>	<p>"The few studies that explicitly link mindfulness with climate adaptation mostly lie at the interface between well-being and disaster management research (Tables 1, 2) with a focus on the post-disaster context (Table 2), and at an individual scale (Table 3). It is a growing body of research that illustrates the importance of mindfulness in postdisaster response and recovery to increase psychological resilience" (Wamsler, 2018)</p>	<p>Minfulness as a driver of change</p>		
<p>Wamsler, Christine; Brossmann, Johannes; Hendersson, Heidi; Kristjansdottir, Rakel; McDonald, Colin; Scarampi, Phil</p>	<p>Ecological mindfulness · Organizational mindfulness · Political mindfulness · Compassion · Sustainability · Wellbeing · Contemplative teaching · Emotion · Planning · Risk reduction · Adaptation · Other ways of knowing · Spiritual ecology · Transformation · Inner transition</p>	<p>"This paper assesses the current role of mindfulness in sustainability research, practice, and teaching. Using an extensive literature review complemented by an experimental learning lab (described in "Methodology"), we outline the core conceptual trajectories of mindfulness in general sustainability research, practice, and teaching [...] The analysis identified the following core conceptual trajectories with respect to mindfulness in relation to climate change, adaptation, and risk reduction practice" (Wamsler et al., 2018)</p>	<p>Education</p>	<p>Organizational productivity</p>	

Weber, Hanna; Loschelder, David D.; Lang, Daniel J.; Wiek, Arnim	Experiential marketing; consumer behaviour; community-supported agriculture (CSA); relational proximity; global food supply; sustainability marketing	"Findings indicate that experiential marketing tools, to varying degrees, indeed create connections from consumers to producers, thereby fostering sustainable consumption behaviour. The findings can inform international food supply marketing efforts aimed at stimulating sustainable consumption." (Weber et al., 2021)	PEB	Subject Wellbeing	
Wong, Catherine; Carlson, Cynthia	Conference paper, no keywords	"Introducing first-year engineering students to mindfulness techniques and strategies along with sustainability topics, may help students cope with stress and anxiety about environmental challenges and their early college transition, in addition to providing strategies for resilience. These are skills that engineers can benefit from for the rest of their lives. [...] These activities allowed students time outside of class to engage with topics in an interdisciplinary manner as they were open to students in all departments and the public"	Education		Mindfulness as a driver of change

Appendix E – Research Approach, Design and Methods used in the literature

Authors	Research Question	Research Approach	Research Design	Research Methods	Theory	Measure of Mindfulness	Geographical location	Transdisciplinary
Benz, A; Formuli, A; Jeong, G; Mu, N; Rizvanovic, N	The topics addressed are a selection of criteria for adapting to changing environments, perspectives on how to harvest insights from different fields of scientific endeavor and ideas how to make use of the necessary interdisciplinarity.	Qualitative Research	Perspective Paper	Secondary data analysis				
Bjelajac, D; Dercan, B; Kovacic, S	This paper aims to emphasize the importance of dark skies and appropriate usage of ICTs in the nighttime hours for our psychological health and well-being in general and at the same time to propose astronomy tourism as a part of the sustainable tourism offer as a tool for fighting light pollution.	Qualitative Research	Case Study	Literature Review				
Hensley, Nathan 2020	This paper will examine the (mis)alignment of managerial and mechanistic educational approaches with HESD while advocating for teaching students how to learn rather than what to learn, emphasizing the need to cultivate contemplation and creativity, and exploring the opportunities associated with divergent thinking.	Qualitative Research	Case Study	Literature Review				

Kaufmann, Nadine; Sanders, Christoph; Wortmann, Julian	The aim of this article is to contribute to a pedagogy of degrowth as one path within a complex search for ways to imagine and support sustainable futures, which address root causes of the current crises. Analysing these crises as crises of conviviality, resulting from imperial modes of living and producing, we sketch the framework for sustainable futures marked by world	Qualitative Research	Perspective Paper	Secondary data analysis	Education for Sustainable Development (ESD)			
	relations of interconnectedness and solidarity.							
Lang, Daniel J.; Wiek, Arnim; von Wehrden, Henrik	We offer here critical and constructive reflections on some prevalent practices (our own included), and suggest that for making sustainability science in general, and transdisciplinary sustainability research in particular, more impactful and deliver on its promise, we need to promote and implement a research practice that bridges these divides.	Qualitative Research	Perspective Paper	Secondary data analysis				
Pacis, Margarita; VanWynsberghe, Robert	The purpose of this paper is to posit that a key sustainability tool can help provide a needed guide for the many forms of new curricula for academic, public and professional learning communities. The authors demonstrate that key sustainability competency (KSC) research can highlight and provide an array of learning outcomes that can be back cast to co-design flexible, detailed curriculum, pedagogy, practice and assessment structures.	Qualitative Research	Case Study	Literature Review	Key Sustainability Competency (KSC)			

Renowden, Christina; Beer, Tanja; Mata, Luis	Our focus on ArtScience experiences designed to engage the head, heart and hands emphasises our aspiration to connect the research with the broader scope of education for sustainability and science communication, including cultivating ecological awareness and mindfulness to stimulate thoughts, ideas and the potential for action towards pro- sustainability behaviours.	Qualitative Research	Case Study	Interviews /Survey	ArtScience theoretical framework, and 'head, heart and hand' transformative learning framework		Melbourn, Australia	The Living Pavilion was an Indigenous-led, transdisciplinary project connecting Indigenous knowledge, ecological science and sustainable design through participatory arts (Beer et al., 2019). The event took place between 1 and 17 May 2019 and was held at the University of Melbourne's Parkville campus (Victoria, Australia) on unceded lands of the Wurundjeri people of the Woi Wurrung language group, who have belonged to and been custodians of those lands for over 65,000 years
Sajjad, Aymen; Shahbaz, Wahab	Drawing insights from the systems theory perspective, we critically examine, interpret, and explicate the role of mindfulness in fostering social sustainability at three specific levels: individual, organizational and societal.	Qualitative Research	Case Study	Literature Review	Systems theory			

Schroder, A	This essay provides a critical reflection about the (lacking) ethical dimension in the conventional models of sustainability through an aesthetic approach. To perform this exercise of reflection, the work of the Brazilian artist Lisa Simpson—Agente Costura is introduced and some “unconventional” aesthetic strategies present in her work, such as embodiment, affect, mindfulness, rhythm and movement, are explored.	Qualitative Research	Case Study	Secondary data analysis				
Siqueira, Rodrigo P.; Pitassi, Claudio	Therefore, the main purpose of this article is to develop an analytical framework to further the study of the influence of mindfulness on the cognitive abilities, attitudes and behaviors of individuals within organizations to identify and utilize creative solutions that can lead to sustainability-oriented innovation.	Qualitative Research	Case Study	Literature Review				
Thiermann, UB; Sheate, WR (2022)	This research aimed to use qualitative methods to inquire about the proenvironmental motivations and behaviors of individuals with an on-going meditation practice for a year or more. The analysis was guided by the following research question: Have the study participants experienced changes in their motivations and performance levels of PEB after they started engaging in mindfulness practices, and if so, what are the common mechanisms mediating these changes?	Qualitative Research	Crosssectional	Interviews /Survey				

Thiermann, UB; Sheate, WR (2021)	This article reviews 30 years of research in mindfulness and sustainability and disentangles theoretical knowledge from empirical evidence. We identified six leading theoretical links between mindfulness and sustainability which find backing in empirical work	Qualitative Research	Case Study	Literature Review				
Thiermann, UB; Sheate, WR (2020)	This paper aims to spark the discussion about how we can prepare human beings to become the transitioning force rather than remain passive receivers of environmental policies and behavioural adjustments	Qualitative Research	Perspective Paper	Secondary data analysis	A 2-pathway model and the Comprehensive Action Determination Model			
Wamsler, Christine (2018)	Based on a literature review, this paper assesses current research on mindful climate adaptation and how individual mindfulness may be linked to climate adaptation.	Qualitative Research	Case Study	Literature Review			Skåne, Sweden	600 households in the coastal

Wamsler, Christine; Brossmann, Johannes; Hendersson, Heidi; Kristjansdottir, Rakel; McDonald, Colin; Scarampi, Phil	This paper explores the current role of mindfulness in sustainability science, practice, and teaching. Based on a qualitative literature review that is complemented by an experimental learning lab, we sketch the patterns and core conceptual trajectories of the mindfulness– sustainability relationship.	Qualitative Research	Crosssectional	Literature Review + Interviews /Survey				experimental learning lab: included 70 students from two sustainability-focused Masters' Programs at Lund University International Master's Program in Environmental Studies and Sustainability Science (LUMES), and the International Master's Program in Disaster Risk Management and Climate Change Adaptation
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Delgado-Montoro, Roberto; FerrizValero, Alberto; García-Taibo, Olalla; BaenaMorales, Salvador	Therefore, the objective of this study was to assess the effects of mindfulness practices on the ability of students to focus their attention on external, internal or kinesthetic factors, awareness in acting, and acceptance	Quantitative Research	Experimental	Interviews /Survey	Sustainable Development (ESD)	MSS (Mindfulness at School Scale), CAMM (Child and Adolescent Mindfulness Measure)	Alicante, Spain	127 students in high school
Haider, Murtaza; Shannon, Randall; Moschis, George P.	This review aims for a theoretical and structural understanding of the literature to identify future avenues for marketing, to explore and increase its contribution to consumption sustainability research.	Quantitative Research	Case Study	Literature Review				
Howell, RA	Hence this paper offers valuable insights into the design (structure and learning activities) of a flipped social science ESD course, and participants' responses to the course.	Quantitative Research	Case Study	Interviews /Survey			University of Edinburgh (UK)	39 third year students on the four year undergraduate MA (Hons) Sustainable Development degree at the University of Edinburgh
Thiermann, UB; Sheate, WR; Vercammen, A (2020)	First, we sought to address gaps in the mindfulness and sustainability literature by examining whether mindfulness practice (rather than dispositional mindfulness) relates to common predictors and measurable indicators of PEB, specifically the environmental impact generated by animal-protein consumption. The second goal was to provide preliminary evidence that mindfulness contributes to a shift in motivation toward the environment by activating the relational pathway of PEB	Quantitative Research	Experimental	Interviews /Survey	The 2pathway model of PEB and the self-determination theory	Comprehensive Inventory of Mindfulness Experiences (CHIME)	UK	With data obtained from an online survey of 300 adults meditators in the United Kingdom, we investigated how different levels of meditation experience are related to animal-protein intake

Weber, Hanna; Loschelder, David D.; Lang, Daniel J.; Wiek, Arnim	Creating connections between consumers and producers (relational proximity) seems a promising approach to foster sustainable consumption behaviour in international food supply. In this intervention study, we tested three experiential marketing interventions to connect consumers to producers of an international communitysupported agriculture (CSA) partnership for coffee (Teikei Coffee).	Quantitative Research	Experimental	Interviews /Survey			Hannover, Germany	open annual national consumer fair for sustainable products, services, and lifestyles, which attracted around 2,000 visitors in 2019. 136 participants randomly selected
Lee, RE; Lorenzo, E; Szeszulski, J; Arriola, A; Bruening, M; Estabrooks, PA; Hill, J; Marsiglia, FF; O'Connor, T; Pollins, KS; Shaibi, GQ; Soltero, E; Todd, M	This manuscript describes the design and methodology of Sustainability via Active Garden Education (SAGE), a 12-session cluster-randomized controlled crossover design trial using community-based participatory research (CBPR) to test a garden-based ECEC physical activity and fruit and vegetables promotion intervention for young children aged 3–5 years in 20 sites.	Quantitative Research	Experimental	Interviews /Survey			Phoenix, US	336 kids below the age of five in education center
Wong, Catherine; Carlson, Cynthia	Mindfulness and sustainability programs were initiated over three years by a facultylibrarian collaborative team to assist firstyear engineering students in building environmental literacy and personal resilience skills. The faculty-librarian team established in class and out of class themes, games, assignments, and programming using an embedded librarian approach.	Quantitative Research	Case Study	Interviews /Survey			Boston, US	59 students from an undergraduate program in a Catholic college

Appendix F – Gaps and future research recommendations highlighted in the reviewed literature

Gaps Reduction Process	Further Recommendations Reduction Process	Gaps Distillation process	Further Recommendations Distillation Process	Aggregation Process and Themes	
	<p>"However, it is certainly important to gather further knowledge about the processes underlying the relationship between mindfulness and proenvironmental behaviors" (Benz et al., 2022)</p>		<p>Could focus on the relationship between mindfulness and proenvironmental behaviors</p>		

	"Future research could study more in-depth which role the mindfulness-induced change in social environment plays for changes in PEB performance." (Thiermann and Sheate, 2022)		Could study the role mindfulness-induced change in social environment plays for changes in PEB performance.	PEB	C H A N G E A T T H E I N D I V I D U A L
"few studies provide insight into the relationship between mindfulness practice levels and individual engagement in proenvironmental behaviors. [...] the existence of a causal relationship between the two concepts is still debated and will require a considerable amount of time and financial resources" (Thiermann et al., 2020)		Lack of evidence on the causal relationship between mindfulness practice and individual engagement in proenvironmental behaviours			
"The second research gap is the lack of insight in measurable environmental impact. The measurement of PEB, defined as "behavior that harms the environment as little as possible, or even benefits the environment" (Steg and Vlek, 2009, p. 309), is a challenging task " (Thiermann et al., 2020)		Lack of insight in measuring the environmental impact with PEB			
"Empirical data on the causal effects of mindfulness consumption are missing [55], highlighting the research gap." (Haider et al., 2022)		Lack of empirical data supporting the causal effects of mindfulness on consumption			

<p>"The few qualitative studies relating to mindfulness and PEB so far have focused on the effect of short-term mindfulness interventions on consumption behaviors in meditation-naïve participants" (Thiermann and Sheate, 2022)</p>		<p>Lack of research on the long-term effect of mindfulness on consumption behaviours</p>		<p>PEB</p>	<p>L E V E L</p>
<p>"there is little empirical evidence of if and how experiential marketing tools can connect consumers with producers and thereby foster sustainable consumption behaviour." (Weber et al., 2021)</p>		<p>Lack of empirical evidence on how connecting the consumer to the producers to foster sustainable consumption</p>			
<p>"To date, sustainability research has often focused exclusively on [...], rather than concomitantly exploring the personal, experiential, affective and emotional affinity people share with the natural world (Connelly et al., 2016; Jacobson et al., 2007; Lumber et al., 2017)." (Renowden et al., 2020)</p>		<p>Lack of research on the personal, experiential, affective and emotional affinity people share with the natural world</p>		<p>Awareness</p>	<p>C H A N G E</p>
<p>"This essay provides a critical reflection about the (lacking) ethical dimension in the conventional models of sustainability through an aesthetic approach" (Schroder, 2018)</p>		<p>Lack of ethical dimension in the conventional models of sustainability</p>			
	<p>"We end with a call for more sustainability research that acknowledges positive emotional connections, spirituality, and mindfulness in particular, recognizing that the micro and macro are mirrored and interrelated." (Wamsler et al., 2018)</p>		<p>Could address mindfulness application in different professional fields and acknowledge positive emotional connections, spirituality, and mindfulness in sustainability research</p>		<p>A T T H E I</p>

	"further research should also look at individual mindfulness disposition and link it to sustainability.This would open the way for a broader discussion on the role of mindfulness, inner transition, and spirituality in general, in sustainability." (Wamsler et al., 2018)		Studying individual mindfulness disposition in relation to sustainability	Awareness	N D I V I D U A L L E V E L
"Numerous authors have confirmed the relationship between well-being and nature exposure, yet, natural darkness as a part of the natural environment has been mostly neglected in such research." (Bjelajac et al., 2021)		Lack of research on the importance of natural darkness as part of the natural environment and its potential benefit on the well-being		Nature Connectedness	
"Furthermore, these authors mentioned that only 10% of the studies conducted with samples of university students had a control group" (Delgado-Montoro et al., 2022)		Lack of control group in studies testing mindfulness practices			S

	"they pointed out that enlarging the sample of mindfulness studies in education is necessary in order to verify the efficacy of this practice and generalize the obtained results. [...] it would have been interesting to expand the detail by the comparison between genders. Moreover, analyzing the long-term impact of these interventions through longitudinal studies would be enriching" (Delgado-Montoro et al., 2022)		Could verify the efficacy of mindfulness practices by enlarging the samples, using control groups, comparing between genders, and conducting longitudinal studies	Research Method	S R E S E A R C
	"Researchers will have to invest in more long-term studies and go beyond what we already know from the classical, health-related mindfulness research. Rejecting causality because of a lack of change in self-report measures after an 8-week course is as premature as declaring causality without understanding the full picture" (Thiermann and Sheate, 2021)		Could be longer studies that are not only based on self-reporting measures	Research Method	H
	"we suggest that future studies regarding causality accompany new meditators for a period of at least 1 year to detect changes in worldviews and lifestyles." (Thiermann et al., 2020)		Could be longer studies of at least 1 year		S S
	"we need to go beyond and also question the epistemological and ontological assumptions we are bringing to the task." (Thiermann and Sheate, 2021)		Could question the epistemological and ontological assumptions.		R E S E A

	"Understanding educational practice in the context of sustainable futures as a common and yet unfinished project shared by academic and practical educators and facilitators" (Kaufmann et al., 2019)		Could use a transdisciplinary research project in educational practices for sustainability	Research Design	R C H
	"The challenge here is that sustainability scientists often do not lead by example regarding collaboration, mindfulness, and solution orientation. Embedded in highly competitive environments, incentivizing distinction and exclusion, we experience and maintain work environments that feed individualism, pressure, and stress." (Lang et al., 2017)		Could incentivize sustainability scientist to lead by example regarding collaboration, mindfulness and solution orientation		S S R E

"Qualitative studies, surprisingly lacking to date in this field, can help provide deeply rich explanations as to why and how people respond to interventions" (Thiermann and Sheate, 2020)		Lack of qualitative studies on mindfulness' relationship to sustainability			S E A R C H
"very few qualitative studies of the mindfulness-sustainability nexus exist." (Thiermann and Sheate, 2022)		Lack of qualitative studies on mindfulness' relationship to sustainability			

	"In future research, we aim to address a major weakness in the concept of KSC, one that we identified at the beginning of the paper (footnote 2); namely, a learning theory (Wiek et al., 2016). Transformative learning theory is one possibility." (Pacis and VanWynsberghe, 2020)		Could address the weaknesses of the transformative learning theory of the Key Sustainability Competency concept	Theory	S S R E S E A R C H
"There is no clear operationalized definition of mindfulness [232], resulting in a fragmented and weak objective observation that is missing the robust and empirically proven causal effects of mindfulness on sustainable consumption [55]" (Haider et al., 2022)		Lack of clear mindfulness definition			
"Moreover, analyzing the long-term impact of these interventions through longitudinal studies would be enriching, since the permanence of the achieved improvements over time has not been studied [40] and, therefore, it is not clear that a real change in lifestyle can be obtained" (Delgado-Montoro et al., 2022)		Lack of empirical evidence that a real change of lifestyle can be achieved			C H A
"First, we suggest that the relationship between mindfulness and human sustainability needs empirical validation. [...] the empirical evidence to support this assertion [that mindfulness could help address social sustainability issues] is mostly lacking." (Sajjad and Shahbaz, 2020)		Lack of empirical evidence supporting the relationship between mindfulness and human sustainability			N G E A T

"shift the mindfulness and sustainability research narrative and embark in a collaborative and creative effort to study the causality between mindfulness and sustainability." (Thiermann and Sheate, 2021)		Lack of evidence to support the causality between mindfulness and sustainability		Mindfulness as a driver of change	T H E S O C I E T Y L E V E L C H A
"it might need a rethinking of how to explore causality between mindfulness and sustainability" (Thiermann and Sheate, 2021)		Lack of evidence to support the causality between mindfulness and sustainability			
	"We understand that the long-term goal of researchers in the area should be to, first, establish whether mindfulness causes behaviours and society to become more sustainable" (Thiermann and Sheate, 2020)		Could focus on long-term research to identify whether mindfulness causes society to become more sustainable		
	A future narrative should uncover and disentangle the multi-faceted processes that transform the inner dimensions of individuals. This entails a detailed study of the triggers for change (e.g. different mindfulness practices) and the outcome of the change (e.g. behaviours and impact)." (Thiermann and Sheate, 2021)		Could study in detail the triggers and outcomes of change at the inner dimensions level		
"There is almost no research into the role of mindfulness in climate adaptation" (Wamsler, 2018)		Lack of research into the role of mindfulness in climate adaptation			

<p>"That said, the relationship between mindfulness and social sustainability aspects is under-researched (Wamsler 2018; Wamsler et al. 2018). [...] the relationship between mindfulness and social sustainability at the societal level has been particularly underresearched." (Sajjad and Shahbaz, 2020)</p>		<p>Lack of research on the relationship between mindfulness and social sustainability, particularly at the societal level.</p>		<p>Mindfulness as a driver of change</p>	<p>N G E</p>
<p>"While cross-sectional studies support the association between mindfulness and sustainable behavior, the existence of a causal relationship between the two concepts is still debated and will require a considerable amount of time and financial resources" (Thiermann et al., 2020)</p>		<p>Lack of evidence to support the causality between mindfulness and sustainability</p>			<p>A T T H E</p>
<p>"However, research on the role of creativity and mindfulness in higher education for sustainable development (HESD) is lacking." (Hensley, 2020)</p>		<p>Lack of research on the role of creativity and mindfulness in higher education for sustainable development</p>		<p>Education</p>	<p>S O C I E T Y</p>
<p>"Although there is a gap in the literature that explores the intersection(s) of sustainability education and mindfulness" (Hensley, 2020)</p>		<p>Lack of research about the intersection between sustainability, education, and mindfulness</p>			<p>L E V E L</p>
<p>"What little literature there is on FC and ESD suggests that ESD benefits from FC pedagogy." (Howell, 2021)</p>		<p>Lack of research on the usage of flipped classroom for Education for sustainable development</p>			<p>C H A N</p>

					G E
"SAGE (Sustainability via Active garden Education) fills an important void in the policy literature by employing a participatory strategy to produce a carefully crafted and engaging curriculum with the goal of meeting health policy guidelines and educational accreditation standards." (Lee et al., 2019)		Lack of policy literature regarding curriculums that meets the health policy guidelines and educational accreditation standards		Education	A T T H E S O C I E T Y L E V E L
	" second, to provide structural recommendations for mindfulness policies and educational programs" (Thiermann and Sheate, 2020)		Could provide structural recommendations for mindfulness policies and educational programs		
"Additional studies in this area are necessary to develop a body of evidence to support adding mindfulness interventions to the curriculum." (Wong and Carlson, 2020)		Lack of studies and evidence to add mindfulness interventions in the curriculum			
"There has been a gap in the empirical research concerning the impact of mindfulness training on the attitudes and behavior of organizational leaders in favor of a sustainable development in corporations; this issue should be examined." (Siqueira and Pitassi, 2016)		Lack of research on the impact of mindfulness training on the behaviours of organizational leaders in favor to sustainable development			

	<p>"In this regard, future studies could investigate empirically how mindfulness practice could help in building human capital, supporting an ethical climate in the workplace, improving corporate citizenship behavior and developing an occupational health and safety culture. Second, it is critical to examine the role of mindfulness in addressing societal sustainability issues." (Sajjad and Shahbaz, 2020)</p>		<p>Could investigate how mindfulness practice could help addressing societal sustainability issues</p>	<p>Organizational Productivity</p> <p>Organizational productivity</p>	
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