FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION

(ICADE)

PRO-ENVIRONMENTAL BEHAVIOUR: THE ROLE OF MINDFULNESS IN SOCIOEMOTIONAL AND VOLITIONAL COMPETENCIES

An examination of individual's abilities for sustainability transition

by

Ana M. Gómez Olmedo

Advisors:

Isabel Carrero Bosch, PhD.

Carmen Valor Martínez, PhD.

Madrid

April 2021

ACKNOWLEDGEMENTS

Such a bizarre moment, this of finally getting to the end of my thesis, so fulfilling and yet so breath-taking, just as it started. One meeting with Isabel was enough to turn my personal north star into my research purpose. Mamen came shortly after, generously answering a call for help that has proven essential. Many striking moments followed, academically, professionally, and personally. Some of them tremendously grateful, others quite ungrateful. Through them, I learned to not take things for granted, to challenge myself, to accept my mistakes, to overcome them and grow higher and better. When I thought it was too tough a new challenge would show up. Instead of giving up, I then opened myself to the opportunity of knowing my real self, both, my virtues, and my limitations. This process has been an opportunity for self-awareness as well as an intellectual challenge that required to humbly adopt a first learner stance.

Now, after these years of work, when I am supposed to gather lots of knowledge, I am left with the feeling that this is just the beginning. I honestly think that I have learnt again how to read, how to write, how to understand the world I live in, how to gently see the wood for the trees. To my surprise, through this process of awareness and acceptance, I became the guinea pig of some experimental research, my own research.

Many people joined me through this journey. People that helped me to ride this rollercoaster, stop, and catch my breath. Isabel and Mamen, or Mamen and Isabel, both have put up with my ups and downs first-hand. For that, I will always thank you and I am immensely grateful. I put you through a lot which allowed me to realise that the role of PhD's advisor is not sufficiently rewarded, especially under the current circumstances. Raquel and Carlos at Comillas, it may seem to you that you were just doing your work. To me, your time meant a lot. My colleagues at ESIC, those who assist me when I most needed them, who offered me their advice, many thanks. Special thanks to María, who cared for me when she noticed what I was going through. Dearest thanks to my partner, my family, my sherpas, my friends who encouraged me to do what was best, sometimes even asking to give up. I thank that too because, eventually, I cultivated many invaluable personal resources that will be with me for life and hopefully be transferred to my kids by example. First and foremost, the eagerness to keep learning.

To my elder ones,
to my sherpas,
whose wisdom and love
will forever guide me.

ABSTRACT

The environmental problems we are facing have not precedents and yet, individual responsibility has not been sufficiently considered. Although our environmental actions are part of the problem, they are also part of the solution that should lead to behavioural change. However, pro-environmental behaviours (PEB hereafter) are full of intricacies and the key determinants for this so needed behavioural change need to be further explored. Previous studies have called for integrative approaches of promoting these behaviours, linked to rational but also emotional components, as both affect individual decision-making. To this purpose, mindfulness is posited as a promising component to nurture PEB.

Mindfulness is described as a quality of mind with nuclear components such as an enhanced awareness through a focus of attention which leads to self-regulation. It can be understood as a trait (MAAT hereafter), state, or intervention although all of them are intertwined. Mindfulness benefits have been proved in many fields, starting from clinical contexts, where it was initially implemented as a practice through the work of Kabat-Zinn. However, in terms of sustainability transitions, there is a lack of theoretical and empirical research on the influence of mindfulness on PEB.

Particularly, it is missing a deeper look to how mindfulness can be implemented in education to nurture socioemotional rather than cognitive competencies, given that they may provide students with the interpersonal skills that education for sustainable development (ESD hereafter) is calling for, as well as an empirical exploration of its effects on volitional skills that are central to decision-making processes, such as self-control (SC hereafter) so that they are capable to face the sustainability issues that will encounter in their daily lives. Thus, this thesis aims to bridge these two gaps, exploring socioemotional and volitional competencies to promote PEB. For this purpose, theoretical and empirical work to explain the contribution of these skills is offered.

Theoretically, this thesis first gathers the literature around the relationship between mindfulness and PEB (Chapter 1), so that the rationale of this work is better framed, to then collect the outcomes of mindfulness interventions on socioemotional competencies needed for PEB (Chapter 2). The literature review and meta-analysis conducted found that emotional regulation, along with empathy and social connectedness and resilience,

are the main socioemotional components nurtured by mindfulness practice. As per the empirical contribution, this thesis offers an incremental examination of antecedents of PEB from a volitional perspective, first by examining the role of SC as an antecedent of PEB (Chapter 3) and then the direct and indirect effect of MAAT mediated by SC (Chapter 4), finding differential effects depending on the influence of external barriers. Therefore, some behaviours, those with lower external barriers, will require more volitional control than others while the incorporation of both, SC and MAAT increase the explained variance of PEB. Finally, a summary of the main conclusions and contribution of this thesis as well as limitations and future lines of research is offered (Chapter 5).

By this research, this thesis aims to contribute to the literature of mindfulness, ESD and transformative consumer research so that alternative ways of promoting individual sustainability transitions are offered. It is also hoped that this individual behaviour change will be deployed at institutional and organizational levels so that together, it is possible to work towards a common objective. Additionally, the contribution of this thesis works towards ensuring responsible consumption, the 12th objective of the sustainable development goals stated at the Agenda 2030, by offering an exploration of how mindfulness may influence the acquisition of individual competencies required for a more sustainable lifestyle.

KEYWORDS: *Pro-environmental behaviour, mindfulness, self-control, education for sustainable development, transformative consumer research*

RESUMEN

Los problemas ambientales a los que nos enfrentamos no tienen precedentes y, sin embargo, el estudio de los factores que a nivel individual pueden ayudar a solventarlos no han sido lo suficientemente estudiados. La promoción del comportamiento proambiental del individuo (PEB por sus siglas en inglés) es una tarea compleja que en la literatura tradicionalmente se ha enfocado desde una perspectiva motivacional al tiempo que se sugería la búsqueda de alternativas para la explicación de estos comportamientos. Estas alternativas deberían ofrecer enfoques más integradores vinculados a componentes racionales, pero también emocionales dado que ambos afectan nuestras decisiones a nivel individual, así como nuestro impacto ambiental.

Dentro de esos puntos de vista alternativos, el estudio del papel de mindfulness en la promoción de PEB resulta prometedor. Existen diferentes conceptualizaciones de mindfulness, en concreto, como una disposición, un estado momentáneo de la mente o una intervención que permite desarrollar la capacidad disposicional del individuo. De manera general, mindfulness es descrito como una cualidad de la mente cuyos elementos centrales, en concreto, el despertar de la conciencia, enfoque de la atención y autorregulación, pueden ejercer un papel clave en la transición individual hacia la sostenibilidad. Pese a los beneficios probados en otros contextos, principalmente en ámbitos clínicos gracias al trabajo de John Kabat-Zinn, falta una investigación teórica y empírica sobre la influencia de mindfulness en PEB. En particular, una mirada más profunda a su papel en la educación como herramienta para nutrir otras competencias complementarias a las académicas y cognitivas. Las competencias socioemocionales, como la empatía y la compasión, pueden proporcionar a los estudiantes las habilidades interpersonales que exige la educación para el desarrollo sostenible (ESD por sus siglas en inglés). Por otro lado, competencias volitivas, como el autocontrol, pueden ayudar a plasmar las intenciones en acción, capacitándoles para hacer frente a las barreras para la adopción de PEB.

A partir de una revisión de la literatura entorno a la relación entre mindfulness y PEB (Capítulo 1) se realiza una exploración de las competencias socioemocionales y volitivas con el objeto de realizar un aporte teórico y empírico para explicar este tipo de conductas. Así, esta tesis reúne la literatura en torno a los resultados de intervenciones de

mindfulness para el desarrollo de las competencias socioemocionales necesarias para la promoción de PEB (Capítulo 2). Como resultado se extrae que la regulación emocional, junto con la empatía y la conexión social y la resiliencia, son los principales componentes socioemocionales alimentados por la práctica de mindfulness. En relación con la contribución empírica, esta tesis ofrece un estudio incremental de antecedentes de PEB desde una perspectiva volitiva. Primero, se explora la influencia del autocontrol disposicional (SC por sus siglas en inglés) en la adopción de PEB (Capítulo 3), dando como resultado un incremento de la varianza explicada del comportamiento. Sin embargo, mientras que SC muestra una mayor influencia en los comportamientos con bajas barreras externas, esta influencia disminuye en los comportamientos muy afectados por dichas barreras (por ejemplo, reciclaje versus compra responsable). Por lo tanto, no todos los comportamientos deben tratarse por igual. Algunos requerirán más control volitivo que otros. Además, se explora la relación directa del mindfulness disposicional (MAAT por sus siglas en inglés) e indirecta, a través de SC, cuando éste actúa como mediador en la relación con PEB (Capítulo 4). La varianza explicada del comportamiento aumenta aún más, mientras se mantiene el efecto diferencial entre los comportamientos que requieren más control volitivo. Tras ello, se ofrece un resumen de principales conclusiones, limitaciones y futuras líneas de investigación (Capítulo 5).

Con la realización de estos estudios, esta tesis contribuye a varias corrientes de la literatura. A la literatura sobre mindfulness, ofreciendo soporte teórico y empírico sobre su papel en la sostenibilidad; a la literatura sobre ESD, aportando evidencia de que mindfulness puede aplicarse en la formación para el desarrollo de competencias socioemocionales; finalmente, a la literatura sobre prácticas transformadoras de los comportamientos de consumo ofreciendo alternativas al estudio de las transiciones individuales hacia la sostenibilidad. Así, esta tesis contribuye a su vez al objetivo de desarrollo sostenible número 12 sobre la promoción de consumo responsable fijado en la Agenda 2030.

PALABRAS CLAVES*: Comportamiento proambiental, mindfulness, autocontrol, educación para el desarrollo sostenible, comportamientos de consumo*

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CHIME	Comprehensive inventory of mindfulness experiences
ESD	Education for sustainable development
FFMQ	Five facets mindfulness questionnaire
GEB	General ecological behaviour
KIM	Kentucky inventory on mindfulness scale
MAAT	Mindfulness as-a-trait
MBSR	Mindfulness-based stress reduction program
PEB	Pro-environmental behaviour
SC	Self-control
TPB	Theory of Planned Behavior

INTRODUCTION

1. Research topic

In the global situation we are currently in, our environmental footprint far exceeds what our planet can provide (Global Footprint Network, 2018). By 2030, two planets will be needed to keep the pace of our lifestyles (WWF, 2014). Beyond the causes of these global issues, there is strong evidence about the link between human activities and environmental degradation (Oreskes, 2018). Our daily behaviour, related to common tasks, such as buying food or commuting, has indeed a large environmental impact (Mont, Neuvonen, & Lähteenoja, 2014). However, although our knowledge of the causes behind the global environmental problems has increased over the years, neither has this sufficiently meant a straight shift of our daily behaviours nor a lower environmental impact in consequence (Otto & Pensini, 2017).

In this vein, the growth of the world economy makes that not only the adoption of pro-environmental behaviours (PEB hereafter) seems impossible, but inconvenient and inaccessible (Prothero et al., 2011). Given that most of the environmental problems that affect us are intimately rooted in our way of behaving, the solution to these problems involves an intentional change towards a more environmental behaviour (Steg & Vlek, 2009). An aim that is worth pursuing (Amel, Manning, & Scott, 2009).

A multitude of terms can be found in the literature to refer to environmental behaviours, each of them from different perspectives. For instance, "environmentally conscious behaviours" are described as the awareness of the environmental impact of a product throughout its lifecycle (Bohlen, Schlegelmilch, & Diamantopoulos, 1993; Schwepker & Cornwell, 1991) or "ethical behaviours" when there is an ethical consideration about the impact on society of our decision-making processes, purchases, and any other consumer experiences (Roberts, 1993) (see a review of terms by Tripathi & Singh, 2016). This thesis uses a broad definition of PEB as a set of actions or "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002: 240). In this definition, PEB demands a conscious effort to stop the unsustainable consumption behaviours, whose growth and therefore impact on the environment remain unstoppable (Gifford & Nilsson, 2014; Prothero et al., 2011).

While acknowledging initiatives to handle these issues at institutional and organizational levels, a focus on individual behaviour seems critical to promote the adoption of PEB (UN, 2015). Previous research has addressed the issue of individual behaviour change and PEB (see Grilli & Curtis, 2021, for a review) although not without limitations. Research seems to have focused on single specific behaviours (e.g., recycling) or settings (e.g., workplace) and the implementation of behavioural models for the study of PEB seems restricted (Abrahamse & Steg, 2013). Besides, if we analyze the determinants of PEB studied in the literature (see White, Habib, & Hardisty, 2019 for a review), it becomes clear that the research on PEB adoption has placed special emphasis on constructs and variables associated with motivation (e.g., identity, values, or attitudes) (Gatersleben, Murtagh, & Abrahamse, 2014; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014). However, motivational factors, although important, are not sufficient for behaviour change. Individual's motivation will not necessarily lead to the adoption of PEB (Carrington, Neville, & Whitwell, 2010). Thus, attention should be driven to other factors that may explain the so much found attitude-behaviour gap (Abrahamse, 2019; Carrington, Neville, & Whitwell, 2010).

By acknowledging these shortcomings, the aim of this thesis is to provide a further understanding of the factors that may nurture the adoption of PEB by offering an alternative approach to traditional models in the study of individual behaviour. This alternative view comes from the exploration of mindfulness as a promising avenue of work on the study of PEB, as it has been reflected in past literature (Ives, Freeth, & Fischer, 2020; Wamsler, 2020). Based on existing theoretical and empirical work (see Thiermann & Sheate, 2020, for a review), mindfulness is posited as an essential tool for the transition to more sustainable societies as it may help to cultivate the individual resources that are needed to pave this way (Geiger, Grossman, & Schrader, 2019; Siquiera & Pitassi, 2016; Wamsler et al., 2018).

The most common definition of mindfulness is that of Kabat-Zinn (1994:4) where mindfulness is defined as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally". According to various authors (Armstrong & Jackson, 2015; Brown & Kasser, 2005; Ericson, Kjønstad, & Barstad, 2014; Rosenberg, 2004), mindfulness has been presented as an antidote to consumerism, as it helps us to view others with compassion, moving away from dominant behaviour patterns and emphasizing the importance of intrinsic values (Steffen et al., 2015; Steg & Vlek, 2009).

Therefore, mindfulness provides a life orientation and emotional wellbeing regardless of the materialistic patterns of our current society (Ericson, Kjønstad, & Barstad, 2014; Jacob, Jovic, & Brinkerhoff, 2009; Brown & Kasser, 2005).

Concerning the role of mindfulness in PEB, this thesis particularly examines how mindfulness may affect PEB by studying its effects on ability-related constructs or competencies. This intends to redress the aforementioned overemphasis on motivational approaches, given that these ability factors have received little attention in past literature (Joshi & Rahman, 2015). They have been studied incompletely (e.g., examining the influence of knowledge) or indirectly (e.g., studying the influence of economic resources) (Grunert, Hieke, & Wills, 2014; White, Habib, & Hardisty, 2019).

In this thesis, we start from a broader conception of ability, based on the definition of the construct made in other domains where ability is defined as the competence necessary for problem-solving (MacInnis, Moorman, & Jaworski, 1991; Rothschild, 1999). In the domain under study (PEB adoption), this competence includes both the ability to break with automatic behaviours to establish new modes of action and the ability to overcome internal and external barriers (Ölander & Thøgersen, 1995; Rothschild, 1999). Hence, it can be argued that the ability to adopt PEB requires both, a process of awareness of current unsustainable behaviour, as a previous step to being able to deactivate automatic behaviours, as well as the ability to self-regulate our PEB regardless of the encountered barriers (De Groot & Steg, 2009; Gregory & Leo, 2003). These two dimensions of ability, awareness and behaviour regulation, can be trained and thus, further developed (Ölander & Thøgersen, 1995). This thesis will specifically examine whether mindfulness can be used to nurture two of the central abilities for PEB: socioemotional competencies and self-control (SC hereafter).

Firstly, socioemotional competencies are explored. This set of competencies are those skills required to effectively self-regulate one's emotions, solve problems effectively, and cultivate interpersonal relations, taking both, personal and other's needs into consideration (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2003; Denham et al., 2003). Thus, the development of socioemotional competencies enables the individual to make essential collaborative decisions in PEB (Schonert-Reichl & Roeser, 2016; Sol & Wals, 2015). Therefore, within these competencies intrapersonal

(e.g., emotions) and interpersonal (e.g., empathy) skills are intertwined and interdependent (Elias et al., 1997).

Secondly, volitional abilities are empirically examined. These abilities, described as the interplay of conscious (e.g., attention) and non-conscious processes (e.g., cognitive processing) (Kuhl, 2000), require the exercise of SC to pursue behaviours when other alternatives come into conflict (Orbell, 2004). Thus, the SC ability will be chosen as an antecedent of behaviour and as a mediating construct in this research. This SC ability encompasses the capacity to initiate, implement and maintain actions that allow the transformation processes towards the adoption of PEB (Farmer, Breazeale, Stevens, & Waites, 2017; Nguyen, Dadzie, Chaudhuri, & Tanner, 2019).

Focusing on abilities such as these imply awarding the individual a leading role in sustainability transitions. Despite the barriers, the individual is responsible for her behaviour and, therefore, holds the key to change. Therefore, this thesis proposes a change from the inside out by examining how to develop individual abilities to rethink individual behaviour patterns and question traditional modes of action. By doing so, the individual is provided with modes of behaviour more compatible with planetary limits (Abson et al., 2017; Fischer & Riechers, 2019).

By bringing this rationale together, the scope of our research is established. Mindfulness is considered as a key tool in the individual transformation process towards the adoption of PEB (Bahl et al., 2016) through the improvement of the so-needed socioemotional (Medeiros & Guendelman, 2019) and volitional competencies (Mori & Tasaki, 2019), competencies that are intertwined (Heimlich & Ardoin, 2008). Moreover, we will examine the influence of different mindfulness-related constructs. In particular, mindfulness interventions and their effects on the development of socioemotional competencies and mindfulness-as-a-trait (MAAT hereafter) and its correlation with SC.

2. Objective of the thesis

To work towards this aim, we set the following specific objectives:

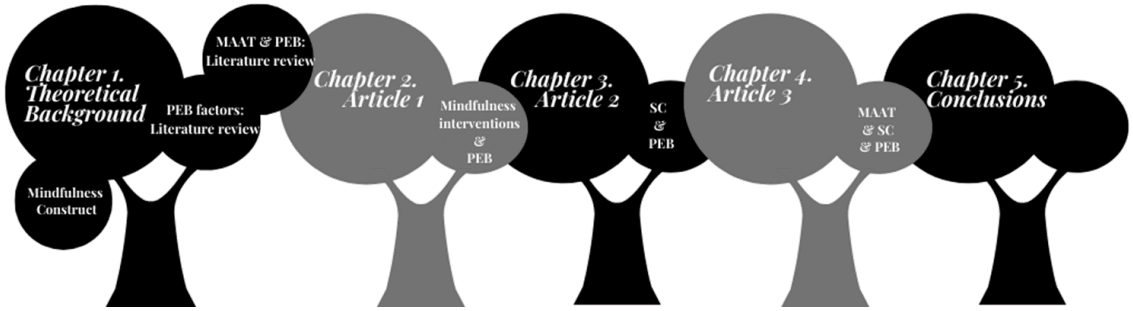
1. To identify past literature on mindfulness-as-an-intervention and the development of socioemotional abilities so that outcomes and potential mechanisms on the influence on PEB can be offered.
2. To empirically examine the influence of mindfulness-as-a-trait on PEB, mediated by its effect on dispositional volitional abilities, namely SC.

To do so, this thesis, first, provides a background of the mindfulness construct to, then, examine the existing relationship between mindfulness and PEB so that its role in the development of socioemotional and SC abilities can be tested. By doing so, this work goes further in attempting to verify the association between constructs associated with the ability and adoption of PEB. Moreover, this work seeks to examine if mindfulness interventions nurture socioemotional competencies, not only by influencing the adoption of PEB but also by promoting the process of integral transformation of the individual inherent in its adoption as well as the role of MAAT and SC on this whole change, that is, from the inside out.

3. Overview

To achieve the aforementioned objectives, this thesis gathers a compendium of studies that together contribute to explain PEB. See *Figure 1* for an illustration of the thesis structure.

Figure 1. Thesis structure



Thus, this thesis is structured as follows:

i. Chapter 1. A review of studies about the relationship between mindfulness and PEB is first offered. The roots of the mindfulness concept and its introduction in western societies is explained along with a description of its conceptualization and operationalization in the academic field. By giving an overview of its central components, namely, awareness and self-regulation, the basis for the articulation of this thesis is offered. As for PEB, a description of its determinants is provided, so that the focus of this thesis, dispositional capabilities of the individuals, specifically, socioemotional and volitional competencies, is supported. A theoretical and empirical explanation of the relationship between mindfulness and PEB is then offered. Thus, for this purpose, this chapter includes the following reviews:
    a. A literature review of the determinants of PEB to provide a better theoretical understanding of the focus and contribution of this thesis along with a framework for the research conducted.
    b. A review of empirical research of mindfulness on PEB to frame the aim of the empirical studies of this thesis.

ii. Chapter 2. This review is followed by a study that focuses on how mindfulness interventions may nurture socioemotional competencies. Thus, the article *Mindfulness in education for sustainable development to nurture socioemotional competencies: A systematic review and meta-analysis*[1] provides an exhaustive review of the literature and meta-analysis of mindfulness interventions promoting the development of socioemotional competencies with an examination of the size of its effect. As a result, three sub-competencies that mindfulness can develop, that is, emotional regulation, empathy and social connectedness and resilience, are identified.

iii. Chapter 3. This chapter focuses on the empirical examination of the dispositional skill of SC. Thus, the article *Volition to behave sustainably: an examination of the role of self-control*[2] helps to explore the role of SC as a complement to existing models of behaviour research, namely, the theory of planned behaviour (TPB hereafter). Besides proving its role as an antecedent of PEB, this article shows how the addition of SC to the model provides further understanding of how a volitional component such as SC has a differential effect on certain PEBs. While a behaviour for which there are less external barriers will be more influenced by a greater dispositional SC, other behaviours may require different components, such as a greater environmental identity.

iv. Chapter 4. After accounting for the effects of SC on PEB, this chapter examines the incremental effect of MAAT on the promotion of PEB. Thus, the article *Trait mindfulness and pro-environmental behaviour: an empirical examination of the mediating role of self-control*[3] explores the relationship between MAAT, a multidimensional individual trait or disposition, the volitional ability of SC and the adoption of PEB. This study finds that MAAT is associated with greater SC particularly on PEB with low external barriers. Additionally, the mediating role of SC is empirically examined. As a result, this study shows how the core components of MAAT act as an antecedent of PEB regulation and how the indirect

[1] Gómez-Olmedo, A. M., Valor, C., & Carrero, I. (2020). Mindfulness in education for sustainable development to nurture socioemotional competencies: A systematic review and meta-analysis. *Environmental Education Research, 26*(11), 1527-1555. doi: 10.1080/13504622.2020.1777264

[2] Gómez-Olmedo, A. M., Carrero, I., & Valor, C. (2020). Volition to behave sustainably: An examination of the role of self-control. In press, accepted for publication in *Journal of Consumer Behaviour*. doi: 10.1002/cb.1905

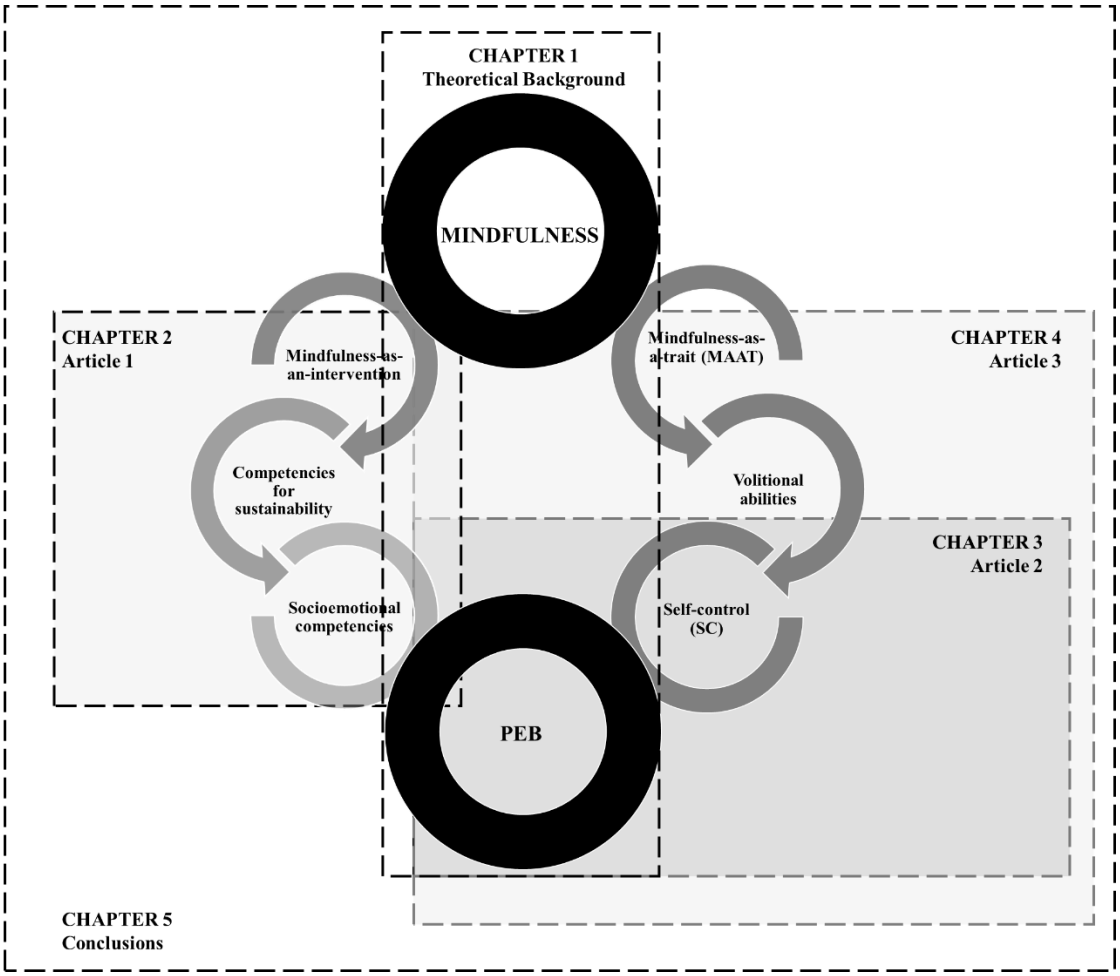
[3] Although this article uses the same database as the article in Chapter 3, it was written separately to differentiate between published and unpublished work. For this reason, some content appears in both articles.

effect of MAAT through the mediating role of SC varies across different types of PEBs. Additionally, the inclusion of MAAT in the study increases the explained variance which, with the mediation of SC, offers new avenues for further research.

v. Chapter 5. Lastly, some conclusions, with theoretical and practical implications as well as limitations of the thesis and further avenues for research, are proposed. Thus, this thesis offers further evidence about the promising role of mindfulness to cultivate socioemotional competencies, and of the role of dispositional abilities, MAAT and SC, as valid predictors of PEB as well as of SC as a mediator. Taking all these findings together, future research and strategies are suggested.

In sum, this thesis sheds some light on the factors related to the socioemotional and volitional facets of behaviour that had not been sufficiently explored. By doing so, it contributes to offer new theoretical and empirical approaches to the scholarship on mindfulness, by emphasizing its role in facilitating environmental actions through the enhancement of components more related to self-regulation; to the literature on transformative sustainable consumption by opening alternative approaches to the study of behavioural strategies for shaping individual behaviours with affective and volitional components and to the field of education for sustainable development (ESD hereafter) as it unveils the socioemotional and volitional competencies enhanced by mindfulness and that are required to better adapt our behaviours to sustainability transitions. A visual representation of the workflow followed in this thesis is presented in *Figure 2*.

Figure 2. Thesis workflow



This thesis puts different streams of literature in dialogue, such as ESD, transformative consumer research, and mindfulness making a threefold contribution. First, it contributes to the literature on ESD by exploring the influence of mindfulness interventions in the development of underexplored skills, socioemotional competencies, that must be introduced in the individual's learning for sustainability transitions, promoting its application in the personal and professional sphere. Second, this thesis contributes to the literature on transformative consumer research and PEB, by focusing on the volitional abilities of the individual. Finally, this thesis expands research on mindfulness by offering a theoretical contribution with regards to the cultivation of socioemotional abilities through mindfulness practice, as well as empirical evidence about the association between individual mindful disposition, self-regulation of behaviour and the adoption of PEB.

4. References

Abrahamse, W. (2019). *Encouraging pro-environmental behaviour: What works, what doesn't, and why.* Cambridge, MA: Academic Press.

Abrahamse, W., & Steg, L. (2013). Social influence approaches to encourage resource conservation: a meta-analysis. *Global Environmental Change*, *23*(6), 1773–1785.

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., Von Wehrden, H., Abernethy, P., Ives, C.D., Jager, N.W., & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio*, *46*(1), 30-39.

Amel, E. L., Manning, C. M., & Scott, B. A. (2009). Mindfulness and sustainable behavior: Pondering attention and awareness as means for increasing green behavior. *Ecopsychology*, *1*(1), 14-25.

Armstrong, A., & Jackson, T. (2015). *The Mindful Consumer. Mindfulness training and the escape from consumerism* [Document file]. Retrieved January 24th, 2019 from https://www.foe.co.uk/sites/default/files/downloads/mindful-consumer-mindfulness-training-escape-from-consumerism88038.pdf

Bahl, S., Milne, G. R., Ross, S. M., Mick, D. G., Grier, S. A., Chugani, S. K., Chan, S.S., Gould, S., Cho, Y, Dorsey, J.D., Schindler, R.M., Murdock, M.R., & Boesen-Mariani, S. (2016). Mindfulness: Its transformative potential for consumer, societal, and environmental well-being. *Journal of Public Policy & Marketing*, *35*(2), 198-210.

Bohlen, G., Schlegelmilch, B. B., & Diamantopoulos, A. (1993). Measuring ecological concern: A multi-construct perspective. *Journal of marketing management*, *9*(4), 415-430.

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social indicators research*, *74*(2), 349-368.

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of business ethics*, *97*(1), 139-158.

Collaborative for Academic, Social, and Emotional Learning (CASEL). (2003). *Safe and sound: An educational leader's guide to evidence-based social and emotional learning programs.* Chicago: Author.

De Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology*, *37*(8), 1817-1836.

Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach–Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence?. *Child development, 74*(1), 238-256.

Elias, M. J., J. E. Zins, R. P. Weissberg, K. S. Frey, M. T. Greenberg, N. M. Haynes, Kessler, R., Shwab-Stone, M.E, & Shriver, T. P. (1997). *Promoting social and emotional learning: Guidelines for educators*. Alexandria, VA: Association for Supervision and Curriculum Development.

Ericson, T., Kjønstad, B. G., & Barstad, A. (2014). Mindfulness and Sustainability. *Ecological Economics 104*, 73–79.

Farmer, A., Breazeale, M., Stevens, J. L., & Waites, S. F. (2017). Eat green, get lean: Promoting sustainability reduces consumption. *Journal of Public Policy & Marketing, 36*(2), 299-312.

Fischer, J., & Riechers, M. (2019). A leverage points perspective on sustainability. *People and Nature, 1*(1), 115-120.

Gatersleben, B., Murtagh, N., & Abrahamse, W. (2014). Values, identity and pro-environmental behaviour. *Contemporary Social Science, 9*(4), 374-392.

Geiger, S. M., Grossman, P., & Schrader, U. (2019). Mindfulness and sustainability: correlation or causation?. *Current opinion in psychology, 28*, 23-27.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology, 49*(3), 141-157.

Global Footprint Network (2018). *National Footprint Accounts*. Oakland, CA: Global Footprint Network.

Gregory, G. D., & Leo, M. D. (2003). Repeated behavior and environmental psychology: the role of personal involvement and habit formation in explaining water consumption 1. *Journal of Applied Social Psychology, 33*(6), 1261-1296.

Grilli, G., & Curtis, J. (2019). Encouraging pro-environmental behaviours: A review of methods and approaches. *Renewable and Sustainable Energy Reviews, 135*, 110039.

Grunert, K. G., Hieke, S., & Wills, J. (2014). Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy, 44*, 177-189.

Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental education research, 14*(3), 215-237.

Ives, C. D., Freeth, R., & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. *Ambio, 49*(1), 208-217.

Jacob, J., Jovic, E., & Brinkerhoff, M. B. (2009). Personal and planetary well-being: Mindfulness meditation, pro-environmental behavior and personal quality of life in a survey from

the social justice and ecological sustainability movement. *Social Indicators Research, 93*(2), 275-294.

Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. *International Strategic management review, 3*(1-2), 128-143.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: mindfulness meditation in everyday life.* New York: Hyperion.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research, 8*(3), 239-260.

Kuhl, J. (2000). A functional-design approach to motivation and self-regulation: The dynamics of personality systems interactions. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 111-169). San Diego: Academic Press.

Maclnnis, D. J., Moorman, C., & Jaworski, B. J. (1991). Enhancing and measuring consumers' motivation, opportunity, and ability to process brand information from ads. *Journal of marketing, 55*(4), 32-53.

Medeiros, S., & Guendelman, S. (2019). A Socio-affective, Developmentally Informed Perspective for Contemplative Practices in Adolescence: Towards Resilient Communities. In *Enhancing Resilience in Youth* (pp. 175-187). Springer, Cham.

Mont, O., Neuvonen, A., & Lähteenoja, S. (2014). Sustainable lifestyles 2050: stakeholder visions, emerging practices and future research. *Journal of Cleaner Production, 63*, 24-32.

Mori, T., & Tasaki, T. (2019). Factors influencing pro-environmental collaborative collective behaviors toward sustainability transition–a case of renewable energy. *Environmental Education Research, 25*(4), 566-584.

Nguyen, T. D., Dadzie, C. A., Chaudhuri, H. R., & Tanner, T. (2019). Self-control and sustainability consumption: Findings from a cross cultural study. *Journal of International Consumer Marketing, 31*(5), 380-394.

Ölander, F. & Thøgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. *Journal of consumer policy, 18*(4), 345-385.

Orbell, S. (2004). Intention–behavior relations: A self-regulation perspective. In G. Haddock & G. R. O. Maio (Eds.), *Contemporary perspectives on the psychology of attitudes* (pp. 145-168). London: Psychology Press.

Oreskes, N. (2018). The scientific consensus on climate change: How do we know we're not wrong?. In E. A. Lloyd & E. Winsberg (Eds.), *Climate Modelling: Philosophical and conceptual issues* (pp. 31-64*).* Cham: Springer International Publishing

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change, 47*, 88-94.

Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. G., Ozanne, L. K., & Thøgersen, J. (2011). Sustainable consumption: Opportunities for consumer research and public policy. *Journal of Public Policy & Marketing, 30*(1), 31-38.

Roberts, J.A. (1993). Sex differences in socially responsible consumers' behavior. *Psychological Reports, 73*(1), 139–148.

Rosenberg, E. L. (2004). Mindfulness and consumerism. In T. Kasser & A. D. Kanner (Eds.), *Psychology and Consumer Culture: The Struggle for a Good life in a Materialistic world.* Washington DC: American Psychological Association.

Rothschild, M. L. (1999). Carrots, sticks, and promises: A conceptual framework for the management of public health and social issue behaviors. *Journal of marketing, 63*(4), 24-37.

Schonert-Reichl, K. & Roeser, R. (2016). *Handbook of mindfulness in education.* New York: Springer.

Schwepker Jr, C. H., & Cornwell, T. B. (1991). An examination of ecologically concerned consumers and their intention to purchase ecologically packaged products. *Journal of Public Policy & Marketing, 10*(2), 77-101.

Siqueira, R. P., & Pitassi, C. (2016). Sustainability-oriented innovations: Can mindfulness make a difference?. *Journal of Cleaner Production, 139*, 1181-1190.

Sol, J., & Wals, A. E. (2015). Strengthening ecological mindfulness through hybrid learning in vital coalitions. *Cultural Studies of Science Education 10*(1), 203-214.

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S.R., de Vries, W., de Wit, C.A., Folke, C., Gerten, D., Heinke, J., Mace, G.M., Persson, L.M., Ramanathan, V., Reyers, B., & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science, 347*(6223).

Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. *Journal of Environmental Psychology, 38*, 104–115.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of environmental psychology, 29*(3), 309-317.

Thiermann, U. B., & Sheate, W. R. (2020). Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour. *Ecological Economics, 174*, 106668.

Tripathi, A., & Singh, M. P. (2016). Determinants of sustainable/green consumption: a review. *International Journal of Environmental Technology and Management, 19*(3-4), 316-358.

UN (2015). *Transforming our world: the 2030 Agenda for Sustainable Development.* New York, NY: Division for Sustainable Development Goals.

Wamsler, C. (2020). Education for sustainability: fostering a more conscious society and transformation towards sustainability. *International Journal of Sustainability in Higher Education*, *21*(1), 112-130.

Wamsler, C., Brossmann, J., Hendersson, H., Kristjansdottir, R., McDonald, C., & Scarampi, P. (2018). Mindfulness in sustainability science, practice, and teaching. *Sustainability Science, 13*(1), 143-162.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing, 83*(3), 22-49.

WWF (World Wildlife Fund). (2014). *Living planet report.* Switzerland: WWF International.

CHAPTER 1

Mindfulness and PEB relationship: an integrative review

1.1. Definition and background of mindfulness

The concept of *mindfulness* has a long history in the Buddhist tradition, being introduced in the West for the first time in 1910 (Rhys Davids, 1910). Since 1980, the concept has received greater attention, initially from psychotherapy practices, thanks to the work of John Kabat-Zinn (Gethin, 2011), a scientist, writer, and meditation teacher who was determined to bring mindfulness into the mainstream after showing its benefits in clinical contexts (Kabat-Zinn, 2011). This great interest was followed by academic researchers beyond clinical settings (Stratton, 2015; Brown, Ryan, & Creswell, 2007). In the sustainability field, the first scientific article referring to mindfulness and sustainability dates back to 1999 (Brinkerhoff & Jacob, 1999). Since then, this stream of research has increased exponentially (Thiermann & Sheate, 2020).

The term "mindfulness" originally comes from the sanskrit word "sati" (Rhys Davids, 1910: 323–324) which could be translated as "remembering" although the meaning of this remembering goes far beyond its literality. Without deepening into the complexity of its origins (see Gethin, 2011 for a review), it is a "remembering" that cultivates the serenity of the mind on the here and now, which helps to develop an array of attitudes and intentions that are coherent with our self (Qiu & Rooney, 2017). Hence, this religious definition of mindfulness is engrained in the first scientific works published in the PEB domain (Brinkerhoff & Jacob, 1999; Jacob & Brinkerhoff, 1999). Besides, throughout the scientific research of mindfulness, the same term "mindfulness" is used to refer to either an individual trait or disposition (MAAT); a mental state (Bishop et al., 2004); or an intervention or practice (Valk et al., 2017). These different uses of the term will be described next.

Among all the definitions provided, the most used is the one elaborated by Kabat-Zinn (1994: 4) who described mindfulness as the process of "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally". Based on this definition, mindfulness is seen as a "way of being" (Cullen, 2011: 187), a "quality of mind" (Kang, Gruber, & Gray, 2013: 192), therefore, as a disposition, that is, MAAT, an inherent capacity of the individual (Baer et al., 2008), rather than a certain practice or state. This definition reflects an evolution of the Eastern Buddhist tradition of mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003; Bishop, 2002) to a

non-religious definition. This secular approach has served to popularize the concept from the field of psychology and psychotherapy, predecessors of the spread of mindfulness, to non-clinical settings. Nevertheless, it has been acknowledged that the eastern roots of mindfulness and its western conceptualization need to be in dialogue (Wallace & Shapiro, 2006; Williams & Kabat-Zinn, 2011).

Along with this secular conceptualization, there is a different line of development of mindfulness detached from the Buddhist tradition and more in line with a Western Psychological perspective, which is pioneered by Langer & Moldoveanu (2000). These authors conceptualize mindfulness as "the process of drawing novel distinctions" (Langer & Moldoveanu, 2000: 1), a cognitive state that allows us to adopt a beginner's mind where everything is new to our eyes. This cognitive state entails deploying individual abilities through a "heightened state of involvement and wakefulness" (Langer & Moldoveanu, 2000: 2). This is the definition most adopted in organizational settings (Weick, Sutcliffe, & Obstfeld, 1999). Additionally, state mindfulness has also been approached from an Eastern view following Bishop et al.'s (2004) stream of research. Thus, it is described as a "state-like quality, that is maintained only when attention to experience is intentionally cultivated with an open, nonjudgmental orientation to experience" (Lau et al., 2006: 1447).

Finally, mindfulness-as-an-intervention is described as a range of formal and informal exercises to foster awareness of the present moment (Creswell, 2017). A classical intervention is the mindfulness-based stress reduction program (MBSR hereafter) developed by Kabat-Zinn (1991). During this program, a mindful disposition is cultivated through formal practice during an 8-week intervention (e.g., breathing meditation), as well as informally through practice related to daily activities (e.g., mindful eating) accompanied by a full day of mindful practice in the sixth week. The level of engagement of participants will determine the quality of the mindful disposition developed over time. Albeit MBSR is the most popular intervention, there are other developed for non-clinical purposes, either to achieve the overall objective of increasing MAAT or to achieve specific objectives such as the cultivation of socioemotional skills in education (MindUp program; Maloney, Lawlor, Schonert-Reichl, & Whitehead, 2016) or even, to facilitate sustainable consumption adoption (BINKA training; Stanszus et al., 2017).

In this thesis, two of the conceptualizations of mindfulness are used. Chapter 2 focuses on mindfulness-as-an-intervention, whereas Chapter 4 focuses on mindfulness as-a-trait (MAAT). It is noteworthy that, although mindfulness can be distinctively understood as a trait, state or intervention, these concepts are intertwined (Thiermann & Sheate, 2020). Thus, MAAT can be trained either through a mindfulness intervention or through the promotion of a state of consciousness (Kabat-Zinn, 2003; Rau & Williams, 2016).

With regards to its central elements, MAAT is related to the quality of the mind that allows us to acquire full awareness and focus our attention on the present moment (Brown & Ryan, 2003). This enhanced awareness, through the focus on attention, has become one of the fundamental features of mindfulness (Brown, Ryan, & Creswell, 2007). Other authors add to the awareness component, a component of self-regulation of our behaviour (Bishop et al., 2004; Kabat-Zinn, 1994). These two elements, awareness and self-regulation, constitute the purpose of the line of research of this thesis and are described next.

Following Kabat-Zinn's definition (1994), the process of awareness implies focusing our attention on both, internal and external stimuli. Attention to internal stimuli refers to the self-regulation of attention that allows one to be inhibited from distractions and avoid the constant and, at times, unstoppable elaboration of thoughts. This ability works along with a non-evaluative stance to experience, avoiding constant judgment and rumination (Bishop et al., 2004). Regarding external stimuli, broader awareness reveals our interdependence with the environment, which makes us feel intimately linked to the context that surrounds us. By this attention to external stimuli, individuals acknowledge that their wellbeing depends on natural surroundings (Amel, Manning, & Scott, 2009). Together, this attention to internal and external stimuli constitutes the basis of an observing ability that is inherent within mindful individuals or that can be developed through practice (Baer, Walsh, & Lykins, 2009).

In turn, mindful attention is referred to as the meta-cognitive awareness of how our mind works (Papies, Pronk, Keesman, & Barsalou, 2015). As it is experienced in most common mindfulness practices, we are not our thoughts, feelings, or sensations; they are just part of our mental processing (Chambers, Gullone, & Allen, 2009). We should just observe them, from a non-judging stance, and accept them as they are. The inherent ability to be mindful allows to naturally flow through this process leading to an active reappraisal or

suppression of thoughts and emotions (Gross & John, 2003). Thanks to this way of processing, mindful attention facilitates to be better attuned to one's and other's experiences which effectively impinges on emotion regulation (Brown, Ryan, & Creswell, 2007). There is wide evidence supporting this claim indicating that this enhanced awareness through the focus of attention promotes a higher quality of social functioning in daily life experiences (Hill & Updegraff, 2012) and a strong connection with others (Brown & Ryan, 2003). As will be later discussed, these two effects may enable the adoption of PEB.

As for the second core element of mindfulness, self-regulation, this is facilitated as a result of increased awareness and enhanced attention (Bahl et al., 2016; Vago & David, 2012). The more conscious our experiences are, the more capable we will be to adapt our behaviours. The busyness of our daily life mostly results in switching to autopilot mode where, if any, our attention is quite limited (Kang, Gruber, & Gray, 2013). Besides, we apply a bias on our attentional capacity, prioritizing those behavioural responses that more benefit the self, hindering the exercise of autonomous functioning (Brown & Ryan, 2003). Since mindfulness increases our full awareness of internal and external stimuli, it may work as a self-regulation mechanism (Bishop et al., 2004).

Having said that, although the mindfulness construct has been described by its components of awareness and in turn, self-regulation, to better understand how mindfulness can unfold its full potential on its influence on the focal constructs of this thesis, PEB and SC, the operationalization of mindfulness will be discussed next. This operationalization identifies some other facets that contribute to further comprehend the nuances of this concept.

1.2. Operationalization of mindfulness

MAAT has been operationalized as a unidimensional or multidimensional construct (see the reviews by Bergomi, Tschacher, & Kupper, 2013, and Sauer et al., 2012). Thus, MAAT can be assessed employing (1) a one-dimensional construct, measured through scales such as the Attention and Awareness Scale (MAAS; Brown & Ryan, 2003); (2) a two-dimensional construct, including a factor of attention to the experience of the present

moment and a factor of acceptance through the regulation of the emotions that may arise which is measured through scales such as the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008; and (3) a multidimensional construct, measured fundamentally through the Five Factors Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and more recently through the Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014).

As for state mindfulness (Bishop et al., 2014), an adaptation of Brown & Ryan's scale (State-MAAS; Brown & Ryan, 2003), as well as the Toronto Mindfulness Scale (TMS; Lau et al., 2006) seem to be the more reliable measurement tools, although they have not been so widely used (see Sauer et al., 2013 for a review). They present some limitations in terms of its design, not valid to assess levels of mindfulness during an intervention, or its lack of generalizability (Tanay & Bernstein, 2013). Therefore, most of the studies examine state mindfulness by conducting a brief mindfulness induction (e.g., 10-15 min) based on classic mindfulness interventions (such as MBSR: Kabat-Zinn, 1991), after which the effects are measured following MAAT scales (Baer, Walsh, & Lykins, 2009). This is also the case for the measurement of mindfulness interventions where MAAT is measured at several timeframes (e.g., pre- and post-intervention), so that baseline levels and effects after the intervention implemented are assessed through self-reported questionnaires (Bergomi, Tschacher, & Kupper, 2013).

Table 1 offers a summary of the most common operationalization of the mindfulness construct (trait and state) used in academic research by the number of dimensions following the review and evaluation provided by Qu, Dasborough, & Todorova (2015). Based on this review, the number of citations of each scale was updated and data regarding internal consistency (Cronbach's alpha) was included.

Table 1. Mindfulness operationalization

Scales	Google Scholar citations (as of February 1, 2021)	Dimensions	Number of items	Reliability (Cronbach's alpha)
MAAT				
The Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003)	19,100	Uni-dimensional	15-items	• α = .87
The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008)	538	Two- dimensional: (1) awareness (2) acceptance	20-items: • awareness (10-items) • acceptance (10-items)	Global α = .87 • awareness subscale α = .75 • acceptance subscale α = .82
The Five Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)	5,590	Multi-dimensional (5 facets): (1) observing (2) non-reacting (3) acting with awareness (4) non-judging (5) describing	39 items: • observing (8-items) • non-reacting (7-items) • acting with awareness (8-items) • non-judging (8-items) • describing (8-items)	Global α = .92 • observing subscale α = .83 • non-reacting subscale α = .75 • acting with awareness subscale α = .87 • non-judging subscale α = .87 • describing subscale α = .91

The Comprehensive Inventory of Mindful Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014)	209	Multi-dimensional (8-facets): (1) acceptance (2) inner awareness (3) outer awareness (4) acting with awareness (5) decentering (6) openness (7) relativity (8) insight	37 items • acceptance (5- • inner awareness (5-items) • outer awareness (4-items) • acting with awareness (4-items) • decentering (6-items) • openness (4-items) • relativity (4-items) • insight (5-items)	Global α = .95 α measured at pre/post intervention by subscale: • acceptance subscale α =.83/.87 • inner awareness α = .68/.76 • outer awareness α = .86/.87 • acting with awareness α = .64/.72 • decentering α = .80/83 • openness α = .60/.62 • relativity α = .74/.76 • insight α = .73/.76
State mindfulness				
The Mindful Attention and Awareness Scale – state - (State-MAAS; Brown & Ryan, 2003)	125	Uni-dimensional	5 items	• α = .92
The Toronto Mindfulness Scale (TMS; Lau et al., 2006)	16,300	Two- dimensional:	13 items • curiosity (6-items) • decentering (7-items)	Global α = .95 • curiosity α = .90 • decentering α = .69

Source: Adapted from Qu, Dasborough, & Todorova (2015)

Thanks to the measurement of mindfulness, as a trait or state, existing empirical research has proved the benefits of this construct in psychological, physical, and socioemotional aspects (see Grossman, Niemann, Schmidt, & Walach, 2004; Tomlinson, Yousaf, Vittersø, & Jones, 2018 and Chambers, Gullone, & Allen, 2009 for reviews). MAAT has shown benefits such as greater subjective wellbeing or cognitive functioning like enhanced attention among others (Brown & Ryan, 2003). In terms of physical health, it helps to prevent compulsive behaviours such as substance addictions or binge eating as well as to promote beneficial behaviours such as healthy eating (Sala, Rochefort, Lui, & Baldwin, 2020). Regarding socioemotional aspects, it has proved to increase aspects such as empathy, compassion or ethical and prosocial behaviours (Condon, 2017; Ruedy & Schweitzer, 2010; Winning & Boag, 2015). Given the existing evidence, research on how mindfulness may promote sustainability transitions within specific contexts such as PEB is seen as a promising avenue for research (Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017; Geiger, Fischer, Schrader, & Grossman, 2020). This thesis aims to attend to this call. After having described the mindfulness concept, its roots, main definitions, core components as well as its operationalization and benefits, the relationship with PEB is next explored.

1.3. The adoption of PEB: a review of antecedents

The study of the influence of mindfulness on the adoption of PEB has become more relevant in recent years (Wamsler et al., 2018; Ericson, Kjønstad, & Barstad, 2014) specifically, as one of the traits that may drive PEB (Thiermann & Sheate, 2020). To better understand the relationship between mindfulness and PEB as well as its relevance for this thesis, a closer look into the individual factors that may act as antecedents of PEB is offered. To do so, an integration of reviews on the factors influencing PEB was conducted (Gifford & Nilson, 2014; Hines, Hungerford, & Tomera, 1987; Kollmus & Agyeman, 2002; Steg & Vlek, 2009; Tripathi & Singh, 2016; Welsch & Khüling, 2009;

White, Habib, & Hardisty, 2019). As a result, the description of individual determinants of PEB can be provided (see *Table 2*).

Table 2. Factors during PEB

Intention	Factor immediately precedent to the behaviour and whose degree determines it. Thus, a high degree of intention would lead to the adoption of PEB. Despite this, its explanatory capacity, although decisive, is not conclusive.	Hines, Hungerford, & Tomera, (1987); Kollmus & Agyeman (2002); Steg & Vlek (2009); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)
Attitude	Both, positive attitudes towards the environment and towards carrying out a pro-environmental action positively affect the adoption of PEB.	Hines, Hungerford, & Tomera (1987); Kollmus & Agyeman (2002); Steg & Vlek (2009); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)
Perceived behavioural control	A concept that is similar to that of “self-efficacy” or "internal locus of control", referring to whether an individual has the perception that a specific action is upon herself or when external factors intervene ("external locus of control") upon others, such as behaviours of governments or institutions. The more sense of control over a PEB, the more likely it will be adopted, although this predictability is discussed.	Hines, Hungerford, & Tomera, (1987); Kollmus & Agyeman (2002); Steg & Vlek (2009); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)
Subjective norm	Those behaviours commonly accepted as being considered appropriate by the community. Therefore, individuals are influenced by social pressure. In this category, elements such as social support or predisposition of an individual to adopt an alternative behaviour against the external norm could in turn be placed.	Hines, Hungerford, & Tomera, (1987); Kollmus & Agyeman (2002); Steg & Vlek (2009); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)

Personality, Identity	Those individuals with greater open-mindedness, compassion, awareness, sense of responsibility, sense of cooperation, and interconnectedness with their environment are more likely to adopt PEB. Their vision of the world will also be differential, from a dominant social paradigm to a new environmental paradigm.	Dunlap & Van Liere (1978); Gifford & Nilsson (2014); Hines, Hungerford, & Tomera (1987); Pirages & Ehrlich (1974); Steg & Vlek (2009); Thiermann & Sheate (2020); Tripathi & Singh (2016)
Values	Following the classification of hedonic, altruistic and biospheric values, the norm activation theory and the theory of values-beliefs-norms, those individuals with self-transcendent (biospheric and altruistic) versus self-enhancement (materialistic) values are more likely to adopt PEB.	De Groot & Steg (2007); Gifford & Nilsson (2014); Schwartz (1977); Steg & Vlek (2009); Stern (2000); Tripathi & Singh (2016)
Environmental knowledge	Rather than general environmental knowledge, which has been argued to influence PEB, action-related knowledge, described as the knowledge about how to take action on environmental problems, seems to be of utmost importance for the promotion of PEB. Access to adequate information on environmental problems through education plays a critical role in this matter.	Gifford & Nilsson (2014); Hines, Hungerford, & Tomera (1987); Kollmus & Agyeman (2002); Liobikienė & Poškus (2019); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)
Environmental awareness	Awareness of the impact that our behaviour has on the environment increases the likelihood of PEB adoption. Awareness is curtailed due to the lack of proximity to environmental consequences, the slow and gradual progression of ecosystems and the complexity of environmental problems themselves.	Hines, Hungerford, & Tomera (1987); Kollmus & Agyeman (2002); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)

Habits	The automatic repetition of past behaviours, the memory of previous behaviours, acquired behaviours and routines constitute great internal barriers to adopt PEB.	Gifford & Nilsson (2014); Steg & Vlek (2009); Tripathi & Singh (2016); Welsch & Khüling (2009); White, Habib, & Hardisty (2019)
Affect	Material goods fulfil a triple function: instrumental, symbolic, and affective. Certain types of PEB (e.g., car use) may be more influenced by symbolic and affective motives, while for other PEBs this influence may vary (e.g., renewable energy).	Kollmus & Agyeman (2002); Noppers, Keizer, Bolderdijk, & Steg (2014); Steg & Vlek (2009)
Cognitive Bias	Cognitive strategies accommodate reality to our biases and ways of seeing the world. As a result, behaviours that make us uncomfortable are inhibited, even when we feel that are more appropriate. Therefore, a large load of cognitive biases such as the belief that our damage to the environment will only impact other people, in other regions, rather than on our own, will difficult the adoption of PEB.	Gifford & Nilsson (2014); Kollmus & Agyeman (2002); Tripathi & Singh (2016); White, Habib, & Hardisty (2019)
Demographic	Age, gender, income, place of residence, religion, intellectual, cultural, political inclinations, or social class, among others, have an impact on the adoption of PEB, although evidence is inconclusive. Among all these factors, gender, income, age and education are the most studied as possible moderators. Thus, a woman, with a medium-high income level, of middle age and higher education has been found as the profile most likely to adopt PEB.	Kollmus & Agyeman (2002); Gifford & Nilsson (2014); Hines, Hungerford, & Tomera (1987); Welsch & Khüling (2009); Tripathi & Singh (2016)

As it has consistently been acknowledged in the literature, the study of PEB is complex (White, Habib, & Hardisty, 2019). Based on the individual factors here described, it could be theorized that an individual with the following characteristics may be more prone to adopt PEB. A person who most likely would show altruistic, biospheric and post-materialistic values (Steg & Vlek, 2009). Someone who would probably have a long-term vision in the adoption of PEB which, despite the short-term cost of not receiving social approval, results in a personal benefit (Tripathi & Singh, 2016). Someone whose behaviour is more likely to be perceived as under control, independent of external factors (White, Habib, & Hardisty, 2019). An open-minded individual who would probably show compassion, a sense of responsibility and a willingness to cooperate with others, with whom she may feel intimately connected, regardless of whether they are friends or strangers (Thiermann & Sheate, 2020). An individual who would probably be capable of breaking bad habits and previous behaviours, with high knowledge of not only the environmental problems but also the impact of her behaviour (Gifford & Nilsson, 2014). This capability would be probably acquired based on the ability to observe reality as it is, without bias, attending and adapting to the consequences that may arise (Tripathi & Singh, 2016). In terms of socio-demographic variables, this individual would more likely be an affluent high-educated woman (Gifford & Nilsson, 2014).

Despite this wide scope of attributes, most of the research has focused on the motivational aspects that may affect individual behaviour when there is evidence that motivation, although important, is not sufficient to perform PEB (Carrington, Neville, & Whitwell, 2010). Instead, rather than focusing on motivational components, learning about our inner selves seems to be a critical step, as it has been defended in scholarship on ESD (de Haan, 2006; Papenfuss, 2019) and sustainable consumption (Stanszus et al., 2017). Individuals that are aware of their interrelation with their environment, who show compassion, a sense of cooperation and capabilities to self-regulate their behaviour seem to more likely adopt PEB (Gifford & Nilsson, 2014; Steg & Vlek, 2009; Tripathi & Singh, 2016).

Additionally, the adoption of PEB seems to be also determined by our past behaviours (White, Habib, & Hardisty, 2019). Unsustainable automatic routines are embedded in our daily routines and therefore self-regulation strategies seem to be needed to disrupt these habits. The relevance of these socioemotional and self-regulatory factors, particularly the need for SC, for the promotion of PEB has been stressed in past literature (Bamberg, 2013; Nielsen, 2019; Nielsen, 2017; Tripathi & Singh, 2016). However, as we have

mentioned in the Introduction, the influence of these competencies on PEB has been underexamined as well as the potential effect of mindfulness on them.

To work on this gap, a review about the role of mindfulness on PEB so that the determinants of PEB are complemented from a mindfulness approach is discussed next. To do so, theoretical and empirical studies about the influence of mindfulness on individual factors are explored.

1.4. Mindfulness as an antecedent of PEB: a review of studies

There are recent reviews of the literature on the correlation between mindfulness and PEB (see *Table 3* for a summary). Within these reviews, theoretical and empirical links are suggested. As per the theoretical mechanisms, Ericson, Kjønstad, & Barstad (2014) suggest that (1) subjective wellbeing, (2) awareness of intrinsic values and (3) empathy and compassion may act as the three potential links between mindfulness and sustainability. This theoretical model is complemented by Thiermann & Sheate (2020), including the need for attention and acceptance to achieve an enhanced awareness. Thus, it is proposed that this awareness along with self-reflection and detachment from habitual behaviours would work as the mechanisms explaining the influence of mindfulness on the individual's adoption of PEB. In the case of Tezel & Giritli (2017), their work attends to the role of mindfulness as a self-regulatory strategy to promote PEB. Additionally, Wamsler (2018) offers an approach to the relationship between mindfulness and climate adaptation from an individual, organizational, and societal level. Although this author does not explicitly suggest potential mechanisms, she refers to PEB as a relevant research field that needs more empirical evidence given that some of its researched aspects, such as the role of mindfulness in counteracting maladaptive behaviours, has not been sufficiently explored.

Along with this theoretical *corpus*, some reviews offer a summary of the empirical findings that have been presented in the literature given that not all the theoretical mechanisms have been tested. Thus, as a result of the review of seven studies on

sustainable consumption, Fisher, Stanszus, Geiger, Grossman, & Schrader (2017) conclude that four mechanisms have been empirically supported, namely, (1) de-automatization through the awareness and inhibition of routines, (2) coherence between attitudes and individual behaviour (3) reorientation towards non-materialistic lifestyles which leads to subjective wellbeing; and (3) pro-social behaviour. In the more recent review, conducted by Thiermann & Sheate (2020), six different pathways between mindfulness and PEB are offered: (1) greater awareness, which is mainly related to de-automatization; (2) enhancement of personal health and subjective wellbeing; (3) greater connectedness to nature; (4) improved pro-sociality which includes the promotion of certain abilities such as altruism, compassion and empathy; (5) recognition of intrinsic values which would promote ethical decision making; (6) and openness to new experiences, which need to be promoted along with a non-judgmental stance of individual experiences to contribute to PEB.

Table 3. Summary of literature reviews on mindfulness and PEB

Authors	**Mechanisms approach**	**Mindfulness construct**	**Type of review**	**Number of studies**	**Dependent variable**
Ericson, Kjønstad, & Barstad (2014)	Theoretical	Mindfulness interventions	Literature review	Number of studies not reported	*Sustainable behaviour*
Fisher, Stanszus, Geiger, Grossman, & Schrader (2017)	Empirical	MAAT	Literature review	7	*Sustainable consumption*
Tezel & Giritli (2017)	Theoretical	MAAT	Literature review	9	*Sustainable behavior*
Thiermann & Sheate (2020)	Theoretical and empirical	MAAT / Mindfulness practice / Combination trait and practice	Literature review	Not fully disclosed	*PEB*
Wamsler et al. (2018)	Theoretical	MAAT	Literature review	Number of studies not reported	*Climate adaptation*

Both, theoretical papers and empirical reviews point to the fact that a deeper exploration of aspects that may facilitate inner transitions is needed, given that the field of mindfulness and sustainability is still in its early stages of research and its causal effects, although positive, remain not sufficiently explored (Geiger, Fischer, Schrader, & Grossman, 2020). Thus, while some of the mechanisms have received much attention, such as values and subjective wellbeing, others such as the inhibition of automatic behaviours have not sufficiently addressed (Fisher, Stanszus, Geiger, Grossman, & Schrader, 2017). For this, alternative views need to be considered.

Attending to this call, to further examine the most relevant aspects of the relationship between mindfulness and PEB, an update of the literature review on empirical studies investigating the relationship between mindfulness, as a trait, state or intervention, and the adoption of PEB was conducted. To do so, the 25 articles identified in Thiermann & Sheate's work (2020) were complemented by performing a search procedure to identify additional empirical works. For this purpose, a search string[4] was built including a set of keywords with different conceptualizations of PEB such as "ecological behaviour" or "sustainable behaviour" and the term mindfulness. This was followed by a snowballing procedure within the full list of studies. Thus, the references of the articles were scanned so that additional studies could be identified. Together, the articles included in Thiermann & Sheate's review, those yielded by the search procedure and those extracted from the snowballing procedure, were read to ensure that they complied with the inclusion criteria of this review. Thus, only studies that used a measure of PEB as the dependent variable and that were referred to consumer behaviours rather than institutional or organizational behaviour (e.g., employees' pro-environmental behaviour) were included. Additionally, ethical or prosocial behaviours were excluded given that they are seen as mechanisms and therefore comprised within the broader concept of PEB adopted in this thesis. See *Table 4* for full details of the procedure followed.

[4] TI = ("pro-environmental behavior*" OR "pro-environmental behaviour*" OR "ecological behavior*" OR "ecological behaviour*" OR "environmental behavior*" OR "environmental behaviour*" OR "environmental actions" OR "ecologically responsible behavior*" OR "ecologically responsible behaviour*" OR "environmentally responsible behavior*" OR "environmentally responsible behaviour*" OR "environmentally significant behavior*" OR "environmentally significant behaviour*" OR "pro-ecological behavior*" OR "pro-ecological behaviour*" OR "environmentally conscious behavior*" OR "environmentally conscious behaviour*" OR "environmentally friendly behavior*" OR "environmentally friendly behaviour*" OR "sustainable behavior*" OR "sustainable behaviour*" OR "eco-friendly behavior*" OR "eco-friendly behaviour*" OR "green behavior*" OR "green behaviour*" OR "conservation behavior*" OR "conservation behaviour* ") Refined by TOPIC: (mindfulness) Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

Table 4. Selection of studies procedure

Thiermann & Sheate's review (2020)
Amel, Manning, & Scott (2009); Aspy & Proeve, (2017); Barbaro & Pickett (2016); Barber & Deale (2014); Böhme, Stanszus, Geiger, Fischer, & Schrader (2018); Brinkerhoff & Jacob (1999); Brown & Kasser (2005); Chan (2019); Dhandra (2019); Geiger, Fischer, Schrader, & Grossman (2020); Geiger, Otto, & Schrader (2018); Grabow et al. (2018); Howell et al. (2011); Hunecke & Richter (2019); Jacob, Jovic, & Brinkerhoff (2009); Loy & Reese (2019); Pandey, Chandwani, & Navare (2018); Panno et al. (2018); Ritcher & Hunecke (2020); Ruedy & Schweitzer (2010); Shapiro, Jazaieri, & Goldin (2012); Stanszus, Frank, & Geiger (2019); Tang, Geng, Schultz, Zhou, & Xiang (2017); Wamsler & Brink (2018); Werner, Spiller, & Meyerding, (2020)
New search string
Deringer, Hanley, Hodges, & Griffin, (2020); Dharmesti, Merrilees, & Winata (2020); Hanley, Dorjee, & Garland (2020); Ray, Franz, Jarrett, & Pickett (2020); Yilmaz & Anasori (2020)
Snowballing procedure
Armstrong (2012); Helm & Subramaniam (2019); Wei, Li, Zeng, & Zhu (2020); Yigit (2020)
Inclusion criteria
Amel, Manning, & Scott (2009); Armstrong (2012); Barbaro & Pickett (2016); Böhme, Stanszus, Geiger, Fischer, & Schrader (2018); Brown & Kasser (2005); Chan (2019); Deringer, Hanley, Hodges, & Griffin (2020); Dharmesti, Merrilees, & Winata (2020); Geiger, Fischer, Schrader, & Grossman (2020); Geiger, Grossman, & Schrader (2019); Geiger, Otto, & Schrader (2018); Grabow et al. (2018); Hanley, Dorjee, & Garland (2020); Helm & Subramaniam (2019); Hunecke & Richter (2019); Jacob, Jovic, & Brinkerhoff (2009); Loy & Reese (2019); Panno et al. (2018); Ray, Franz, Jarrett, & Pickett (2020); Ritcher & Hunecke (2020); Stanszus, Frank, & Geiger (2019); Wei, Li, Zeng, & Zhu (2020); Werner, Spiller, & Meyerding, (2020); Yigit (2020); Yilmaz & Anasori (2020)
25 studies

Based on this, 15 studies remained included from Thiermann Sheate's review (2020) and 10 new articles were selected as a result of the search procedure conducted. Thus, a total of 25 studies were further reviewed to classify their content for the purpose of this thesis. Then, the content of the studies was extracted based on the following categories (1) mindfulness definition used in the study so that results can be interpreted based on its approach, that is, an eastern conceptualization more rooted in Buddhism practices or a

western mindfulness definition following Langer & Moldoveanu's (2000) conceptualization; (2) operationalization of the mindfulness construct; (3) type of PEB used as a dependent variable so that it is easier to elucidate to what type of PEB the study refers to as well as to also examine its operationalization (4) sample size and composition; (5) correlational studies and within them, analysis of the direct and indirect effects; (6) experimental studies; and lastly, (7) boundary conditions. The description and findings of the different studies as well as a discussion that frames the line of research of this thesis is offered next.

1.4.1. Mindfulness definition

Most of the studies adopt the eastern conceptualization of mindfulness, although several definitions were followed. Five studies (Brown & Kasser, 2005; Deringer, Hanley, Hodges, & Griffin, 2020; Hanley, Dorjee, & Garland, 2020; Panno et al., 2018; Yilmaz & Anasori, 2020) embrace the uni-dimensional conceptualization of Brown & Ryan (2003), while one study follows the Bishop's definition (2004) based on the two components of attention to the present moment, through self-regulation, and non-judgmental acceptance (Amel, Manning, & Scott, 2009). The most common definition was the one provided by Kabat-Zinn throughout his work (1982, 1991, 1994, 2003, 2005) followed by eight studies (see *Table 5* for a summary). Based on this same eastern orientation, ad-hoc definitions were identified in four studies (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Geiger, Fischer, Schrader, & Grossman, 2020; Geiger, Grossman, & Schrader, 2019; Stanszus, Frank, & Geiger, 2019). The ad-hoc conceptualization follows the definition proposed by Böhme, Geiger, Grossman, Stanszus, & Schrader (2016) and seems to serve the purposes of their research, the examination of sustainable consumption. Additionally, three studies (Armstrong 2012; Barbaro & Pickett, 2016; Yigit, 2020) provide a review of different definitions which is also based on an eastern operationalization of mindfulness.

Only three studies (Dharmesti, Merrilees, & Winata, 2020; Helm & Subramaniam, 2019; Werner, Spiller, & Meyerding, 2020), followed Langer's approach (1989) where mindfulness is seen as a cognitive style, a way to be opened to external stimuli through a novel view of our experiences. Lastly, one study (Chan, 2019) does not refer to any specific definition. A summary of these results is offered in *Table 5*.

Table 5. Mindfulness definitions

Eastern conceptualization	
Brown & Ryan (2003)	Brown & Kasser (2005); Deringer, Hanley, Hodges, & Griffin (2020); Hanley, Dorjee, & Garland (2020); Panno et al. (2018); Yilmaz & Anasori (2020)
Bishop et al. (2004)	Amel, Manning, & Scott (2009)
Kabat-Zinn (1982, 1991, 1994, 2003, 2005)	Geiger, Otto, & Schrader (2018); Grabow et al. (2018); Hunecke & Richter (2019); Jacob, Jovic, & Brinkerhoff (2009); Loy & Reese (2019); Ray, Franz, Jarrett, & Pickett (2020); Ritcher & Hunecke (2020); Wei, Li, Zeng, & Zhu (2020)
Review of definitions	Armstrong (2012); Barbaro & Pickett (2016); Yigit (2020)
Ad-hoc definition based on eastern tradition	Böhme, Stanszus, Geiger, Fischer, & Schrader (2018); Geiger, Fischer, Schrader, & Grossman (2020); Geiger, Grossman, & Schrader (2019); Stanszus, Frank, & Geiger (2019)
Western conceptualization	
Langer & Moldoveanu (2000)	Dharmesti, Merrilees, & Winata (2020); Helm & Subramaniam (2019); Werner, Spiller, & Meyerding (2020)
Other	
Not reported	Chan (2019)

In sum, most studies followed the well-established definition of mindfulness provided by the eastern stream of this academic research and only those about cognitive approaches did otherwise, that is, a western approach. Additionally, based on the evidence provided by the studies here reviewed, alternative conceptualizations are being put forward for the study of specific domains of PEB (e.g., sustainable consumption Geiger, Fischer, Schrader, & Grossman, 2020). This evidence may be interpreted as a path towards the exploration of mechanisms affecting specific behaviours which seems to require new working definitions such as the formulated by Böhme, Geiger, Grossman, Stanszus, & Schrader (2016:4) in which mindfulness is described as "the unbiased awareness that emerges through intentionally and continuously paying attention to subjective momentary experience with an open, accepting, benevolent, and compassionate attitude".

Within this definition, it is seen how socioemotional factors, such as compassion, are emphasized as an attempt to capture the original meaning of the Buddhist tradition of mindfulness more fully, something that, although inherent, seemed somehow missing, as it has been reflected in past literature (Williams & Kabat-Zinn, 2011). Thus, along with cognitive factors of mindfulness such as enhanced attention, attending to socioemotional aspects is seen as a full embodiment of the mindfulness qualities that benefits individuals as a whole (Lawlor, 2016). Moreover, these socioemotional aspects encompassed in the meaning of mindfulness may potentially be translated to the promotion of PEB. Additionally, this full conceptualization has been followed in educational settings in the search for more holistic outcomes after the implementation of a mindfulness intervention (see Maynard, Solis, Miller, & Brendel, 2017, for a review).

1.4.2. Operationalization of the mindfulness construct

Although the eastern definition was the common approach to mindfulness followed by most of the studies, its operationalization varies. The description of the different measurements and how this may affect the findings of the different studies is offered next. Out of the 25 articles, six of them (see *Table 6* for a summary) measured MAAT through the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) while most of the studies (15) used a multidimensional scale for the assessment of the mindfulness construct. Thus, seven studies used the Five Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), either in its full version or with the selection of some of its facets (Amel, Manning, & Scott, 2009), shorter versions (Richter & Hunecke, 2020), and adaptations to the participants' language (Loy & Reese, 2019). Six studies measured MAAT through the Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014). Some of them either used a shorter version (Werner, Spiller, & Meyerding, 2020), selected specific facets (awareness related facets: Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018) or used an adaptation to specific samples through the Comprehensive Inventory of Mindfulness Experiences-Adolescents (CHIME-A; Johnson, Burke, Brinkman, & Wade, 2017) (Stanszus, Frank, & Geiger, 2019). Finally, two studies used the Kentucky Inventory on Mindfulness Scale, based on four facets (KIMS; Baer Smith, & Allen, 2004 - Geiger, Otto, & Schrader, 2018 – study 1; Loy & Reese, 2019). It should be noted that the facets

included in the KIM scale are comprised in the most comprehensive scales that to date are implemented for the measurement of mindfulness (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014).

Only one study (Helm & Subramaniam, 2019) measured MAAT through the Langer Mindfulness Scale (Pirson, Langer, Bodner, & Zilcha-Mano, 2012; LMS; Bodner & Langer, 2001) while the remaining four studies either used an ad-hoc scale (Dharmesti, Merrilees, & Winata, 2020; Jacob, Jovic, & Brinkerhoff, 2009), did not disclose the measurement implemented (Grabow et al., 2018) or were based on the induction of a mindfulness state (Chan, 2019).

Table 6. Mindfulness operationalization

Scale	Authors
The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003)	Brown & Kasser (2005); Deringer, Hanley, Hodges, & Griffin (2020); Panno et al. (2018); Wei, Li, Zeng, & Zhu (2020); Yigit (2020); Yilmaz & Anasori (2020)
The Five Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)	Amel, Manning, & Scott (2009); Armstrong (2012); Barbaro & Picket (2016); Hanley, Dorjee, & Garland (2020); Hunecke & Richter (2019); Ray, Franz, Jarrett, & Pickett (2020); Ritcher & Hunecke (2020)
The Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014)	Böhme, Stanszus, Geiger, Fischer, & Schrader (2018); Geiger, Fischer, Schrader, & Grossman (2020) – model b*; Geiger, Grossman, & Schrader (2019); Geiger, Otto, & Schrader (2018) – study 2*; Stanszus, Frank, & Geiger, 2019; Werner, Spiller, & Meyerding (2020)
The Kentucky Inventory on Mindfulness Skills (KIMS; Baer Smith, & Allen, 2004)	Geiger, Otto, & Schrader (2018) - study 1*; Loy & Reese (2019)
Langer Mindfulness Scale (Pirson, Langer, Bodner, & Zilcha-Mano, 2012; LMS; Bodner & Langer, 2001)	Helm & Subramaniam (2019)
Ad-hoc scale	Dharmesti, Merrilees, & Winata (2020); Jacob, Jovic, & Brinkerhoff (2009)
Undisclosed	Grabow et al. (2018)
Mindfulness state	Chan (2019)

*It should be noted that some of the articles included more than one study.

Although positive results are consistent throughout the studies, which will be fully explained in the next sections, the psychometric features in terms of reliability of the instruments for the measurement of the mindfulness construct should not be taken lightly. It is beyond the scope of this thesis the discussion about the assessment of mindfulness (see Baer, Walsh, & Lykins, 2009; Gherardi-Donato et al., 2020; Qu, Dasborough, & Todorova, 2015 for reviews) but researches are required to carefully select their measurement instruments, given that the extant variety of possibilities does not offer a common and clear operationalization of the mindfulness construct to facilitate the comparison and generalizability of the results (Qu, Dasborough, & Todorova, 2015). In this vein, shorter versions of the multifaceted scales are recommended given that, asking

questions about participant´s feelings should be taken carefully and may lead to fatigue (Wamsler & Brink, 2017).

1.4.3. Types of PEB as dependent variable

The operationalization of PEB throughout the studies is also examined (see *Table 7* for a summary). As per the results, two scales were consistently used in various studies: The Pro-Environmental Behaviour scale (PEB; Whitmarsh & O'Neill, 2010) and the General Ecological Behaviour scale (GEB; Kaiser, 1998; Kaiser & Wilson, 2000, 2004). Both scales offer good psychometric features, although based on the original values, the PEB scale (Whitmarsh & O'Neill, 2010) offers better reliability ($\alpha = 0.92$) compared with the GEB scale ($\alpha = 0.74$) (Kaiser, 1998). Additionally, a variety of measures of PEB are used. Some of them are domain-oriented (e.g., climate action; Grabow et al., 2018), or were designed ad-hoc based on the purpose of the study, such as the scale adapted from Miller, Merrilees, & Coghlan (2015) to relate to actual PEB in hotels (Dharmesti, Merrilees, & Winata, 2020). Only one study did not disclose the scale used to measure PEB (Geiger, Grossman, & Schrader, 2019).

Table 7. PEB's constructs and scales

Most common scales		
PEB	Pro-Environmental Behaviour scale (PEB; Whitmarsh & O'Neill, 2010)	Barbaro & Pickett (2016); Hanley, Dorjee, & Garland (2020) - study 2; Ray, Franz, Jarrett, & Pickett (2020)
	Pro-Environmental Behaviour Scale (PEBS; Markle, 2013)	Werner, Spiller, & Meyerding (2020)
Ecological behaviour	General Ecological Behaviour scale (GEB; Kaiser, 1998)	Deringer, Hanley, Hodges, & Griffin (2020); Geiger, Otto, & Schrader (2018); Hanley, Dorjee, & Garland (2020); Loy & Reese (2019)
	Ecological Footprint Questionnaire (Dholakia & Wackernagel, 1999; Green-Demers et al., 1997)	Brown & Kasser (2005)

Domain oriented scales		
Sustainable Consumption Behaviour	The Young Consumers' Sustainable Consumption Behavior (YCSCB; Fischer, Böhme, & Geiger, 2017)	Böhme, Stanszus, Geiger, Fischer, & Schrader (2018)
	The cube model of sustainable consumption behaviour (Geiger, Fischer, & Schrader, 2018)	Geiger, Fischer, Schrader, & Grossman (2020)
	Çakmak & Özkan's scale (2016)	Yigit (2020)
	Sustainable Food consumption scale (SCB; Geiger, Fischer, & Schrader, 2018)	Stanszus, Frank, & Geiger (2019)
Adhoc Scales		
Green Behaviour	Green single-item scale developed by authors	Amel, Manning, & Scott (2009)
PEB	Scale developed by the authors based on buying behaviour scale (Pepper, Jackson, & Uzzel, 2009) that includes prosocial, pro-environmental and frugality aspects.	Armstrong (2012) - chapter 2
PEB	Ad-hoc scale adapted from Miller, Merrilees, & Coghlan (2015) to relate to actual PEB in a hotel (recycling, energy, water).	Dharmesti, Merrilees, & Winata (2020)
Sustainable tourism	Self-reported tour preference (climbing package .vs. visit package).	Chan (2019)

Carbon Footprint	Ad-hoc measured with three domains: (1) Diet, by using the Automated Self-Administered 14-h Dietary Assessment Tool (ASA24; Subar et al., 2012); (2) Transportation measured through two ways: odometer readings (self-reported) and smartphone application (automatically reported); (3) Energy use through energy company's databases reports.	Grabow et al. (2018)
Sustainable consumption behaviour: Emission reducing behaviours; Sharing; Responsible buying	Ad-hoc scale with three subscales: emission-reducing behaviours based on Brick & Lewis (2014); propensity to share products; responsible buying based on Webb, Mohr, & Harris (2008)	Helm & Subramaniam (2019)
Sustainable food consumption	Ad-hoc scale with two factors: sustainable food and vegetarian food.	Hunecke & Richter (2019)
Ecologically sustainable behaviour	Ad-hoc scale measuring recycling behaviour, sustainable household choices and sustainable food practice	Jacob, Jovic, & Brinkerhoff (2009)
PEB	Ad-hoc scale with items extracted from Markowitz, Goldberg, Ashton, & Lee (2012)	Panno et al. (2018)
Organic food consumption	Ad-hoc scale based on Bamberg (2013) and Klöckner (2017)	Ritcher & Hunecke (2020)- models 3 and 4

Environmentally responsible consumption as a subscale of consumption refinement	*Consumption refinement* measured through two dimensions of the Social Responsible Purchase and Disposal (SRPD) scale (Webb, Mohr, & Harris 2008): corporate social responsible performance (CSRP), and environmentally responsible consumption (ENVIRON)	Wei, Li, Zeng, & Zhu (2020)
Environmental Responsible Behaviour	PEB scale adapted to tourists based on Lee et al. (2013)	Yilmaz & Anasori (2020)
Scale not reported		
Sustainable consumption	Scale not reported	Geiger, Grossman, & Schrader (2019)

A consistent use of PEB scales would facilitate the generalizability of the results; however, as the report shows this has not been the case. Nonetheless, the two scales most used (PEB and GEB) share some common attributes. Both comprise daily behaviours such as water and energy use as well as a wide range of different behaviours, instead of focusing on one single environmental action. This approach is considered more valid to measure the real impact of an individual's PEB (Geiger, Fischer, Schrader, 2018). Existing reviews encourage researchers to select multi-faceted measurements rather than single-item scales (Lange & Dewitte, 2019) along with scales that cover a wide range of behaviours (Armel, Yan, Todd, & Robinson, 2011) so that a comprehensive measurement and a richer explanation of results can be offered. It should be noted that all PEB scales were self-reported. In this respect, the potential risk of social bias, given that people tend to report what they are intended to do or expected from them rather than their actual behaviour (Milfont, 2009), has been discussed in past literature. However, there is abundant evidence confirming a proper assessment of PEB through self-reported behaviour (Kormos & Gifford, 2014) and self-reported measures are extensively used (Sauer et al., 2013).

1.4.4. Sample size and composition

The size of the sample across studies ranged between 13 (Grabow et al., 2018) to 1.012 participants (Werner, Spiller, & Meyerding, 2020) which is offered in detail in *Table 8.*

Table 8. Sample size

Authors	Sample size
Grabow et al. (2018)	13
Deringer, Hanley, Hodges, & Griffin (2020)	37
Hanley, Dorjee, & Garland (2020) - study 1	54
Böhme, Stanszus, Geiger, Fischer, & Schrader (2018)	70
Stanszus, Frank, & Geiger (2019)	76
Panno et al. (2018) - study 2	97
Ray, Franz, Jarrett, & Pickett (2020)	97
Amel, Manning, & Scott (2009)	100
Geiger, Grossman, & Schrader (2019)	131
Geiger, Fischer, Schrader, & Grossman (2020) – model a	131
Geiger, Fischer, Schrader, & Grossman (2020) – model b	131
Geiger, Otto, & Schrader (2018) - study 1	147
Yigit (2020)	200
Geiger, Otto, & Schrader (2018) - study 2	239
Loy & Reese, (2019)	258
Panno et al. (2018) - study 1	279
Barbaro & Pickett (2016) - study 2	296
Hanley, Dorjee, & Garland (2020) - study 2	299
Hunecke & Richter (2019)	310
Dharmesti, Merrilees, & Winata (2020)	339
Barbaro & Pickett (2016) - study 1	356
Yilmaz & Anasori (2020)	405
Chan (2019)	413
Armstrong (2012) - chapter 2	468
Brown & Kasser (2005)	486
Wei, Li, Zeng, & Zhu (2020)	523
Helm & Subramaniam (2019)	546
Ritcher & Hunecke (2020) - models 3 and 4	560
Jacob, Jovic, & Brinkerhoff (2009)	829
Werner, Spiller, & Meyerding (2020)	1.012

Concerning sample composition, most samples are non-student (see *Table 9*) with participants mostly recruited through online platforms such as Amazon's Crowdsourcing Platform (Mturk) (Barbaro & Pickett, 2016 – Study 2; Hanley, Dorjee, & Garland, 2020; Helm & Subramaniam, 2019; Wei, Li, Zeng, & Zhu, 2020) or online surveys (e.g., Geiger, Otto, & Schrader, 2018). Some of the studies recruited participants with meditation experience (Armstrong, 2012; Jacob, Jovic, & Brinkerhoff, 2009; Panno et al., 2018). Others recruited specific samples for the purpose of the study, such as hotel users (Dharmesti, Merrilees, & Winata, 2020) or attendants to a sustainability event (Amel, Manning, & Scott, 2009). Eight studies used student's samples while two studies used a mixed sample of general population and students such as household, meditators, and university students (Armstrong, 2012) or a mix of students and employees (Geiger, Fischer, Schrader, & Grossman, 2020)

Table 9. Sample composition

Sample composition	**Authors**
General population	Amel, Manning, & Scott (2009); Barbaro & Pickett (2016) – study 2; Brown & Kasser (2005); Dharmesti, Merrilees, & Winata (2020); Geiger, Grossman, & Schrader (2019); Geiger, Otto, & Schrader (2018); Grabow et al. (2018); Hanley, Dorjee, & Garland (2020); Helm & Subramaniam (2019); Hunecke & Richter (2019); Jacob, Jovic, & Brinkerhoff (2009); Panno et al. (2018) - study 2 ; Ritcher & Hunecke (2020); Wei, Li, Zeng, & Zhu (2020); Werner, Spiller, & Meyerding (2020); Yigit (2020); Yilmaz & Anasori (2020)
Students	Barbaro & Pickett (2016) – study 1; Böhme, Stanszus, Geiger, Fischer, & Schrader (2018); Chan (2019); Deringer, Hanley, Hodges, & Griffin (2020); Loy & Reese (2019); Panno et al. (2018) - study 1; Ray, Franz, Jarrett, & Pickett (2020); Stanszus, Frank, & Geiger (2019)
Mixed sample	Armstrong (2012); Geiger, Fischer, Schrader, & Grossman (2020)

*It should be noted that two articles (Barbaro & Pickett, 2016; Panno et al., 2018) included studies with different sample composition.

Regarding sample size, small samples seemed to determine weak or negative findings (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Geiger, Fischer, Schrader, &

Grossman, 2020; Grabow et al., 2018) particularly when the studies use mixed methods designs. As per sample composition, within the studies including samples of meditators, groups differences between levels of meditators were only tested in one study (Panno et al., 2018 - study 2) showing greater scores on PEB between meditators than non-meditators, which is coherent with past literature (Lilley, Whitehead, Howell, Jones, & Pykett, 2016). Alternative lifestyles such as voluntary simplifiers showed greater mindfulness and therefore, higher PEB than individuals following a standard living (Brown & Kasser, 2005). Based on these results and as it can be expected, higher levels of meditation experience, as well as higher environmental awareness baseline levels, are thus good predictors for the achievement of positive results.

Regarding sociodemographic features, one study tested group differences among samples from different countries (India and US; Werner, Spiller, & Meyerding, 2020), although no differences were found. Both samples showed positive results. However, more diverse samples from different countries (Helm & Subramiam, 2019; Ray, Franz, Jarrett, & Pickett, 2020) are suggested to improve the generalizability of the results. Gender and age are shown as important factors that increase explained variances of PEB (Armstrong, 2012; Panno et al., 2018), namely, elder women. In this respect, evidence about the role of gender and age is inconclusive and needs further examination (see Donald et al., 2019 for a review).

Results from a sample of students were equally positive except for one study (Geiger, Fischer, Schrader, & Grossman, 2020) that used a mixed sample and found negative effects on both. Given the domain-oriented PEB under examination (sustainable consumption), the recruitment of a sample more sustainability aware was offered as an explanation for the achievement of better results, along with the need for a larger sample size. Taking these findings together, similar effects on the relationship between mindfulness and PEB may be expected regardless of the sample, although some additional considerations may be taken into account when examining a specific form of PEB.

1.4.5. Correlational studies

Most of the studies included in this review are correlational, all of them showing positive results. To examine this positive correlation in the relationship of MAAT and PEB, a distinction between direct and indirect effects is offered next.

i. Direct correlation

Direct effects of the correlation between MAAT and PEB were tested except for two studies where only an indirect effect was examined (Ritcher & Hunecke, 2020; Yilmaz & Anasori, 2020). Some differential effects of this positive relationship can be found and are explained next.

Four studies exclusively tested this direct association without the presence of mediators (Amel, Manning, & Scott, 2009; Barbaro & Pickett, 2016 - study 1; Werner, Spiller, & Meyerding, 2020; Yigit, 2020). Within these studies, the beneficial effects of mindfulness are attributed to certain mindful qualities such as the ability to enhance the focus of our attention so that we can self-regulate our behaviour by disrupting unsustainable habits, (Amel, Manning, & Scott, 2009; Barbaro & Pickett, 2016). This, in turn, is suggested to be facilitated by the ability of SC (Yigit, 2020). A decentered mind, nurtured not only by awareness but also by self-compassion, is also shown as a relevant quality of mindfulness in the promotion of PEB (Werner, Spiller, & Meyerding, 2020). Based on these findings, the inner awareness of our behaviour as well as outer awareness of our relationship with others, seem equally relevant to predict PEB.

Both aspects are also encountered in the rest of the studies that tested a direct association along with the presence of a mediator. The self-regulation ability enhanced by mindfulness was stressed as necessary to inhibit automatic behaviours and to refrain from the impulse to react based on past actions (Armstrong, 2012; Dharmesti, Merrilees, & Winata, 2020; Hanley, Dorjee, & Garland, 2020; Helm & Subramaniam, 2019; Wei, Li, Zeng, & Zhu, 2020). More significantly, decentering is posed as a valuable mindful mindset (Hanley, Dorjee, & Garland, 2020). Thus, thanks to the improvement of our inner awareness, based on the ability to observe and describe our experience, so that we disrupt our automatic behaviour, individuals develop a meta-awareness that, in turn, facilitates PEB. Additionally, awareness of the consequences of our impact on our surroundings and the environment, that is, outer awareness, is seen to be essential to develop a greater sense of interconnectedness beyond our interests (Dharmesti, Merrilees, & Winata, 2020; Geiger, Otto, & Schrader, 2018; Hunecke & Richter, 2019; Loy & Reese, 2019; Panno et al., 2018).

Others suggest that mindfulness may nurture a sense of wellbeing that is then considered an antecedent of PEB, which is also specifically tested in some studies (Jacob, Jovic, &

Brinkerhoff, 2009; Brown & Kasser, 2005), even when it implies to change our current lifestyles (Geiger, Otto, & Schrader, 2018). However, this positive evidence should be treated with caution given that, although a direct relationship between MAAT and PEB is supported, the size of its effects may be moderate (Armstrong, 2012). Therefore, mindfulness, although important seems to be not sufficient (Amel, Manning, & Scott, 2009). Other variables should be explored to complement its beneficial effects.

Given that certain mindfulness facets, such as *acting with awareness* (Amel, Manning, & Scott, 2009) showed a strong correlation with PEB, a deeper examination of the MAAT and PEB direct relationship through the lens of the mindfulness facets is offered next. To do so, the mindfulness facets that more strongly influenced individual behaviour were extracted. For this, studies using multi-faceted scales, that is, the Kentucky Inventory on Mindfulness Skills (KIMS; Baer Smith, & Allen, 2004) with four facets: *describing*, *non-judging*, *acting* and *observing*; the Five Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) with its five facets: *acting with awareness*, *observing*, *describing*, *non-judging* and *non-reacting* and finally the Comprehensive Inventory of Mindfulness Experiences (CHIME; Bergomi, Tschacher, & Kupper, 2013, 2014) with seven facets: *accepting* (*non-judging*), *acting*, *awareness* (*observing*), *decentering*, *openness*, *insight* and *relativity*, were analyzed. As a result, eight studies were identified, although one of them did not discuss the results per facets (Werner, Spiller, & Meyerding, 2020). A discussion of the correlation per facet, when reported, is then offered next. A summary is provided in *Table 10*.

The *observing* facet was found to be the more correlated with PEB (Armstrong, 2012; Barbaro & Pickett, 2016 – study 2; Geiger, Otto, & Schrader, 2018 – studies 1 and 2; Stanszus, Frank, & Geiger, 2019). This facet has been questioned in past literature (Brown, Bravo, Roos, & Pearson, 2015; Mattes, 2019) based on its dependency on high levels of meditation, given that a higher level of awareness of our current behaviour can lead to negative psychological effects unless meditation practice tempers this effect. However, in the context of PEB, this facet seems to be particularly relevant and is associated with a better perception of external stimuli (Barbaro & Picket, 2016) which may benefit a shift of attention to contextual cues, our natural surroundings, others, and internal stimuli (Geiger, Otto, & Schrader, 2018). Thus, inner reflection may also help to cultivate PEB as it may serve as a mechanism of self-regulation (Richter & Hunecke,

2020), particularly when it is accompanied by other factors such as *non-reactivity* (Anicha, Ode, Moeller, & Robinson, 2012).

Acting with awareness was the second facet more correlated with PEB (Amel, Manning, & Scott, 2009; Armstrong, 2012; Hunecke & Richter, 2019). This was the result after three other facets, *observing*, *describing* and *non-judging* lost significance when mediators related to self-identity (e.g., construction of meaning) were included (Hunecke & Richter, 2019). This cascading effect should be interpreted within the context of the dependent variable of this study, sustainable consumption. For those behaviours that require us to make sacrifices (Geiger, Otto, & Schrader, 2018), a stronger coherence between our inner selves is required to bridge the gap between intentions and behaviours. However, for a broader concept of PEB, this *acting with awareness* facet was associated with the inhibition of automatic behaviours (Armstrong, 2012) and enhanced attention is shown as the mechanism for the disruption of unsustainable habits (Amel, Manning, & Scott, 2009).

The *describing* facet was also found to benefit PEB (Armstrong, 2012; Geiger, Otto, & Schrader, 2018- study 1). In this case, the ability to be able to label our thoughts, feelings and sensations improves in turn the ability to communicate with others (Mattes, 2019), which seems decisive in social contexts and particularly on prosocial behaviours (Armstrong, 2012). This facet is also associated with better emotional regulation, given that naming our feelings improves the cognitive capacity of showing affection to others (Baer, Walsh, & Lykins, 2009). Finally, it is worth mentioning that for the studies where *describing* was positively correlated this effect worked along with the *observing* facet. Together, these two facets cultivate a meta-awareness that helps individuals to enhance attentional control, detach from subjective experience and adopt a distanced stance that benefits individual behaviour (Hanley, Baker, Garland, 2017; Sørensen et al., 2018).

As per the *non-reacting* facet, it also shows this joined effect, in this case working along with the *observing* facet (Barbaro & Pickett, 2016 - study 2). The cultivation of our inner reflections improves an individual's ability to refrain from our automatic actions (Anicha, Ode, Moeller, & Robinson, 2012). Allowing thoughts and feelings to pass and go avoid rumination, which in turn improves adaptive behaviours (Baer, Walsh, & Lykins, 2009). However, when external cues become prominent, this ability may be hindered (Barbaro

& Picket, 2016) which can be a plausible explanation for the lack of effects in the rest of the studies.

With regards to the *non-judging* facet, which allows us to accept the present moment as it is, it shows to promote PEB through the strength of our inner values (Armstrong, 2012; Stanszus, Frank, & Geiger, 2019). Thus, it is discussed how this facet helps individuals to feel at ease with their selves and, therefore, to avoid reaching an ideal construction of one's identity. This theoretical explanation is later supported by the results. It also cultivates cognitive flexibility which also leads to promote adaptive behaviours (Anicha, Ode, Moeller, & Robinson, 2012). This facet is associated with improved regulation of our cognitive resources that otherwise would be directed to the evaluation of our daily experiences (Sørensen et al., 2018). Avoiding this evaluative stance helps individuals to be more opened to the perception of others and in turn to improve self-compassion which is also supported in previous studies (Medvedev et al., 2020; Neff, 2003).

As per the facets included in the CHIME scale that were not yet discussed, *decentering*, *insight* and *relativity* showed positive results in two studies (Geiger, Otto, & Schrader, 2018- study 2; Stanszus, Frank, & Geiger, 2019). Thanks to the reallocation of cognitive resources, individuals can decenter themselves and be more open to their surroundings and others (Hanley, Dorjee, & Garland, 2020), thus, cultivating more self-transcendental values. For this purpose, the enhancement of socioemotional abilities such as empathy or compassion is shown to be decisive to cultivate a greater sense of interconnectedness (Loy & Reese, 2019). In turn, the collective consequences of our environmental impact may be better comprehended (Walker & Chapman, 2003). Taking all these findings together, the ability to be aware of internal and external stimuli, along with the capacity to express our experiences and to self-regulate our automatic behaviours seem to be supported as the basis for the promotion of PEB.

Table 10. Direct effects by mindfulness facets

	observing	*acting with awareness*	*describing*	*non-reacting*	*non-judging*	*decentering*	*insight*	*relativity*
Amel, Manning & Scott (2009)		•						
Armstrong (2012)	•	•	•		•			
Barbaro & Pickett (2016) – study 2	•			•				
Geiger, Otto, & Schrader (2018) – study 1	•		•					
Geiger, Otto, & Schrader (2018) – study 2	•					•	•	•
Hanley, Dorjee, & Garland (2020)				•				
Hunecke & Richter (2019)		•						

*Only facets with significant effects are shown

ii. Mechanisms explaining the relationship between MAAT and PEB

After having reviewed the direct correlation between MAAT and PEB, the role of mediators is discussed next. To do so, the framework of six mediators empirically examined offered by Thierman & Sheatte (2020), namely (1) awareness, (2) personal health and subjective wellbeing, (3) connectedness with nature, (4) pro-sociality, (5) personal values and ethical decision-making, and (6) openness to experience was followed. Thus, the studies that included mediators were grouped based on the different mechanisms to which they are referred. It should be noted that several mechanisms may be examined within a single study (see *Table 11* for a summary of the results).

Thus, five studies (Armstrong, 2012; Dharmesti, Merrilees, & Winata, 2020; Hunecke & Richter, 2019; Ritcher & Hunecke, 2020; Yilmaz & Anasori, 2020) tested the enhancement of awareness as the mechanism through which MAAT promotes PEB adoption. This mechanism explains the relationship between MAAT and PEB given that thanks to enhanced attention to internal and external stimuli, the behaviour is better self-regulated, automatic functioning is disrupted, and emotions are better handled. Thus, greater awareness of ecological problems promoted by mindfulness resulted in nurturing the ability to decrease compulsive patterns of behaviours (Armstrong, 2012).

As per personal health and subjective wellbeing, four studies referred to this mechanism with positive results showing how people would care about the environment beyond their health interests (Armstrong, 2012; Brown & Kasser, 2005; Geiger, Otto, & Schrader, 2018; Jacob, Jovic, & Brinkerhoff, 2009). Thus, a mindful perception of our buying patterns helps to reshape our consumption behaviour and not only through nature relatedness, but also social connectedness (Armstrong, 2012) given that mindfulness helps to perceive our natural surroundings and with that, the impact of our behaviour on others (Barbaro & Pickett, 2016).

Improved pro-social behaviour is the following mechanism to be discussed. This mechanism suggests that mindfulness cultivates the promotion of certain abilities such as altruism, compassion, and empathy (Loy & Reese, 2019; Panno et al., 2018). Recent meta-analyses (Berry et al., 2020; Donald et al., 2020) assessed the effect of mindfulness, as a trait, state or intervention, on pro-social behaviours. Beneficial effects are observed when mindfulness is measured as a trait and following mindfulness interventions even

when a brief mindfulness induction is conducted (Berry et al., 2020). Qualities such as the non-evaluative stance of one's experience promote more openness to the experience of others, and this may nurture greater empathy, regulation of emotions and positive affect (Donald et al., 2020). Therefore, it is expected that these interpersonal abilities facilitate PEB, although based on the extent of our findings (Loy & Reese, 2019; Panno et al., 2018) more research should be needed in this respect.

Intrinsic and extrinsic values, which in turn promote ethical decision making, have been also tested as mediators. A shift to intrinsic values, decreasing an individual's materialism, strengthening values and beliefs mediate the relationship with MAAT and pro-social behaviours (Armstrong, 2012; Helm & Subramaniam, 2019). More specifically, a mindful reflection upon our values has shown to decrease economic dependence and materialism (Brown et al., 2009). In some other studies (Purser & Milillo, 2015), it is suggested that an enhanced awareness allow individuals to adopt ethical, right, actions and provide better attunement to the present moment so that moral intention is promoted (Small & Lew, 2019).

No evidence was found for openness to experience. This mechanism may be better tested by using the CHIME scale, which specifically includes this aspect as a facet, or by a measure of Langer's (1989) mindfulness concept that, as already explained, emphasizes the cognitive processes triggered by mindfulness. This mechanism relates to a focus on external stimuli and, by this, to a more opened stance towards the present moment which should be accompanied by the ability to confront pleasant and unpleasant experiences (Bergomi, Tschacher, & Kupper, 2013). The lack of results suggests that the exploration of factors that may help to deal with our present experience should be further explored.

Although not envisaged by Thiermann & Sheate (2020), the mediation of SC was found as an additional mechanism (Wei, Li, Zeng, & Zhu, 2020). Two dimensions of consumption refinement (corporate socially responsible performance and environmentally responsible consumption) and two behaviours related to consumption reduction (voluntary simplicity and frugal behaviour) were examined. While the latter is more related to personal consumption behaviour (Hunecke, 2005; Pepper Jackson, & Uzzell, 2009), the former is associated with consumption that relates to others (Webb, Mohr, & Harris, 2008). These behaviours were tested through a direct association with MAAT and the mediation of connectedness to nature and SC with differential results.

Thus, the positive effects were partially supported. Whereas connectedness with nature acted as a mediator for overall ethical consumption, SC only had a significant mediating role for behaviours related to personal-related consumption. Based on the results of this study, some preliminary evidence about the role of SC on PEB is offered. For this, a wider assessment of PEB, not restricted to consumer behaviour, should be tested.

Table 11. Mechanisms linking mindfulness and PEB

Mechanisms*	**Authors**
Awareness	Armstrong (2012); Dharmesti, Merrilees, & Winata (2020); Hunecke & Richter (2019); Ritcher & Hunecke (2020); Yilmaz & Anasori (2020)
Personal health & subjective wellbeing	Armstrong (2012); Brown & Kasser (2005); Geiger, Otto, & Schrader (2018); Jacob, Jovic, & Brinkerhoff (2009)
Connectedness with nature	Barbaro & Picket (2016); Hanley, Dorjee, & Garland (2020); Werner, Spiller, & Meyerding (2020)
Pro-sociality (altruism, compassion, and empathy)	Loy & Reese (2019); Panno et al. (2018)
Personal values & Ethical decision-making	Armstrong (2012); Helm & Subramaniam (2019)
Self-control	Wei, Li, Zeng, & Zhu (2020)

*Only mechanisms with results are shown. It should be noted that several mechanisms may be studied within a single study.

1.4.6. Experimental studies

Most of the studies have adopted a correlational approach to the examination of the relationship between MAAT and PEB. Out of the 25 studies, only eight of them were experimental, so that effects on PEB following a mindfulness intervention were tested (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Chan, 2019; Deringer, Hanley, Hodges, & Griffin, 2020; Geiger, Grossman, & Schrader, 2019; Geiger, Fischer, Schrader, & Grossman, 2020; Grabow et al., 2018; Ray, Franz, Jarrett, & Pickett, 2020; Stanszus, Frank, & Geiger, 2019). *Table 12* offers full details of the mindfulness interventions implemented in each study.

Two of them followed the standard 8-week MBSR program (MBSR; Kabat-Zinn, 1991) that includes formal and informal meditation. In three experimental studies (Böhme,

Stanszus, Geiger, Fischer, & Schrader, 2018; Geiger, Fischer, Schrader, & Grossman, 2020; Grabow et al., 2018) the interventions were based on the classical MBSR although customized to the purpose of the research, such as the sustainability mindfulness-based intervention (sMBI) (Geiger, Fischer, Schrader, & Grossman, 2020) or the Mindful Climate Action education program (Grabow et al., 2018). Besides these studies, two studies implemented ad-hoc mindfulness interventions (Deringer, Hanley, Hodges, & Griffin, 2020; Ray, Franz, Jarrett, & Pickett, 2020), in this case in the form of 10 to 20 minutes daily mindfulness exercises within programs that ranged between 4 days to 4 weeks. Finally, only one study implemented a brief mindfulness induction of 6 minutes to assess the effects of state mindfulness.

Within the eight experimental studies, five of them tested differences between group conditions, (e.g., intervention and control group) (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Chan, 2019; Geiger, Fischer, Schrader, & Grossman, 2020; Ray, Franz, Jarrett, & Pickett, 2020; Stanszus, Frank, & Geiger, 2019). Within those, overall results, show that more mindful participants exhibit greater awareness and, in turn, greater relationship with PEB except for one study, where no differences between groups were found in the actual performance of PEB (Geiger, Fischer, Schrader, & Grossman, 2020).

Four of the studies based on mindfulness interventions (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Deringer, Hanley, Hodges, & Griffin, 2020; Grabow et al., 2018; Stanszus, Frank, & Geiger, 2019) used a mixed method approach offering quantitative and qualitative results attending to calls for the need of this complementary assessment (Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017). The qualitative results were assessed either through interviews (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Stanszus, Frank, & Geiger, 2019), focus groups (Grabow et al., 2018) or participants diaries (Deringer, Hanley, Hodges, & Griffin, 2020). Although, within these studies, only two of them used this mixed method approach to triangulate the results (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Stanszus, Frank, & Geiger, 2019).

Table 12. Mindfulness interventions

Type of mindfulness induction/intervention	Authors
MBSR (Kabat-Zinn, 1991) - 8-week	Geiger, Grossman, & Schrader (2019); Stanszus, Frank, & Geiger (2019)
BINKA training based on classic 8-week MBSR (Kabat-Zinn, 1991)	Böhme, Stanszus, Geiger, Fischer, & Schrader (2018)
Sustainability mindfulness-based intervention (sMBI) based on classic 8-week MBSR (Kabat-Zinn, 1991)	Geiger, Fischer, Schrader, & Grossman (2020)
Mindful Climate Action (MCA; Barret et al., 2016) based on classic 8-week MBSR (Kabat-Zinn, 1991)	Grabow et al. (2018)
Ad-hoc intervention: 10 to 20 minutes of guided meditation for 4 days	Deringer, Hanley, Hodges, & Griffin (2020)
Ad-hoc intervention: 4-week online guided meditation (15 minutes audio, 5 days per week)	Ray, Franz, Jarrett, & Pickett (2020)
6-minutes audio guided meditation	Chan (2019)

Although overall positive results can be found among correlational studies, the findings of experimental studies are mixed. Two studies reported negative results (Geiger, Fischer, Schrader, & Grossman, 2020; Geiger, Grossman, & Schrader, 2019). Additionally, three experimental studies, although reported positive effects, they were found weak or inconclusive (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Grabow et al., 2018; Stanszus, Frank, & Geiger, 2019). It is interesting to note that these three studies used a mixed-method approach and, although findings obtained from the qualitative interviews showed beneficial effects of mindfulness interventions on sustainable consumption (Stanszus, Frank, & Geiger, 2019), these results were not fully supported by the quantitative results.

A plausible explanation for both, negative and inconclusive or sparse results, may lay on the need to incorporate factors that help to translate the beneficial effects of mindfulness interventions, such as greater sustainable attitudes (Stanszus, Frank, & Geiger, 2019) or environmental awareness (Grabow et al., 2018) into actual PEB given that this interpretation is supported by the results. Even though positive attitudes towards sustainability may be an important driver of individual behaviour, when confronted with social pressure from families or peers, the final performance of sustainable consumption

option can be burdened. This is particularly important in educational settings, where students are more influenced by their social contexts (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018). More importantly, this study showed how, even when sustainability was important for them, they did not know what to do to bring about change. Therefore, not only greater awareness of social contexts is needed to take action, but also an awareness of the actual individual capabilities to act.

1.4.7. Examination of boundary conditions for the causal effects

An examination of moderating variables that may condition the relationship between mindfulness and PEB, whether as a trait or as an intervention, was performed. A first conclusion is that past studies have seldom tested the role of moderators. Levels of mindfulness interacted in greater PEB adoption; thus, mindfulness practitioners moderated this relationship (Barbaro & Pickett, 2016; Loy & Reese, 2019; Hanley, Dorjee, & Garland, 2020; Panno et al., 2018). Consumption options with lower environmental impact (the type of tourist package) moderated the indirect relationship between mindfulness and PEB, mediated by sustainability awareness (Chan, 2019). Thus, although a brief mindfulness induction increased sustainability awareness, the greater environmental impact of individual behaviour interacted in final PEB choices. An indirect moderation was also tested in one study (Ray, Franz, Jarrett, & Pickett, 2020) showing how participants that were exposed to natural settings (nature condition) experimented a greater connection to nature which in turn strengthen the relationship between mindfulness and PEB. Based on these findings, it could be interpreted that more mindful individuals with a greater awareness of the impact of their behaviour in nature would strength the mindfulness and PEB relationship which is supported by previous results (Barbaro & Pickett, 2016).

1.5. Discussion

As per the overall results, mindfulness has been proven to be significantly correlated with PEB, both directly and mediated by other traits or attitudes. Particularly the role of

mindfulness as a self-regulatory mechanism and as a tool for the development of socioemotional abilities that nurture individual interconnectedness was extracted from the positive results of this review. Based on each category of analysis followed in this review, a summary of the considerations that support these factors as well as that should guide their research is offered next.

An eastern approach to the concept of mindfulness was followed in most studies. Based on more novel definitions of mindfulness (Böhme, Geiger, Grossman, Stanszus, & Schrader, 2016), as well as in reflections about the need to convey the Buddhism roots of mindfulness while preserving its secular meaning (Williams & Kabat-Zinn, 2011), the relevant role of socioemotional factors such as compassion and altruism seemed to need further emphasis. The recommendation about the use of multifaceted scales for the operationalization of the mindfulness construct extracted adds support to this rationale. A deeper examination of the effects of mindfulness and a more comprehensive interpretation of the results could be allowed in the case that each mindfulness facet shows distinctive effects. Therefore, regardless of the findings, to fully capture the potential benefits of mindfulness, the use of multifaceted scales is encouraged. To this, it should be added the need to consider the settings and procedures of the study to be performed so that shorter versions of the scales can be used as an alternative to avoid complex measurements that may threaten the results, particularly in self-reported questionnaires (Grabow et al., 2018).

Based on the findings of the operationalization of PEB, where the PEB scale (PEB; Whitmarsh & O'Neill, 2010) along with the GEB scale (GEB; Kaiser, 1998) were mostly used, the selection of measurement tools tested in previous studies would avoid methodological issues. Besides, by using these scales, a wider view of different PEBs along with an enriched interpretation of the results may be provided (Armel, Yan, Todd, & Robinson, 2011; Lange & Dewitte, 2019). Such tested and comprehensive scales may also allow the generalizability of the results, although other factors, such as sample composition, should be considered in this respect.

Based on findings related to sample issues, although no great differences were found between samples based on general population or students, the use of a diverse sample should be encouraged. Besides, the recruitment of a sufficient number of participants

should also be ensured so that results and study procedures are not compromised (Grabow et al., 2018; Geiger, Fischer, Schrader, & Grossman, 2020).

After having discussed the findings of formal aspects related to the implementation of the studies, a discussion of the findings related to the effects of correlational and experimental studies is offered next. Concerning the direct association of MAAT with PEB, the studies showed how the enhancement of cognitive abilities, such as the focus of attention, led to greater awareness and critical reflection which in turn helped to strengthen self-regulation (Amel, Manning, & Scott, 2009; Dharmesti, Merrilees, & Winata, 2020; Hanley, Dorjee, & Garland, 2020; Helm & Subramaniam, 2019; Wei, Li, Zeng, & Zhu, 2020). Additionally, mindful awareness provided a reflection not only on the self, but also on the ecological impact of our behaviour (Brown & Kasser, 2005; Geiger, Otto, & Schrader, 2018). For this, the development of socioemotional abilities so that individual behaviour is nurtured with a greater sense of empathy, compassion, and self-regulation of emotions to better accept the transition to more sustainable lifestyles seems to be needed.

After ensuring that mindfulness may be a valid predictor of PEB, the mechanisms through which it can be promoted revealed that the same awareness that seems needed to nurture coherent decision-making was showed as an essential path to bring about behavioural change. This awareness, reflected in the *observing* facet of mindfulness, is directed to several points of attention such as bringing to consciousness current unsustainable habits (Chan, 2019; Helm & Subramaniam, 2019), providing a sense of resourcefulness (Helm & Subramaniam, 2019), lowering intrinsic values that are negative to the environment such as materialism (Armstrong, 2012; Grabow et al., 2018) or making sustainable choices more prominent thanks to contextual cues (Brown & Kasser, 2005). In the domain of sustainable consumption, behavioural regulation through mindful awareness is particularly relevant. Hence, the role of mindfulness as an antidote to automatic consumption behaviours (Jacob, Jovic, & Brinkerhoff, 2009; Rosenberg, 2004) may be supported by the relevant role of *observing* external and internal stimuli along with *acting with awareness* found in this review. A self-regulatory mechanism such as SC, along with mindful awareness, could well serve as a direct antecedent of PEB to ensure the actual performance of the intended behaviour.

Besides, this awareness was not only directed towards oneself. It also facilitated a better self-world connection which was translated into an enhanced nature connectedness. Thus,

mindfulness provided an awareness of our relationship with nature (Barbaro & Picket, 2016; Deringer, Hanley, Hodges, & Griffin, 2020; Hanley, Dorjee, & Garland, 2020; Ray, Franz, Jarrett, & Pickett, 2020; Wei, Li, Zeng, & Zhu, 2020) which worked along with the ability to observe our surroundings and to refrain our immediate impulses. Taking this together, through the reflection of their inner selves (awareness of internal stimuli), individuals may act accordingly with this enhanced feeling of interrelatedness (awareness of external stimuli) (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). In turn, greater openness to experience and cognitive flexibility (Geiger, Otto, & Schrader, 2018) may be promoted by mindfulness which could nurture goal-oriented behaviours such as PEB (Wang, Geng, Schultz, & Zhou, 2019).

The need for this interpersonal focus is better observed by the results on the mediators of pro-social behaviours. Mindfulness enhances care for others, empathy, and compassion among more mindful individuals through a decrease in social dominance orientation (Panno et al., 2018). The ability to distance from the subjective experience provided by awareness and observing also helped to cultivate care for others beyond our personal interests (Geiger, Otto, & Schrader, 2018). Thus, those PEBs more related to collective actions, such as climate support, social, as well as nature connectedness, showed a positive mediation effect (Loy & Reese, 2019; Barbaro & Pickett, 2016; Ray, Franz, Jarrett, & Pickett, 2020; Wei, Li, Zeng, & Zhu, 2020). In this case, the *observing* facet was seen as the strongest correlated with PEB (Ray, Franz, Jarrett, & Pickett, 2020) given that attending to external stimuli cultivated a sense of self-world connection.

The role of mindfulness on this shift in perspective towards others is emphasized by the findings of the intrinsic values and ethical decision-making mechanism where one's identity, if not well shaped towards transcendental values rather individualistic, could hinder positive effects (Loy & Reese, 2019; Panno et al., 2018). The few moderators found in the studies (Chan, 2019; Ray, Franz, Jarrett, & Pickett, 2020) also support the beneficial role of mindfulness in enhancing self-regulation and interrelatedness given that awareness of the impact of our behaviour and nature connectedness showed to help to bridge the intention-behaviour relationship. In sum, more decentered, other-focused, altruistic people seem to be needed to promote sustainability transitions.

Only two studies reported a negative direct association between the two constructs, mindfulness and PEB (Geiger, Fischer, Schrader, & Grossman, 2020; Geiger, Grossman,

& Schrader, 2019). They were related to specific PEB domains, sustainable consumption, and conducted through experimental research. Slight positive effects were observed at months after the interventions. Based on this, longer interventions to facilitate a stronger influence of mindfulness facets, as well as the addition of factors that can strengthen individual intentions so that their effects can eventually be transferred to PEB, are offered as alternatives.

Some recommendations can be extracted from the review of the experimental studies that may serve as guidance for future interventions. The need for a thorough customization of the mindfulness programs is seen as a requirement for the success of mindfulness interventions when targeting specific PEBs (e.g., customized to nutrition behaviours; Stanszus, Frank, & Geiger, 2019). However, it is also warned that excessive tailoring may also result in a failed intervention, given that it may add too much complexity to the implementation procedures (Grabow et al., 2018). Although the length of interventions is not seen as determining good results, given that a brief 6-minutes mindfulness induction seemed to be enough to influence more sustainable options of behaviour (Chan, 2019), longer interventions may enlarge the effects, particularly on those behaviours that need the disruption of automatic patterns (e.g., sustainable consumption behaviours; Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018). In this regard, even brief mindfulness inductions, although successful, could be improved. As per the small effects on sustainable consumption behaviours observed over time (Geiger, Grossman, & Schrader, 2019), a need for longer evaluation timeframes is also seen as a requirement for successful interventions (Ray, Franz, Jarrett, & Pickett, 2020). Full disclosure of potential beneficial effects would thus be allowed. A pre-assessment one month before the intervention and one-year follow-up is recommended as a procedure to facilitate a full deploy of the effects of mindfulness interventions (Grabow et al., 2018). Finally, the lack of a waitlist control group (Ray, Franz, Jarrett, & Pickett, 2020) or group distribution among conditions (intervention versus control) through a randomized control comparison group (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018) is also observed as a requirement.

1.6. Summary

This literature review sets out to collect existing empirical evidence about the relationship between mindfulness, as a trait, state, and intervention, and PEB so that a rationale for the exploration of the factors or mechanisms not yet sufficiently explored is provided and therefore, well supported. Thus, a summary of the findings with considerations for the purpose of this thesis is offered next.

Based on this thesis' review, despite the distinctive effect of mindfulness on the ability to effectively influence the regulation of our behaviour and to develop socioemotional abilities so that PEB is promoted, research about the influential effects of these aspects as well as mechanisms related to bridging this environmental intention-behaviour gap through effects on actual behaviour is still scant (Amel, Manning, & Scott, 2009; Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Stanszus, Frank, & Geiger, 2019).

Past studies have stressed the importance of offering alternative approaches that considered not only the cognitive but also the affective factors that determine individual behaviours to facilitate inner transitions to sustainability (Gifford & Nilsson, 2014; Ives, Freeth, & Fischer, 2020) and have suggested the role of mindfulness in particular as a promising tool for the cultivation of such competencies (Feuerborn & Gueldner, 2019). However, traditional approaches seem to have emphasized the examination of cognitive abilities to the detriment of more holistic approaches (Brundiers & Wiek, 2017; Fadeeva, Mochizuki, Brundiers, Wiek, & Redman, 2010). This is particularly relevant in educational settings given that students should acquire these abilities to better address sustainability issues in the future as well as to fully deploy the role of both, students that one day will become decision-makers in organizational settings and educational institutions that fully prepare students to this regard (Brundiers & Wiek, 2017). Besides, given that mindfulness can be trained, educational settings facilitate the implementation of interventions so that students can be better guided (Felver & Jennings, 2016). Moreover, based on this review, the suitability of mindfulness as a learning method to cultivate socioemotional abilities is supported, which has also been proposed in past research (Frank, Fischer, & Wamsler, 2019; Frank & Stanszus, 2019). For this purpose, a focus on interpersonal benefits of mindfulness given its role in factors such as emotion,

compassion, or interconnectedness (Geiger, Otto, & Schrader, 2018; Loy & Reese, 2019; Panno et al., 2018), deserves further attention.

As per the role of mindfulness as a self-regulation strategy to bridge the gap between environmental intentions and behaviours, although there is a theoretical exploration of mechanisms such as the disruption of routines or the congruence of attitudes and behaviours on previous reviews (Fischer, Böhme, & Geiger, 2017), few studies have empirically explored their effects (Amel, Manning, & Scott, 2009; Armstrong, 2012; Geiger, Grossman, & Schrader, 2018) and, to the author's knowledge, none of them through measurement of factors directly to the self-regulation of behaviour such as the novel mechanism found in the literature, the role of SC. The disruption of routines is rather interpreted as the awareness of current unsustainable behaviours (Geiger, Grossman, & Schrader, 2018; Rosenberg, 2004) or examined in the domain of health-related behaviours (Chatzisarantis & Hagger, 2007; Ruffault, Bernier, Juge, & Fournier, 2016). Thus, the enhanced awareness of mindfulness via SC may well constitute a valid facilitator of PEB (Yigit, 2020).

1.7. Conclusions

Following the evidence extracted about the factors and mechanisms that needed further exploration in the mindfulness and PEB relationship, the core of the study of this thesis is established.

Given that mindfulness is a malleable trait and its suitability in educational contexts, the potential of mindfulness interventions in nurturing the less explored socioemotional abilities that are needed to facilitate inner sustainability transitions, is explored. To do so, in Chapter 2 a review and meta-analysis are conducted so that not only existing evidence is collected but also the strength of the mindfulness benefits is assessed. By doing so, this thesis responds to calls for alternative approaches to the exploration of affective components of individual behaviour in learning environments (O'Flaherty & Liddy, 2018; Shephard, Rieckmann, & Barth 2019), as well as for the examination of the role of mindfulness in these learning processes (Wamsler et al., 2018).

In Chapter 3, based on the existing difficulties to bridge the intention-behaviour gap, an alternative exploration is addressed, particularly on the seek for potential mediators that show a direct impact on this path. Thus, in this thesis, SC, a trait that has received some theoretical support on its role with PEB (Bishop et al., 2004) and that, based on this review, lack of sufficient empirical examination, is proposed as an antecedent of PEB. Based on the existing evidence, it may help to bridge the intention-behaviour gap which deserves further attention. By examining this association, this thesis responds to previous calls that claimed for a deeper examination of such individual disposition in the promotion of PEB (Passafaro & Livi, 2017; Steg, Shwom, & Dietz, 2018). Additionally, this constitutes the first step to then examine the influence of mindfulness in the relationship between SC and PEB.

In Chapter 4, after accounting for the effects of SC as an antecedent of PEB, the direct and indirect effect of MAAT on PEB via SC is assessed so that the influence of awareness as well as changes on actual behaviour through this mediator is better explored. In short, the core mindfulness components of awareness and self-regulation complemented by the role of SC can then be fully addressed. Based on the lack of evidence about the exploration of this mechanism, and the theoretical role of mindfulness in this respect, this is an exploration that seems worth pursuing.

With these studies, this thesis will achieve its aim as it offers a wider exploration of individual dispositions that may facilitate sustainability transitions (Ives, Freeth, & Fischer, 2020) and considers the role of mindfulness on PEB, both as a trait and as an intervention, as a potential mechanism for the holistic development of individuals capabilities.

1.8. References

Amel, E. L., Manning, C. M., & Scott, B. A. (2009). Mindfulness and sustainable behavior: Pondering attention and awareness as means for increasing green behavior. *Ecopsychology, 1*(1), 14-25.

Anicha, C. L., Ode, S., Moeller, S. K., & Robinson, M. D. (2012). Toward a cognitive view of trait mindfulness: distinct cognitive skills predict its observing and nonreactivity facets. *Journal of personality, 80*(2), 25

Armel, K. C., Yan, K., Todd, A., & Robinson, T. N. (2011). The Stanford Climate Change Behavior Survey (SCCBS): assessing greenhouse gas emissions-related behaviors in individuals and populations. *Climatic change, 109*(3), 671-694.5-285.

Armstrong, A. J. (2012). Mindfulness and consumerism: a social psychological investigation (PhD thesis). Retrieved October 25th, 2020, from https://search.proquest.com/openview/9df42961ce89316656c7945eebdc6180/1?pq-origsite=gscholar&cbl=18750&diss=y

Aspy, D. J., & Proeve, M. (2017). Mindfulness and loving-kindness meditation: Effects on connectedness to humanity and to the natural world. *Psychological reports, 120*(1), 102-117.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment, 11*(3), 191-206.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3), 329-342.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27–45.

Baer, R. A., Walsh, E., & Lykins, E. L. (2009). *Assessment of mindfulness.* In Clinical handbook of mindfulness (pp. 153-168). Springer: New York, NY.

Bahl, S., Milne, G. R., Ross, S. M., Mick, D. G., Grier, S. A., Chugani, S. K., Chan, S.S., Gould, S., Cho, Y, Dorsey, J.D., Schindler, R.M., Murdock, M.R., & Boesen-Mariani, S. (2016). Mindfulness: Its transformative potential for consumer, societal, and environmental well-being. *Journal of Public Policy & Marketing, 35*(2), 198-210.

Bamberg, S. (2013). Applying the stage model of self-regulated behavioral change in a car use reduction intervention. *Journal of Environmental Psychology, 33*(68–75), 68-75.

Barbaro, N., & Pickett, S. M. (2016). Mindfully green: Examining the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior. *Personality and Individual Differences, 93*, 137-142.

Barber, N. A., & Deale, C. (2014). Tapping mindfulness to shape hotel guests' sustainable behavior. *Cornell Hospitality Quarterly, 55*(1), 100-114.

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). The assessment of mindfulness with self-report measures: Existing scales and open issues. *Mindfulness, 4*(3), 191-202.

Bergomi, C., Tschacher, W., & Kupper, Z. (2014). Konstruktion und erste Validierung eines Fragebogens zur umfassenden Erfassung von Achtsamkeit [construction and initial validation of a questionnaire for the comprehensive investigation of mindfulness]. *Diagnostica, 60*, 111–125.

Berry, D. R., Hoerr, J. P., Cesko, S., Alayoubi, A., Carpio, K., Zirzow, H., Walter, W., Scram, G., Rodriguez, K., & Beaver, V. (2020). Does mindfulness training without explicit ethics-based instruction promote prosocial behaviors? A meta-analysis. *Personality and Social Psychology Bulletin, 46*(8), 1247-1269.

Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction? *Psychosomatic medicine, 64*(1), 71-83.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M. Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical psychology: Science and practice, 11*(3), 230-241.

Böhme, T., Geiger, S. M., Grossman, P., Stanszus, L., & Schrader, U. (2016). *Arbeitsdefinition von Achtsamkeit im Projekt BiNKA* [Working defintition of mindfulness in the BiNKA project] (Technical paper). Berlin, Germany: Technische Universität.

Böhme, T., Stanszus, L., Geiger, S., Fischer, D., & Schrader, U. (2018). Mindfulness Training at School: A Way to Engage Adolescents with Sustainable Consumption? *Sustainability, 10*(10), 3557.

Brick, C., & Lewis, G. J. (2016). Unearthing the "green" personality: Core traits predict environmentally friendly behavior. *Environment and Behavior, 48*(5), 635-658.

Brinkerhoff, M. B., & Jacob, J. (1999). Mindfulness and quasi-religious meaning systems: An empirical exploration within the context of ecological sustainability and deep ecology. *Journal for the Scientific Study of Religion, 38*(4), 524–542.

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social indicators research, 74*(2), 349-368.

Brown, K. W., Kasser, T., Ryan, R. M., Alex Linley, P., & Orzech, K. (2009). When what one has is enough: Mindfulness, financial desire discrepancy, and subjective well-being. *Journal of Research in Personality, 43*(5), 727–736.

Brown, D.B., Bravo, A.J., Roos, C.R., & Pearson, M.R. (2015). Five Facets of Mindfulness and Psychological Health: Evaluating a Psychological Model of the Mechanisms of Mindfulness. *Mindfulness 6*, 1021–1032.

Brown, K.W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84(*4), 822–848.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological inquiry, 18*(4), 211-237.

Brundiers, K., & Wiek, A. (2017). Beyond interpersonal competence: Teaching and learning professional skills in sustainability. *Education Sciences, 7*(1), 39.

Çakmak, A. Ç., & Özkan, B. (2016). Üniversite Öğrencilerinin Ekolojik Farkındalıkları İle Yeşil Tüketim Alışkanlıklarının Farklı Değişkenler Perspektifinden Karşılaştırılması: İnteraktif Bir Uygulama. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 5*(8), 3144-3170.

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: the Philadelphia Mindfulness Scale. *Assessment, 15*(2), 204–223

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of business ethics, 97*(1), 139-158.

Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical psychology review, 29*(6), 560-572.

Chan, E. Y. (2019). Mindfulness promotes sustainable tourism: the case of Uluru. *Current Issues in Tourism, 22(*13), 1526-1530.

Chatzisarantis, N. L., & Hagger, M. S. (2007). Mindfulness and the intention-behavior relationship within the theory of planned behavior. *Personality and Social Psychology Bulletin, 33*(5), 663-676.

Condon, P. (2017). Mindfulness, compassion, and prosocial behaviour. *Mindfulness in social psychology*, 124-138.

Conner, M., & McMillan, B. (1999). Interaction effects in the theory of planned behaviour: Studying cannabis use. *British journal of social psychology, 38*(2), 195-222.

Creswell, J. D. (2017). Mindfulness interventions. *Annual review of psychology, 68*, 491-516.

Cullen, M. (2011). Mindfulness-based interventions: An emerging phenomenon. *Mindfulness,* 2(3), 186-193.

Dhandra, T. K. (2019). Achieving triple dividend through mindfulness: More sustainable consumption, less unsustainable consumption and more life satisfaction. *Ecological economics, 161,* 83-90.

Dharmesti, M., Merrilees, B., & Winata, L. (2020). "I'm mindfully green": examining the determinants of guest pro-environmental behaviors (PEB) in hotels. *Journal of Hospitality Marketing & Management, 29*(7), 830-847.

De Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology, 37*(8), 1817-1836.

De Haan, G. (2006). The BLK '21'programme in Germany: a 'Gestaltungskompetenz'-based model for Education for Sustainable Development. *Environmental Education Research, 12*(1), 19-32.

Deringer, S. A., Hanley, A. W., Hodges, J. S., & Kent, L. (2020). Improving ecological behavior in outdoor recreation through mindfulness interventions: a mixed methods inquiry. *Journal of Outdoor Recreation, Education, and Leadership, 12*(2).

Dholakia, R., & Wackernagel, M. (1999). *The ecological footprint questionnaire.* San Fracisco, CA: Redefining Progress.

Donald, J. N., Sahdra, B. K., Van Zanden, B., Duineveld, J. J., Atkins, P. W., Marshall, S. L., & Ciarrochi, J. (2019). Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behaviour. *British Journal of Psychology, 110*(1), 101-125.

Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm". *The journal of environmental education, 9*(4), 10-19.

Ericson, T., Kjønstad, B. G., & Barstad, A. (2014). Mindfulness and Sustainability. *Ecological Economics 104*, 73–79.

Fadeeva, Z., Mochizuki, Y., Brundiers, K., Wiek, A., & Redman, C. L. (2010). Real-world learning opportunities in sustainability: from classroom into the real world. *International Journal of Sustainability in Higher Education, 11*(4), 308-324.

Felver, J. C., & Jennings, P. A. (2016). Applications of mindfulness-based interventions in school settings: An introduction. *Mindfulness, 7,* 1-4

Feuerborn, L. L., & Gueldner, B. (2019). Mindfulness and social-emotional competencies: Proposing connections through a review of the research. Mindfulness, 10(9), 1707-1720.

Fischer, D., Böhme, T., & Geiger, S. M. (2017). Measuring young consumers' sustainable consumption behavior: Development and validation of the YCSCB scale. *Young Consumers, 18*(3), 312–326.

Fischer, D., Stanszus, L., Geiger, S., Grossman, P., & Schrader, U. (2017). Mindfulness and sustainable consumption: A systematic literature review of research approaches and findings. *Journal of Cleaner Production, 162*, 544-558.

Frank, P., Fischer, D., & Wamsler, C. (2019). Mindfulness, Education, and the Sustainable Development Goals. In W. Leal Filho, A. M. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.), *Encyclopedia of the UN Sustainable Development Goals. Quality Education* (Vol. 10, pp. 1–11). Cham: Springer.

Frank, P., & Stanszus, L. S. (2019). Transforming consumer behavior: Introducing self-inquiry-based and self-experience-based learning for building personal competencies for sustainable consumption. *Sustainability, 11*(9), 2550.

Geiger, S. M., Fischer, D., & Schrader, U. (2018). Measuring what matters in sustainable consumption: an integrative framework for the selection of relevant behaviors. *Sustainable Development, 26*(1), 18-33.

Geiger, S. M., Fischer, D., Schrader, U., & Grossman, P. (2020). Meditating for the planet: effects of a mindfulness-based intervention on sustainable consumption behaviors. *Environment and Behavior, 52(*9), 1012-1042.

Geiger, S. M., Grossman, P., & Schrader, U. (2019). Mindfulness and sustainability: Correlation or causation?. *Current Opinion in Psychology, 28*, 23-27.

Geiger, S. M., Otto, S., & Schrader, U. (2018). Mindfully green and healthy: An indirect path from mindfulness to ecological behavior. *Frontiers in psychology, 8*, 2306.

Gethin, R. (2011). On some definitions of mindfulness. *Contemporary Buddhism, 12*(1), 263-279.

Gherardi-Donato, E. C. S., Moraes, V. S., & Esper, L. H. (2020). Mindfulness Measurement Instruments: A Systematic Review. *International Journal of Psychiatry Research, 3*(4), 1-12.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International journal of psychology, 49*(3), 141-157.

Grabow, M., Bryan, T., Checovich, M. M., Converse, A. K., Middlecamp, C., Mooney, M., Torres, E. R., Younkin, S. G., & Barrett, B. (2018). *Mindfulness and climate change action: a feasibility study. Sustainability, 10*(5), 1508.

Green-Demers, I., Pelletier, LG, & Ménard, S. (1997). The impact of behavioral difficulty on the saliency of the association between self-determined motivation and environmental behaviors. *Canadian Journal of Behavioral Science, 29*(3), 157.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of personality and social psychology, 85*(2), 348.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of psychosomatic research, 57*(1), 35-43.

Hanley, A. W., & Garland, E. L. (2017). Clarity of mind: Structural equation modeling of associations between dispositional mindfulness, self-concept clarity and psychological well-being. *Personality and individual differences, 106*, 334-339.

Hanley, A. W., Dorjee, D., & Garland, E. L. (2020). Mindfulness training encourages self-transcendent states via decentering. *Psychology of Consciousness: Theory, Research, and Practice.* [In Press]. Retrieved February 16th, 2021 from https://eprints.whiterose.ac.uk/165750/1/Hanley_Dorjee_Garland_20_Mindfulness_training_encourages_self_transcendent_states_via_decentering.pdf

Helm, S., & Subramaniam, B. (2019). Exploring socio-cognitive mindfulness in the context of sustainable consumption. *Sustainability, 11*(13), 3692.

Hill, C. L., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*(1), 81.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of environmental education, 18(*2), 1-8.

Howell, A. J., Dopko, R. L., Passmore, H. A., & Buro, K. (2011). Nature connectedness: Associations with well-being and mindfulness. *Personality and individual differences, 51(*2), 166-171.

Huneke, M. E. (2005). The face of the un-consumer: An empirical examination of the practice of voluntary simplicity in the United States. *Psychology & Marketing, 22*(7), 527-550.

Hunecke, M., & Richter, N. (2019). Mindfulness, construction of meaning, and sustainable food consumption. *Mindfulness, 10*(3), 446-458.

Ives, C. D., Freeth, R., & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. *Ambio, 49*(1), 208-217.

Jacob, J. C., & Brinkerhoff, M. B. (1999). Mindfulness and subjective well-being in the sustainability movement: A further elaboration of multiple discrepancies theory. *Social Indicators Research, 46*(3), 341-368.

Jacob, J., Jovic, E., & Brinkerhoff, M. B. (2009). Personal and planetary well-being: Mindfulness meditation, pro-environmental behavior and personal quality of life in a survey from the social justice and ecological sustainability movement. *Social Indicators Research*, *93*(2), 275-294.

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017). Development and validation of a multifactor mindfulness scale in youth: The Comprehensive Inventory of Mindfulness Experiences–Adolescents (CHIME-A). *Psychological assessment*, *29*(3), 264.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General hospital psychiatry*, *4*(1), 33-47.

Kabat-Zinn J. (1991). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness.* Delta: New York

Kabat-Zinn, J. (1994). *Wherever you go, there you are: mindfulness meditation in everyday life.* New York: Hyperion.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. Clinical psychology: *Science and practice*, *10*(2), 144-156.

Kabat-Zinn, J. (2005). *Coming to our senses: Healing ourselves and the world through mindfulness*. Hachette UK.

Kabat-Zinn, J. (2011). Some reflections on the origins of MBSR, skillful means, and the trouble with maps. *Contemporary Buddhism*, *12*(1), 281-306.

Kaiser, F. G. (1998). A general measure of ecological behavior 1. *Journal of applied social psychology*, *28*(5), 395-422.

Kaiser, F. G., & Wilson, M. (2000). Assessing People's General Ecological Behavior: A Cross-Cultural Measure 1. *Journal of applied social psychology*, *30*(5), 952-978.

Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behavior: The specific composition of a general performance. *Personality and individual differences*, *36*(7), 1531-1544.

Kang, Y., Gruber, J., & Gray, J. R. (2013). Mindfulness and de-automatization. *Emotion review*, *5*(2), 192-201.

Klöckner, C. A. (2017). A stage model as an analysis framework for studying voluntary change in food choices. The case of beef consumption reduction in Norway. *Appetite*, *108*, 434–449.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, *8*(3), 239-260.

Kormos, C., & Gifford, R. (2014). The validity of self-report measures of proenvironmental behavior: A meta-analytic review. *Journal of Environmental Psychology, 40*, 359-371.

Lange, F., & Dewitte, S. (2019). Measuring pro-environmental behavior: Review and recommendations. *Journal of Environmental Psychology, 63*, 92-100.

Langer, E. (1989). Minding matters: The consequences of mindlessness-mindfulness. *Advances in Experimental Social Psychology*, *22*, 137–173.

Langer, E. J., & Moldoveanu, M. (2000). Mindfulness research and the future. *Journal of social issues*, *56*(1), 129-139.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L. E., Devins, G., et al. (2006). The toronto mindfulness scale: development and validation. *Journal of Clinical Psychology, 62*(12), 1445–1468.

Lawlor, M. S. (2016). Mindfulness and social emotional learning (SEL): A conceptual framework. In *Handbook of mindfulness in education* (pp. 65-80). Springer, New York, NY.

Lee, T. H., Jan, F. H., & Yang, C. C. (2013). Conceptualizing and measuring environmentally responsible behaviors from the perspective of community-based tourists. *Tourism Management, 36*, 454-468.

Lilley, R., Whitehead, M., Howell, R., Jones, R., & Pykett, J. (2016). Mindfulness, behaviour change and engagement in environmental policy. Retrieved February 10th, 2021, from https://changingbehaviours.files.wordpress.com/2016/01/mindfulnessreportgapfinal.pdf

Liobikienė, G., & Poškus, M. S. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behavior: modifying the value-belief-norm theory. *Sustainability*, *11*(12), 3324.

Loy, L. S., & Reese, G. (2019). Hype and hope? Mind-body practice predicts pro-environmental engagement through global identity. *Journal of Environmental Psychology, 66*, 101340.

Maloney, J. E., Lawlor, M. S., Schonert-Reichl, K. A., & Whitehead, J. (2016). A mindfulness-based social and emotional learning curriculum for school-aged children: the MindUP program. In K. Schonert-Reichl & R. Roeser (Eds.), *Handbook of mindfulness in education* (pp. 313–334). New York: Springer.

Markle, G. L. (2013). Pro-environmental behavior: does it matter how it's measured? Development and validation of the pro-environmental behavior scale (PEBS). *Human ecology*, *41*(6), 905-914.

Markowitz, E. M., Goldberg, L. R., Ashton, M. C., & Lee, K. (2012). Profiling the "pro-environmental individual": A personality perspective. *Journal of personality, 80*(1), 81-111.

Mattes, J. (2019). Systematic Review and Meta-Analysis of Correlates of FFMQ Mindfulness Facets. *Frontiers in Psychology 10*, 1-18.

Maynard, B. R., Solis, M. R., Miller, V. L., & Brendel, K. E. (2017). Mindfulness-based interventions for improving cognition, academic achievement, behavior, and socioemotional functioning of primary and secondary school students. *Campbell systematic reviews, 13*(1), 1-144.

Medvedev, O. N., Cervin, M., Barcaccia, B., Siegert, R. J., Roemer, A., & Krägeloh, C. U. (2020). Network Analysis of Mindfulness Facets, Affect, Compassion, and Distress. *Mindfulness*, 1-12.

Milfont, T. L. (2009). The effects of social desirability on self-reported environmental attitudes and ecological behaviour. *The Environmentalist, 29*(3), 263-269.

Miller, D., Merrilees, B., & Coghlan, A. (2015). Sustainable urban tourism: understanding and developing visitor pro-environmental behaviours. *Journal of Sustainable Tourism, 23(*1), 26-46.

Neff, K. (2003). Self-compassion: an alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2*(2), 85–101.

Nielsen, K. S. (2017). From prediction to process: A self-regulation account of environmental behavior change. *Journal of Environmental Psychology, 51*, 189-198.

Nielsen, K. S. (2019). *The Role of Self-regulation in Environmental Behavior Change* (Doctoral dissertation). Retrieved February 1st, 2020, from https://openarchive.cbs.dk/bitstream/handle/10398/9749/Kristian%20Steensen%20Nielsen.pdf?sequence=1

Noppers, E. H., Keizer, K., Bolderdijk, J. W., & Steg, L. (2014). The adoption of sustainable innovations: driven by symbolic and environmental motives. *Global Environmental Change, 25*, 52-62.

Norman, P., & Conner, M. (2006). The theory of planned behaviour and binge drinking: Assessing the moderating role of past behaviour within the theory of planned behaviour. *British journal of health psychology, 11*(1), 55-70.

O'Flaherty, J., & Liddy, M. (2018). The impact of development education and education for sustainable development interventions: a synthesis of the research. *Environmental Education Research, 24*(7), 1031-1049.

Pandey, A., Chandwani, R., & Navare, A. (2018). How can mindfulness enhance moral reasoning? An examination using business school students. *Business Ethics, 27*(1), 56–71.

Panno, A., Giacomantonio, M., Carrus, G., Maricchiolo, F., Pirchio, S., & Mannetti, L. (2018). Mindfulness, pro-environmental behavior, and belief in climate change: the mediating role of social dominance. *Environment and Behavior, 50*(8), 864-888.

Papenfuss, J. T. (2019). Inside-out Pedagogies: Transformative Innovations for Environmental and Sustainability Education (Doctoral dissertation). Retrieved February 16th, 2020, from https://repository.asu.edu/attachments/216922/content/Papenfuss_asu_0010E_18938.pdf

Papies, E. K., Pronk, T. M., Keesman, M. and Barsalou, L. W. (2015) The benefits of simply observing: mindful attention modulates the link between motivation and behavior. *Journal of Personality and Social Psychology, 108*(1), 148-170.

Passafaro, P., & Livi, S. (2017). Comparing determinants of perceived and actual recycling skills: the role of motivational, behavioral and dispositional factors. *The Journal of Environmental Education, 48*(5), 347-356.

Pepper, M., Jackson, T., & Uzzell, D. (2009). An examination of the values that motivate socially conscious and frugal consumer behaviours. *International journal of consumer studies, 33*(2), 126-136.

Pirages, D.C. & Ehrlich, P.R. (1974) *Ark II: Social Response to Environmental Imperatives.* San Francisco, CA: Freeman.

Pirson, M., Langer, E. J., Bodner, T., & Zilcha-Mano, S. (2012). The development and validation of the Langer mindfulness scale-enabling a socio-cognitive perspective of mindfulness in organizational contexts. Fordham university schools of business research paper. Retrieved May 10th, 2018 from http://dx.doi.org/10.2139/ssrn.2158921

Purser, R. E., & Milillo, J. (2015). Mindfulness revisited: A Buddhist-based conceptualization. *Journal of Management Inquiry, 24*(1), 3–24.

Qiu, J. X., & Rooney, D. (2019). Addressing unintended ethical challenges of workplace mindfulness: A four-stage mindfulness development model. *Journal of Business Ethics, 157*(3), 715-730.

Qu, Y. E., Dasborough, M. T., & Todorova, G. (2015). Which mindfulness measures to choose to use?. *Industrial and Organizational Psychology, 8*(4), 710-723.

Rau, H. K., & Williams, P. G. (2016). Dispositional mindfulness: A critical review of construct validation research. *Personality and Individual Differences, 93*, 32-43.

Ray, T. N., Franz, S. A., Jarrett, N. L., & Pickett, S. M. (2020). Nature Enhanced Meditation: Effects on Mindfulness, Connectedness to Nature, and Pro-Environmental Behavior. *Environment and Behavior, 0013916520952452*.

Rhodes, R. E., & Dickau, L. (2013). Moderators of the intention-behaviour relationship in the physical activity domain: a systematic review. *British journal of sports medicine, 47*(4), 215-225.

Rhys Davids, T. W. (1910). *Dialogues of the Buddha.* Vol. 2. London: Henry Frowde

Richter, N., & Hunecke, M. (2020). Facets of Mindfulness in Stages of Behavior Change Toward Organic Food Consumption. *Mindfulness, 11*(6), 1354-1369.

Rosenberg, E. (2004). Mindfulness and consumerism. In T. Kasser & A.D. Kanner (Eds.), *Psychology and consumer culture: The struggle for a good life in a materialistic world* (pp. 107–125). Washington, DC: American Psychological Association.

Ruedy, N. E., & Schweitzer, M. E. (2010). In the moment: The effect of mindfulness on ethical decision making. *Journal of Business Ethics, 95*(1), 73-87.

Ruffault, A., Bernier, M., Juge, N., & Fournier, J. F. (2016). Mindfulness may moderate the relationship between intrinsic motivation and physical activity: A cross-sectional study. *Mindfulness, 7*(2), 445-452.

Sala, M., Rochefort, C., Lui, P. P., & Baldwin, A. S. (2020). Trait mindfulness and health behaviours: a meta-analysis. *Health psychology review, 14*(3), 345-393.

Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, N. (2013). Assessment of mindfulness: Review on state of the art. *Mindfulness, 4*(1), 3-17.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Eds..), *Advances in experimental social psychology* (Vol. 10, pp. 221–279). New York: Academic Press.

Shapiro, S. L., Jazaieri, H., & Goldin, P. R. (2012). Mindfulness-based stress reduction effects on moral reasoning and decision making. *The Journal of Positive Psychology, 7*(6), 504-515.

Shephard, K., Rieckmann, M., & Barth, M. (2019). Seeking sustainability competence and capability in the ESD and HESD literature: An international philosophical hermeneutic analysis. *Environmental Education Research, 25*(4), 532-547.

Small, C., & Lew, C. (2019). Mindfulness, moral reasoning and responsibility: Towards virtue in ethical decision-making. *Journal of Business Ethics, 169*, 103–117.

Smith, J. R., Terry, D. J., Manstead, A. S., Louis, W. R., Kotterman, D., & Wolfs, J. (2007). Interaction effects in the theory of planned behavior: The interplay of self-identity and past behavior. *Journal of Applied Social Psychology, 37*(11), 2726-2750.

Shapiro, S. L., Jazaieri, H., & Goldin, P. R. (2012). Mindfulness-based stress reduction effects on moral reasoning and decision making. *The Journal of Positive Psychology, 7*(6), 504-515.

Sørensen, L., Osnes, B., Visted, E., Svendsen, J. L., Adolfsdottir, S., Binder, P. E., & Schanche, E. (2018). Dispositional mindfulness and attentional control the specific association between the mindfulness facets of non-judgment and describing with flexibility of early operating orienting in conflict detection. *Frontiers in psychology, 9*, 2359.

Stanszus, L., Fischer, D., Böhme, T., Frank, P., Fritzsche, J., Geiger, S., ... & Schrader, U. (2017). Education for sustainable consumption through mindfulness training: Development of a consumption-specific intervention. *Journal of teacher education for sustainability, 19*(1), 5-21.

Stanszus, L. S., Frank, P., & Geiger, S. M. (2019). Healthy eating and sustainable nutrition through mindfulness? Mixed method results of a controlled intervention study. *Appetite, 141*, 104325.

Steg, L., Shwom, R., & Dietz, T. (2018). What drives energy consumers?: Engaging people in a sustainable energy transition. *IEEE Power and Energy Magazine, 16*(1), 20-28.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of environmental psychology, 29*(3), 309-317.

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of social issues, 56*(3), 407-424.

Subar, A. F., Kirkpatrick, S. I., Mittl, B., Zimmerman, T. P., Thompson, F. E., Bingley, C., Willis, G., Islam, N. G., Baranowski, T., McNutt, S., & Potischman, N. (2012). The Automated Self-Administered 24-hour dietary recall (ASA24): a resource for researchers, clinicians, and educators from the National Cancer Institute. *Journal of the Academy of Nutrition and Dietetics, 112*(8), 1134-1137.

Tanay, G., & Bernstein, A. (2013). State mindfulness scale (SMS): development and initial validation. *Psychological assessment, 25*(4), 1286.

Tang, Y., Geng, L., Schultz, P. W., Zhou, K., & Xiang, P. (2017). The effects of mindful learning on pro-environmental behavior: A self-expansion perspective. *Consciousness and Cognition, 51*, 140-148.

Tezel, E., & Giritli, H. (2017). Understanding sustainability through mindfulness: A systematic review. In *International Sustainable Buildings Symposium* (pp. 321-327). Cham: Springer.

Thiermann, U. B., & Sheate, W. R. (2020). Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour. *Ecological Economics, 174*, 106668.

Tomlinson, E. R., Yousaf, O., Vittersø, A. D., & Jones, L. (2018). Dispositional mindfulness and psychological health a systematic review. *Mindfulness, 9*(1), 23-43.

Tripathi, A., & Singh, M. P. (2016). Determinants of sustainable/green consumption: a review. *International Journal of Environmental Technology and Management, 19*(3-4), 316-358.

Vago, D. R., & David, S. A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in human neuroscience, 6*, 296, 1-30.

Valk, S. L., Bernhardt, B. C., Trautwein, F. M., Böckler, A., Kanske, P., Guizard, N., ... & Singer, T. (2017). Structural plasticity of the social brain: Differential change after socio-affective and cognitive mental training. *Science Advances, 3*(10), e1700489.

Walker, G. J., & Chapman, R. (2003). Thinking Like a Park: The Effects of Sense of Place, Perspective-Taking, and Empathy on Pro-Environmental Intentions. *Journal of Park & Recreation Administration, 21*(4), 71-86.

Wallace, B. A., & Shapiro, S. L. (2006). Mental balance and well-being: building bridges between Buddhism and Western psychology. *American Psychologist, 61*(7), 690.

Wamsler, C. (2018). Mind the gap: The role of mindfulness in adapting to increasing risk and climate change. *Sustainability science, 13*(4), 1121-1135.

Wamsler, C., & Brink, E. (2018). Mindsets for sustainability: Exploring the link between mindfulness and sustainable climate adaptation. *Ecological Economics, 151*, 55-61.

Wamsler, C., Brossmann, J., Hendersson, H., Kristjansdottir, R., McDonald, C., & Scarampi, P. (2018). Mindfulness in sustainability science, practice, and teaching. *Sustainability Science, 13(*1), 143-162.

Wang, J., Geng, L., Schultz, P. W., & Zhou, K. (2019). Mindfulness increases the belief in climate change: The mediating role of connectedness with nature. *Environment and behavior, 51*(1), 3-23.

Webb, D. J., Mohr, L. A., & Harris, K. E. (2008). A re-examination of socially responsible consumption and its measurement. *Journal of business research, 61*(2), 91-98.

Wei, L., Li, Y., Zeng, X., & Zhu, J. (2020). Mindfulness in Ethical Consumption: The Mediating Roles of Connectedness to Nature and Self-control. *International Marketing Review*, online first.

Werner, A., Spiller, A., & Meyerding, S. G. (2020). The yoga of sustainable diets: Exploring consumers mind and spirit. *Journal of Cleaner Production, 243*, 118473.

Welsch, H., & Kühling, J. (2009). Determinants of pro-environmental consumption: The role of reference groups and routine behavior. *Ecological economics, 69*(1), 166-176.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing, 83*(3), 22-49.

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology, 30*(3), 305-314.

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

Winning, A. P., & Boag, S. (2015). Does brief mindfulness training increase empathy? The role of personality. *Personality and Individual Differences, 86*, 492-498.

Yigit, M. K. (2020). Investigating the relationship between consumer mindfulness and sustainable consumption behavior. *International Journal of Research in Business and Social Science (2147-4478), 9*(6), 37-43.

Yılmaz, Y., & Anasori, E. (2021). *Environmentally responsible behavior of residents: impact of mindfulness, enjoyment of nature and sustainable attitude.* Retrieved March 4th, 2021 from https://www.emerald.com/insight/content/doi/10.1108/JHTI-07-2020-0121/full/html?casa_token=NpGCMlB7ZKQAAAAA:oFN1W4Ab3sdLYEfAJfme1gU4UU6jEi5pwqa5_JTPSy3AYmvVpFFL6GahSi4Wc1mpnumb1hOL8Rka-7MtTPq3dmwdr6xsOVHmrS758bew0OWCgbxDwuJs

CHAPTER 2

Mindfulness in education for sustainable development to nurture socioemotional competencies: a systematic review and meta-analysis

2.1. Introduction

Education for sustainable development (ESD hereafter) is an increasingly relevant area of research, as the need to educate individuals who can deal with sustainable development challenges has become more urgent (UNESCO, 2018). Educating for sustainable development requires a new learning system that shifts our lifestyles (Ojala, 2016; Wamsler et al., 2018), transforming "ecological principles into habits of mind, body and heart" (Nazir & Pedretti, 2016: 288). To this end, the exploration of learning methods that allow for the development of competencies that help to deal with this personal transition is advocated (de Haan, 2006; Papenfuss, 2019), going beyond the "cognitive-knowing" focus (Dutta & Chandrasekharan, 2018; Frank & Stanszus, 2019; Nazir & Pedretti, 2016). This paper aims to contribute to these explorations of transformative learning methods and, in particular, of learning methods that can nurture the socioemotional dimension of the key competencies for sustainability (hereafter, socioemotional competencies).

Socioemotional competencies are those skills required to effectively self-regulate one's emotions, solve problems effectively, and cultivate interpersonal relations, taking both personal and other's needs into consideration (CASEL, 2003; Denham et al., 2003). These competencies encompass both intrapersonal and interpersonal skills, which are intertwined and interdependent (Elias et al., 1997), namely, the capacity to understand and manage emotions (Manni, Sporre, & Ottander, 2017; Ojala, 2012, 2016) or the ability to feel empathy for others and establish and maintain positive relationships (Weissberg, Durlak, Domitrovich, & Gullotta, 2015).

In particular, this paper examines the potential use of mindfulness practices for the cultivation of these socioemotional competencies. Mindfulness practice has recently been defended as a suitable learning method in the context of ESD (Wamsler et al., 2018; Stanszus et al., 2017) and, more specifically, as a learning method that can promote socioemotional competencies (Schonert-Reichl & Roeser, 2016; Sols & Wals, 2015).

Although past research has not focused on how mindfulness practices nurture socioemotional competencies in the specific domain of sustainability, other research suggests that mindfulness practice may enable the development of environmental

identities and lifestyles (Aspy & Proeve, 2017; Ericson, Kjønstad, & Barstad, 2014; Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017), since it brings about "environmental enlightenment" (Bai & Romanycia, 2013, cited in Nazir & Pedretti, 2016; Bai & Scutt, 2009). This paper adds to this research by showing that mindfulness practices target and promote both the interpersonal and the intrapersonal components of socioemotional competencies (Felver, Butzer, Olson, Smith, & Khalsa, 2015; Kristeller & Johnson, 2005; Shapiro, Carlson, Astin, & Freedman, 2006) that could be subsequently applied to sustainability-related issues. Indeed, Buddhist and Western traditions associate mindfulness practice with both emotional and social development (Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008); the cultivation of awareness develops internal processes - awareness and decentering- that, in turn, nurture care for the self and for others (Flook, Goldberg, Pinger, & Davidson, 2015; Khoury, 2018; Vago & Silbersweig, 2012) by enhancing emotional regulation, empathy and social connectedness, and resilience. However, there are missing studies that empirically assess the effects of mindfulness practices on socioemotional competencies (Felver, Butzer, Olson, Smith, & Khalsa, 2015).

In particular, this study (1) examines whether mindfulness programs may be effective in nurturing aspects associated with socioemotional competencies, and (2) identifies under which conditions these programs are more effective. To do so, this study conducted and integrated the findings of a systematic review and performed a meta-analysis to measure the effectiveness of mindfulness programs on emotional regulation, empathy and social connectedness, and resilience.

This study makes a twofold contribution to the ESD literature. First, to our knowledge, this is the first study to examine the relationship between mindfulness practices and socioemotional competencies, responding to recent calls for more research on new approaches to learning in ESD (O'Flaherty & Liddy, 2018; Shephard, Rieckmann, & Barth, 2018), and on the use of mindfulness practices in the context of sustainability learning (Wamsler et al., 2018). The meta-analysis extends the initial research on the effects of mindfulness practices in the context of ESD (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Stanszus et al., 2017) by providing an aggregate measurement of the effects on the development of socioemotional competencies, complementing the existing qualitative reviews on the nexus between sustainability and mindfulness to adopt sustainable lifestyles. Second, this paper also provides guidance on how to design

mindfulness-based programs for successful implementation in ESD.

2.2. Socioemotional competencies in ESD

Our study adheres to the basic tenets of a transformative approach to ESD (de Haan, 2006), understanding that learners should be educated not only to be competent towards academic performance but also to gain a deeper understanding of their own inner states and frames of reference (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Wamsler, 2020) and that they should acquire socioemotional competencies that help them relate to others with care and love (Frank & Stanszus, 2019; O'Flaherty & Liddy, 2018). In summary, transformative-learning approaches defend that ESD consists of character education with a competence-based approach (Frank & Stanszus, 2019; McConnell Moroye & Ingman, 2018).

Different key competencies frameworks have been proposed over the years. Recently, UNESCO (2017) proposed an integrative framework of eight key competencies for ESD based on previous conceptualizations (e.g., de Haan, 2010; Rieckmann, 2012; Wiek, Withycombe, & Redman, 2011). The competencies for ESD include the following three domains: cognitive, socioemotional and behavioural (UNESCO, 2017). However, the emphasis on the cognitive and behavioural components has led to overlooking the non-cognitive components (Brundiers & Wiek, 2017; Fadeeva, Mochizuki, Podger, Mustakova-Possardt, & Reid, 2010), despite evidence showing the need for socioemotional learning to facilitate a structural shift in learners' unsustainable values, attitudes and behaviours (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Frank & Stanszus, 2019; Nazir & Pedretti, 2016; Stanszus et al., 2017) that enable them to work with global communities (McConnell Moroye & Ingman, 2018; Piasentin & Roberts, 2018).

In the education literature, socioemotional competencies have often been defined as "effectiveness in interaction" (Rose-Krasnor, 1997:112). These competencies encompass both intrapersonal and interpersonal facets that are entwined, meaning that both are important to create productive social interactions (Elias et al., 1997). The intrapersonal aspect or emotional component comprises the ability to be aware of and regulate one's

emotions and to solve problems effectively (CASEL, 2003; Goleman, 1995). The interpersonal facet or component, which includes social skills and empathy, allows the individual to be attuned to other's needs and emotions (Goleman, 1995). These two skills are interrelated (Yoder, 2014), as they jointly serve to help an individual be aware of and manage emotions, face and resolve problems effectively, and create positive relations (CASEL, 2003).

The interpersonal component of ESD competencies is present in almost all frameworks, although with different names and operationalizations. For instance, in Wiek, Withycombe, & Redman's framework (2011, 211), interpersonal competence is defined as "the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving". Similarly, Brundiers, Wiek, & Redman (2010) propose a collaborative cluster that includes components such as team-working empathy or compassion, which, in the context of sustainability, derive from a sense of connection with people and nature.

Regarding the intrapersonal component in the context of ESD, the ability to manage affective and emotional responses and the capacity to manage stressful situations are considered fundamental skills, given the complex challenges faced in sustainability (Moser, 2012; Verlie, 2019). Indeed, the most recent frameworks of competencies for ESD have acknowledged the importance of including a set of intrapersonal or emotional skills, which were omitted in previous compilations of key competencies (Giangrande et al., 2019; Taimur & Sattar, 2019). These skills include self-awareness, stress management, motivation and the capacity to deal with one's needs and emotions (Giangrande et al., 2019; UNESCO, 2017).

2.3. Mindfulness practice: concept and the development of socioemotional competencies

Mindfulness can be understood as a trait, a state or an intervention or program, although the explanation of these differences will not be reviewed here (see Crane et al., 2017 and Sauer et al., 2013). In mindfulness programs, the focus of our study, individuals are

trained in the practice of mindfulness to cultivate a non-dualistic consciousness where body and mind, are interdependent (Bai & Scutt, 2009). Although embedded in Buddhist roots (Amaro, 2015), mindfulness practices have been secularized to be seen as a quality of consciousness that can be accessed and operationalized (Frank, Fischer, & Wamsler, 2019). The secularization of mindfulness practices has facilitated the widespread implementation of the practice among individuals non-attached to religious worldviews and, more specifically, in educational settings (Frank, Fischer, & Wamsler, 2019).

Mindfulness programs encompass a set of mindfulness practices for attentional training and awareness that are cultivated to enhance the ability to be open to the present moment, regardless of whatever appears on our stream of thoughts, avoiding the habitual process of judging or reacting by what it is encountered in this experience of awareness (Bahl et al., 2013; Kabat-Zinn, 2013). The cultivation of this state of mind helps to develop a clarity of mind, a sense of not attachment to the feelings that an experience or an object can bring about, which has been referred in the literature as equanimity (Desbordes et al., 2015).

Mindfulness programs include meditation and other formal and informal practices to cultivate a state of awareness (Crane et al., 2017; Shapiro, Carlson, Astin, & Freedman, 2006). Formal practices may include meditative awareness practices, such as mindful yoga, while informal practices, such as mindful walking, aim to bring mindfulness into the experiences of daily life so that individuals are connected to their thoughts, emotions or sensations and also to other people's feelings and actions as a training of being aware of the present moment (Kabat-Zinn, 2003). Mindfulness practice is part of the contemplative practices long advocated in ESD as a route for inner transformation (Eaton, Hughes, & MacGregor, 2016). Mindfulness has been already used in the context of environmental education or ESD, even if not always called as such (for examples see Aspy & Proeve, 2017; Gray & Colucci-Gray, 2019; Morton, 2007; Woods & Moscardo, 2003).

Mindfulness has been regarded as a suitable learning method for the individual transformation sought by ESD, as it creates awareness and facilitates the cultivation of a critical distance position of learners towards society (Frank, Fischer, & Wamsler, 2019; Frank & Stanszus, 2019; Stanley, 2012). Indeed, mindfulness has been described as "a way of being in the world, being-in-with others, and being a self, whose form is mutable,

plural and context dependent" (Tobin, 2018:112). Despite the initial evidence of the relationship between trait mindfulness/mindfulness practices and the core objectives of environmental education, such as fostering a sense of interdependence with nature (Aspy & Proeve, 2017) or the adoption of sustainable lifestyles (Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017; Franz & Stanszus, 2019; Wamsler et al., 2018), there have been few attempts to integrate mindfulness practices into ESD (Frank, Fischer, & Wamsler, 2019).

Examining the effectiveness of mindfulness practices in nurturing the socioemotional competencies begs the question of why such effects should be expected. The past research has shown that mindfulness practice triggers two psychological mechanisms - awareness and decentering- that underpin the development of the socioemotional competencies (Coffey, Hartman, & Fredrickson, 2010; Kristeller & Johnson, 2005; Shapiro, Carlson, Astin, & Freedman, 2006). With mindfulness practice, learners acquire growing awareness and decentering, which, in turn, nurture three fundamental facets of the socioemotional competencies, since awareness and decentering positively accrue emotional regulation, empathy and social connectedness and resilience. These three outcomes have neural correlates that will not be reviewed here (see Hofmann, Sawyer, Witt, & Oh, 2010 and Wang et al., 2014, for a review).

Mindfulness practice trains the mind to "attend to the contents of consciousness, moment by moment" without judging or reacting to such contents (Shapiro, Carlson, Astin, & Freedman, 2006:376). By this, the individual develops a changed relationship to experience, which is called decentering (Carmody, Baer, Lykins, & Olendzki, 2009; Shapiro, Carlson, Astin, & Freedman, 2006). Decentering is defined as the progressive "awareness of habitual reactions and disengagement from this usual preoccupation with the self" (Kristeller & Johnson, 2005:392), which entails a shift in perspective that facilitates individuals to become more aware of the needs of others (Shapiro, Carlson, Astin, & Freedman, 2006). Decentering nurtures the ability to more objectively observe one's moment-to-moment experience, which enables the individual to decide how they want to respond to thoughts, emotions, or behaviours (Creswell, 2017). Decentering has also been found to mediate the relationship between mindfulness as a trait and pro-environmental behaviour (Franquesa et al., 2017; Patel & Holm, 2018).

Decentering brings about three components of socioemotional competencies. First, by

decentering, an individual learns to disengage from deeply wired emotional responses so that he or she is more able to choose how to react to internal or external stimuli (Creswell, 2017). Moreover, the emotional regulation facilitated by mindfulness practice has been found to accrue empathy and compassion (Neff, Hsieh, & Dejitterat, 2005), probably because, as the individual is more able to accept her/his own emotions, she is also more capable of accompanying others in their emotional experiences (Trautwein, Naranjo, & Schmidt, 2014). The research on mindfulness shows that enhanced emotional regulation leads to reduced aggressive behaviour and improved interpersonal relations (Shonin, Van Gordon, Compare, Zangeneh, & Griffiths, 2015). Decentering also facilitates perspective-taking and value clarification, which, in turn, enhances social connectedness (Felver, Doerner, Jones, Kaye, & Merrell, 2013). The relationship between mindfulness practice and prosocial attitudes and behaviour is well established (see Donald et al., 2019 and Shonin, Van Gordon, Compare, Zangeneh, & Griffiths, 2015, for a review).

Finally, awareness and decentering nurture self-compassion and resilience (Bishop et al., 2004). More self-compassionate individuals are more resilient, meaning that they are better prepared to face situations of social conflict or rejection (Gerber et al., 2015; Johnson & O'Brien, 2013), show more positive thinking (Shonin, Van Gordon, Compare, Zangeneh, & Griffiths, 2015), and recover more easily and rapidly from past negative events (Schonert-Reichl & Lawlor, 2010). Moreover, a relationship between self-compassion and compassion towards others has been evidenced (Creswell, 2017; Hofmann, Grossman, & Hinton, 2011).

In summary, the research on the effects of mindfulness practices suggest that they may be an effective learning strategy for socioemotional competencies in ESD since they facilitate emotional regulation, cultivate empathy towards others, and make learners more resilient, which are three fundamental aspects of socioemotional competencies (Frank, Fischer, & Wamsler, 2019; Weissberg, Durlak, Domitrovich, & Gullotta, 2015). These outcomes are all grounded in the growing awareness and acceptance nurtured by mindfulness practices. However, an assessment of the particular effect that mindfulness may have on these socioemotional competencies is missing.

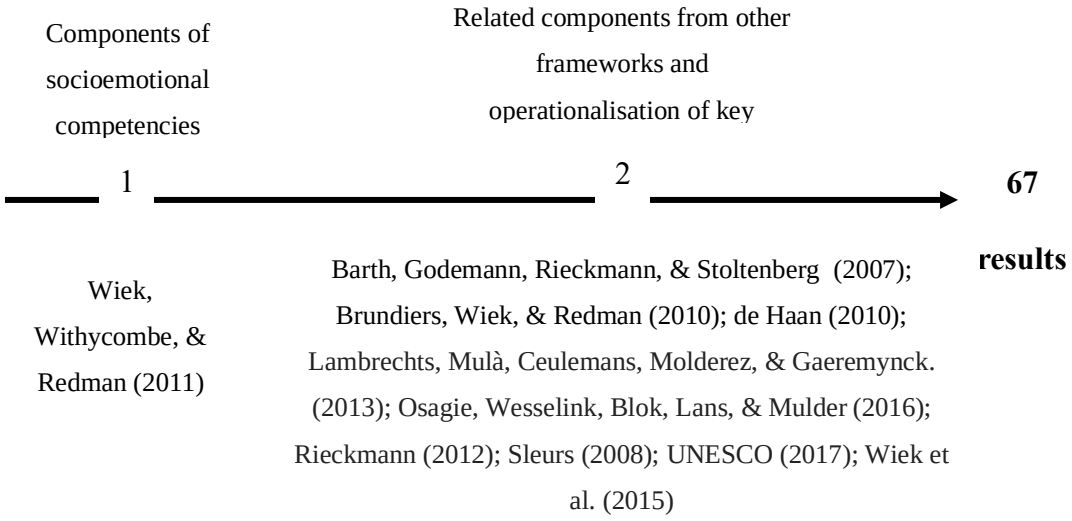
2.4. Methods

To provide a robust assessment of the outcomes of programs, a systematic literature review was complemented by using a meta-analysis to evaluate the effectiveness of mindfulness practices. To minimize the risk of bias, this study reports (see *Appendix 1*) the steps that have been taken in the design of the review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009; Whiting et al., 2016).

2.4.1. Search domain: a definition of socioemotional competencies and their components

Following the recommendations for search strategies outlined by the Peer Review of Electronic Search Strategies (PRESS) statement (McGowan et al., 2016), to identify the components of socioemotional competencies to select search terms, we started with Wiek, Withycombe, & Redman's framework (2011), which has been recognized as influential for the identification of key sustainability competencies in the context of ESD (Lozano, Merrill, Sammalisto, Ceulemans, & Lozano, 2017). The initial keywords extracted from this framework were complemented with other fundamental frameworks of competencies in ESD (Barth, Godemann, Rieckmann, & Stoltenberg, 2007; Brundiers, Wiek, & Redman, 2010; de Haan, 2010, Lambrechts, Mulà, Ceulemans, Molderez, & Gaeremynck, 2013; Osagie, Wesselink, Blok, Lans, & Mulder, 2016; Rieckmann, 2012; Sleurs, 2008; UNESCO, 2017; Wiek et al., 2015) With this expansive focus, a comprehensive list of the components of socioemotional competencies was identified (referred to as sub-competencies hereafter) and used as the keyword list in the literature search (see *Appendix 2*). For an illustration of the search term strategy, see *Figure 3*.

Figure 3. Search terms strategy



2.4.2. Inclusion criteria

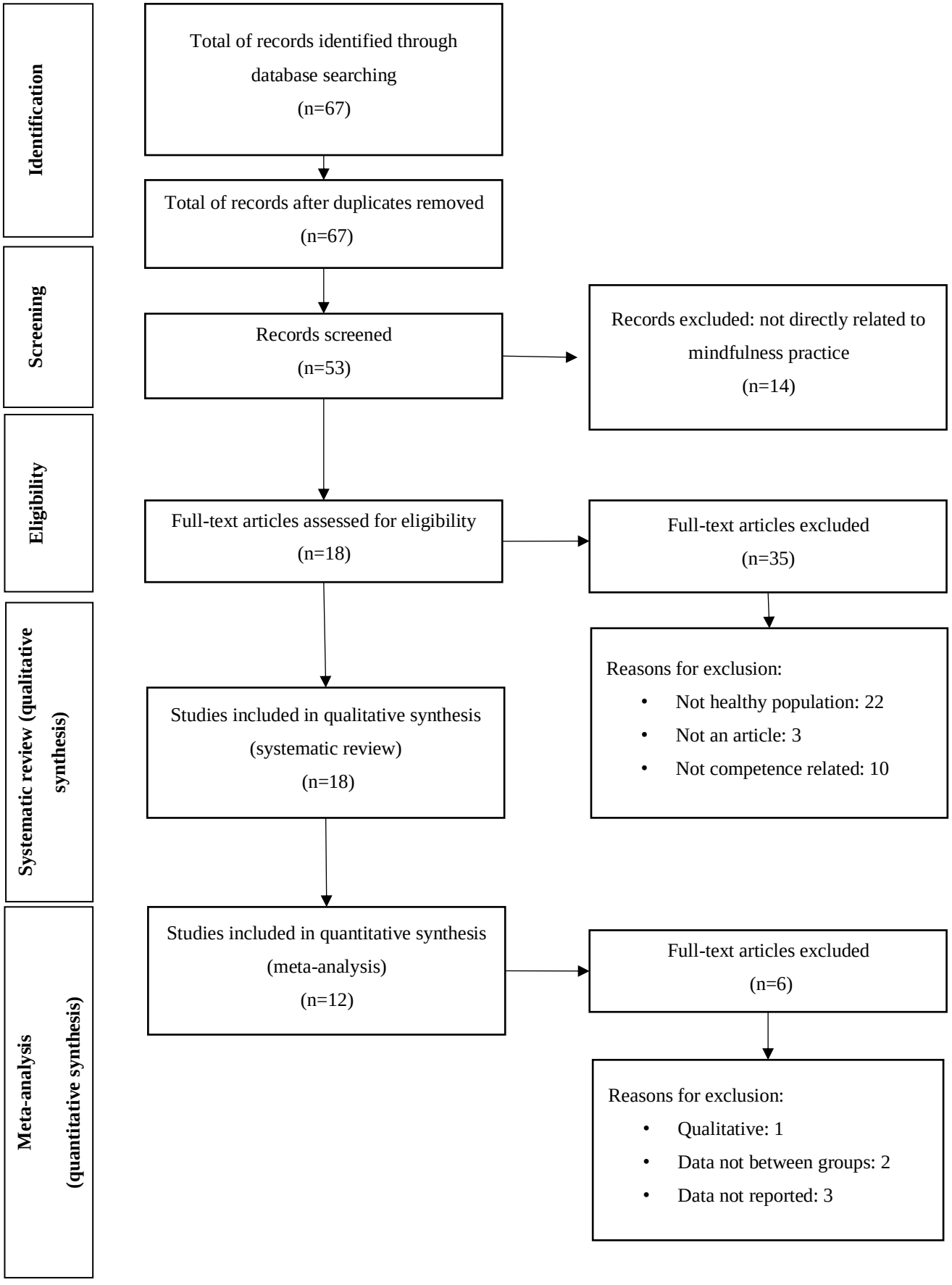
It should be noted that since this paper conducts a systematic review and a meta-analysis, two different sets of inclusion criteria were used. For the review, the articles were included if a) the document type was a peer-reviewed paper, b) the article was in English, c) the article was related to mindfulness programs, excluding conceptual or methodological papers, d) the target of the program was a non-clinical population, and e) the article was directly related to a sub-competence. The search was restricted to the years 2001–2018. The search yielded 67 papers for possible inclusion in the review. No duplicates were found.

A screening of the title and the abstracts was performed; as a consequence, 14 papers were excluded given that, although they referred to one of the sub-competencies, their content did not relate to mindfulness practices. This procedure yielded a final sample of 53 articles. The full text of the included articles was retrieved and read in its entirety by two authors. As a result, 35 more articles were excluded since they did not comply with the inclusion criteria. Following this criterion, 18 articles were examined in the final sample.

For the meta-analysis, of these 18 papers, only 12 provided information about control/comparison groups allowing us to measure the effects of mindfulness practices. Six papers were excluded because one was qualitative (Sharp & Jennings, 2016), two only reported effect sizes between time periods and not between groups (Bluth &

Eisenlohr-Moul, 2017; Bluth, Roberson, & Gaylord, 2015), and three articles did not report the required data, so the effect size computation was impossible (Brendel, Hankerson, Byun, & Cunningham, 2016; Duarte & Pinto-Gouveia, 2017; Gregory, 2015). Nevertheless, these discarded articles were analyzed in detail and used to interpret and complement the findings of the meta-analysis in the discussion section. The study selection flow diagram is summarized in *Figure 4*.

Figure 4. Study selection flow diagram

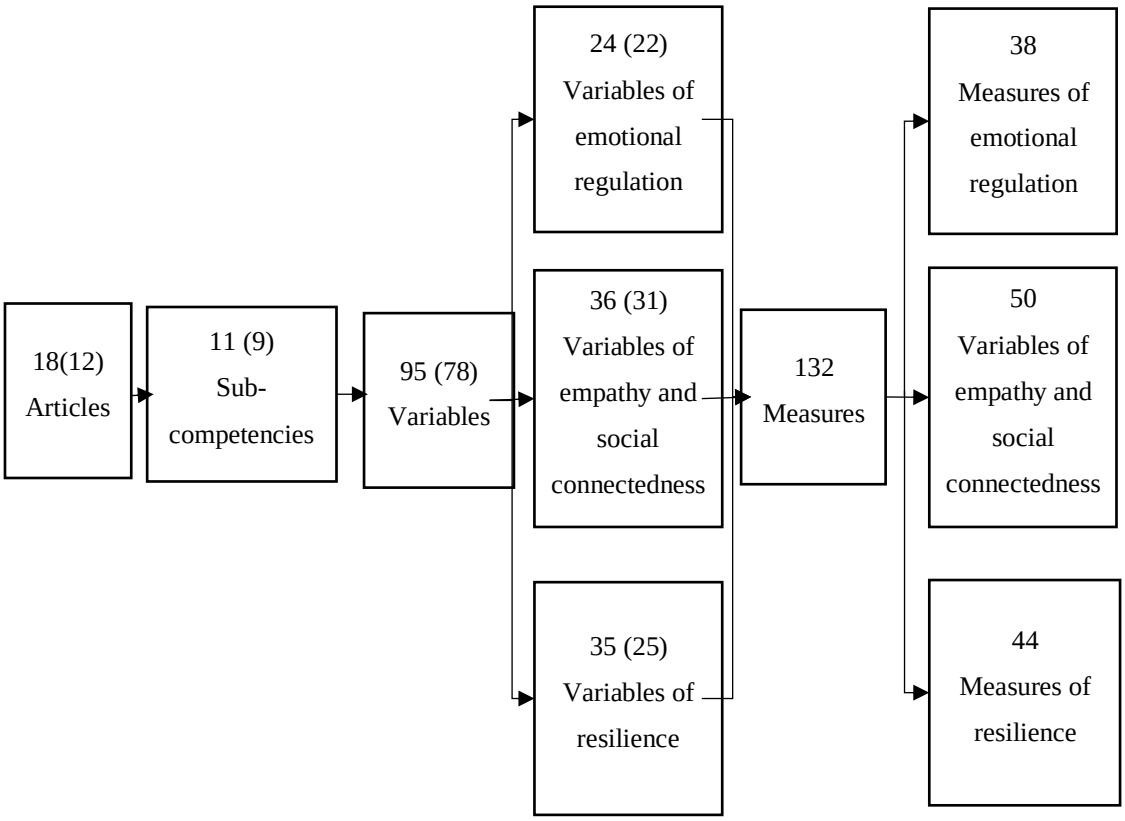


2.4.3. Coding process

For the systematic review, the 18 papers were coded for 12 fields, as follows: author, journal, year of publication, sub-competence, type of program, length, procedures, target population of the program, sample, measurement, scales, and results. Eleven sub-competencies, measured through 95 variables, were included and categorized into three groups of outcomes, following the three mechanisms or routes explained in the introduction section of this paper, as follows: emotional regulation (24 variables), empathy and social connectedness (36 variables), and resilience (35 variables) (see *Figure 5*). The description of the outcome categories with the full list of variables for the 18 articles is offered in *Appendix 3.*

For the 12 articles included in the meta-analysis, additional coding allowed us to extract the means and standard deviations from the articles. During coding, it was observed that some variables were measured through different scales (e.g., resilience was measured through decentering and self-compassion; Crowder & Sears, 2017), between different experimental groups (e.g., perspective or affect module; Hildebrandt, McCall, & Singer, 2017), or between different target groups (e.g., fathers and mothers; Coatsworth et al., 2015). Two errors in reporting were also identified (de Carvalho, Pinto, & Marôco, 2017). All measures were included. All variables used to measure the effects were compiled, and a decision among authors led to the analysis of nine sub-competencies, 78 variables and 132 measures. Of the total measures, 38 were related to emotional regulation, 50 to empathy and social connectedness and 44 to resilience (see *Figure 5*).

Figure 5. Measures of sub-competencies



2.4.4. Meta-analytical strategy

The means and standard deviations of the program were used to calculate Cohen's d for each of the control and experimental group comparisons and for each of the target groups under examination (e.g., mothers vs. fathers in Coatsworth et al., 2015). Then, a meta-analysis was performed with pooled effect sizes using the inverse variance statistical method with random effects models (REMs) described by Borenstein, Hedges, Higgins, & Rothstein (2011). The pooled effect sizes were reported as Hedge's measure of SMD with a 95% CI, and homogeneity was reported with the Q, I^2 and p-values. A second set of analyses was performed to test the efficacy of mindfulness programs for each of the outcomes under examination, namely, emotional regulation, empathy and social connectedness and resilience.

2.5. Description of the studies included in the meta-analysis

The 12 programs included in the meta-analysis involved a total sample of 2373 participants ranging from 14 (Crowder & Sears, 2017) to 509 participants (Franquesa et al., 2017), with an average sample of 197.75 participants. Twenty-six scales were used to assess the nine sub-competencies that are categorized into the three groups of outcomes. The length of the programs ranged from 40 minutes (Fernando, Skinner, & Consedine, 2017) to 15 weeks (de Carvalho, Pinto, & Marôco, 2017). With regard to the sample composition, eight different groups were identified, as follows: adults (Hildebrandt, McCall, & Singer, 2017), families (Coatsworth, Duncan, Greenberg, & Nix, 2010; Coatsworth et al., 2015), marine reservists (Jha, Morrison, Parker, & Stanley, 2017), medical students (Fernando, Skinner, & Consedine, 2017), experienced and inexperienced meditators (Franquesa et al., 2017), social workers (Crowder & Sears, 2017), primary students (de Carvalho, Pinto, & Marôco, 2017; Kohlenberg et al., 2015; Schonert-Reichl et al., 2015) and teachers (de Carvalho, Pinto, & Marôco, 2017; Schonert-Reichl et al., 2015). The programs for families, primary students and teachers were held in academic settings (Coatsworth, Duncan, Greenberg, & Nix, 2010; Coatsworth et al., 2015; de Carvalho, Pinto, & Marôco, 2017; Schonert-Reichl et al., 2015). Finally, out of the 10 types of programs that were implemented, only one of them was a standard MBSR program (Crowder & Sears, 2017). The rest of the programs were adaptations to either the target population (e.g., students, de Carvalho, Pinto, & Marôco, 2017) or the sub-competence under study (e.g., resilience, Fernando, Skinner, & Consedine, 2017). Regarding the methodological quality of the studies, two studies included manipulation checks (Fernando, Skinner, & Consedine, 2017; Michel, Bosch, & Rexroth, 2014), one study included a self-assessment of the mindfulness practice (Franquesa et al., 2017), and three studies introduced a rating of the implementation fidelity of the mindfulness program (Coatsworth, Duncan, Greenberg, & Nix, 2010; Coatsworth et al., 2015; Schonert-Reichl et al., 2015). Finally, with the exception of Jha, Morrison, Parker, & Stanley (2017), all of the experimental studies were randomized control trials, although one study was registered in a protocol registration system (Hildebrandt, McCall, & Singer, 2017).

2.6. Results

2.6.1. Meta-analysis results

Overall, the mindfulness programs in the context of socioemotional competencies yielded a significant pooled effect size of .218 (k = 132; *95% CI* = .149, .286), which is a small effect size (Cohen, 1988). Homogeneity was not found (Q = 601.52, p = .000, I^2 = 78.221%), showing that the variance between studies could not be attributed to a sampling error and suggesting other systematic differences across the studies (Lipsey & Wilson, 2001). Then, the sample was split into the three groups of outcomes to calculate the program effect in each group of studies and to compare the existence of significant differences among groups (*Table 13*). The subgroup analysis showed that the mindfulness programs had a small significant effect size on empathy and social connectedness (d = .141) and resilience (d = .169). In the case of empathy and social connectedness, there was a lower level of heterogeneity, showing that the low efficacy was quite consistent among the programs. In contrast, for emotional regulation, there was a small to medium significant effect size (d = .374). The ANOVA test showed that mindfulness programs seemed to be more effective at enhancing emotional regulation since the effect sizes for the other two outcomes were significantly smaller (*Table 13*)

Table 13. Results of meta-analysis

Groups	***N***	***K***	***d***	***95%CI***		***I^2 (%)***	***Q***	***p* (dif across groups)**
Emotional regulation	6530	38	.374	.239	.509	82.762	214.651***	
Empathy and social connectedness	6984	50	.141	.067	.215	51.864	101.796***	G1-2 (.003***)
Resilience	6160	44	.169	.030	.309	81.084	227.327***	G3-2 (.039**)

*** Statistically significant at the .01 level (2-tailed). ** Statistically significant at the .05 level (2-tailed).

The results of the literature review and meta-analysis are integrated into the discussion below.

i. Effects on "emotional regulation"

According to the systematic review and the meta-analysis results, mindfulness moderately enhances the emotional regulation of negative and positive emotions (d = .374). With respect to positive emotions, mindfulness practice has shown to facilitate a better expression of individual emotions in tune with the emotions of others in a number of studies (e.g., Coatsworth, Duncan, Greenberg, & Nix, 2010; de Carvalho, Pinto, & Marôco, 2017; Schonert-Reichl et al., 2015). In fact, the majority of the studies reported significant improvements from baseline conditions. The only two negative results (Coatsworth et al., 2015; de Carvalho, Pinto, & Marôco, 2017) attribute their findings to high levels of emotional control at the baseline or to the need for more customized programs to achieve further improvements.

ii. Effects on "empathy and social connectedness"

Mindfulness has been demonstrated to effectively drive prosocial behaviour through the enhancement of *empathy* or *social connectedness* (full details in *Appendix 3*) even after brief programs of only one hour (e.g., Kohlenberg et al., 2015). However, the effect size is small (d = .141). These low effect sizes are attributed by authors to misguided programs (Hildebrandt, McCall, & Singer, 2017) or to the limited length or intensity of the program (Coatsworth et al., 2015). Higher effect sizes were reported in programs with the components of affect (Kohlenberg et al., 2015) or programs adapted to the sample compositions (e.g., Coatsworth, Duncan, Greenberg, & Nix, 2010) with intense daily meditation practices (Franquesa et al., 2017). This latter study offers a clear connection between daily meditation and value-related behaviour since participation in an ongoing mindfulness practice showed significant improvements in value clarification, which is used as a measure to assess a values-oriented life, mediated by the decentering ability.

iii. Effects on "resilience"

This group included the measures of *resilience* and *ambiguity and frustration* tolerance. Since *self-compassion* has been found to provide greater emotional resilience (Neff & Vonk, 2009), variables measuring self-compassion as a component of emotional resilience were also included in this group. Cognitive resilience was tested with measures such as the *ability to reappraise situations*, *shift perspective* or *perspective taking* (Jha, Morrison, Parker, & Stanley, 2017; Schonert-Reichl et al., 2015; Sharp & Jennings,

2016). Although an increase was found in both cognitive and emotional resilience, the effect size for this group was low (d = .169). This low effect size was attributed to the limited practice time (Jha, Morrison, Parker, & Stanley, 2017) and to the need to enhance decentering, as it has been shown to be a mediating mechanism leading to greater resilience (Crowded & Sears, 2017; Fernando, Skinner, & Consedine, 2017).

iv. Components of mindfulness programs that increase the effect size

Although the overall effect size of mindfulness programs to promote socioemotional competencies is low, certain characteristics of the programs increase its efficacy. First, in academic settings, trained instructors have been found to be key in achieving successful results (Franquesa et al., 2017). A second critical factor is tailoring the program to the target population (Coatsworth, Duncan, Greenberg, & Nix, 2010; Coatsworth et al., 2015) and to the course objectives. Examples of such tailored programs are the three mental training modules of "The ReSource Project" implemented by Hildebrandt, McCall, & Singer (2017) developed to enhance compassion. Similarly, the Functional Analytic Psychotherapy mindfulness program (Kohlenberg et al., 2015) is a customized program to promote interconnectedness. These tailored programs have achieved greater effects than those using standard mindfulness practices (Crowder & Sears, 2017). In particular, the programs that promoted the cultivation of affect, such as the loving-kindness meditation, were found to obtain not only better results but also longer-term effects (Hildebrandt, McCall, & Singer, 2017; de Carvalho, Pinto, & Marôco, 2017). A program particularly targeted to teachers, e.g., "Cultivating Awareness and Resilience in Education", was also found (Sharp & Jennings, 2016).

Third, the length of the programs ranged from 15 to 40 minutes (Fernando, Skinner, & Consedine, 2017). Longer and more intense practices are posited to be critical success factors since daily meditators reported higher levels of socioemotional competencies (Franquesa et al., 2017). Likewise, more intense mindfulness practices resulted in greater improvements in resilience (Jha, Morrison, Parker, & Stanley, 2017). Fourth, individuals with lower levels of a given sub-competence have been found to benefit more from the programs (e.g., Fernando, Skinner, & Consedine, 2017).

2.7. Discussion

This systematic literature review and meta-analysis, bridging the scholarship on key ESD competencies and mindfulness practices, have allowed a response to the two research questions that prompted this study. First, our findings show that mindfulness practices nurture socioemotional competencies, although the effect size is small (d = .218) (k = 132; *95% CI* = .149, .286) (Cohen, 1988). This result is consistent with recent meta-analyses of the effects of meditation on emotion regulation, empathy, compassion and pro-social behaviours (Kreplin, Farias, & Brazil, 2018; Luberto et al., 2018; Waters, Barsky, Ridd, & Allen, 2015) that also found overall small effect sizes. Nevertheless, the results show differential effects depending on the observed outcome. The largest effect size was found for the category of emotional regulation (d=.374), while the effect sizes for the other two categories of empathy and social connectedness and resilience were small (d = .141 and d = .169, respectively). Emotional regulation is a fundamental ability in the context of ESD, as it enables learners to maintain efficient learning habits and cope with stressful situations, particularly useful in times of great pressures and demands (Shankland & Rosset, 2017). The medium-effect found in emotion regulation supports the suitability of mindfulness practice as a learning method in ESD to address the problems found in the literature regarding the need to incorporate emotion education in the curricula so that learners are able to cope with the sustainability challenges (Blatt, 2015; Manni, Sporre, & Ottander, 2017; Nazir & Pedretti, 2016; Ojala, 2012).

A plausible explanation for the differences between the three outcomes examined in this paper may be based on how the mechanisms of mindfulness practices impinge on different outcomes and unfold in time (Carmody, Baer, Lykins, & Olendzki, 2009). Two explanations have been offered, as follows: (1) these mechanisms unfold sequentially in "conditioned chains of mental processes" or (2) they co-arise. If we accept the thesis of a chain of processes, then it is plausible to think that mindfulness practices may have greater effects on mental processes that are more related to decentering, such as emotional regulation. In contrast, the effects should be lower for more distal processes, namely, those arising as a result of emotional regulation, which are, in this case, empathy and social connectedness and resilience. This thesis could provide an explanation for the results since according to their model, decentering leads to emotional regulation and

emotional regulation leads to empathy and social connectedness and resilience.

However, the findings offer some support for the rival thesis (co-arising mechanisms). As we observe that the three outcomes increase, albeit to a different extent, a sort of "connected vessels" effect or "mindfulness cascade" is indicated, which is also suggested by Hildebrandt, McCall, & Singer (2017) and Waters, Barsky, Ridd, & Allen (2015); e.g., nurturing emotional regulation will also give rise to empathy and social connectedness, but with a different level of intensity. More research about how mediating mechanisms unfold in time (Creswell, 2017) is necessary to explain these results. In particular, future research should study the relationship between dosage and outcomes (Davidson & Kaszniak, 2015) to establish how many hours of practice are necessary to see a significant and mid-to-large change in the three analyzed outcomes.

The overall small effect found in the meta-analysis should not be interpreted as proof of the inadequacy of mindfulness in the context of ESD. It should be borne in mind that this meta-analysis is based on a limited number of papers that are quite heterogeneous regarding the target population and the program design. More research on the effect of mindfulness practice on socioemotional abilities is necessary before determining the actual potential of mindfulness practices to nurture socioemotional competencies. Additionally, the competencies under study are difficult to acquire (Lambrechts, Mulà, Ceulemans, Molderez, & Gaeremynck, 2013). Although other approaches, such as socioemotional learning programs, have also proved beneficial (see Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011 for a review), the question of what pedagogical approaches can best be applied for enhancing the achievement of competencies remains unanswered (Shephard, Rieckmann, & Barth, 2018) until more comparative studies are carried out. Mindfulness programs could be combined with other learning strategies, as suggested by Frank & Stanszus (2019), and their effects may increase. More research is needed to establish the comparative advantages of mindfulness programs over other learning methods and/or in conjunction with other methods in the context of ESD.

A potential advantage of mindfulness practices is that they impinge on different interpersonal and intrapersonal outcomes (Creswell, 2017). Indeed, three of the studies in the meta-analysis concurrently measured the three outcomes (Coatsworth et al., 2015; Hildebrandt, McCall, & Singer, 2017; Schonert-Reichl et al., 2015). As explained above, the three outcomes are simultaneously enhanced, although each of them to a different

extent. Furthermore, although the direct effects are small, mindfulness practices may indirectly affect other competencies that are critical for ESD, such as executive functions or behavioural changes, which were not the focus of this research (Creswell, 2017; Felver, Doerner, Jones, Kaye, & Merrell, 2013; Shankland & Rosset, 2017). The past studies on mindfulness programs in education for sustainable consumption (Frank & Stanszus, 2019; Stanszus et al., 2017) show the wide array of benefits that students perceived after the practice, even though the effects on attitudinal and behavioural change were small or nonsignificant. This finding is quite promising since learning methods that holistically promote long-term outcomes while recognizing the distinctiveness of ESD are needed (O'Flaherty & Liddy, 2018).

Finally, mindfulness practice has been shown to be more beneficial for those with lower baseline levels of the studied competencies (e.g., Fernando, Skinner, & Consedine, 2017). Some of the reviewed studies found smaller or nonsignificant effects for those with higher baseline levels of competence. In view of these results, authors (Coatsworth et al., 2015; de Carvalho, Pinto, & Marôco, 2017) suggest segmenting participants according to this baseline level and customizing the program for those with higher baseline levels, which could also increase the effect size. There is limited research on how individual differences may affect the mechanisms and outcomes of mindfulness programs (van Dam et al., 2018). Future studies should address this so that educators may have an orientation of the profiles that benefit more from the practice.

Regarding the second research question, our findings shed light on the key components of mindfulness programs so that some orientation can be provided to implement mindfulness practices in the context of ESD. To obtain better results, three aspects seem to be crucial, as also assessed in studies related to meditation programs in education (Waters, Barsky, Ridd, & Allen, 2015). First, with respect to the type of program, the results showed that customized mindfulness programs that are tailored to the intended outcome are more effective. For instance, the combination of mindfulness and self-compassion/compassion programmes- such as loving-kindness meditation or meditation in nature- seems to be key for obtaining benefits in some of the sub-competencies (e.g., interconnectedness) (Hildebrandt, McCall, & Singer, 2017; Kohlenberg et al., 2015).

In addition to adapting mindfulness practices to the specific outcome sought, it is necessary to adapt them to the ESD domain. UNESCO (2017) emphasizes the importance

of setting specific ESD strategies and learning objectives to empower students to face sustainability challenges locally. From this perspective, although ESD is "a global task" (de Haan, 2010:326) the content of mindfulness interventions should be tailored to fit specific contextual socioenvironmental challenges. This adaption is possible as mindfulness programs for environmental education and ESD are being created. To illustrate, the Mindful Climate Action Curriculum (Barrett et al., 2016) is adapted to specific environmental problems in an urban setting; similarly, the mindfulness exercises built in the course Personal Approaches to Sustainable Consumption (Frank & Stanszus, 2019) are adapted to the specific ESD goal of enhancing sustainable consumption among young, Western consumers. Other non-mindfulness programmes, such as meditation in nature, has been shown to increase nature relatedness (Unsworth, Palicki, & Lustig, 2016). Notwithstanding, there is not enough empirical evidence to assess the differential impacts of these programs on learners' socioemotional development and/or on other outcomes central in environmental education, such as nature relatedness. Still, these courses show the possibility of adapting mindfulness practices to the objectives and contents of environmental education, so that they help nurture domain-specific socioemotional competencies.

Second, with respect to the length of the practice, although even short mindfulness courses have demonstrated to be effective (Kohlenberg et al., 2015), the results show the need for longer courses and more intense practices to guarantee positive results on the three outcomes (de Carvalho, Pinto, & Marôco, 2017; Franquesa et al., 2017; Hildebrandt, McCall, & Singer, 2017).

Third, in terms of the sample composition, since the evidence shows that mindfulness practices develop socioemotional competencies in different samples, it is advisable to target both teachers and students (de Carvalho, Pinto, & Marôco, 2017; Sharp & Jennings, 2016; Schonert-Reichl et al., 2015) following the suggestions of other authors (e.g., Lawlor, 2014; Ludvik & Eberhart, 2018). The programs should enable the training of teachers in mindfulness programs (Sharp & Jennings, 2016). How teachers appraise and apply their own learning in their daily practice may be essential, as is also suggested in other contexts, such as for ecologically minded teachers (McConnell Moroye & Ingman, 2018), especially given that the emotional learning and well-being of the teachers themselves may influence the achievement of better results among students (Schonert-Reichl et al., 2015). The teachers' own emotional learning and well-being may influence

the achievement of better results among students (Schonert-Reichl et al., 2015), and teaching based on their own meditation experience has also been proposed by other authors as a result of authentic inquiry (Ludvik & Eberhart, 2018; Tobin, 2018). Additionally, teachers' own meditation practices may facilitate the design of curricula that could best engage their students (Stanszus et al., 2017). In an analysis of ecologically minded teachers (McConnell Moroye & Ingman, 2018), three essential qualities were found, as follows: care, interconnectedness and integrity. These qualities are closely linked to their relationships with students, relationships among things and the coherence to behave in accordance with these interrelations so that educative experiences show their relevance for life to students. Understanding how these interrelationships between mindful teachers and students work, as well as their overall impact, should be further addressed.

In summary, although some indications can be provided on the basis of the review, more studies are necessary so that educators have an empirically sound recommendation to orient the program design, length and suggested amount of practice to nurture the socioemotional competencies for sustainability. Additionally, the relationship between the learners' competence and their willingness to promote sustainability after competencies have been learned should be further explored (Shephard, Rieckmann, & Barth, 2018).

2.8. Limitations

The results of this study have to be interpreted with caution for several reasons. First, as in all meta-analyses, the findings are limited by the influence of publication bias (Turner, 2013) and the eligibility criteria used; e.g., only papers in English were reviewed, and the search was restricted to those studies calling the program "mindfulness", thus excluding other terms, such as contemplative practices or meditation. The selection of keywords was also challenging since the components of socioemotional competencies are not clearly defined and different terms are used across the frameworks, an issue that has also been encountered by other studies in ESD (Giangrande et al., 2019). Although all the major frameworks of ESD competencies were included, we could have omitted other

terms in the searches.

When interpreting the present findings, the heterogeneity of the included studies should be born in mind, particularly regarding the mindfulness programs implemented, the course length and the type of practice, the target groups under assessment, and the measures used. This heterogeneity and the methodological issues concerning the use of quantitative methods in mindfulness research have been noted in previous studies as limitations in systematic reviews and meta-analyses (Davidson & Kaszniak, 2015; van Dam et al., 2018). This lack of consistency in samples, designs and questionnaires does not facilitate comparability of conclusions that would otherwise provide evidence about which mindfulness programs are more effective. This limitation leads to the need for systematic comparisons between equivalent mindfulness programs under the same procedures. However, the feasibility of similar procedures under similar overall conditions is a limitation mentioned in other studies (Waters, Barsky, Ridd, & Allen, 2015).

2.9. Conclusion

This study has examined the potential of a nontraditional learning method (mindfulness practice) to develop competencies as a response to the urgent calls to educate students on sustainability challenges and, more specifically, to develop socioemotional competencies for this endeavour. It offers support for a positive, albeit weak, effect on the three outcomes leading to the development of socioemotional competencies, especially regarding empathy and social connectedness and resilience. It also provides guidance to educators willing to include mindfulness practices in their courses and leads to the identification of four areas where more research is necessary, as follows: (1) the measurement of the outcomes, (2) the dosage and frequency of practice, (3) the role of teachers and families in the implementation of mindfulness programs, and (4) the role of mediators and moderators.

This study continues an exciting agenda on the role of mindfulness practices in the context of ESD by making a twofold contribution. First, the results contribute to the ESD

discussion on how to nurture socioemotional learning by means of mindfulness practice. Complementing studies that showed the effect of mindfulness practices on connectedness to nature (Aspy & Proven, 2017; O'Flaherty & Liddy, 2018; Shephard, Rieckmann, & Barth, 2018) and sustainable consumption (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Frank & Stanszus, 2019), it is shown that mindfulness programs have a positive and small-to-medium effect on the emotional regulation ability and have a positive but small effect on empathy and social connectedness and resilience. This study also identifies key components of mindfulness programs that may increase this effect (for instance, adaptation of the program or length of practice), thus providing suggestions for educators who want to use this learning method. On the basis of the results, it is suggested that mindfulness practices may become part of the "learning system" in which, through the cultivation of socioemotional competencies, students acquire the socioemotional abilities required to address complex sustainability issues (Wamsler et al., 2018).

Second, by providing evidence of the association between mindfulness programs and the development of socioemotional competencies, this work extends the previously mentioned mechanisms whereby trait mindfulness may facilitate the confronting of sustainability-related challenges. Whereas other authors have foregrounded the relationship of mindfulness and the development of non-materialistic and intrinsic motives and greater awareness of sustainable alternatives (Ericson, Kjønstad, & Barstad, 2014; Stanszus et al., 2017; Wamsler & Brink, 2018), this research shows other potential mechanisms, such as enhanced emotional regulation and resilience and greater empathy and social connectedness.

To summarize, this study complements the existing reviews by measuring the effects of mindfulness practice on socioemotional competencies and by providing guidance about what key aspects of mindfulness programs need special consideration to better implement this practice in educational environments. Understanding that this is an emerging area of research, this work provides some fundamental research questions that need to be answered before a robust conclusion can be offered about the effectiveness of mindfulness programs towards the development of key ESD competencies.

2.10. References

Amaro, A. (2015). A holistic mindfulness. *Mindfulness*, 6(1), 63-73.

Aspy, D. J., & Proeve, M. (2017). Mindfulness and loving-kindness meditation: Effects on connectedness to humanity and to the natural world. *Psychological reports*, *120*(1), 102-117.

Bahl, S., Milne, G. R., Ross, S. M., & Chan, K. (2013). Mindfulness: A long-term solution for mindless eating by college students. *Journal of Public Policy & Marketing*, *32* (2), 173-184.

Bai, H., & Romanycia, S. (2013). Learning from Hermit Crabs, Mycelia and Banyan: Schools as Centers of Critical Inquiry and Renormatization. In R. B. Stevenson, M. Brody, J. Dillon, & A. E. J. Wals (Eds.), *International Handbook of Research on Environmental Education* (pp. 101–107). New York: AERA Routledge.

Bai, H., & Scutt, G. (2009). Touching the Earth with the Heart of Enlightened Mind: The Buddhist Practice of Mindfulness for Environmental Education. *Canadian Journal of Environmental Education*, *14*(1), 92-106.

Barrett, B., Grabow, M., Middlecamp, C., Mooney, M., Checovich, M. M., Converse, A. K., Gillespie, B, & Yates, J. (2016). Mindful climate action: health and environmental co-benefits from mindfulness-based behavioral training. *Sustainability*, *8*(10), 1040.

Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education, 8* (4), 416-430.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M. Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical psychology: Science and practice, 11* (3), 230-241.

Blatt, E. N. (2015). An investigation of the goals for an environmental science course: teacher and student perspectives. *Environmental Education Research*, *21*(5), 710-733.

Bluth, K., & Eisenlohr-Moul, T. A. (2017). Response to a mindful self-compassion intervention in teens: A within-person association of mindfulness, self-compassion, and emotional well-being outcomes. *Journal of Adolescence*, *57*, 108-118.

Bluth, K., Roberson, P. N. E., & Gaylord, S. A. (2015). A Pilot Study of a Mindfulness Intervention for Adolescents and the Potential Role of Self-Compassion in Reducing Stress. *Explore: The Journal of Science and Healing, 11*(4), 292-295.

Böhme, T., Stanszus, L., Geiger, S., Fischer, D., & Schrader, U. (2018). Mindfulness Training at School: A Way to Engage Adolescents with Sustainable Consumption? *Sustainability*, *10*(10), 3557.

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis.* New York: John Wiley & Sons Ltd.

Brendel, W., Hankerson, S., Byun, S., & Cunningham, B. (2016). Cultivating leadership Dharma Measuring the impact of regular mindfulness practice on creativity, resilience, tolerance for ambiguity, anxiety and stress. *Journal of Management Development, 35*(8), 1056-1078.

Brundiers, K., & Wiek, A. (2017). Beyond interpersonal competence: Teaching and learning professional skills in sustainability. *Education Sciences, 7*(1), 39.

Brundiers, K., Wiek, A., & Redman, C. L. (2010). Real-world learning opportunities in sustainability: from classroom into the real world. *International Journal of Sustainability in Higher Education, 11*(4), 308-324.

Carmody, J., Baer, R. A., Lykins, E. L. B., & Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of clinical psychology, 65*(6), 613-626.

Coatsworth, J. D., Duncan, L. G., Greenberg, M. T., & Nix, R. L. (2010). Changing Parent's Mindfulness, Child Management Skills and Relationship Quality With Their Youth: Results From a Randomized Pilot Intervention Trial. *Journal of Child and Family Studies, 19*(2), 203-217.

Coatsworth, J. D., Duncan, L. G., Nix, R. L., Greenberg, M. T., Gayles, J. G., Bamberger, K. T., Berrena, E., & Demi, M. A. (2015). Integrating Mindfulness With Parent Training: Effects of the Mindfulness-Enhanced Strengthening Families Program. *Developmental psychology, 51*(1), 26-35.

Coffey, K. A., Hartman, M., & Fredrickson, B. L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness, 1*(4), 235-253.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale: L. Erlbaum Associates.

Collaborative for Academic, Social, and Emotional Learning (CASEL). (2003). *Safe and sound: An educational leader's guide to evidence-based social and emotional learning programs.* Chicago: Author.

Collins, K. M., Onwuegbuzie, A. J., & Sutton, I. L. (2006). A model incorporating the rationale and purpose for conducting mixed methods research in special education and beyond. *Learning disabilities: a contemporary journal, 4*(1), 67-100.

Crane, R. S., Brewer, J., Feldman, C., Kabat-Zinn, J., Santorelli, S., Williams, J. M. G., & Kuyken, W. (2017). What defines mindfulness-based programs? The warp and the weft. *Psychological medicine, 47*(6), 990-999.

Creswell, J. D. (2017). Mindfulness interventions. *Annual review of psychology, 68*, 491-516.

Crofton, F. S. (2000). Educating for sustainability: opportunities in undergraduate engineering. *Journal of Cleaner Production, 8*(5), 397-405.

Crowder, R., & Sears, A. (2017). Building Resilience in Social Workers: An Exploratory Study on the Impacts of a Mindfulness-based Intervention. *Australian Social Work, 70* (1), 17-29.

Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *American Psychologist, 70* (7), 581-592.

de Carvalho, J. S., Pinto, A. M., & Marôco, J. (2017). Results of a mindfulness-based social-emotional learning program on Portuguese elementary students and teachers: a quasi-experimental study. *Mindfulness, 8*(2), 337-350.

de Haan, G. (2006). The BLK '21'programme in Germany: a 'Gestaltungskompetenz'-based model for Education for Sustainable Development. *Environmental Education Research, 12*(1), 19-32.

de Haan, G. (2010). The development of ESD-related competencies in supportive institutional frameworks. *International Review of Education, 56*(2-3), 315-328.

Dekeyser, M., Raes, F., Leijssen, M., Leysen, S., & Dewulf, D. (2008). Mindfulness skills and interpersonal behaviour. *Personality and individual differences, 44*(5), 1235-1245.

Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach–Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence? *Child development, 74*(1), 238-256.

Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W., Olendzki, A., & Vago. D. R. (2015). Moving beyond mindfulness: defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness, 6*(2), 356-372.

Donald, J. N., Sahdra, B. K., Van Zanden, B., Duineveld, J. J., Atkins, P. W., Marsh,all, S. L., & Ciarrochi, J. (2019). Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behaviour. *British Journal of Psychology, 110*(1), 101-125.

Duarte, J., & Pinto-Gouveia, J. (2017). Mindfulness, self-compassion and psychological inflexibility mediate the effects of a mindfulness-based intervention in a sample of oncology nurses. *Journal of Contextual Behavioral Science, 6*(2), 125-133.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child development, 82*(1), 405-432.

Dutta, D., & Chandrasekharan, S. (2018). Doing to being: farming actions in a community coalesce into pro-environment motivations and values. *Environmental Education Research, 24*(8), 1192-1210.

Eaton, M., Hughes, H., & MacGregor, J. (2017). *Contemplative Approaches for Sustainability in Higher Education: Theory and Practice.* New York: Routledge.

Elias, M. J., Zins, J. E., Weissberg, R. P., Frey, K. S., Greenberg, M. T., Haynes, N. M., Kessler, R., Schwab-Stone, M.E., & Shriver, T. P. (1997). *Promoting social and emotional learning: Guidelines for educators*. Alexandria, VA: Association for Supervision and Curriculum Development.

Ericson, T., Kjønstad, B. G., & Barstad, A. (2014). Mindfulness and sustainability. *Ecological Economics, 104*, 73-79.

Fadeeva, Z., Mochizuki, Y., Podger, D. M., Mustakova-Possardt, E., & Reid, A. (2010). A whole-person approach to educating for sustainability. *International Journal of Sustainability in Higher Education, 11*(4), 339-352.

Felver, J. C., Butzer, B., Olson, K. J., Smith, I. M., & Khalsa, S. B. S. (2015). Yoga in public school improves adolescent mood and affect. *Contemporary school psychology, 19*(3), 184-192.

Felver, J. C., Doerner, E., Jones, J., Kaye, N. C., & Merrell, K. W. (2013). Mindfulness in school psychology: Applications for intervention and professional practice. *Psychology in the Schools, 50*(6), 531-547.

Fernando, A. T., Skinner, K. & Consedine, N. S. (2017). Increasing Compassion in Medical Decision-Making: Can a Brief Mindfulness Intervention Help? *Mindfulness, 8*(2), 276-285.

Fischer, D., Stanszus, L., Geiger, S., Grossman, P., & Schrader, U. (2017). Mindfulness and sustainable consumption: a systematic literature review of research approaches and findings. *Journal of Cleaner Production, 162*, 544-558.

Flook, L., Goldberg, S. B., Pinger, L., & Davidson, R. J. (2015). Promoting prosocial behavior and self-regulatory skills in preschool children through a mindfulness-based kindness curriculum. *Developmental Psychology, 51*(1), 44–51.

Frank, P., Fischer, D., & Wamsler, C. (2019). Mindfulness, Education, and the Sustainable Development Goals. In W. Leal Filho, A. M. Azul, L. Brandli, P. G. Özuyar, & T. Wall (Eds.), *Encyclopedia of the UN Sustainable Development Goals. Quality Education*, *10*, (pp. 1–11). Cham: Springer.

Frank, P., & Stanszus, L. S. (2019). Transforming Consumer Behavior: Introducing Self-Inquiry-Based and Self-Experience-Based Learning for Building Personal Competencies for Sustainable Consumption. *Sustainability, 11*(9), 2550.

Franquesa, A., Cebolla, A., García-Campayo, J., Demarzo, M., Elices, M., Pascual, J. C., & Soler, J. (2017). Meditation practice is associated with a values-oriented life: the mediating role of decentering and mindfulness. *Mindfulness, 8*(5), 1259-1268.

Gerber, M., Feldmeth, A. K., Lang, C., Brand, S., Elliot, C., Holsboer-Trachsler, E., & Pühse, U. (2015). The relationship between mental toughness, stress, and burnout among adolescents: a longitudinal study with Swiss vocational students.*Psychological reports, 117*(3), 703-723.

Giangrande, N., White, R. M., East, M., Jackson, R., Clarke, T., Saloff Coste, M., & Penha-Lopes, G. (2019). A competency framework to assess and activate education for sustainable development: Addressing the UN sustainable development goals 4.7 challenge. *Sustainability, 11*(10), 2832.

Goleman, D. (1995). *Emotional intelligence*. New York: Bantam Books.

Gray, D. S., & Colucci-Gray, L. (2019). Laying down a path in walking: student teachers' emerging ecological identities. *Environmental Education Research, 25*(3), 341-364.

Gregory, A. (2015). l Yoga and Mindfulness Program: The Effects on Compassion Fatigue and Compassion Satisfaction in Social Workers. *Journal of Religion and Spirituality in Social Work, 34*(4), 372-393.

Hildebrandt, L. K., McCall, C., & Singer, T. (2017). Differential effects of attention-, compassion-, and socio-cognitively based mental practices on self-reports of mindfulness and compassion. *Mindfulness, 8*(6), 1488-1512.

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical psychology review, 31*(7), 1126-1132.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of consulting and clinical psychology, 78*(2), 169-183.

Jha, A. P., Morrison, A. B., Parker, S. C., & Stanley, E. A. (2017). Practice Is Protective: Mindfulness Training Promotes Cognitive Resilience in High-Stress Cohorts. *Mindfulness, 8*(1), 46-58.

Johnson, E. A., & O'Brien, K. A. (2013). Self-compassion soothes the savage ego-threat system: Effects on negative affect, shame, rumination, and depressive symptoms. *Journal of Social and Clinical Psychology, 32*(9), 939-963.

Kabat-Zinn, J. (2013). *Full Catastrophe Living (Revised Edition), Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness.* Bantam, New York.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice, 10*(2), 144-156.

Kearins K. & Springett, D. (2003). Educating for sustainability: developing critical skills. *Journal of Management Education, 27*(2), 188–204.

Kelly, P. (2006). Letter from the oasis: Helping engineering students to become sustainability professionals. *Futures, 38*(6), 696-707.

Khoury, B. (2018). Mindfulness: embodied and embedded. *Mindfulness, 9*(4), 1037-1042.

Kohlenberg, R. J., Tsai, M., Kuczynski, A. M., Rae, J. R., Lagbas, E., Lo, J., & Kanter, J. W. (2015). A brief, interpersonally oriented mindfulness intervention incorporating Functional Analytic Psychotherapy's model of awareness, courage and love. *Journal of Contextual Behavioral Science, 4*(2), 107-111.

Kreplin, U., Farias, M., & Brazil, I. A. (2018). The limited prosocial effects of meditation: A systematic review and meta-analysis. *Scientific reports, 8*(1), 2403.

Kristeller, J. L., & Johnson, T. (2005). Cultivating loving kindness: A two-stage model of the effects of meditation on empathy, compassion, and altruism. *Zygon®, 40*(2), 391-408.

Lambrechts, W., Mulà, I., Ceulemans, K., Molderez, I., & Gaeremynck, V. (2013). The integration of competences for sustainable development in higher education: an analysis of bachelor programs in management. *Journal of Cleaner Production, 48*, 65-73.

Lawlor, M. S. (2014). Mindfulness in practice: Considerations for implementation of mindfulness-based programming for adolescents in school contexts. *New directions for youth development, 2014*(142), 83-95.

Leydesdorff, L., Carley, S., & Rafols, I. (2013). Global maps of science based on the new Web-of-Science categories. *Scientometrics, 94*(2), 589-593.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oaks: Sage.

Lotan, G., Tanay, G., & Bernstein, A. (2013). Mindfulness and Distress Tolerance: Relations in a Mindfulness Preventive Intervention. *International Journal of Cognitive Therapy, 6*(4), 371-385.

Lozano, R., Merrill, M., Sammalisto, K., Ceulemans, K., & Lozano, F. (2017). Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal. *Sustainability, 9*(10), 1889-1904.

Luberto, C. M., Shinday, N., Song, R., Philpotts, L. L., Park, E. R., Fricchione, G. L., & Yeh, G. Y. (2018). A systematic review and meta-analysis of the effects of meditation on empathy, compassion, and prosocial behaviors. *Mindfulness, 9*(3), 708-724.

Ludvik, M. B., & Eberhart, T. L. (2018). *Positively Transforming Minds within Educational Systems: An Inner-Directed Inquiry Process for Educators and the Students they Serve.* New York: Publish Drive.

Manni, A., K. Sporre, & Ottander, C. (2017). Emotions and values–a case study of meaning-making in ESE. *Environmental Education Research, 23*(4), 451-464.

Markowitz, E. M., Goldberg, L. R., Ashton, M. C., & Lee, K. (2012). Profiling the "pro-environmental individual": A personality perspective. *Journal of personality, 80*(1), 81-111.

McConnell Moroye, C., & Ingman, B. C. (2018). Ecologically minded teaching. *Environmental Education Research ,24*(8), 1128-1142.

McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V. & Lefebvre, C. (2016). PRESS peer review of electronic search strategies: 2015 guideline statement. *Journal of clinical epidemiology, 75*, 40-46.

Michel, A., Bosch, C., & Rexroth, M. (2014). Mindfulness as a cognitive-emotional segmentation strategy: An intervention promoting work-life balance. *Journal of Occupational and Organizational Psychology, 87*(4), 733-754.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine, 151*(4), 264-269.

Morton, T. (2007). *Ecology without nature: Rethinking environmental aesthetics.* London: Harvard University Press.

Moser, C. O. (2012). *Gender Planning and Development: Theory, Practice and Training*. London: Routledge.

Nazir, J., & Pedretti, E. (2016). Educators' perceptions of bringing students to environmental consciousness through engaging outdoor experiences. *Environmental Education Research, 22*(2), 288-304.

Neff, K. D., Hsieh, Y. P., & Dejitterat. K. (2005). Self-compassion, achievement goals, and coping with academic failure. *Self and identity, 4*(3), 263-287.

Neff, K. D., & Vonk, R. (2009). Self-compassion versus global self-esteem: Two different ways of relating to oneself. *Journal of Personality, 77*(1), 23-50.

O'Flaherty, J., & Liddy, M. (2018). The impact of development education and education for sustainable development interventions: a synthesis of the research. *Environmental Education Research, 24*(7), 1031-1049.

Ojala, M. (2012). Hope and climate change: The importance of hope for environmental engagement among young people. *Environmental Education Research, 18*(5), 625-642.

Ojala, M. (2016). Facing anxiety in climate change education: From therapeutic practice to hopeful transgressive learning. *Canadian Journal of Environmental Education, 21*, 41-56.

Osagie, E. R., Wesselink, R., Blok, V., Lans, T., & Mulder, M. (2016). Individual competencies for corporate social responsibility: A literature and practice perspective. *Journal of Business Ethics, 135*(2), 233-252.

Papenfuss, J. T. (2019). *Inside-out Pedagogies: Transformative Innovations for Environmental and Sustainability Education.* Doctoral dissertation. Retrieved February 16th, 2020, from https://repository.asu.edu/attachments/216922/content/Papenfuss_asu_0010E_18938.pdf

Patel, T., & Holm, M. (2018). Practicing mindfulness as a means for enhancing workplace pro-environmental behaviors among managers. *Journal of environmental planning and management, 61*(13), 2231-2256.

Piasentin, F. B., & Roberts, L. (2018). What elements in a sustainability course contribute to paradigm change and action competence? A study at Lincoln University, New Zealand. *Environmental Education Research, 24*(5), 694-715.

Rieckmann, M. (2012). Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures, 44*(2), 127-135.

Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social development, 6*(1), 111-135.

Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, N. (2013). Assessment of mindfulness: Review on state of the art. *Mindfulness, 4*(1), 3-17.

Shankland, R., & Rosset, E. (2017). Review of brief school-based positive psychological interventions: A taster for teachers and educators. *Educational Psychology Review, 29*(2), 363-392.

Schonert-Reichl, K. A., Oberle, E., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing Cognitive and Social-Emotional Development Through a Simple-to-Administer Mindfulness-Based School Program for Elementary School Children: A Randomized Controlled Trial. *Developmental psychology, 51*(1), 52-66.

Schonert-Reichl, K. A., & Lawlor, M. S. (2010). The effects of a mindfulness-based education program on pre-and early adolescents' well-being and social and emotional competence. *Mindfulness, 1*(3), 137-151.

Schonert-Reichl, K. & Roeser, R. (2016). *Handbook of mindfulness in education.* New York: Springer.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of clinical psychology, 62*(3), 373-386.

Sharp, J. E., & Jennings, P. A. (2016). Strengthening Teacher Presence Through Mindfulness: What Educators Say About the Cultivating Awareness and Resilience in Education (CARE) Program. *Mindfulness, 7*(1), 209-218.

Shephard, K., Rieckmann, M. & Barth, M. (2018). Seeking sustainability competence and capability in the ESD and HESD literature: an international philosophical hermeneutic analysis. *Environmental Education Research, 25*(4), 532-547.

Shonin, E., Van Gordon, W., Compare, A., Zangeneh, M., & Griffiths, M. D. (2015). Buddhist-derived loving-kindness and compassion meditation for the treatment of psychopathology: A systematic review. *Mindfulness*, *6*(5), 1161-1180.

Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving transformative sustainability learning: engaging head, hands and heart. *International Journal of Sustainability in Higher Education, 9*(1), 68-86.

Sleurs, W. (2008). *Competences for ESD (Education for Sustainable Development) Teachers. A Framework to Integrate ESD in the Curriculum of Teacher Training Institutes*. Brussels: Final report Comenius project CSCT.

Sol, J., & Wals, A. E. (2015). Strengthening ecological mindfulness through hybrid learning in vital coalitions. *Cultural Studies of Science Education, 10*(1), 203-214.

Stanley, S. (2012). Mindfulness: Towards a critical relational perspective. *Social and Personality Psychology Compass, 6*(9), 631-641.

Stanszus, L., Fischer, D., Böhme, T., Frank, P., Fritzsche, J., Geiger, S., Harfensteller, J., Grossman, P., & Schrader, U. (2017). Education for sustainable consumption through mindfulness training: Development of a consumption-specific intervention. *Journal of teacher education for sustainability, 19*(1), 5-21

Sterling, S. (1996). Education in change. In J. Huckle, & S. Sterling (Eds.), *Education for sustainability* (pp. 18-39). London: Earthscan.

Sterling, S., & Thomas, I. (2006). Education for sustainability: the role of capabilities in guiding university curricula. *International Journal of Innovation and Sustainable Development*, *1*(4), 349-370.

Stratton, S. P. (2015). Mindfulness and contemplation: Secular and religious traditions in Western context. *Counseling and Values, 60*(1), 100-118.

Svanström, M., Lozano-García, F. J., & Rowe, D. (2008). Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education, 9*(3), 339-351.

Taimur, S., & Sattar, H. (2019). Education for Sustainable Development and Critical Thinking Competency. In W. Leal Filho et al. (Eds.), *Encyclopedia of the UN Sustainable Development Goals: Quality Education.* Basel: Springer Nature Switzerland AG.

Tobin, K. (2018). The role of mindfulness in harmonising sustainable lifestyles. *Learning: Research and Practice, 4*(1), 112–125.

Trautwein, F. M., Naranjo, J. R., & Schmidt, S. (2014). Meditation effects in the social domain: self-other connectedness as a general mechanism? *Meditation–neuroscientific approaches and philosophical implication. Studies in Neuroscience, Consciousness and Spirituality, 2*, 175-198.

Turner, E. H. (2013). Publication bias, with a focus on psychiatry:causes and solutions. *CNS drugs, 27*(6), 457-468.

UNESCO. (2017). *Education for Sustainable Development Goals: Learning Objectives.* Retrieved February 9th, 2018 from http://unesdoc.unesco.org/ images/0024/002474/247444e.pdf

UNESCO. (2018). *Issues and trends in education for sustainable development*. Paris: UNESCO.

Unsworth, S., Palicki, S. K., & Lustig, J. (2016). The impact of mindful meditation in nature on self-nature interconnectedness. *Mindfulness, 7*(5), 1052-1060.

Vago, D. R., & Silbersweig, D. A. (2012). *Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness.* Retrieved February 9th, 2018 from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3480633/

Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S.W., Kerr, C.E., Gorchov, J., Fox, K. C., Field, B.A., Britton, W.B., Brefczynski-Lewis, J.A., & Meyer, D.E. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science, 13*(1), 36-61.

Verlie, B. (2019). Bearing worlds: learning to live-with climate change. *Environmental Education Research, 25*(5), 751-766.

Wamsler, C. (2020). Education for sustainability: Fostering a more conscious society and transformation towards sustainability. *International Journal of Sustainability in Higher Education, 21*(1), 112-130.

Wamsler, C., & Brink, E. (2018). Mindsets for sustainability: Exploring the link between mindfulness and sustainable climate adaptation. *Ecological economics, 151,* 55-61.

Wamsler, C., Brossmann, J., Hendersson, H., Kristjansdottir, R., McDonald, C., & Scarampi, P. (2018). Mindfulness in sustainability science, practice, and teaching. *Sustainability science, 13*(1), 143-162.

Wang, X., Xu, M., Song, Y., Li, X., Zhen, Z., Yang, Z., & Liu, J. (2014). The network property of the thalamus in the default mode network is correlated with trait mindfulness. *Neuroscience, 278*, 291-301.

Waters, L., Barsky, A., Ridd, A., & Allen, K. (2015). Contemplative education: A systematic, evidence-based review of the effect of meditation interventions in schools. *Educational Psychology Review, 27*(1), 103-134.

Weissberg, R. P., Durlak, J. A., Domitrovich, C. E., & Gullotta, T. P. (2015). Social and emotional learning: Past, present, and future. In J. A. Durlak, C. E. Domitrovich, R. P. Weissberg,

& T. P. Gullotta (Eds.), *Handbook of social and emotional learning: Research and practice* (pp. 3-19). New York: Guilford Press.

Whiting, P., Savović, J., Higgins, J. P., Caldwell, D. M., Reeves, B. C., Shea, B., Davies, P., Kleijnen, J., & Churchill, R. (2016). ROBIS: a new tool to assess risk of bias in systematic reviews was developed. *Journal of clinical epidemiology, 69*, 225-234.

Wiek, A., Bernstein, M., Foley, R., Cohen, M., Forrest, N., Kuzdas, C., Kay, B., & Withycombe Keeler, L. (2015). Operationalising competencies in higher education for sustainable development. In M. Barth, G. Michelsen, I. Thomas, & M. Rieckmann (Eds.), *Handbook of Higher Education for Sustainable Development* (pp. 241-260). London: Routledge.

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science, 6*(2), 203-218.

Woods, B., & Moscardo, G. (2003). Enhancing wildlife education through mindfulness. *Australian Journal of Environmental Education, 19*, 97-108.

Yoder, N. (2014). *Teaching the Whole Child: Instructional Practices That Support Social-Emotional Learning in Three Teacher Evaluation Frameworks. Research-to-Practice Brief.* Washington: Center on Great Teachers & Leaders at American Institutes for Research.

CHAPTER 3

Volition to behave sustainably: an examination of the role of self-control

3.1. Introduction

Addressing growing environmental issues requires more sustainable production and consumption systems. Although the concern about environmental problems has risen globally (Phipps et al., 2013), individual adoption of pro-environmental behaviour (PEB) is currently insufficient to meet the United Nations Sustainable Development Goals (McDonald et al., 2012; Nerini et al., 2018), even when it is central to sustainability transitions (Carrington, Neville, & Whitwell, 2010). PEB refers to "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002, 240).

The adoption of PEB has been examined using multiple theoretical frameworks (see Bamberg & Möser, 2007 for a review), although the complexity of this behaviour has not yet been fully addressed (Gifford, Kormos, & McIntyre, 2011). The extant research agrees that the adoption of PEB requires motivation, opportunity, and ability (Jackson, 2005; Kollmuss & Agyeman, 2002; Ölander & Thøgersen, 1995; Steg & Vlek, 2009). The theory of planned behaviour (TPB) captures these elements since it predicts that the intention to perform a behaviour depends on motivational factors—attitudes and subjective norms—and nonmotivational factors, namely, perceived behavioural control (PBC).

The explanatory power of the TPB model for the prediction of PEB has been shown to be effective (Kaiser, Hübner, & Bogner, 2005); however, it has received several criticisms regarding its predictive validity and utility (Sniehotta, Presseau, & Araújo-Soares, 2014). One of these criticisms focuses on the inconsistencies between an intended action and its final performance, the so-called intention-behaviour gap (Bray, Johns, & Kilburn, 2011; Carrington, Neville, & Whitwell, 2014). Past studies have attributed this problem partly to the existence of external barriers, such as infrastructural, institutional or economic issues, that prevent individuals from conducting their planned intentions (Gaspar, 2013; Manolas, 2015). However, these barriers do not explain why individuals do not perform behaviours for which there are few or no external barriers (e.g., switching off lights) (Joshi & Rahman, 2015; Manolas, 2015).

We argue that the performance of these actions may be prevented by internal barriers (Gifford, 2011; Van der Linden, 2015; Wynveen & Sutton, 2017), such as difficulties in

disrupting habits (Abrahamse & Steg, 2011; Gaspar, 2013; Steg & Vlek, 2009) or difficulties in managing the inherent conflict between societal benefits and personal short-term egoistic goals hindering the adoption of PEB (de Young, 2000; Gaspar, 2013; Gifford & Nilsson, 2014; Lacroix & Gifford, 2018; Steg & Vlek, 2009). Navigating these internal barriers that inhibit or hinder the adoption of PEB requires ongoing behavioural regulation (Gaspar, 2013). All other things being equal, individuals with greater volitional control would thus be more able to adopt a pro-environmental lifestyle (Nielsen, 2017; Lindenberg, 2001; Stern, 2000).

The TPB limitedly captures volitional control over behaviour (Manstead, 2011; Parkinson, David, & Rundle-Thiele, 2017). The construct of PBC encompasses the *control beliefs* that reflect the perceived ability and opportunity to perform an action (Ajzen, 2002). However, control beliefs may not adequately explain individual behaviour (Hiller, 2011; Notani, 1998). To address this limitation, we hypothesize that a measure of *actual control* over behaviour, namely, dispositional self-control, would predict the adoption of PEB more accurately than a measure of *perceived control*, such as PBC (Sheeran, Trafimow, & Armitage, 2003). Dispositional self-control (SC) is defined as ‘‘the self’s capacity to override or change one’s inner responses, as well as to interrupt undesired behavioural tendencies and to refrain from acting on them’’ (Tangney, Baumeister, & Boone, 2004, 274). We defend that SC is a fundamental volitional ability to facilitate PEB adoption (Hu & Gill, 2016; Kerret, Orkibi, & Ronen, 2016). In addition to testing the direct influence of SC on PEB, this study also hypothesizes that SC would have a greater influence on actions for which there are fewer or no external barriers (e.g., limited availability, limited information, or higher prices) since these actions are under greater volitional control of the individual.

Through the examination of these hypotheses, our study contributes to the literature on sustainable consumption by showing the role of volitional skills in explaining the adoption of PEB, especially conservation behaviours that, although requiring effort, have yet to be addressed from a motivational approach (van der Linden, 2015). Additionally, this study has implications for education on sustainable consumption since the findings suggest the need to design strategies to nurture SC for the mainstream adoption of PEB.

3.2. Theoretical background

3.2.1. Theoretical models of PEB

The adoption of PEB is commonly believed to be the result of multiple combinations of internal and external variables (Gifford, 2011; Kollmuss & Agyeman, 2002; Steg & Vlek, 2009; Swim et al., 2011). However, a theoretical model that captures this complexity seems unattainable (Gifford, Kormos, & McIntyre, 2011). In the context of PEB, motivational models are commonly used (see Jackson, 2005; Kurisu, 2015; Wynveen, 2013 for reviews). Most of them are adaptations of theories widely used to explain human behaviour, such as social cognitive theory (Bandura, 1986) or the TPB (Ajzen, 2002). However, other models have been developed specifically in the context of PEB, such as the value-belief-norm theory (VBN; Stern, 2000), the Attitude-Behaviour-Context model (ABC; Stern, 2000) and the motivation–opportunity–abilities model (Ölander & Thøgersen, 1995).

In this research, the TPB model is used as a baseline. This model assumes that intentions depend on motivational (namely, attitude and subjective norms) and nonmotivational factors (namely, the perceived opportunity and ability to perform a behaviour, captured by the PBC component) (Steg & Vlek, 2009). PBC also influences behaviour directly (Ajzen, 2002). Thus, the TPB is a comprehensive model that captures the motivational, ability and opportunity components required for PEB. This model has also shown great applicability and effectiveness in explaining human behaviour in different domains (Rivis, Sheeran, & Armitage, 2009), including environmentally responsible behaviours (see Bamberg & Möser, 2007; Staats, 2003 for a meta-analysis and review) and, in particular, conservation behaviours (Clement, Henning, & Osbaldiston, 2014; Kaiser, Hübner, & Bogner, 2005). The TPB has been the most commonly applied theory in the field of environmental psychology (Bamberg & Möser, 2007; Sopha, 2011; Stern, 2005) to explain the adoption of a wide variety of behaviours, such as pro-environmental purchasing (Liobikienė, Mandravickaitė, & Bernatonienė, 2016), bike sharing (Si et al., 2020) and sustainable tourism behaviour (Garay, Font, & Corrons, 2019). Indeed, studies comparing the TPB with other models, such as the value-belief-norm model (VBN; Stern, 2000), concluded that the TPB is more effective at predicting and understanding PEB (see

Klöckner, 2013 for a meta-analysis), although not without some limitations that have led other authors to use alternative models to explain PEB (Wynveen, 2013).

For instance, given that PEB is driven by a combination of egoistic and moral or altruistic reasons that sometimes conflict (Bamberg & Möser, 2007), the use of VBN has been defended because it explains behaviour as value-centred (Chan & Bishop, 2013) while the TPB has been criticized for an excessive focus on self-interest. However, concerning conservation behaviours, research shows that whereas the TPB accounted for an impressive 95% of the explained variance, VBN could explain only 64% of the behaviour variance (Kaiser, Hübner, & Bogner, 2005). Moreover, the TPB has been proven to be more predictive of habitual behaviour, such as conservation behaviours, than the VBN model (Klöckner, 2013). A reason for these findings is that the TPB model explains behaviour as a result of proximal determinants of behaviours (e.g., perceived control) whereas the VBN model uses distal components (e.g., personal norms) (Kaiser, Hübner, & Bogner, 2005).

Notwithstanding, the TPB model has been the subject of some other criticisms in terms of its validity and utility (Sniehotta, Presseau, & Araújo-Soares, 2014). For example, one criticism is that the TPB model offers an overly simplistic view of human behaviour, which decreases its predictive validity (Miller, 2017; Trafimow, 2015). To address these criticisms, the model has been subsequently extended by introducing new components to increase its explanatory power. This was originally welcomed and encouraged by its author (Ajzen, 1991, 2015). Another criticism of fundamental interest in this study concerns how the TPB captures the volitional elements in the PBC component (Manstead, 2011; Parkinson, David, & Rundle-Thiele, 2017). We focus on this next.

3.2.2. PBC vs. actual control: a rationale for including SC in the TPB

PBC was incorporated into the TPB model to reflect beliefs about the individual's control over a given behaviour (Ajzen, 2002). Thus, PBC captures contextual variables that, according to Ajzen (1991), are better predictors of behaviours than trait measures. In the formulation of the TPB, it was theorized that under conditions of very high volitional control, behavioural intention rather than PBC should be the only predictor of behaviour (Ajzen, 1991, 2002; Ajzen & Driver, 1992). However, Armitage & Conner's meta-

analysis (2001) did not confirm this rationale; on the contrary, they found that this relationship was not fully explained by the degree of volitional control. An explanation for this finding is that PBC does not accurately reflect actual control over one's actions (Armitage & Conner, 2001; Fitch & Ravlin, 2005).

The construct of PBC captures the perceived ability and opportunity to perform such an action (Ajzen, 2002). PBC does not reflect actual control; rather, it is a measure of control beliefs. Control beliefs may not adequately explain behaviour since individuals may either fail to properly account for their impacts on the environment or misestimate their ability/opportunity to conduct a behaviour (Armitage & Conner, 1999; Notani, 1998). Additionally, negative associations between PBC and PEB have been found when assessing individual actions since some people do not feel that they are in control of their performance unless their behaviours are adopted by other people (Frantz & Mayer, 2009). Given these limitations, we defend that a measure of actual control, namely, SC, will more accurately explain the adoption of a behaviour than a measure of perceived control (Sheeran, Trafimow, & Armitage, 2003). Indeed, Notani's meta-analysis (1998) showed that the more accurate the perceptions of control are, the more predictive PBC will be.

A measure of SC could better explain PEB adoption since it would capture individuals' ability to circumvent the barriers that cause the gap between intention and behaviour (Carrington, Neville, & Whitwell, 2010). It is plausible to expect that people may not be able to acknowledge their actual ability to protect the environment (Hiller, 2011). Moreover, behaviours may be difficult to imagine, or the individual may have little or no previous experience with their performance, which would reduce the accuracy of control beliefs (Gifford, Kormos, & McIntyre, 2011; Notani, 1998; Wynveen, 2013). Additionally, in the process of adopting PEB, an individual will inevitably encounter both internal and external difficulties that demand greater SC to overcome the selfish motivation to act under the mandate of one's benefit (Nielsen, 2017). Past studies have documented an extensive variety of internal and external barriers to performing PEB (see Gifford, 2011; Kollmuss & Agyeman, 2002; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; Steg & Vlek, 2009 for reviews), although the extent to which PEB is affected by constraints varies among PEB actions (Abrahamse & Steg, 2011). For instance, whereas buying organic food may be affected by external factors such as its availability, saving water may be influenced by more personal interests (Gaspar, 2013).

SC has been traditionally conceptualized as an ability that an individual possesses that to a greater or lesser extent helps to regulate or inhibit their behaviours in daily life (Tangney, Baumeister, & Boone, 2004). Thus, deeply ingrained in the notion of dispositional SC is the ability to transform habits (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). In particular, by effectively confronting present thoughts, emotions or behaviours that take us away from our true goals (Baumeister, Vohs, & Tice, 2007), SC guides one's behaviour towards long-term objectives, which often imply a personal sacrifice in favour of long-term societal benefits (Nielsen, 2019). SC has been proven to be fundamental in explaining the adoption of behaviours that demand individuals' forgoing immediate gratification in favour of long-term goals and that demand the breaking of automatized habits, such as quitting smoking (Muraven, 2010), increasing physical activity (Stadler, Oettingen, & Gollwitzer, 2009), or following a healthy diet (Haws, David, & Dholakia, 2016). Thus, the more SC an individual has, the more likely it is that he or she will carry out an intended action. Hence, SC is posited to be directly associated with the adoption of PEB since it helps to break unsustainable habits and manage conflicts between present and future goals that relate to personal and societal interests (Kotabe & Hofmann, 2015).

However, despite the potential relevance of SC as a predictor of PEB adoption (Nielsen, 2017), empirical evidence remains scarce (Chuang, Xie, & Liu, 2016; Hu & Gill, 2016; Kerret, Orkibi, & Ronen, 2016; Redondo & Puelles, 2017). SC has been proven to be an ability that facilitates the adoption of environmental choices consistent with one's environmental identity (Chuang, Xie, & Liu, 2016; Hu & Gill, 2016) or that helps individuals cope with behavioural inconsistencies (Redondo & Puelles, 2017). Although previous studies provide initial findings to improve the understanding of the relationship between volitional abilities and PEB, they do not fully account for the direct influence of SC on behaviour or examine whether the magnitude of the influence on behaviour is similar in different types of PEB actions. Rather, SC has been theorized as a mediating mechanism that facilitates consistency between individuals' identities and their adoption of a wide range of behaviours, both environmental and nonenvironmental (Kerret, Orkibi, & Ronen, 2016; Redondo & Puelles, 2017). In studies not directly related to behaviour, other authors have found SC to be an antecedent of intentions, given that variables, such as the focus of one's attention on environmental choices, differ based on an individual's

SC (Chuang, Xie, & Liu, 2016; Hu & Gill, 2016). In sum, based on these arguments, we hypothesize that dispositional SC is a direct antecedent of PEB.

3.2.3. The differential influence of SC depending on the type of PEB

Although we theorize that SC is a direct antecedent of all pro-environmental actions, we further suggest that the magnitude of the effect is greater for pro-environmental actions for which the external barriers are low. Conservation actions, such as switching off lights or turning down the temperature, are examples of actions that do not involve external barriers. In these cases, the nonperformance of a conservation behaviour is a consequence of automatized routines that require motivation and the exertion of SC to change (Hidalgo, Hernández, Lambistos, & Pisano, 2011; Lavelle, Rau, & Fahy, 2015). Since these actions are under greater volitional control of the individual, it is plausible to think that individuals with greater SC will be more able to conduct their planned intentions (Fitch & Ravlin, 2005). This is because the performance of these actions requires the breaking of automatized habits that require the conscious exercise of planning an effortful action that is facilitated by SC (Baumeister, Vohs, & Tice, 2007). In contrast, other PEB actions may be curtailed by external barriers. The purchase of organic food is an example of a behaviour that is not under full volitional control of the individual (Aschemann-Witzel & Niebuhr Aagaard, 2014): even though a person is motivated to buy organic foods, if these products are not available or the premium price is unaffordable, he or she would not buy them.

3.3. Method

3.3.1. Hypotheses development

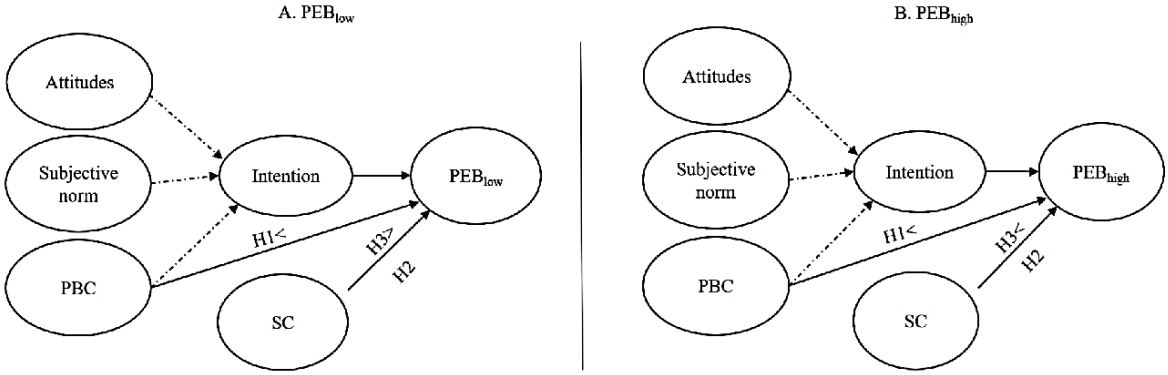
Based on the theoretical framework of our study, the following formal hypotheses are proposed:

H1: The inclusion of a measure of actual control (SC) is more predictive of behaviour than a measure of perceived control (PBC).

H2: SC is positively associated with the adoption of PEB. Moreover, we expect that the inclusion of SC as a direct antecedent of behaviour will increase the explained variance of PEB.

H3: The magnitude of the effect will be greater for PEB actions for which the presence of external barriers is low (hereafter PEB_{low}) than for PEB actions for which external barriers are high (hereafter PEB_{high}). *Figure 6* summarizes the conceptual model tested in this study.

Figure 6. Hypothesized model



*Non-hypothesized relationships are represented with dashed lines. The > symbol indicates a stronger relationship in the direction of the arrow.

3.3.2. Procedure and participants

Data were collected using an online survey distributed using a convenience community sample in Spain. A total of 496 people accessed the survey, and 412 completed it in its entirety. The sample (N = 412) had a mean age of 45.9 years (SD = 12.01 years), 72.6% of the respondents were women, and 87.8% had a high level of education. See *Table* 14 for a summary of the sociodemographic description of the sample.

Table 14. Socio-demographic profile

Variable	Category	%
Gender	Men	27.4%
	Women	72.6%
Age	18-34 years old	15%
	35-54 years old	62.4%
	55-74 years old	21.6%
	75-94 years old	0.9%
Level of Education	Undergraduate studies	12.1%
	Postgraduate studies	87.8%

Women and highly educated individuals were overrepresented in the sample; however, t-tests show that the mean scores on the focal constructs (PEB and SC) did not differ on the basis of gender or the level of education (*Table 15*). Thus, the composition of the sample did not suggest that any bias that could prevent the analysis of the results (Calder, Phillips, & Tybout, 1983).

Table 15. Mean values by gender and level of education

	PEB_{low}		**PEB_{high}**		**SC**	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Men	3.09	0.54	2.05	0.51	3.37	0.61
Women	3.16	0.51	2.15	0.54	3.38	0.59
	$t(410) = -1.106$, $p = 0.27$		$t(410) = -1.759$, $p = 0.08$		$t(410) = -0.217$, $p = 0.83$	
Undergraduate	3.19	0.50	2.19	0.55	3.39	0.60
Postgraduate	3.13	0.52	2.11	0.53	3.32	0.59
	$t(410) = -.7$, $p = 0.48$		$t(410) = -.994$, $p = 0.32$		$t(410) = .775$, $p = 0.44$	

Several steps were taken in the design of the survey to minimize the potential of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The survey was split into different sections with a brief introduction where anonymity and confidentiality were guaranteed to all participants. Items were presented in a randomized order, and reverse-worded items were used. The potential impact of common method bias was empirically examined using Harman's single-factor test, which showed that only 22% of the variance accounted for a single factor, indicating that common method bias was not a concern for our study (Eichhorn, 2014).

3.3.3. Measures

All measures used for the analysis were based on past research. Details about the wording of each of the items are available in *Table 16.*

i. TPB

The constructs of the TPB model were operationalized using instructions from the theory of planned behaviour (TPB; Ajzen, 1985, 1991, 2006). The Spanish translation of the original 5-point Likert scale (Arango & Mesías, 2015) was used. The 16 items were adapted to environmental behaviours.

ii. Self-control

The trait SC was measured through 13 items following the Brief Self-control Scale (BSCS; Tangney, Baumeister, & Boone, 2004), which was translated into Spanish by Oliva et al. (2012). Participants were asked to what degree each of the statements reflected their situation on a 5-point Likert scale.

iii. Pro-environmental behaviour

PEB was measured through the original Whitmarsh & O'Neill scale (2010) and translated into Spanish by the study authors. The scale is composed of 12 items that assess a variety of behaviours. Participants answered how often they performed each of the actions, without specifying a particular domain (such as the workplace or household), on a 4-point Likert scale.

To test our hypothesis about the particular influence of dispositional SC on PEB_{low} compared to PEB_{high}, the items of the scale were classified on these two types of behaviours: (1) PEB_{low}, which was composed of items PEB1, PEB8, PEB9, PEB10 and PEB11, and (2) PEB_{high}, which included items PEB2, PEB3, PEB4, PEB5, PEB6, PEB7 and PEB12.

3.3.4. Analysis

The structural equation model (SEM) was performed using the AMOS software (version 26). The hypothesized models for each type of behaviour (PEB_{low} and PEB_{high}) introduced the component of SC as an antecedent of PEB. Four models were estimated to compare the proposed model with its corresponding rival models. The proposed model was

constrained by setting a null regression value for the path added (SC→PEB). Accordingly, the proposed and constrained (rival) models were compared by analysing the significance of the aforementioned path, the increase in PEB-explained variance and the goodness of fit using a chi-squared test (Chin, 1998). Considering the t-test results, which showed that the mean scores of the focal constructs (PEB and SC) did not differ on the basis of gender or the level of education, moderation analysis with these two variables was not performed.

3.4. Results

3.4.1. Measurement model

A two-step approach to structural equation modelling was conducted following Anderson & Gerbing (1988) so that the scale reliability and convergent and discriminant validity of the measurement model would be tested before proceeding with the examination of the relationship between constructs through our structural model. As shown in *Table 16*, despite the chi-squared statistic being significant, all constructs showed a good model fit. The reliabilities of the measures were determined by both Cronbach's alpha and the composite reliability. Although one of the PEB subscales (PEB_{low}) barely met the threshold recommended by Nunnally (1978), it was used because it provided information on PEB actions at a subscale level required for the purpose of the study. In terms of convergent validity, all factor loadings were high and statistically significant, indicating that convergent validity was achieved.

Table 16. Measurement model

Constructs	Items	Standardized factor loadings	
		PEB_{low}	PEB_{high}
TPB Now, we will ask you about your responsible consumption, understood as that which "takes in consideration the economic, social, political, ecological consequences, etc., when choosing between the different options that the market offers" (Piñeiro & Díaz, 2012). To do this, please indicate your level of agreement or disagreement with the following statements (from 1= strongly disagree to 5= strongly agree). (Cronbach's alpha= 0.91; Composite reliability: 0.95) CFA: χ^2 = 265.88, *df* = 97, $\chi 2/df$ = 2.74, *CFI* = 0.95, *TLI* = 0.94, *RMSEA*= 0.07, *RMR* = 0.04. *Source: Adapted from Ajzen (2006), translated into Spanish by Arango & Mesías (2015)*	**Intention** (TPB.I)		
	TPB.I1. I intend to behave in an environmentally friendly manner in the forthcoming six months	0.91	0.91
	TPB.I2. I will try to behave in an environmentally friendly manner in the forthcoming six months	0.87	0.87
	TPB.I3. I plan to behave in an environmentally friendly manner in the forthcoming six months	0.88	0.88
	Attitude (TPB.A)		
	TPB.A1. For me, behaving in an environmentally friendly way is beneficial	0.76	0.76
	TPB.A.2. For me, behaving in an environmentally friendly way is pleasant	0.70	0.70
	TPB.A.3. For me, behaving in an environmentally friendly way is good	0.68	0.68
	TPB.A.4. For me, behaving in an environmentally friendly way is valuable	0.79	0.79
	TPB.A.5. For me, behaving in an environmentally friendly way is enjoyable	0.68	0.68
	Subjective Norm (TPB.SN)		

	TPB.SN1. Most people who are important to me think that I should behave in an environmentally friendly way	0.68	0.67
	TPB.SN.2. The people close to me think that it is very likely that I behave in an environmentally friendly way	0.64	0.64
	TPB.SN.3. The people in my life whose opinions I value would approve of me behaving in an environmentally friendly way	0.76	0.76
	TPB.SN.4. Most people who are important to me would value that I behave in an environmentally friendly way	0.73	0.73
	PBC (TPA.PBC)		
	TPB.PBC1. For me, to behave in an environmentally friendly way would be possible	0.83	0.83
	TPB.PBC.2. If I wanted to, I could behave in an environmentally friendly way	0.70	0.70
	TPB.PBC.3. I have complete control to behave in an environmentally friendly way	0.70	0.70
	TPB.PBC.4. It is mostly up to me whether to behave in an environmentally friendly way	0.67	0.67
Self-control- SC Please indicate the level of self-control that you exert in the behaviour of your daily	SC1. I am good at resisting temptation.	0.56	0.56
	SC2. I have a hard time breaking bad habits.	0.69	0.69

life (from 1= strongly disagree to 5= strongly agree) (Cronbach's alpha= 0.84; Composite reliability: 0.84). CFA: χ^2 = 156.50, *df* = 64, $\chi 2/df$ = 2.44, *CFI* = 0.92, *TLI* = 0.91, *RMSEA*= 0.06, *RMR* = 0.05. *Source: Adapted from Tangney, Baumeister, & Boone (2004), translated into Spanish by Oliva* et al. *(2012)*	SC3. I am lazy	0.59	0.59
	SC4. I say inappropriate things.	0.59	0.59
	SC5. I do certain things that are bad for me if they are fun.	0.60	0.60
	SC6. I refuse things that are bad for me.	0.42	0.42
	SC7. I wish I had more self-discipline.	0.45	0.45
	SC8. People would say that I have strong self-discipline.	0.45	0.45
	SC9. Pleasure and fun sometimes keep me from getting work done.	0.56	0.56
	SC10. I have trouble concentrating.	0.56	0.56
	SC11. I am able to work effectively towards long-term goals.	0.36	0.37
	SC12. Sometimes I can't stop myself from doing something even if I know it is wrong.	0.65	0.64
	SC13. I often act without thinking through all the alternatives.	0.49	0.49
Pro-environmental Behaviour Low - PEB_{low} Please indicate how often you perform each action in your daily life (from 1= never to 4= always). (Cronbach's alpha= 0.63; Composite reliability: 0.63) CFA: χ^2 = 10.35, *df* = 5, $\chi 2/df$ = 2.07, *CFI* = 0.97, *TLI* = 0.95, *RMSEA*= 0.05, *RMR* = 0.02.	PEB1. I turn off the lights when they're not in use.	0.46	
	PEB8. I recycle paper and glass.	0.48	
	PEB9. I reuse or repair things instead of throwing them away.	0.47	
	PEB10. I save water by taking shorter showers.	0.67	
	PEB11. I close the faucet while I brush my teeth.	0.43	

Source: Adapted from Whitmarsh & O'Neill's scale (2010) and translated to Spanish by the study authors		
Pro-environmental Behaviour High – PEB_{high} Please indicate how often you perform each action in your daily life (from 1= never to 4= always). (Cronbach's alpha= 0.72; Composite reliability: 0.74) CFA: χ^2 = 38.75, *df* = 14, $\chi 2/df$ = 2.77, *CFI* = 0.95, *TLI* = 0.92, *RMSEA*= 0.07, *RMR* = 0.03. *Source: Adapted from Whitmarsh & O'Neill's scale (2010) and translated to Spanish by the study authors*	PEB2. I share journeys by car.	0.50
	PEB3. I reduce the times I travel by plane.	0.39
	PEB4. I buy environmentally responsible products.	0.68
	PEB5. I buy organic, local or seasonal products (fruits and vegetables).	0.53
	PEB6. I avoid eating meat.	0.45
	PEB7. I buy products with less packaging.	0.64
	PEB12. I participate in environmental protests.	0.52

Table 17 presents the descriptive statistics, including the means, standard deviations, and correlations between the seven constructs included in the model.

Table 17. Descriptive statistics and correlations between constructs

Constructs	***M***	***SD***	**1**	**2**	**3**	**4**	**5**	**6**
1. PEB_{low}	3.14	0.52						
2. PEB_{high}	2.12	0.53	0.50**					
3. SC	3.38	0.60	0.34**	0.25**				
4. Intention	3.90	0.81	0.37**	0.40**	0.22**			
5. Attitude	4.19	0.61	0.37**	0.39**	0.17**	0.66**		
6. Subjective norm	3.67	0.73	0.27**	0.33**	0.20**	0.59**	0.55**	
7. PBC	3.88	0.76	0.23**	0.28**	0.23**	0.51**	0.41**	0.43**

M = mean; SD = standard deviation; N = 412

The confirmatory factor analysis (CFA) of the dependent variables showed that although the chi-squared statistic was significant, overall fitness measures were adequate for both models PEB_{low} (CFA: χ^2 = 945.70, *df* = 510, χ^2/df = 1.85, *CFI* = 0.92, *TLI* = 0.91, *RMSEA* = 0.05, *RMR* = 0.05) and PEB_{high} (CFA: χ^2 = 1,056.53, *df* = 577, χ^2/df = 1.83, *CFI* = 0.91, *TLI* = 0.90, *RMSEA* = 0.05, *RMR* = 0.05). Convergent validity was established because all factor loadings were high and statistically significant. Discriminant validity was also assessed given that, following Awang (2014), the correlations of the measurement model were below 0.85 (see *Table 18*).

Table 18. Correlation among variables

			PEB_{low}	**PEB_{high}**
Intention (TPB.I)	<-->	Attitude (TPB.A)	0.75	0.75
Intention (TPB.I)	<-->	Subjective Norm (TPB.SN)	0.68	0.68
Intention (TPB.I)	<-->	PBC (TPA.PBC)	0.60	0.60
Intention (TPB.I)	<-->	SC	0.23	0.23
Intention (TPB.I)	<-->	PEB_{low}	0.49	
Intention (TPB.I)	<-->	PEB_{high}		0.49
Attitude (TPB.A)	<-->	Subjective Norm (TPB.SN)	0.66	0.66
Attitude (TPB.A)	<-->	PBC (TPA.PBC)	0.51	0.51
Attitude (TPB.A)	<-->	SC	0.17	0.17
Attitude (TPB.A)	<-->	PEB_{low}	0.51	
Attitude (TPB.A)	<-->	PEB_{high}		0.50
Subjective Norm (TPB.SN)	<-->	PBC (TPA.PBC)	0.53	0.53
Subjective Norm (TPB.SN)	<-->	SC	0.23	0.23
Subjective Norm (TPB.SN)	<-->	PEB_{low}	0.39	
Subjective Norm (TPB.SN)	<-->	PEB_{high}		0.41
PBC (TPA.PBC)	<-->	PEB_{low}	0.36	
PBC (TPA.PBC)	<-->	PEB_{high}		0.38
SC	<-->	PEB_{low}	0.47	
SC	<-->	PEB_{high}		0.35
PBC (TPA.PBC)	<-->	SC	0.27	0.27

3.4.2. Structural model

Regarding the structural model, the goodness of fit was acceptable for the four models (see *Table 19*). Moreover, parsimonious measures (AIC and CAIC) supported the improvements in the proposed models. Even though an additional variable was added to the rival model, the AIC and CAIC values were lower for our proposed model (Lin, Huang, & Weng, 2017; Schermelleh-Engel, Moosbrugger, & Müller, 2003).

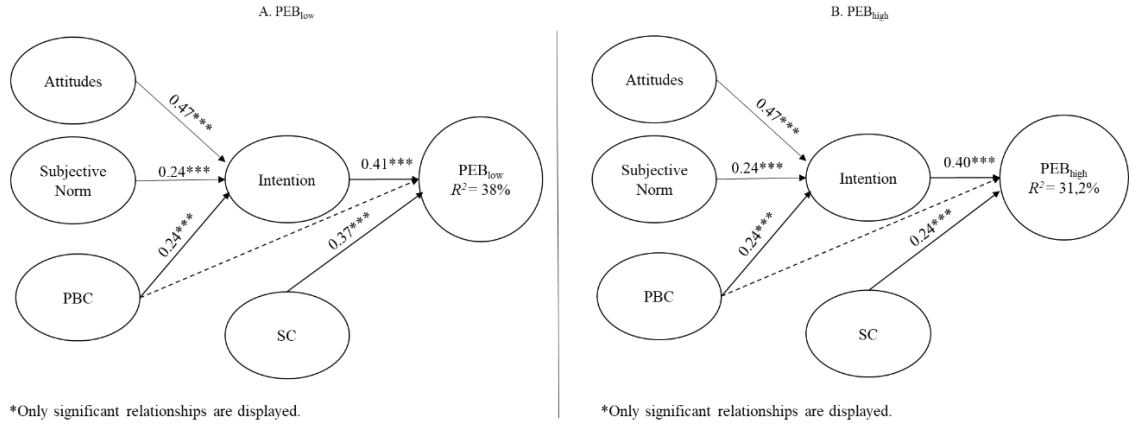
Table 19. Goodness of fit

Fitness measures		Overall Goodness of Fit							Parsimonious Fit	
		χ^2	*df*	χ^2/df	*CFI*	*TLI*	*RMSEA*	*RMR*	*AIC*	*CAIC*
PEB_{low}	Proposed model	956.97	513	1.87	0.91	0.91	0.05	0.05	1,120.97	1,532.69
	Rival model	414,59	180	2.30	0.91	0.90	0.05	0.06	1,154.74	1,561.45
PEB_{high}	Proposed model	1,067.14	580	1.84	0.91	0.90	0.05	0.05	1,239.14	1,670.95
	Rival model	451.40	221	2.04	0.91	0.90	0.05	0.05	1,254.17	1,680.96

Regarding the hypotheses proposed, the results for SC compared to PBC showed that SC had a significant association with PEB_{low} (β = 0.37, p = 0.00) whereas PBC was not significant (β = 0.02, p = 0.79). This was also the case for PEB_{high}, where PBC was not significant (β = 0.08, p = 0.27). These results support our first hypothesis that the inclusion of SC is more predictive of behaviour than PBC (H1).

As *Figure 7* shows, SC was positively associated with PEB (H2), thus supporting our second hypothesis (PEB_{low}: β = 0.37, p = 0.00; PEB_{high}: β = 0.24, p = 0.00). Furthermore, the results showed that incorporating a direct association between SC and PEB_{low} into the model increased the explained variance of PEB_{low} from 26.1% to 38% with a significant improvement in the model fit measured by a significant $\Delta\chi$^2 ($\Delta\chi$^2 = 35.78, Δdf = 1, p = 0.00).

Figure 7. Models of PEB_{low} and PEB_{high}



In the case of PEB_{high}, the findings showed that the path added over the basic TPB model (SC → PEB_{high}) was statistically significant (p = 0.00) and, as expected, had a positive value (β = 0.24). This increased the explained variance of PEB_{high} from 26.6% to 31.2% with a significant improvement in the model fit ($\Delta\chi\text{^}2$ = 17.03, Δdf = 1, p = 0.00).

These results support the third hypothesis. The magnitude of the effect (PEB_{low}; β = 0.37, p = 0.00) was greater for actions with limited external barriers (H3). A summary of the results is provided in *Table 20.* The results for the full SEM models are also provided in *Figure 8.*

Table 20. Hypotheses' results

Paths	**Rival model**	**Proposed model PEB_{low}** [a)]	**Proposed model PEB_{high}** [b)]
SC→PEB		0.37***	0.24***
PBC→PEB		0.02	0.08
Explained variance PEB_{low}	26.1%	38%	
Explained variance PEB_{high}	26.6%		31.2%

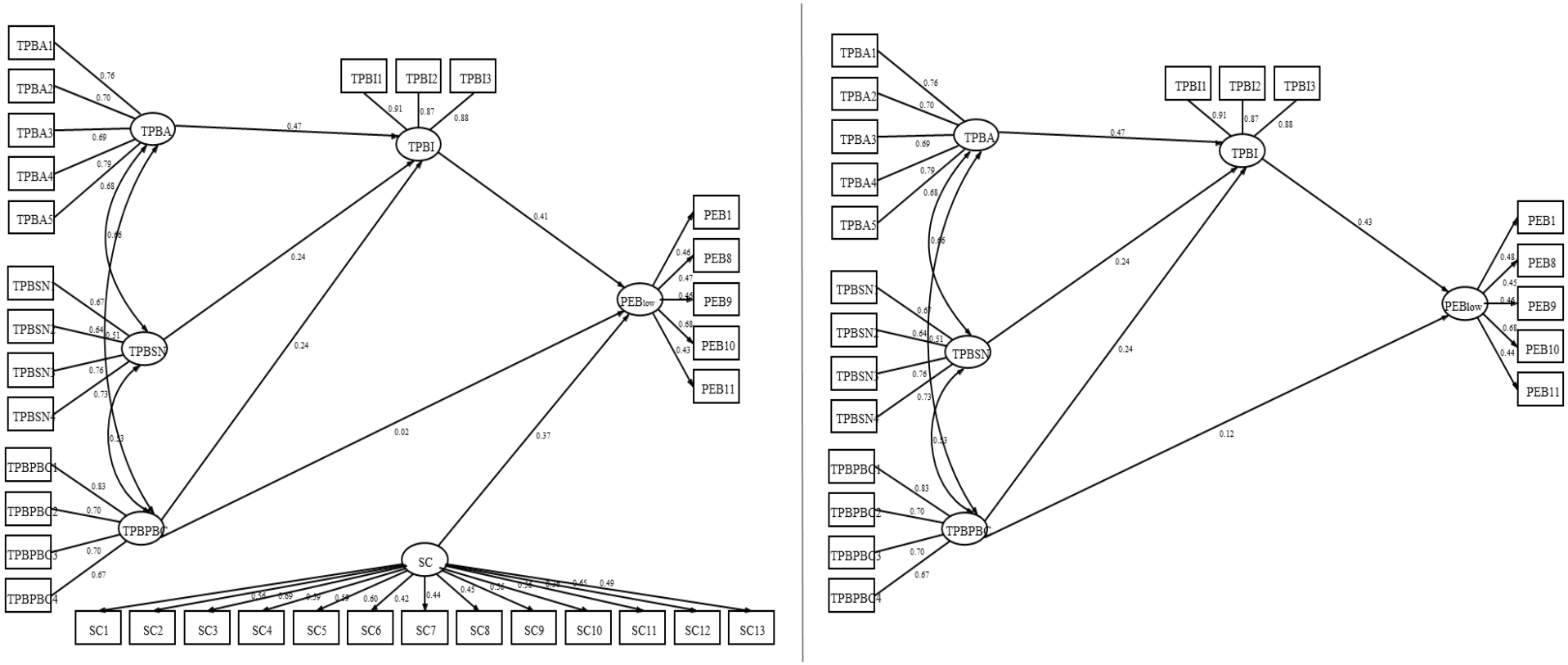
***p< 0.001

a) Improvement of model fit [$\Delta\chi\text{^}2$ = 35.78, Δdf = 1, p = 0.00]

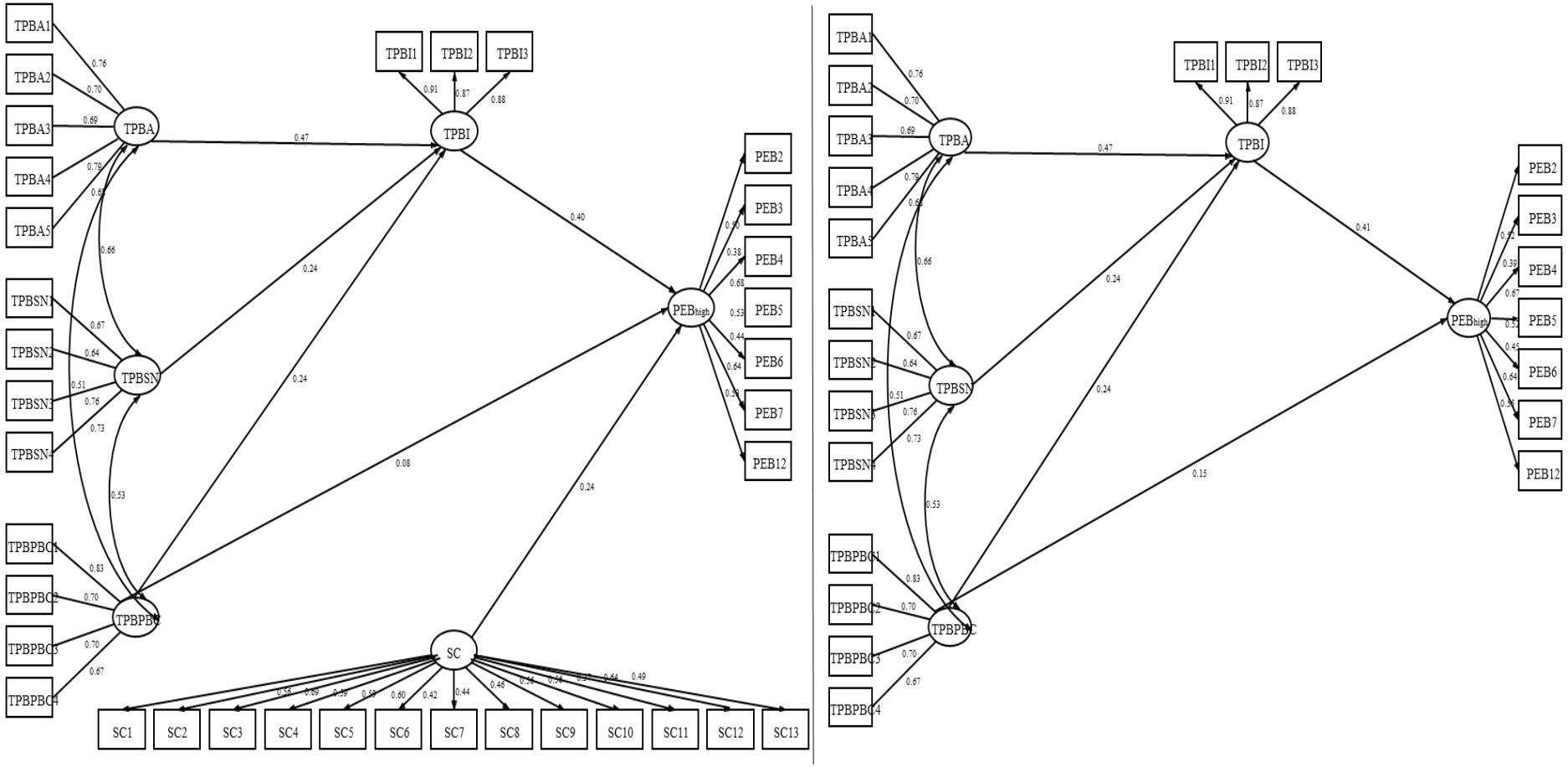
b) Improvement of model fit [$\Delta\chi\text{^}2$ = 17.03, Δdf = 1, p = 0.00]

Figure 8. Total SEM models

PEB_{low}



PEB$_{high}$


TPBA1
TPBA2
TPBA3
TPBA4
TPBA5
TPBSN1
TPBSN2
TPBSN3
TPBSN4
TPBPBC1
TPBPBC2
TPBPBC3
TPBPBC4
TPBA
TPBSN
TPBPBC
TPBI1
TPBI2
TPBI3
TPBI
SC
SC1
SC2
SC3
SC4
SC5
SC6
SC7
SC8
SC9
SC10
SC11
SC12
SC13
PEB$_{high}$
PEB2
PEB3
PEB4
PEB5
PEB6
PEB7
PEB12
0.47
0.40
0.24
0.08
0.53
0.41
0.15

3.5. Discussion

3.5.1. Discussion of the findings

The findings of our study demonstrate the superior explicative ability of behaviour as a measure of actual control, SC, compared with perceived control, PBC. Comparing the effects of PBC and SC on PEB adoption, this study finds a positive association between SC and behaviour and a nonsignificant association between PBC and PEB. Additionally, we find that the magnitude of the effect of SC on behaviour is greater for those actions with fewer external variables.

First, based on our first hypothesis, PBC is not significantly associated with PEB. The effect of PBC on PEB is indirect and mediated by intentions. Past studies have suggested that PBC may not adequately predict PEB unless it is referred to as a single environmental behaviour so that individuals are more capable of accurately predicting its adoption (Kaiser & Gutscher, 2003; Kaiser, Schultz, & Scheuthle, 2007). Our results suggest that control beliefs may not be an accurate measure of control over behaviour. Knowing that environmental problems are a common global issue, people may tend to think that their behaviours are not relevant and tend to rely upon others' PEBs as proof of their potential behaviours (Frantz & Mayer, 2009). An additional explanation may be the lack of accuracy regarding the impact of one's actions, which may misguide the type of PEB in which an individual engages (Ajzen, 2002; Gifford, Kormos, & McIntyre, 2011; Hiller, 2011). Indeed, a lack of actual control and accuracy over one's performance is considered to be the two conditions under which PBC cannot be used as a determinant of behaviour (Sheeran, Trafimow, & Armitage, 2003).

Second, the results support our rationale for the inclusion of a volitional skill as an antecedent of PEB. Studies in other domains have also called for more attention on the analysis of the effects of volitional skills on PEB (see de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012 for a review). SC is significantly and positively associated with PEB for both PEB_{low} and PEB_{high}, which indicates its relevance as a predictor of PEB adoption. The direct influence of SC on PEB may be explained by the

fact that it reflects the ability of the individual to inhibit or disrupt automatic habits (Gaspar, 2013) or to forgo short-term gratification (Nielsen, 2019).

Third, the findings show that the magnitude of the effect of the SC component is greater for $PEB_{low.}$ Additionally, based on the value of the explained variance for PEB_{low} compared with a rival model without this component, the explanatory power of the model with SC increases further, which provides evidence of the unique role of dispositional SC for the adoption of PEB_{low}. This finding supports the view that an individual trait such as SC has a stronger influence on behaviours under the volitional control of the individual (Gaspar, 2013) and for which there are fewer external barriers (Gifford, 2011; Gifford & Nilsson, 2014). This result also allows one to understand the determinants that may interact with the disruption of repetitive unsustainable actions so that behavioural change can be more easily promoted (Gregory & Leo, 2003). Consistent with past meta-analyses (Armitage & Conner, 2001; Conner, 2020), the results of this study show that PBC is not more explicative of behaviours under greater volitional control, as was originally defended (Ajzen, 1985); on the contrary, our results show that SC and not PBC is more strongly associated with these behaviours.

The adoption of PEB requires the elimination of unsustainable repetitive actions, which, in turn, demands behavioural maintenance. The change of this type of routine action is greatly facilitated by SC, whereas one-time choice behaviours (e.g., installing solar panels) may be more influenced by other variables, such as intentions (Gifford, Kormos, & McIntyre, 2011). Indeed, past research shows a medium-to-strong effect of SC on automatic behaviours compared with a small effect on those behaviours requiring high deliberation and intention (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). This can explain the lesser effect of SC for PEB_{high}. In sum, we suggest that the inclusion of a volitional skill such as SC increases the explicative ability beyond motivational variables and measures of control beliefs.

3.5.2. Conclusions, contributions, and implications

This study responds to calls to further explain the environmental attitude-behaviour gap by examining the influence of volitional abilities on behaviour and contributes to elucidating the conditions under which models are more predictive of behaviour through the influence of psychological factors (Gifford, Kormos, & McIntyre, 2011). The role of SC has been differentiated from perceptions of self-ability captured in PBC, a prominent

barrier for PEB adoption identified in the literature (Wynveen & Sutton, 2017). Thus, the examination of volitional factors that may be relevant for the promotion of ongoing behavioural regulation contributes to the efforts of searching for individual factors that can facilitate sustained environmental behaviour over time (Manolas, 2015; Van der Linden, 2015). To the best of our knowledge, this is the first study to show that SC directly relies on PEB, answering past calls for further research (Steg, Shwom, & Dietz, 2018; Passafaro & Livi, 2017). In addition, the exertion of SC implies eliminating the internal constraints that restrain the adoption of PEB (e.g., egoistic patterns) or the barriers inhibiting the behaviour (e.g., habits), an approach from negative determinants of behaviour for which more research has also been called (Gaspar, 2013).

Our study demonstrates the association between SC and PEB, showing that the addition of SC as a direct antecedent of behaviour in the TPB model increases the explained variance, particularly for behaviours that rely more upon one's control. Only recently has the focus been placed on addressing the barriers that affect our everyday lives and our present and future behaviour (Heckhausen & Heckhausen, 2018). Therefore, the study of individual volitional skills provides a deeper examination of the components that still lack the attention they deserve (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012).

Our study contributes to the literature on environmental behaviour by testing individual volitional components to assess if they promote greater progress in the understanding and adoption of PEB compared to the overemphasis of motivational approaches (Passafaro & Livi, 2017; Steg, Shwom, & Dietz, 2018). Our research also contributes to the broad stream of literature about individual differences in the context of PEB (Gifford & Nilsson, 2014). Whereas past studies have identified traits associated with greater motivation for PEB adoption, such as values, personality traits or environmental beliefs (Bratanova, Loughnan, & Gatersleben, 2012; De Groot & Steg, 2007), this study highlights the importance of volitional traits to explain the difference between environmentally responsible and less responsible individuals.

Some implications for policymakers and educators can also be offered. There have been calls for strategies to overcome barriers to specific pro-environmental behaviours and the implementation of interventions to encourage individual behaviour change (Gifford, 2011). Given that SC is a malleable ability, it can be exercised through practice in

different aspects of life (Baumeister, Gailliot, DeWall, & Oaten, 2006; Muraven & Baumeister, 2000). There are two main routes to improve SC (Beames, Schofield, & Denson, 2017). The direct route involves SC training interventions in which the individual exercises behavioural or cognitive routine tasks that require SC. Several meta-analyses have shown that such interventions are significantly effective in increasing SC levels, and their effect is transferred to unrelated SC domains, such as healthy eating or academic performance (Beames, Schofield, & Denson, 2017; Hagger, Wood, Stiff, & Chatzisarantis, 2010). The indirect route includes interventions that enhance SC by improving executive functions (e.g., attentional shifting and control, cognitive flexibility, and planning) that jointly facilitate SC (Diamond, 2013). For instance, mindfulness-based interventions have been shown to improve specific aspects of executive function and, in particular, SC (Chiesa, Calati, & Serretti, 2011; Tang, Yang, Leve, & Harold, 2012).

All these interventions may be easily implemented in an educational setting and can inform policymakers about the design of new strategies for the promotion of PEB actions that incorporate the role of the individual capacity of SC to break learned habits and adopt sustainable behaviours. Indeed, given that SC facilitates consistency in a wide range of individual behaviours, it creates a beneficial synergy that leads to the suggestion that the training of this ability should be further incorporated into other domains (Corno, 2001; Kerret, Orkibi, & Ronen, 2016; Redondo & Puelles, 2017). Moreover, although our results demonstrate the association between SC and PEB, other studies have shown that SC positively affects individual well-being (Hofmann et al., 2014) by bringing personal and societal interests together (Nielsen, 2017). Thus, any initiative oriented towards increasing SC could contribute to escalating PEB, but it will also positively affect citizens' wellbeing, achieving the double dividend of societal and individual welfare (Nielsen, 2017).

3.5.3. Limitations and future lines of research

This study is not without limitations. First, this is a correlational study based on self-reported measures. Further research is needed on the use of other types of techniques or, at least, on their combination with other types of data sources. Calls have been made for experimental studies to assess a measure of actual control, although important methodological limitations are acknowledged (Lange, Steinke, & Dewitte, 2018). Another methodological consideration is the cross-sectional nature of this study, which

may not determine causality. Limitations also include concerns about the generalizability to other samples considering that perceptions of environmental problems and the relevance of behaviours may differ based on cultural backgrounds. We also acknowledge that SC cannot be interpreted in isolation. Behaviours without external barriers may be hindered by other psychological barriers, such as a limited intellectual capacity, which may complicate the projection of personal and future welfare (Gifford, 2011). Empirical studies are needed to understand the interrelationships of these multiple variables.

Some future lines of research are suggested in relation to the spillover effects between PEB actions. Positive spillover effects between PEB_{low} and PEB_{high} are more likely when individuals have an internal locus of control (Steg, Perlaviciute, & van der Werff, 2015). To tackle environmental problems, the attribution of one's actions as a fundamental step of the solution to environmental problems is needed (Truelove et al., 2014). Therefore, enhancing SC may help to reinforce an environmentally responsible identity since SC would facilitate the gradual adoption of PEB actions. Indeed, there is evidence that consistently acquiring a primary set of behaviours, such as conservation behaviours, may leverage the adoption of more long-term PEB actions, facilitating gradual coherence between intentions and behaviour (Nilsson, Bergquist, & Schultz, 2017). Thus, SC helps not only to promote the initial adoption of PEB actions but also to maintain them over time. The circumstances under which PEB maintenance may be better enhanced by SC should be further addressed.

3.6. References

Abrahamse, W., & Steg, L. (2011). Factors related to household energy use and intention to reduce it: The role of psychological and socio-demographic variables. *Human Ecology Review*, 30-40. Retrieved April 25th, 2020, from https://www.jstor.org/stable/24707684

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (11-39). Berlin, Heidelberg: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1. *Journal of applied social psychology*, *32*(4), 665-683.

Ajzen, I. (2006). Constructing a TPB questionnaire: Conceptual and methodological considerations [Document file]. Retrieved February 26th, 2019, from http://www.people.umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I. (2015). The theory of planned behaviour is alive and well, and not ready to retire: a commentary on Sniehotta, Presseau, and Araújo-Soares. *Health psychology review*, *9*(2), 131-137.

Ajzen, I., & Driver, B. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, *24*(3), 207-224.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103(3)*, 411-423.

Arango, A. C., & Mesías, J. T. (2015). Lealtad a la práctica deportiva: Una aplicación de la TPB a los servicios públicos para la práctica deportiva. *SPORT TK-Revista EuroAmericana de Ciencias del Deporte*, *4*(1), 29-40.

Armitage, C. J., & Conner, M. (1999). The theory of planned behaviour: Assessment of predictive validity and perceived control. *British journal of social psychology*, *38*(1), 35-54.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British journal of social psychology*, *40*(4), 471-499.

Aschemann-Witzel, J., & Niebuhr Aagaard, E. M. (2014). Elaborating on the attitude–behaviour gap regarding organic products: young Danish consumers and in-store food choice. *International Journal of Consumer Studies*, *38*(5), 550-558.

Awang, Z. (2014). *A handbook on SEM for academicians and practitioners: the step by step practical guides for the beginners*. Bandar Baru Bangi, MPWS Rich Resources.

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of environmental psychology*, *27*(1), 14-25.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.

Baumeister, R. F., Gailliot, M., DeWall, C. N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of personality*, *74*(6), 1773-1802.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current directions in psychological science*, *16*(6), 351-355.

Beames, J., Schofield, T. P., & Denson, T. F. (2017). A meta-analysis of improving self-control with practice. In D.T. de Ridder, M. Adriaanse, K. Fujita (Eds.), *International Handbook of Self-control in Health and Well-being* (pp. 405-417). Abingdon Oxford: Routledge.

Bratanova, B., Loughnan, S., & Gatersleben, B. (2012). The moral circle as a common motivational cause of cross-situational pro-environmentalism. *European Journal of Social Psychology, 42*(5), 539-545.

Bray, J., Johns, N., & Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. *Journal of business ethics, 98*(4), 597-608.

Calder, B. J., Phillips, L. W., & Tybout, A. M. (1983). Beyond external validity. *Journal of Consumer Research, 10*(1), 112-114.

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of business ethics, 97(*1), 139-158.

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2014). Lost in translation: Exploring the ethical consumer intention–behavior gap. *Journal of Business Research, 67*(1), 2759-2767.

Chan, L., & Bishop, B. (2013). A moral basis for recycling: Extending the theory of planned behaviour. *Journal of Environmental Psychology, 36*, 96-102.

Chiesa, A., Calati, R., & Serretti, A. (2011). Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. *Clinical psychology review, 31*(3), 449-464.

Chin, W.W. (1998). The partial least squares approach for structural equation modeling. In G.A. Macoulides (Ed.), *Modern methods for business research* (pp. 295–336). Mahwah, NJ: Lawrence Erlbaum Associates.

Chuang, Y., Xie, X., & Liu, C. (2016). Interdependent orientations increase pro-environmental preferences when facing self-interest conflicts: The mediating role of self-control. *Journal of Environmental Psychology, 46*, 96-105.

Clement, C., Henning, J. B., & Obbaldiston, R. (2014). Integrating factors that predict energy conservation: The theory of planned behavior and beliefs about climate change. *Journal of Sustainable Development, 7*, 46–59.

Conner, M. (2020). Theory of Planned Behavior. In G. Tenenbaum & R.C. Eklund (Eds), *Handbook of Sport Psychology, 3* (4th ed.). Hoboken, NJ: John Wiley & Sons

Corno, L. (2001). Volitional aspects of self-regulated learning. In B.J. Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 191–226). Mahwah, NJ: Lawrence Erlbaum Associates.

De Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology, 37*(8), 1817-1836.

de Ridder, D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review*, *16*, 76–99.

de Young, R. (2000). New ways to promote proenvironmental behavior: Expanding and evaluating motives for environmentally responsible behavior. *Journal of social issues*, *56*(3), 509-526.

Diamond, A. (2013). Executive functions. *Annual review of psychology*, *64*, 135-168.

Eichhorn, B. R. (2014). Common method variance techniques. *Cleveland State University, Department of Operations & Supply Chain Management*. Cleveland, OH: SAS Institute Inc.

Fitch, J. L., & Ravlin, E. C. (2005). Willpower and. perceived behavioral control: Influences on the intention-behavior relationship and postbehavior attributions. *Social Behavior and Personality: an international journal*, *33*(2), 105-124.

Frantz, C. M., & Mayer, F. S. (2009). The emergency of climate change: Why are we failing to take action? *Analyses of social issues and public policy*, *9*(1), 205-222.

Garay, L., Font, X., & Corrons, A. (2019). Sustainability-oriented innovation in tourism: An analysis based on the decomposed theory of planned behavior. *Journal of Travel Research*, *58*(4), 622-636.

Gaspar, R. (2013). Understanding the reasons for behavioral failure: a process view of psychosocial barriers and constraints to pro-ecological behavior. *Sustainability*, *5*(7), 2960-2975.

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American psychologist*, *66*(4), 290.

Gifford, R., Kormos, C., & McIntyre, A. (2011). Behavioral dimensions of climate change: drivers, responses, barriers, and interventions. *Wiley Interdisciplinary Reviews: Climate Change*, *2*(6), 801-827.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology*, *49*(3), 141-157.

Gregory, G. D., & Leo, M. D. (2003). Repeated behavior and environmental psychology: the role of personal involvement and habit formation in explaining water consumption 1. *Journal of Applied Social Psychology*, *33*(6), 1261-1296.

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. (2010). Ego depletion and the strength model of self-control: a meta-analysis. *Psychological bulletin*, *136*(4), 495.

Haws, K., Davis, S., & Dholakia, U. (2016). Salad= success and fries= failure? Conceptualizing and assessing self-control outcome measures in food decision-making research. *Journal of Consumer Behaviour*, *15*(2), 99-116.

Heckhausen, J., & Heckhausen, H. (2018). Motivation and action: Introduction and overview. In *Motivation and action* (pp. 1-14). Springer, Cham.

Hidalgo, M. C., Hernández, B., Lambistos, M. J., & Pisano, I. (2011). Evaluating pro-environmental behavior: differences between low-and high-involvement behaviors. *International Journal of Hispanic Psychology, 4*(1), 45-54.

Hiller, A. (2011). Climate change and individual responsibility. *The Monist, 94*(3), 349-368. Retrieved April 26th, 2020, from http://www.jstor.org/stable/23039149

Hofmann, W., Luhmann, M., Fisher, R. R., Vohs, K. D., & Baumeister, R. F. (2014). Yes, but are they happy? Effects of trait self-control on affective well-being and life satisfaction. *Journal of personality, 82*(4), 265-277.

Hu, R., & Gill, N. (2016). Garden-related environmental behavior and weed management: An Australian case study. *Society & natural resources*, *29*(2), 148-165.

Jackson, T. (2005). *Motivating Sustainable Consumption: a Review of Evidence on Consumer Behaviour and Behavioural Change*, report to the Sustainable Development Research Network (SDRN). SDRN: Surrey, UK.

Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. *International Strategic management review, 3(*1-2), 128-143.

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of applied social psychology, 33*(3), 586-603.

Kaiser, F. G., Hübner, G., & Bogner, F. X. (2005). Contrasting the theory of planned behavior with the value-belief-norm model in explaining conservation behavior. *Journal of applied social psychology, 35*(10), 2150-2170.

Kaiser, F. G., Schultz, P. W., & Scheuthle, H. (2007). The Theory of Planned Behavior Without Compatibility? Beyond Method Bias and Past Trivial Associations. *Journal of Applied Social Psychology*, *37*(7), 1522-1544.

Kerret, D., Orkibi, H., & Ronen, T. (2016). Testing a model linking environmental hope and self-control with students' positive emotions and environmental behavior. *The Journal of Environmental Education*, *47*(4), 307-317.

Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global environmental change*, *23*(5), 1028-1038.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental education research*, *8*(3), 239-260.

Kotabe, H. P., & Hofmann, W. (2015). On integrating the components of self-control. *Perspectives on Psychological Science*, *10*(5), 618-638.

Kurisu, K. (2015). Behavior model development for understanding PEBs. In *Pro-environmental Behaviors* (pp. 47-62). Springer, Tokyo.

Lacroix, K., & Gifford, R. (2018). Psychological barriers to energy conservation behavior: The role of worldviews and climate change risk perception. *Environment and Behavior*, *50*(7), 749-780.

Lange, F., Steinke, A., & Dewitte, S. (2018). The Pro-Environmental Behavior Task: A laboratory measure of actual pro-environmental behavior. *Journal of Environmental Psychology, 56*, 46-54.

Lavelle, M. J., Rau, H., & Fahy, F. (2015). Different shades of green? Unpacking habitual and occasional pro-environmental behavior. *Global Environmental Change, 35*, 368-378.

Lin, L. C., Huang, P. H., & Weng, L. J. (2017). Selecting path models in SEM: A comparison of model selection criteria. *Structural Equation Modeling: A Multidisciplinary Journal*, *24*(6), 855-869.

Lindenberg, S. (2001). Intrinsic motivation in a new light. *Kyklos*, *54*(2-3), 317-342.

Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social issues, 63*(1), 117-137.

Liobikienė, G., Mandravickaitė, J., & Bernatonienė, J. (2016). Theory of planned behavior approach to understand the green purchasing behavior in the EU: A cross-cultural study. *Ecological Economics*, *125*, 38-46.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global environmental change*, *17*(3-4), 445-459.

Manolas, E. (2015). Promoting pro-environmental behavior: Overcoming barriers. *AEJES, 1*, 13-21.

Manstead, A. S. R. (2011). The benefits of a critical stance: A reflection on past papers on the theories of reasoned action and planned behaviour. *British Journal of Social Psychology, 50*(3), 366-373.

McDonald, S., Oates, C. J., Alevizou, P. J., Young, C. W., & Hwang, K. (2012). Individual strategies for sustainable consumption. *Journal of Marketing Management, 28*(3-4), 445-468.

Miller, Z. D. (2017). The enduring use of the theory of planned behavior. *Human Dimensions of Wildlife*, *22*(6), 583-590.

Muraven, M. (2010). Building self-control strength: Practicing self-control leads to improved self-control performance. *Journal of experimental social psychology, 46*(2), 465-468.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological bulletin, 126(*2), 247.

Nerini, F. F., Tomei, J., To, L. S., Bisaga, I., Parikh, P., Black, M., ... & Milligan, B. (2018). Mapping synergies and trade-offs between energy and the Sustainable Development Goals. *Nature Energy*, *3*(1), 10-15.

Nielsen, K. S. (2017). From prediction to process: A self-regulation account of environmental behavior change. *Journal of Environmental Psychology*, *51*, 189-198.

Nielsen, K. S. (2019). *The Role of Self-regulation in Environmental Behavior Change* (Doctoral dissertation). Retrieved February 1st, 2020, from https://openarchive.cbs.dk/bitstream/handle/10398/9749/Kristian%20Steensen%20Nielsen.pdf?sequence=1

Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: a review and research agenda. *Environmental Education Research*, *23*(4), 573-589.

Notani, A. S. (1998). Moderators of perceived behavioral control's predictiveness in the theory of planned behavior: A meta-analysis. *Journal of consumer psychology*, *7*(3), 247-271.

Nunnally, J.C. (1978), *Psychometric Theory*, 2nd ed., McGraw-Hill Book Company, New York, NY.

Ölander, F. & Thøgersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. *Journal of consumer policy*, *18*(4), 345-385.

Oliva Delgado, A., Hidalgo García, M. V., Moreno Rodríguez, M. D. C., Jiménez García, L., Jiménez Iglesias, A. M., Antolín Suárez, L., & Ramos Valverde, P. (2012). *Uso y riesgo de adicciones a las nuevas tecnologías entre adolescentes y jóvenes andaluces* [Document file]. Retrieved March 4th, 2019 from https://idus.us.es/xmlui/bitstream/handle/11441/67723/uso_riesgo.pdf?sequen

Parkinson, J., David, P., & Rundle-Thiele, S. (2017). Self-efficacy or perceived behavioural control: Which influences consumers' physical activity and healthful eating behaviour maintenance? *Journal of Consumer Behaviour*, *16*(5), 413-423.

Passafaro, P., & Livi, S. (2017). Comparing determinants of perceived and actual recycling skills: the role of motivational, behavioral and dispositional factors. *The Journal of Environmental Education*, *48*(5), 347-356.

Phipps, M., Ozanne, L. K., Luchs, M. G., Subrahmanyan, S., Kapitan, S., Catlin, J. R., Gau, R., Walker, R., Rose, R. L., Simpson, B., & Weaver, T. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. *Journal of Business Research*, *66*(8), 1227-1234.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y. & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879–903.

Redondo, I., & Puelles, M. (2017). The connection between environmental attitude–behavior gap and other individual inconsistencies: a call for strengthening self-control. *International Research in Geographical and Environmental Education*, *26*(2), 107-120.

Rivis, A., Sheeran, P., & Armitage, C. J. (2009). Expanding the affective and normative components of the theory of planned behavior: A meta-analysis of anticipated affect and moral norms. *Journal of applied social psychology*, *39*(12), 2985-3019.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of psychological research online*, *8*(2), 23-74.

Sheeran, P., Trafimow, D., & Armitage, C. J. (2003). Predicting behaviour from perceived behavioural control: Tests of the accuracy assumption of the theory of planned behaviour. *British journal of social psychology*, *42*(3), 393-410.

Si, H., Shi, J. G., Tang, D., Wu, G., & Lan, J. (2020). Understanding intention and behavior toward sustainable usage of bike sharing by extending the theory of planned behavior. *Resources, Conservation and Recycling*, *152*, 104513.

Sniehotta, F. F., Presseau, J., & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health Psychology Review*, *8*, 1–7.

Sopha, B. M. (2011). Literature research on energy behaviour: Behavioural models, determinants, indicators, barriers and interventions. In the *Enova project "Indicators of determinants of household energy behaviours".* Enova, Trondheim, Norway.

Staats, H. (2003). Understanding proenvironmental attitudes and behavior: an analysis and review of research based on the theory of planned behavior. In M. Bonnes, T. Lee & M. Bonaiuto (Eds.), *Psychological theories for environmental issues* (pp. 171–201). Aldershot, UK: Ashgate Publishing

Stadler, G., Oettingen, G., & Gollwitzer, P. M. (2009). Physical activity in women: Effects of a self-regulation intervention. *American journal of preventive medicine*, *36*(1), 29-34.

Steg, L., Perlaviciute, G., & van der Werff, E. (2015). Understanding the human dimensions of a sustainable energy transition. *Frontiers in psychology*, *6*, 805.

Steg, L., Shwom, R., & Dietz, T. (2018). What drives energy consumers? Engaging people in a sustainable energy transition. *IEEE Power and Energy Magazine*, *16*(1), 20-28.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of environmental psychology*, *29*(3), 309-317.

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of social issues*, *56*(3), 407-424.

Stern, P. 2005. "Understanding individuals' environmentally significant behaviour". *Environmental Law Reporter*, *35*(11), 10785–10790.

Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., ... & Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American psychologist*, *66*(4), 241.

Tang, Y. Y., Yang, L., Leve, L. D., & Harold, G. T. (2012). Improving executive function and its neurobiological mechanisms through a mindfulness-based intervention: Advances within the field of developmental neuroscience. *Child development perspectives*, *6*(4), 361-366.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of personality*, *72*(2), 271-324.

Trafimow, D. (2015). On retiring the TRA/TPB without retiring the lessons learned: A commentary on Sniehotta, Presseau and Araújo-Soares. *Health Psychology Review*, *9*(2), 168-171.

Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change, 29*, 127-138.

Van Der Linden, S. (2015). Intrinsic motivation and pro-environmental behaviour. *Nature Climate Change, 5*(7), 612-613.

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*, *30*(3), 305-314.

Wynveen, B. (2013). *Attaining sustainable behavior among non-environmentally-motivated individuals: A formative experiment* (Doctoral dissertation). Retrieved April 26th, 2020, from https://tigerprints.clemson.edu/all_dissertations/1113

Wynveen, C. J., & Sutton, S. G. (2017). Engaging great barrier reef stakeholders: mediation analyses of barriers among the antecedents of pro-environmental behavior. *Human Dimensions of Wildlife, 22*(2), 126-141.

CHAPTER 4

Trait mindfulness and pro-environmental behaviour: an empirical examination of the mediating role of self-control

4.1. Introduction

On these days of environmental crisis, there are a lot of initiatives that have been put forward at institutional and organization levels to promote sustainability transitions (UN, 2015; Tsalis et al. 2020). However, an individual-centric approach has also claimed to be critical (Droz, 2020). This individual approach has even been suggested as a more contemporary view to addressing sustainability challenges (Sachs et al. 2019). However, in the research area, attempts to reflect this view in behaviour models are still scant (Vermeir et al., 2020).

Thus, the examination of drivers that could promote pro-environmental behaviour (PEB hereafter), defined as a "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002:240), seems to be central. There is an extant stream of research in this respect (see Gifford & Nilson, 2014; White, Habib, & Hardisty, 2019 for reviews). However, motivational factors seem to have been overemphasized even though individual's will, although important, seems not sufficient for behaviour change (Carrington, Neville, & Whitwell, 2010), a limitation that has been largely discussed in the literature (ElHaffar, Durif, & Dubé, 2020).

The theory of planned behaviour (TPB hereafter) has been widely used for the explanation of PEB although not without limitations (Sniehotta, Presseau, & Araújo-Soares, 2014). It has been criticized for aspects such as its inconsistencies in the predictive ability of behaviour, the so-called intention-behaviour gap (Carrington, Neville, & Whitwell, 2010) therefore, not fully capturing volitional control over behaviour (Parkinson, David, & Rundle-Thiele, 2017); or for being too rational, so that other processes such as emotional factors are not considered (Sniehotta, 2009).

In this study, it is argued that a measure of volitional control, namely self-control (SC hereafter) may help to counteract the internal barriers that inhibit the performance of PEB. SC is described as "the self's capacity to override or change one's inner responses, as well as to interrupt undesired behavioural tendencies and to refrain from acting on them" (Tangney, Baumeister, & Boone, 2004, 274). In this study, SC is used as a measure of

actual control, which differs from the measure of *control belief* captured in the perceived behavioural control component of the TPB model (PBC hereafter).

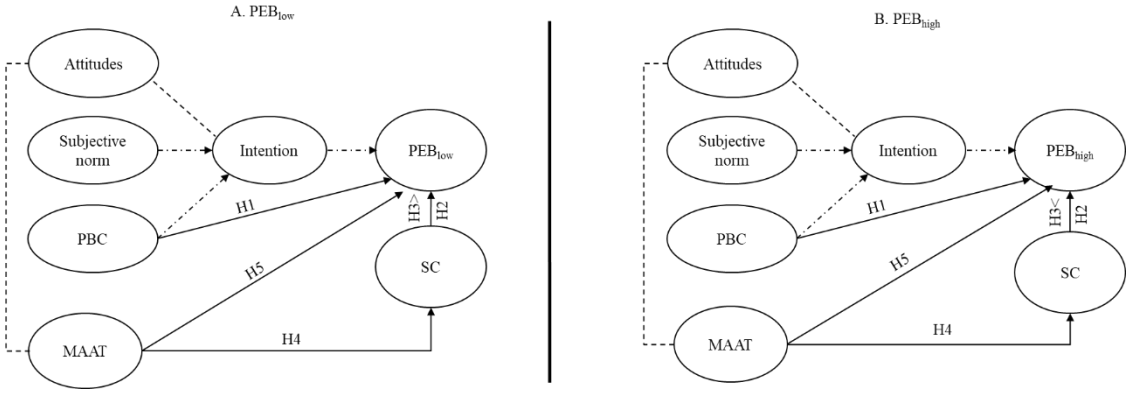
It is also argued that SC may be enhanced through mindfulness-as-a-trait (MAAT hereafter). MAAT is described as an inner disposition that individuals possess to a greater or lesser extent and that enhances the awareness of one's daily experience through a deliberate, particular attention and purpose reflection on automatic patterns of our internal and external experiences (Fischer et al., 2017). Thus, MAAT comprises three behavioural elements: a deliberate intention, attention, and attitude (Shapiro et al., 2006) for which it has been suggested as a promising driver of the adoption of PEB (see Ericson, Kjønstad, & Barstad, 2014; Richter & Hunecke, 2020; Thiermann & Sheate, 2020 for reviews). MAAT has been associated with a better executive functioning trough emotional, attentional and inhibitory control, helping to enhance individual SC by avoiding negative thinking, rumination, and reactivity (Bahl et al., 2016; Elkins-Brown, Teper, & Inzlicht, 2017; Shapiro et al., 2006).

Additionally, although past studies have studied MAAT as an indirect predictor of PEB (Ricther & Hunecke, 2020), to further bridge the gap between the intention and the environmental behaviour, a direct relationship is also examined. By adding MAAT to the TPB model, cognitive and emotional factors are considered as well as the existence of possible individual determinants of attitudes, subjective norms and PBC. Both aspects need to be addressed (Ajzen, 2011; Sniehotta, 2009). In turn, the addition of MAAT to the model may help to further enhance the explained variance of PEB, over and beyond the potential increase obtained by the inclusion of SC.

Therefore, both components, MAAT and SC could facilitate the promotion of PEB while increasing the predictive validity of the TPB model. However, their influence on PEB may vary. In those behaviours, such as turning off the lights (PEB_{low}), where low external barriers and cognitive processes are affecting automatic patterns as proximal determinants of individual behaviours, the role of SC may differ as well as its enhancement by a mindful disposition. However, on some other behaviours with higher external barriers, such as buying environmentally friendly products (PEB_{high}), where a more emotional regulation is expected to act under one's values, the influence of SC may be less determinant (Wittmann & Sircova, 2018).

Based on this, it is hypothesized that SC will predict PEB more accurately than PBC (H1) and that SC will act as an antecedent of PEB increasing the predictive validity of the TPB model (H2). It is also expected that the influence of SC will be greater for PEB_{low} than for PEB_{high} (H3). By adding the MAAT component to the TPB model, it is also hypothesized that MAAT will indirectly influence PEB through the mediation role of SC (H4) while accounting for the influence of MAAT on individual's attitudes and the direct relationship between MAAT and PEB. Moreover, given that MAAT would have a direct influence on behaviour, we further hypothesize that the addition of MAAT will help to further increase the explained variance of PEB (H5). A visual representation of the conceptual model is offered in *Figure 9.*

Figure 9. Conceptual model



Through our work, we contribute to the literature of transformative consumer research given that, alternative ways of promoting PEB are offered, as well as on education on sustainable development so that components such as MAAT can be further studied to facilitate environmental behaviour change from its roots[5].

[5] Given that the first three hypotheses were empirically examined in the previous chapter, this research focuses on the mediation role of SC on PEB by adding MAAT to the TPB model. Therefore, the last two hypotheses are discussed next.

4.2. Method

A survey was administered to a convenience sample of 412 participants (299 women) with a mean age of 45.9 years. TPB was measured by following the instructions of the theory of planned behaviour (TPB; Ajzen, 2006). The 16-items were adapted to environmental behaviours using a 5-point Likert scale. The translation into Spanish by Arango & Mesías (2015) was used. SC was measured through the Brief Self-control Scale (BSCS; Tangney, Baumeister, & Boone, 2004) of 13 items on a 5-point Likert scale translated into Spanish by Oliva et al. (2012). MAAT was measured by using the FFMQ scale's short-form (FFMQ-SF; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011) translated into Spanish by Cebolla et al. (2012). Participants were asked on a 5-point Likert scale. PEB was operationalized through the Whitmarsh & O'Neill scale (2010) on a 4-point Likert scale. The translation into Spanish was carried out by the study authors. The 12 items were classified into two types of behaviours: PEB_{low} and PEB_{high} so that differential effects could be examined. As per the analysis, structural equation modelling (SEM) was used to analyse the data following a two-step approach (Anderson & Gerbing, 1988). We first ensure reliability and convergent and discriminant validity of the measurement model, determined by (1) Cronbach's alpha and composite reliability of the scales (Hair et al., 2012); (2) the factor loadings above the minimum range recommended (Hair et al., 2006); and (3) the value of the correlation of all variables below 0.80 (Awang, 2014). Then, we proceed with the examination of the structural model.

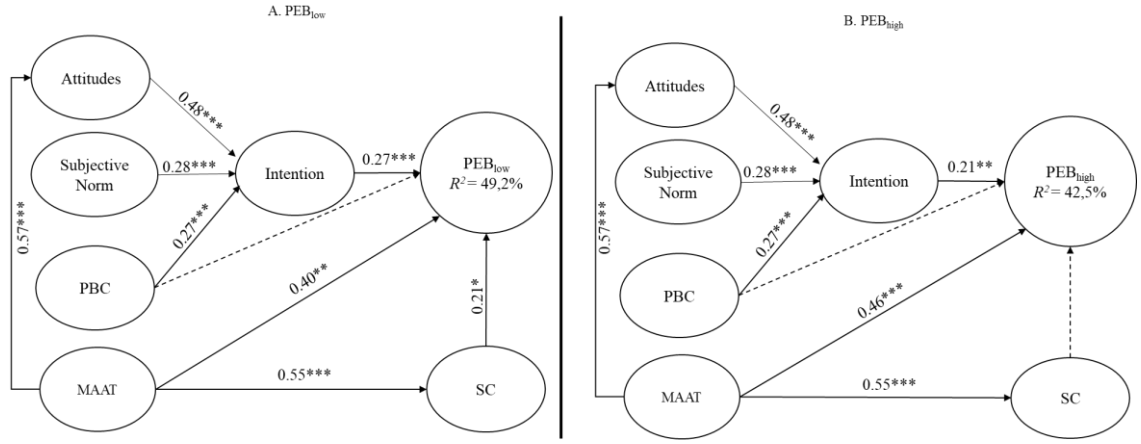
4.3. Results

After a confirmatory factor analysis, the non-judging facet of the FFMQ scale was removed given that a four-facet scale yielded a better fit, a result that is supported in past literature (Lilja et al., 2011). Cronbach's alpha and composite reliability of the scales were assessed: TPB components of intentions (α = 0.92 *CR* = 0.93), attitudes (α = 0.85; *CR* = 0.85), subjective norm (α = 0.79; *CR* = 0.82), and PBC (α = 0.81; *CR* = 0.82); SC (α = 0.84; *CR* = 0.83); MAAT (α = 0.86; *CR* = 0.94); PEB_{low} (α = 0.63; *CR* = 0.58) and PEB_{high} (α = 0.72; *CR* = 0.73).

As per the PEB_{low} scale, although it barely met the values recommended (Nunnally, 1978), it was used for the examination of the effects on a subscale level. All remaining indicators yielded good results. Moreover, our two measurement models, PEB_{low} and $PEB_{high.,}$ showed acceptable goodness of fit (CFA PEB_{low}: χ^2 = 2,701.40, *df* = 1,282, χ^2/df = 1.62, *CFI* = 0.91, *TLI* = 0.90, *RMSEA* = 0.04, *RMR* = 0.06; CFA PEB_{high}: χ^2 = 2,202.72, *df* = 1,387, χ^2/df = 1.51, *CFI* = 0.92, *TLI* = 0.91, *RMSEA* = 0.04, *RMR* = 0.05). By looking at the results, it was also shown that for MAAT, gender differences are significant, a personal variability that is supported by previous literature (Stoet et al., 2013).

As per the structural model (see *Figure 10*), the path MAAT→PEB was positive and significant for both types of behaviours as expected (PEB_{low}: β = 0.40; *p* = 0.00; PEB_{high}: β = 0.46; *p* = 0.00) as well as the path MAAT →Attitudes (β = 0.57; *p* = 0.00). With regards to the indirect influence of MAAT on PEB mediated by SC, we first look at the path MAAT →SC. The relationship between MAAT and SC was significant and positive ($PEB_{low/high}$; β = 0.55; *p* = 0.00). However, the indirect relationship between MAAT on PEB is only significant for PEB_{low} (β = 0.19; *p* = 0.00). Therefore, these findings provide evidence about differences regarding the type of PEB. We also tested the total effects of the path MAAT→PEB. The value of standardized total effects (direct and indirect) for PEB_{low} was 0.59, slightly greater than for PEB_{high} (0.54) given that, although the direct path MAAT →PEB was greater for PEB_{high}, the relationship between SC and PEB was greater and significant only for PEB_{low}. Finally, to examine our last hypothesis (H5), two competing models were examined, one with the SC component and the second with the incremental inclusion of MAAT. This inclusion of MAAT increased the explained variance of PEB_{low} from 38% to 49.2% with a significant improvement in the model fit ($\Delta\chi$^2 = 173.15, Δdf = 3, *p* = 0.00) and of PEB_{high} from 31.2% to 42.5% ($\Delta\chi$^2 = 181.62, Δdf = 3, *p* = 0.00).

Figure 10. Structural model



4.4. Conclusions

Our results support our rationale for the inclusion of MAAT to complement a more rational approach to behaviour. The need for alternative approaches has received calls from the literature so that inner transitions to sustainability are promoted (Ives, Freeth, & Fischer, 2020; Wamsler et al., 2018). While MAAT acts as an antecedent of PEB regulation (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003), the indirect effect of MAAT through the mediating role of SC varies across PEBs. This finding may be explained by the distinction between self-related behaviours (PEB_{low}) and others-related behaviours (PEB_{high}) (Orazi, Chen, & Chan, 2019). While MAAT through SC may change automatic patterns of behaviours related to the self (PEB_{low}), for others-focused environmental actions (PEB_{high}), SC, although needed, may not be enough. Therefore, for PEB_{high}, other psychological mechanisms may be required such as nurturing environmental identity or the training on compassion (Ives, Freeth, & Fischer, 2020) providing the individual with emotional resources that may be needed when considering long-term goals. Finally, the addition of MAAT to the model increased the explained variance of PEB. Thus, although SC contributes to PEB, the combination of cognitive and emotional facets reflected in the MAAT construct helps to further enhance it. Our study contributes to the literature of transformative consumer research as it provides an alternative view to the traditional approaches to education for sustainable consumption (Stanszus et al., 2017), a field of research that seems to be not sufficiently explored (Rosenberg, 2004).

4.5. References

Ajzen, I. (2006). Constructing a TPB questionnaire: Conceptual and methodological considerations [Document file]. Retrieved February 26th, 2019, from http://www.people.umass.edu/aizen/pdf/tpb.measurement.pdf

Ajzen, I. (2011) The theory of planned behaviour: Reactions and reflections. *Psychology & Health, 26*(9), 1113-1127.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin, 103(3)*, 411-423.

Arango, A. C., & Mesías, J. T. (2015). Lealtad a la práctica deportiva: Una aplicación de la TPB a los servicios públicos para la práctica deportiva. *SPORT TK-Revista EuroAmericana de Ciencias del Deporte, 4*(1), 29-40.

Awang, Z. (2014). *A handbook on SEM for academicians and practitioners: the step by step practical guides for the beginners.* Bandar Baru Bangi: MPWS Rich Resources.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment*, *11*(3), 191-206.

Bahl, S., Milne, G. R., Ross, S. M., Mick, D. G., Grier, S. A., Chugani, S. K., Chan, S.S., Gould, S., Cho, Y, Dorsey, J.D., Schindler, R.M., Murdock, M.R., & Boesen-Mariani, S. (2016). Mindfulness: Its transformative potential for consumer, societal, and environmental well-being. *Journal of Public Policy & Marketing, 35*(2), 198-210.

Bohlmeijer, E., Ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form. *Assessment*, *18*(3), 308-320.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology*, *84*(4), 822.

Carrington, M. J., Neville, B. A., & Whitwell, G. J. (2010). Why ethical consumers don't walk their talk: Towards a framework for understanding the gap between the ethical purchase intentions and actual buying behaviour of ethically minded consumers. *Journal of business ethics, 97(*1), 139-158.

Cebolla, A., Garcia-Palacios, A., Soler, J., Guillén, V., Baños, R., & Botella, C. (2012). Psychometric properties of the Spanish validation of the Five Facets of Mindfulness Questionnaire (FFMQ). *The European Journal of Psychiatry*, *26*(2), 118-126.

Droz, L. (2020). Environmental Individual Responsibility for Accumulated Consequences. *Journal of Agricultural and Environmental Ethics, 33*(1), 111-125.

Elkins-Brown, N., Teper, R., & Inzlicht, M. (2017). How mindfulness enhances self-control. In *Mindfulness in social psychology* (pp. 65-78). New York, NY: Routledge.

ElHaffar, G., Durif, F., & Dubé, L. (2020). Towards closing the attitude-intention-behavior gap in green consumption: A narrative review of the literature and an overview of future research directions. *Journal of Cleaner Production*, 122556.

Ericson, T., Kjønstad, B. G., & Barstad, A. (2014). Mindfulness and sustainability. *Ecological Economics*, *104*, 73-79.

Fischer, D., Stanszus, L., Geiger, S., Grossman, P., & Schrader, U. (2017). Mindfulness and sustainable consumption: A systematic literature review of research approaches and findings. *Journal of Cleaner Production*, *162*, 544-558.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology*, *49*(3), 141-157.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice hall.

Hair, J. F., Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long range planning*, *45*(5-6), 320-340.

Ives, C. D., Freeth, R., & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. *Ambio*, *49*(1), 208-217.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental education research*, *8*(3), 239-260.

Lilja, J. L., Frodi-Lundgren, A., Hanse, J. J., Josefsson, T., Lundh, L. G., Sköld, C., Hansen, E., & Broberg, A. G. (2011). Five facets mindfulness questionnaire—reliability and factor structure: a Swedish version. *Cognitive behaviour therapy*, *40*(4), 291-303.

Nunnally, J.C. (1978), *Psychometric Theory, 2nd ed.* New York, NY: McGraw-Hill Book Company.

Oliva Delgado, A., Hidalgo García, M. V., Moreno Rodríguez, M. D. C., Jiménez García, L., Jiménez Iglesias, A. M., Antolín Suárez, L., & Ramos Valverde, P. (2012). *Uso y riesgo de adicciones a las nuevas tecnologías entre adolescentes y jóvenes andaluces* [Document file]. Retrieved March 4th, 2019 from https://idus.us.es/xmlui/bitstream/handle/11441/67723/uso_riesgo.pdf?sequen

Orazi, D. C., Chen, J., & Chan, E. Y. (2019). To Erect Temples to Virtue: Effects of State Mindfulness on Other-Focused Ethical Behaviors. *Journal of Business Ethics*, 1-14.

Parkinson, J., David, P., & Rundle-Thiele, S. (2017). Self-efficacy or perceived behavioural control: Which influences consumers' physical activity and healthful eating behaviour maintenance? *Journal of Consumer Behaviour*, *16*(5), 413-423.

Richter, N., & Hunecke, M. (2020). Facets of Mindfulness in Stages of Behavior Change Toward Organic Food Consumption. *Mindfulness*, *11*(6), 1354-1369.

Rosenberg, E. L. (2004). Mindfulness and consumerism. In T. Kasser & A. D. Kanner (Eds.), *Psychology and consumer culture. The struggle for a good life in a materialistic world, 1st Ed.* Washington, D.C: American Psychological Association.

Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., & Fuller, G. (2019). *Sustainable development report 2019*. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN)

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of clinical psychology*, *62*(3), 373-386.

Sniehotta, F. F. (2009). Towards a theory of intentional behaviour change: Plans, planning, and self-regulation. *British journal of health psychology*, *14*(2), 261-273.

Sniehotta, F. F., Presseau, J., & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health Psychology Review, 8*, 1–7.

Stanszus, L., Fischer, D., Böhme, T., Frank, P., Fritzsche, J., Geiger, S., ... & Schrader, U. (2017). Education for sustainable consumption through mindfulness training: Development of a consumption-specific intervention. *Journal of teacher education for sustainability*, *19*(1), 5-21.

Stoet, G., O'Connor, D. B., Conner, M., & Laws, K. R. (2013). Are women better than men at multi-tasking? *BMC Psychology, 1*(1), 1-10.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of personality*, *72*(2), 271-324.

Thiermann, U. B., & Sheate, W. R. (2020). Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour. *Ecological Economics*, *174*, 106668.

Tsalis, T. A., Malamateniou, K. E., Koulouriotis, D., & Nikolaou, I. E. (2020). New challenges for corporate sustainability reporting: United Nations' 2030 Agenda for sustainable development and the sustainable development goals. *Corporate Social Responsibility and Environmental Management, 27*, 1617-1629.

UN (2015). *Transforming our world: the 2030 Agenda for Sustainable Development.* New York, NY: Division for Sustainable Development Goals.

Vermeir, I., Weijters, B., De Houwer, J., Geuens, M., Slabbinck, H., Spruyt, A., ... & Verbeke, W. (2020). Environmentally sustainable food consumption: A review and research agenda from a goal-directed perspective. *Frontiers in Psychology, 11*, 1603.

Wamsler, C., Brossmann, J., Hendersson, H., Kristjansdottir, R., McDonald, C., & Scarampi, P. (2018). Mindfulness in sustainability science, practice, and teaching. *Sustainability Science, 13*(1), 143-162.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing, 83*(3), 22-49.

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology, 30*(3), 305-314.

Wittmann, M., & Sircova, A. (2018). Dispositional orientation to the present and future and its role in pro-environmental behavior and sustainability. *Heliyon, 4*(10), e00882.

CHAPTER 5

Conclusions

5.1. Introduction

We started this thesis with the observation of that the environmental crisis calls upon greater individual adoption of PEB which, along with organizational and institutional action, will ease the path of the so needed transition to more sustainable lifestyles. It was also discussed that this path is full of complexities which makes the adoption of PEB a goal too difficult or inaccessible to pursue (Prothero et al., 2011). Existing research about the determinants of PEB offers some theoretical and empirical understanding, although motivational approaches have been prioritized (Jackson, 2005; Kurisu, 2015; Wynveen, 2013). Based on existing evidence, an intentional change is required and individuals, although aware of the environmental impact of their behaviour, seem not fully capable of its performance. Following this rationale, this thesis argues that there is a need to focus on those capabilities not sufficiently explored yet, namely, socioemotional and volitional capabilities. Besides, this focus requires an alternative approach that allows to nurture this range of capabilities, that is, mindfulness.

Existing theoretical and empirical research provided some support to the role of mindfulness in nurturing these set of competencies, although a deeper look at its effects on the adoption of PEB seemed missing. Theoretical findings of this thesis have confirmed that mindfulness has the potential to nurture socioemotional competencies, such as emotional regulation and resilience, to a greater extent. Empirical evidence has also supported the role of MAAT as an indirect antecedent on the adoption of PEB, mediated by SC. In particular, the second study shows how the addition of MAAT and SC significantly increases the explained variance of PEB. However, these effects do not apply to all behaviours; thus, the type of PEB moderates the relationship: those PEBs more associated with internal barriers are more influenced by MAAT and SC, compared to PEBs for which there are more external barriers.

As the last step of this thesis, these findings will be discussed. Implications, future lines of research and main contributions will also be presented.

5.2. Empirical, theoretical and managerial contribution

In Chapter 1, a review of studies empirically examining the link between mindfulness and PEB was conducted. As a previous step, to better frame the purpose of this thesis, a comprehensive summary of the determinants of PEB and of the mechanisms that had already been theoretically and empirically proposed to explain the relationship between mindfulness and PEB was offered. By extending previous findings, this thesis' review unveiled some factors and mechanisms that needed further exploration. Inner and outer awareness of factors such as emotion, empathy or compassion was found to be distinctive on the proper development of individual interpersonal competencies along with other factors more related to knowledge, values, or identity. However, they seemed to be underexplored. Based on this, research about the influential effect of mindfulness on determinants of PEB related to self-decentering, reinforcing our self-world connection so that individual behaviour is not fully driven by personal interests, was posited to be worth addressing.

Whereas much research had abounded on the importance of cognitive and motivational constructs to explain PEB, the relevance of socioemotional and volitional individual capabilities has not sufficiently been addressed in past research (Frank, Fischer, & Wamsler, 2019). Additionally, although theoretical mechanisms related to bridge the environmental-behaviour gap had been proposed, a more extensive empirical examination seemed to be needed. Based on existing empirical evidence, the study of central components of behavioural self-regulation, such as SC, emerged as a potential line of research. Therefore, based on these findings and existing research about the role of mindfulness as a self-regulation strategy, a closer look at the role of SC on PEB and the influence of mindfulness on this relationship seemed to need further examination. Together, the influence of mindfulness on socioemotional competencies and SC were stated as the central focus of this thesis.

Therefore, in Chapter 2, a systematic review and a meta-analysis of the state of the art on the acquisition of socioemotional competencies through mindfulness interventions was carried out. To do this, the framework of competencies formulated by Wiek,

Withycombe, & Redman (2011) was followed. Mindfulness practice was suggested as an alternative strategy for the acquisition of this set of competencies. Thus, existing evidence showed how mindfulness interventions not only benefited individuals via cognitive enhancement but also via affective factors that are involved in the daily performance of individual behaviours (Siquiera & Pitassi, 2016). Hence, findings showed that mindfulness helped to improve learning processes (Brendel, Hankerson, Byun, & Cunningham, 2016), cognitive resilience (Bluth & Eisenlohr-Moul, 2017), interpersonal relationships (Coatsworth et al., 2015), compassion (Hildebrandt, McCall, & Singer, 2017), empathy (Schonert-Reichl et al., 2015) or emotional control (de Carvalho, Pinto, & Maroco, 2017) among other aspects. As a result of the review, three potential mechanisms were identified through which the practice of mindfulness could be an effective intervention, namely, emotional regulation, empathy and social connectedness, and resilience. Additionally, the overall results of the meta-analysis showed that the effect of mindfulness practices was relatively small. Although this finding is in line with previous evidence (Kreplin, Farias, & Brazil 2018; Luberto et al., 2018; Waters, Barsky, Ridd, & Allen, 2015), the size of this effect varies. Thus, the effect was stronger for emotional regulation which is particularly relevant in times of greater stress and increasing demands (Shankland & Rosset, 2017).

Once the acquisition of socioemotional skills needed for the promotion of sustainability transitions was explored, the next study, Chapter 3, focused on volitional competencies. As it has been widely discussed in the literature, a greater intention does not necessarily lead to the adoption of a behaviour (Webb & Sheeran, 2006), a gap that is especially relevant in the context of PEB (Nielsen, 2017). The study of the volitional aspects of behaviour also stemmed from a lack of research in this field (Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017). These factors include not only aspects such as the disruption of habits or automatic behaviours (Tripathi & Singh, 2016) but also the control of emotions or the reflection on our cognitive biases, among others (White, Habib, & Hardisty, 2019). Based on the central components of mindfulness, particularly an enhanced awareness, mindfulness has been posited as a promising tool for behavioural regulation. Thus, the study of how mindfulness as a personal trait of the individual (MAAT) might promote PEB through the regulation of cognitive and affective processes, specifically from the individual's capacity for SC, was proposed. Particularly, the role of

mindfulness and SC as predictors of PEB, and mindfulness mediated by SC were examined.

The findings of this study provided empirical support to the formulated hypotheses. As a first step (Chapter 3), the role of SC as a direct antecedent of PEB was examined providing evidence of its beneficial effects although the effect size of this influence varies. While those PEBs more affected by internal barriers (e.g., saving water) were more explained and affected by SC, those under the influence of mainly external barriers (e.g., participating in environmental protests) may require to be complemented by other factors. Therefore, the type of PEB was found to moderate the effect between SC and PEB.

Additionally, the inclusion of MAAT as an antecedent of PEB added more predictability to the adoption of this behaviour while the effects on SC remained supported (Chapter 4). Thus, given that research about mindfulness and actual engagement in PEB is limited (Barbaro & Pickett, 2016), this thesis provides empirical evidence about how to bridge this gap. Together, these findings empirically showed how the influential effects of both components, MAAT and SC, on PEB, may allow individuals to modify their behaviour to adapt it to their ideals, values, morality and social expectations, thereby contributing to the individual adoption of PEB and, in turn, to individual wellbeing, given the already-proven effects of mindfulness to this respect (Brown & Kasser, 2005; Jacob, Jovic, & Brinkerhoff, 2009).

Overall, the findings of this thesis enable the deployment of strategies for the individual behaviour change that the current environmental crisis demands by focusing on our inner selves. In short, turning inward to act outward. In doing so, not only recent calls about the relevance of inner transitions to sustainability are answered (Chan, 2019; Ives, Freeth, & Fischer, 2020; Jacob, Jovic, & Brinkerhoff, 2009; Wamsler et al., 2018), but also a contribution to specific sustainability goals is offered. Particularly, this thesis attends to the promotion of more sustainable consumption behaviours stated in the 12th objective of the sustainable development goals (UNESCO, 2017).

In sum, this thesis aimed to make a triple contribution. First, to the transformative consumer research literature, informing the design of strategies that allow the promotion of PEB as the only possible behaviour in contrast with today's unsustainable lifestyles. Second, to the ESD literature, providing insights that may inform the training required in students for the development of socioemotional and volitional skills that along with

academic competencies allow the full development of the individual. Third, to the mindfulness literature, which benefits, both as a trait and as an intervention, have been shown.

Concerning managerial implications, some recommendations based on the empirical findings of this thesis are offered. In Chapter 2, the findings of the meta-analysis may inform future PEB adoption strategies. Given that mindfulness interventions in the domain of socioemotional competencies showed bigger effects on empathy and social connectedness and that these two factors are determinant of our relationship with others, future mindfulness-based strategies may help to address the shortcomings here described. For this purpose, in Chapter 1 some recommendations based on findings on experimental research were offered. Furthermore, based on the findings of Chapter 3 and 4 and given that MAAT and SC are malleable traits (Baumeister, Gailliot, DeWall, & Oaten, 2006; Kiken, Garland, Bluth, Palsson, & Gaylord, 2015; Muraven & Baumeister, 2000), they can both further be trained through mindfulness interventions, so that behaviour change can be sustained over time.

Mindfulness-based interventions in specific contexts such as ESD should also be further encouraged so that determinant factors on the process of behaviour adoption and change, particularly, socioemotional competencies and SC, are cultivated at their roots. Thus, based on the findings of this thesis, mindfulness training in ESD is posited as a feasible and promising approach to engage with students in improving SC and further develop cognitive and socioemotional competencies through longer and regular mindfulness interventions (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018). Hence, climate educational programs have already proved successful in this regard (Grabow et al., 2018). Moreover, within educational settings, mindfulness has the potential to promote integral change given that not only learning goals are better achieved through an enhancement of cognitive functioning (Yeganeh & Kolb, 2009), but also self-awareness and inner reflection are promoted so that the conflicts that may arise during this process of behavioural change are soothed (Sermboonsang, Tansuhaj, Silpakit, & Chaisuwan, 2020). Therefore, both key parts of behavioural change, that is, conscious increase awareness as well as critical self-reflection, are benefited (Moore, 2005).

Additionally, based on qualitative assessment on sustainable consumption contexts, students are opened to share their feelings, thoughts, and overall reflections of their

current behaviour (Böhme, Stanszus, Geiger, Fischer, & Schrader, 2018; Stanszus, Frank, & Geiger, 2019). Hence, educators are encouraged to provide opportunities to students to fully promote their awareness and to provide the proper settings to offer room for these sharing experiences. Based on this, the role of educators needs also to be emphasized. Educators themselves should experience the potential benefits of mindfulness firsthand so that they could better comprehend their implications and therefore, better guide their students (Schonert-Reichl & Lawlor, 2010).

Taken together, these findings attend to calls made by previous studies by allowing a further understanding of the interpersonal and intrapersonal determinants comprised in PEB (Bamberg & Möser, 2007; Barbaro & Pickett, 2016). Inner emotions as well as greater empathy and social connectedness play a significant role in the adoption of PEB (Cameron & Fredrickson, 2015). The focus on the educational field as a suitable setting for the implementation of mindfulness interventions and cultivation of MAAT, specifically on ESD, answers to calls for more scientific research on mindfulness in this context, especially when it seems to have decreased over the years. Only 23 out of 96 articles framed within the field of social sciences in the education sector, referred applications in the university environment (De la Fuente-Anuncibay, González-Barbadillo, González-Bernal, Cubo, & PizarroRuiz, 2019). All these implications also attend to calls not only about the cultivation of an overall PEB but also certain domains such as prosocial behaviours (Cameron & Fredrickson, 2015) essential in the relationships between students, their peers, and families (Goldsmith, 2015).

Additionally, although mindfulness has been suggested to have the ability to inhibit automatic behaviours and transform intentions into actions (Shapiro, Carlson, Astin, & Freedman, 2006; Dhandra, 2019), this potential effect of mindfulness on PEB has yet to be tested. Thus, although to achieve the demands of sustainability transitions a substantial change of our current lifestyles is needed, the cultivation of volitional skills such as SC may be a successful step forward (Dhandra, 2019). Moreover, the enhancement of SC for PEB may promote beneficial spillovers such as greater individual wellbeing (Allen & Paddock, 2015).

Therefore, the findings of this thesis are in line with existing evidence that claims that PEB and wellbeing should not be seen in conflict (Brown & Kasser, 2005; Dhandra, 2019). A change of existing intrinsic values (e.g., materialism), so that individuals seek

the sources of their wellbeing in non-material sources, such as a closer relationship with nature, results in personal, nature and societal wellbeing (Dhandra, 2019; Ericson, Kjnstad, & Barstad, 2014), that is, a triple dividend. Foremost, through mindfulness, this triple achievement may be effortless achieved given that it helps to cultivate key aspects such as mindful awareness (Jacob, Jovic, & Brinkerhoff, 2009) or attentional capacity (Jha, Krompinger, & Baime, 2007) which in turn replenish individual emotional regulation (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003) and self-regulatory capacity (Friese et al., 2002). Therefore, this thesis offers some empirical evidence attending to calls to the need for more empirical research in this respect (Orazi, Chen, & Chan, 2019).

5.3. Limitations

This thesis presents some limitations that should be noted, some of them previously discussed, First, in Chapter 1, the number of studies selected may have limited the scope of the review given that mindfulness at the workplace was not included, Besides, the search methodology included a string of keywords that may have missed some relevant studies. However, it should be considered that the search string was extensive, and it was complemented with a snowballing procedure, both valid methods for conducting a comprehensive literature review (Jalali & Wohlin, 2012).

In Chapter 2, the literature review was complemented with a meta-analysis, which also may present some limitations. Thus, the search strategy was restricted to mindfulness-based interventions and the search string, related to socioemotional competencies, could not be clearly defined given that the terms mentioned in the different frameworks varied, an issue also encountered in some other studies (Giangrande et al., 2019). Limitations regarding the use of interventions are also worth mentioning. There is a high level of heterogeneity between mindfulness procedures (e.g., customization of the programs) and some methodological issues (e.g., measurement timeframes) that restrain the comparability of the conclusions reported, both limitations already noted in previous studies of this kind (Davidson & Kaszniak 2015; Van Dam et al., 2018). However, this issue seems difficult to tackle given that thorough customization is needed to achieve

effective interventions what hinders the feasibility of the comparison of procedures (Waters, Barsky, Ridd, & Allen, 2015).

In Chapter 3 and 4, the nature of the study was correlational which constitutes a limitation given that it is prone to bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Although calls have been made to encourage researchers the implementation of experimental research, the methodological limitations are widely acknowledged (Lange, Steinke, & Dewitte, 2018). Hence, the literature review of Chapter 1 provides additional evidence to this respect given the lack of efficacy of certain interventions (e.g., sustainable consumption) and behavioural measures. Overall empirical conclusions should also be taken with caution given that they do not determine causality. The use of a variety of samples and baseline levels, among other aspects, limits their generalizability.

It is also acknowledged that the core concepts examined in this thesis, mindfulness, socioemotional competencies and SC, cannot be interpreted in isolation. PEB is a complex behaviour that could be influenced by other circumstances such as psychological barriers or cognitive capacities which may difficult the projection of personal and societal benefits (Gifford, 2011).

5.4. Further lines of research

Suggestions about questions to be addressed in future research have already been proposed throughout this thesis. Taken together, the findings offer a closer examination of socioemotional competencies and SC through the lens of mindfulness as determinant individual dispositions for short-term and long-term behaviours. This view from inner dispositions, although claimed in previous studies (Wamsler et al., 2018), should not be interpreted as a neglection of the external barriers affecting individual behaviour. Moreover, the distinctive effects of MAAT on PEB, less or more influence by external barriers, opens avenues for further research about how behaviours upon external barriers should be addressed. To do so and based on existing evidence and the findings of this thesis, future research will require to further address not only the cognitive and socioemotional levels of PEB but also behavioural aspects so that the actual performance of PEB is ensured.

Also, more research about mindfulness intervention procedures within ESD that yet remained underexplored should be addressed. This may include aspects such as the customization of mindfulness programs based on students' baseline awareness and expectations, length of the interventions, measurement of the outcomes or greater guidance during the intervention and at follow up. Based on existing evidence, these factors were posited as major limitations for positive effects (Geiger, Fischer, Schrader, & Grossman, 2020). Thus, informed by the conclusions of this thesis, the implementation of strategies within this specific context of education, namely ESD, is encouraged.

As per the benefits of mindfulness on PEB, more research is needed for the empirical exploration of key factors and their interrelationship. To address this, the use of ad-hoc measurement instruments of mindfulness or behavioural measures of PEB should be further researched, although the limitations of these alternative measurement tools are acknowledged (Bergomi, Tschacher, & Kupper, 2013; Sermboonsang, Tansuhaj, Silpakit, & Chaisuwan, 2020; Vago, Gupta, & Lazar, 2019). Additionally, given that brief mindfulness inductions, albeit from one study (Chan, 2019), showed positive results, further research of such a suitable brief mindfulness intervention is needed. Besides, the lack of examination of formal moderation interacting in the mindfulness and PEB relationship, also calls for further empirical research. Considering the focal constructs of this thesis, it would be interesting to test how socioemotional competencies and SC may interreact in this respect. As an example, the enhancement of socioemotional competencies, through mindfulness practice, such as greater empathy or compassion, may help to close the gap between environmental intentions and PEB. By pursuing this avenue of research, not only would researchers explore relationships not sufficiently addressed but also would do so by joining together individuals and their surroundings in the path to the promotion of sustainability transitions.

Lastly, given that mindfulness and SC can be trained, the enhancement of these abilities has the potential to offer some beneficial spillover effects. Thus, the acquisition of short-term PEBs may nurture the gradual maintenance of behaviours that are good for us, others, and the environment (Nilsson, Bergquist, & Schultz, 2017). More specifically, in educational settings, teacher's and student's mindfulness training may offer some beneficial spillover effects other than the achievement of academic goals (Crain, Schonert-Reichl, & Roeser, 2017). Therefore, the exploration of general spillover effects and their interaction in specific contexts such as ESD should be further addressed.

5.5. References

Allen, T. D., & Paddock, E. L. (2015). How being mindful impacts individuals' work-family balance, conflict, and enrichment: A review of existing evidence, mechanisms and future directions. *Mindfulness in organizations: Foundations, research, and applications*, 213-238.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment, 11*(3), 191-206.

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of environmental psychology, 27*(1), 14-25.

Barbaro, N., & Pickett, S. M. (2016). Mindfully green: Examining the effect of connectedness to nature on the relationship between mindfulness and engagement in pro-environmental behavior. *Personality and Individual Differences*, *93*, 137-142.

Baumeister, R. F., Gailliot, M., DeWall, C. N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality, 74*(6), 1773–1802.

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). The assessment of mindfulness with self-report measures: Existing scales and open issues. *Mindfulness, 4*(3), 191-202.

Bluth, K., & Eisenlohr-Moul, T. A. (2017). Response to a mindful self-compassion intervention in teens: A within-person association of mindfulness, self-compassion, and emotional well-being outcomes. *Journal of Adolescence, 57*, 108-118.

Böhme, T., Stanszus, L. S., Geiger, S. M., Fischer, D., & Schrader, U. (2018). Mindfulness Training at School: A Way to Engage Adolescents with Sustainable Consumption?. *Sustainability, 10*(10), 3557.

Brendel, W., Hankerson, S., Byun, S., & Cunningham, B. (2016). Cultivating leadership Dharma Measuring the impact of regular mindfulness practice on creativity, resilience, tolerance for ambiguity, anxiety and stress. *Journal of Management Development, 35*(8), 1056-1078.

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social indicators research, 74(*2), 349-368.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology, 84*(4), 822.

Cameron, C. D., & Fredrickson, B. L. (2015). Mindfulness facets predict helping behavior and distinct helping-related emotions. *Mindfulness, 6*(5), 1211-1218.

Chan, E. Y. (2019). Mindfulness promotes sustainable tourism: the case of Uluru. *Current Issues in Tourism, 22*(13), 1526-1530.

Coatsworth, J. D., Duncan, L. G., Nix, R. L., Greenberg, M. T., Gayles, J. G., Bamberger, K. T., Berrena, E., & Demi, M. A. (2015). Integrating Mindfulness with Parent Training: Effects of the Mindfulness-Enhanced Strengthening Families Program. *Developmental Psychology 51*(1), 26–35.

Crain, T. L., Schonert-Reichl, K. A., & Roeser, R. W. (2017). Cultivating teacher mindfulness: Effects of a randomized controlled trial on work, home, and sleep outcomes. *Journal of occupational health psychology, 22*(2), 138.

Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *American Psychologist, 70*(7), 581.

de Carvalho, J. S., Pinto, A. M., & Maroco, J. (2017). Results of a Mindfulness-Based Social-Emotional Learning Program on Portuguese Elementary Students and Teachers: A Quasi-Experimental Study. *Mindfulness, 8*(2), 337–350.

De la Fuente-Anuncibay, R., González-Barbadillo, Á., González-Bernal, J., Cubo, E., & PizarroRuiz, J. P. (2019). Mediating effect of mindfulness cognition on the development of empathy in a university context. *Plos one, 14*(4), e0215569.

Dhandra, T. K. (2019). Achieving triple dividend through mindfulness: More sustainable consumption, less unsustainable consumption and more life satisfaction. *Ecological economics, 16*1, 83-90.

Ericson, T., Kjnstad, B. G., & Barstad, A. (2014). Mindfulness and sustainability. *Ecological Economics, 104*, 73–79.

Fischer, D., Stanszus, L., Geiger, S., Grossman, P., & Schrader, U. (2017). Mindfulness and sustainable consumption: A systematic literature review of research approaches and findings. *Journal of Cleaner Production, 162*, 544-558.

Friese, M., Messner, C., & Schaffner, Y. (2012). Mindfulness meditation counteracts self-control depletion. *Consciousness and cognition, 21*(2), 1016-1022.

Geiger, S. M., Fischer, D., Schrader, U., & Grossman, P. (2020). Meditating for the planet: effects of a mindfulness-based intervention on sustainable consumption behaviors. *Environment and Behavior, 52*(9), 1012-1042.

Geiger, S. M., Grossman, P., & Schrader, U. (2019). Mindfulness and sustainability: Correlation or causation?. *Current Opinion in Psychology, 28*, 23-27.

Giangrande, N., R. M. White, M. East, R. Jackson, T. Clarke, M. S. Coste, & Penha-Lopes, G. (2019). A Competency Framework to Assess and Activate Education for Sustainable Development: Addressing the UN Sustainable Development Goals 4.7 Challenge. *Sustainability, 11*(10), 2832

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American psychologist, 66*(4), 290.

Goldsmith, E. B. (2015). *Social influence and sustainable consumption.* Cham, Switzerland: Springer.

Grabow, M., Bryan, T., Checovich, M. M., Converse, A. K., Middlecamp, C., Mooney, M., Torres, E. R., Younkin, S. G., & Barrett, B. (2018). Mindfulness and climate change action: a feasibility study. *Sustainability*, *10*(5), 1508.

Hildebrandt, L. K., C. McCall, & Singer, T. (2017). Differential Effects of Attention-, Compassion-, and Socio-Cognitively Based Mental Practices on Self-Reports of Mindfulness and Compassion. *Mindfulness*, *8*(6), 1488–1512.

Ives, C. D., Freeth, R., & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. *Ambio*, *49*(1), 208-217.

Jackson, T. (2005). *Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change, report to the Sustainable Development Research Network (SDRN).* Surrey, UK: SDRN.

Jacob, J., Jovic, E., & Brinkerhoff, M. B. (2009). Personal and planetary well-being: Mindfulness meditation, pro-environmental behavior and personal quality of life in a survey from the social justice and ecological sustainability movement. *Social Indicators Research*, *93*(2), 275-294.

Jalali, S., & Wohlin, C. (2012). Systematic literature studies: database searches vs. backward snowballing. *In Proceedings of the 2012 ACM-IEEE international symposium on empirical software engineering and measurement* (pp. 29-38). IEEE.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, *7*(2), 109-119.

Kiken, L. G., Garland, E. L., Bluth, K., Palsson, O. S., & Gaylord, S. A. (2015). From a state to a trait: Trajectories of state mindfulness in meditation during intervention predict changes in trait mindfulness. *Personality and Individual differences*, *81*, 41-46.

Kreplin, U., Farias, M., & Brazil, I. A. (2018). The limited prosocial effects of meditation: A systematic review and meta-analysis. *Scientific reports*, *8*(1), 1-10.

Kurisu, K. (2015). Behavior model development for understanding PEBs. In *Pro-environmental behaviors* (pp. 47–62). Tokyo, Japan: Springer

Lange, F., Steinke, A., & Dewitte, S. (2018). The Pro-Environmental Behavior Task: A laboratory measure of actual pro-environmental behavior. *Journal of Environmental Psychology*, *56*, 46-54.

Luberto, C. M., Shinday, N., Song, R., Philpotts, L. L., Park, E. R., Fricchione, G. L., & Yeh, G. Y. (2018). A systematic review and meta-analysis of the effects of meditation on empathy, compassion, and prosocial behaviors. *Mindfulness*, *9*(3), 708-724.

Moore, M. J. (2005). The transtheoretical model of the stages of change and the phases of transformative learning: Comparing two theories of transformational change. *Journal of Transformative Education, 3*(4), 394-415.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*(2), 247

Nielsen, K. S. (2017). From prediction to process: A self-regulation account of environmental behavior change. *Journal of Environmental Psychology, 51*, 189-198.

Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: a review and research agenda. *Environmental Education Research, 23*(4), 573-589.

Orazi, D. C., Chen, J., & Chan, E. Y. (2019). To Erect Temples to Virtue: Effects of State Mindfulness on Other-Focused Ethical Behaviors. *Journal of Business Ethics*, 1-14.

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology 88*(5), 879–903.

Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. G., Ozanne, L. K., & Thøgersen, J. (2011). Sustainable consumption: Opportunities for consumer research and public policy. *Journal of Public Policy & Marketing, 30*(1), 31-38.

Schonert-Reichl, K. A., & Lawlor, M. S. (2010). The effects of a mindfulness-based education program on pre-and early adolescents' well-being and social and emotional competence. *Mindfulness, 1*(3), 137-151.

Schonert-Reichl, K. A., Oberle, E., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social–emotional development through a simple-to-administer mindfulness-based school program for elementary school children: A randomized controlled trial. *Developmental psychology, 51*(1), 52.

Sermboonsang, R., Tansuhaj, P. S., Silpakit, C., & Chaisuwan, C. (2020). Mindfulness-based transformational learning for managing impulse buying. *Journal of Education for Business, 95*(2), 129-137.

Shankland, R., & Rosset, E. (2017). Review of Brief School-Based Positive Psychological Interventions: A Taster for Teachers and Educators. *Educational Psychology Review, 29*(2), 363–392.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of clinical psychology, 62*(3), 373-386.

Siqueira, R. P., & Pitassi, C. (2016). Sustainability-oriented innovations: Can mindfulness make a difference?. *Journal of Cleaner Production, 139*, 1181-1190.

Stanszus, L. S., Frank, P., & Geiger, S. M. (2019). Healthy eating and sustainable nutrition through mindfulness? Mixed method results of a controlled intervention study. *Appetite, 141*, 104325.

Tripathi, A., & Singh, M. P. (2016). Determinants of sustainable/green consumption: a review. *International Journal of Environmental Technology and Management, 19*(3-4), 316-358.

UNESCO. 2017. *Education for Sustainable Development Goals: Learning Objectives*. Retrieved May 11th, 2018 from http://unesdoc.unesco.org/ images/0024/002474/247444e.pdf

Vago, D. R., Gupta, R. S., & Lazar, S. W. (2019). Measuring cognitive outcomes in mindfulness-based intervention research: a reflection on confounding factors and methodological limitations. *Current opinion in psychology, 28*, 143-150.

Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazart, S.W., Kerr, C.E., Gorchov, J., Fox, K.C.R., Field, B.A., Britton, W.B., Brefczynski-Lewis, J.A., & Meyer, D.E. (2018). Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. Perspectives on Psychological Science: *A Journal of the Association for Psychological Science 13(*1): 36–61.

Wamsler, C., Brossmann, J., Hendersson, H., Kristjansdottir, R., McDonald, C., & Scarampi, P. (2018). Mindfulness in sustainability science, practice, and teaching. *Sustainability Science, 13*(1), 143-162.

Waters, L., A. Barsky, A. Ridd, & Allen, K. (2015). Contemplative Education: A Systematic, Evidence-Based Review of the Effect of Meditation Interventions in Schools. *Educational Psychology Review, 27*(1), 103–134.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological bulletin, 132*(2), 249.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing, 83*(3), 22-49.

Wiek, A., L. Withycombe, and C. L. Redman. (2011). Key Competencies in Sustainability: A Reference Framework for Academic Program Development. *Sustainability Science 6*(2), 203–218.

Wynveen, B. (2013). *Attaining sustainable behavior among non-environmentally-motivated individuals: A formative experiment* (Doctoral dissertation). Retrieved April 26th, 2020, from https://tigerprints.clemson.edu/all_dissertations/1113

Yeganeh, B. & Kolb, D. (2013) Mindfulness and Experiental Learning *In: Handbook for Strategic HR.* New York, NY: The Organizational Development Network

Appendix 1. Prisma checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	85
ABSTRACT			
Structures summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	85
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	86,87,88
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	94
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	94, 95, 96, 97

Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	*Appendix 2*
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	*Appendix 2*
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	94,95,96,97
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	94, 95 ,96, 97 *Figure 3*
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	*Appendix 3*
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	94
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	*Table 13*
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	101, 102, 103
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	94, *Appendix 2*
Additional analysis	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	94, 95, 96, 97, 98, 99, 100
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	*Figure 4*

Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	*Appendix 2*
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	101, 102, 103
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	*Table 13*
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency	*Table 13*
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	101, 102, 103
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression (see Item 16).	101, 102, 103
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	104, 105, 106, 107, 108
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	108, 109
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	109, 110, 111
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Non applicable

Appendix 2. Search terms strategy

The search was conducted in March 2018 in the Web of Science database. This database was chosen on the basis of its extensive coverage, initiated in 1990, and its interdisciplinary and multidisciplinary set of documents with more than 10,000 journals of high impact (Leydesdorff, Carley, & Rafols, 2013).

This research followed an approach process for the selection of search terms to conduct our inquiry of components of socioemotional competencies following the construction of comprehensive lists conducted by other authors (Collins, Onwuegbuzie, & Sutton, 2006) and the Peer Review of Electronic Search Statement guidelines (PRESS; McGowan et al., 2016).

By doing so, we attempted to provide an extensive list of components for this specific set of competencies that help to enrich the selection of search terms for our systematic review and meta-analysis. This process uses the framework proposed by Wiek, Withycombe, & Redman (2011) which was complemented by other frameworks (Barth, Godemann, Rieckmann, & Stoltenberg, 2007; Brundiers, Wiek, & Redman, 2010; de Haan, 2010, Lambrechts, Mulà, Ceulemans, Molderez, & Gaeremynck, 2013; Osagie, Wesselink, Blok, Lans, & Mulder, 2016; Rieckmann, 2012; Sleurs, 2008; UNESCO, 2017) and the operationalisation of key competencies by Wiek et al. (2015). A figure that illustrates the process is provided (see *Figure 3*). The process is described below.

Step 1: The first step in this inquiry was to identify the components of the socioemotional competencies based on the framework of key competencies for sustainability provided by Wiek, Withycombe, & Redman (2011). In this framework, the description of the interpersonal competence provided an initial set of components (civic competence, cooperation, empathy, ethnocentrism, leadership, and solidarity) which was complemented with socioemotional competencies from the other key competencies such as responsibility or interconnected thinking.

Step 2: This initial list was extended by reading frameworks of competencies provided by other authors (Barth, Godemann, Rieckmann, & Stoltenberg, 2007; Brundiers, Wiek, & Redman, 2010; de Haan, 2010, Lambrechts, Mulà, Ceulemans, Molderez, & Gaeremynck, 2013; Osagie, Wesselink, Blok, Lans, & Mulder, 2016; Rieckmann, 2012; Sleurs, 2008; UNESCO, 2017) and by the operationalisation of key competencies by Wiek et al. (2015).

The list of components is detailed below.

List of components	Authors
Acting responsibly	Rieckmann (2012)
Adaptation	Wiek, Withycombe, & Redman (2011)
Ambiguity and frustration tolerance	Rieckmann (2012)
Change of perspective	Rieckmann (2012)
Civic competence	Wiek, Withycombe, & Redman (2011)
Communication and collaboration skills	Crofton (2000); UNESCO (2017)
Compassion	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008)
Conflict resolution	Sipos, Battisti, & Grimm (2008)
Considering changes to current ways of life	Kelly (2006)
Cooperation	Wiek, Withycombe, & Redman (2011)
Cosmopolitan perception	Barth, Godemann, Rieckmann, & Stoltenberg (2007)
Courage	Kelly (2006)
Creativity	Sipos, Battisti, & Grimm (2008)
Deliberation	Wiek, Withycombe, & Redman (2011)
Diversity	Sterling & Thomas (2006)
Emotions	Sleurs (2008)
Empathy	Wiek, Withycombe, & Redman (2011); UNESCO (2017)
Empowering	Sipos, Battisti, & Grimm (2008)
Ethical thinking	Wiek, Withycombe, & Redman (2011)
Ethnocentrism	Wiek, Withycombe, & Redman (2011)
Fairness	Wiek, Withycombe, & Redman (2011)
Flexibility	Sterling (1996)
Generosity	Kelly (2006)
Global consciousness	Kelly (2006)
Global mindset	Wiek, Withycombe, & Redman (2011)
Handling of complexity	Rieckmann (2012)
Happiness	Wiek, Withycombe, & Redman (2011)
Holistic thinking	Crofton (2000)
Inclusivity	Sipos, Battisti, & Grimm (2008)

Integrity	Svanström, Lozano-García, & Rowe (2008)
Interconnected thinking	Wiek, Withycombe, & Redman (2011)
Interconnectedness (ecological, social and economic systems)	Sterling & Thomas (2006)
Interdisciplinary work	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008)
Justice	Wiek, Withycombe, & Redman (2011)
Leadership	Wiek, Withycombe, & Redman (2011)
,Negotiation	Wiek, Withycombe, & Redman (2011)
Openness to experience	Markowitz, Goldberg, Ashton, & Lee (2012)
Participation	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008)
Reflexion on individual and cultural models	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008)
Reflexivity	Kearins & Springett (2003)
Resilience	Sterling (1996)
Responsibility	Wiek, Withycombe, & Redman (2011)
Safety	Wiek, Withycombe, & Redman (2011)
Self-motivation and motivating others	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008); UNESCO (2017)
Self-reliance and self-direction	Barth et al. (2007)
Social action / engagement	Kearins & Springett (2003)
Social Learning	Wiek, Withycombe, & Redman (2011)
Solidarity	Wiek, Withycombe, & Redman (2011)
Trans-cultural understanding and cooperation	de Haan (2006) (cf. Barth et al., 2007; van Dam-Mieras et al., 2008)
Transdisciplinarity	Sipos, Battisti, & Grimm (2008)
Transformative competence	Wiek, Withycombe, & Redman (2011)
Trans-generational thinking	Kelly (2006)
Uncertainty	Sterling & Thomas (2006)
Value clarification and integration	Sleurs (2008)
Value-focused thinking	Wiek, Withycombe, & Redman (2011)
Values	Sleurs (2008)

In order to conduct the search, the list of the components agreed was used to build a set of search terms which yielded 67 results:

leader* OR cooperat* OR empathy OR solidarity OR ethnocentri* OR communicat* OR collaborat* OR "trans-cultural" OR underst* OR compass* OR "selfmotivation" OR motivat* OR reflex* OR genero* OR courag* OR "conflict resolution" OR empower* OR creativ* OR inclusiv* OR civic OR "self-reliance" OR "self-direction" OR "change of perspective" OR "acting responsibly" OR adaptat* OR ambiguit* OR toleranc* OR chang* OR "cosmopolitan perception" OR deliberat* OR divers* OR emot* OR "ethical thinking" OR fair* OR "global consciousness" OR "global mindset" OR complexit* OR happ* OR "holistic thinking" OR interconnect* OR "interconnected thinking" OR interdisciplinar* OR justice OR open* OR particip* OR resilience OR responsib* OR safe* OR "social action" OR engag* OR "social learning" OR transdisciplinar* OR "transformative competence" OR "trans-generational" OR uncertaint* OR value? OR "value-focused thinking" OR "value clarification" OR clarif* OR integr* OR flexib*

Results of list of search terms

6.488.433	#1	TI=((leader* OR cooperat* OR empathy OR solidarity OR ethnocentri* OR communicat* OR collaborat* OR "trans-cultural" OR underst* OR compass* OR "selfmotivation" OR motivat* OR reflex* OR genero* OR courag* OR "conflict resolution" OR empower* OR creativ* OR inclusiv* OR civic OR "self-reliance" OR "self-direction" OR "change of perspective" OR "acting responsibly" OR adaptat* OR ambiguit* OR toleranc* OR chang* OR "cosmopolitan perception" OR deliberat* OR divers* OR emot* OR "ethical thinking" OR fair* OR "global consciousness" OR "global mindset" OR complexit* OR happ* OR "holistic thinking" OR interconnect* OR "interconnected thinking" OR interdisciplinar* OR justice OR open* OR particip* OR resilience OR responsib* OR safe* OR "social action" OR engag* OR "social learning" OR transdisciplinar* OR "transformative competence" OR "trans-generational" OR uncertaint* OR value? OR "value-focused thinking" OR "value clarification" OR clarif* OR integr* OR flexib* AND (sustainab* OR "sustainable development" OR "social consciousness" OR "social action"))) Indexes= WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan=All years Language=Auto
1.690	#2	TI=(mindfulness AND (intervention OR practic* OR program*)) Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language =English
319	#3	#2 AND #1 Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language = English
246	#4	#3 NOT TI=clinical NOT TS=clinical Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language = English

183	#5	#3 NOT TI=clinical NOT TS=clinical Refined by: DOCUMENT TYPE: (ARTICLE) Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language = Auto
148	#6	#3 NOT TI=clinical NOT TS=clinical Refined by: DOCUMENT TYPE: (ARTICLE) AND LANGUAGE: (ENGLISH) Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language =Auto
89	#7	#3 NOT TI=clinical NOT TS=clinical Refined by: DOCUMENT TYPE: (ARTICLE) AND LANGUAGE: (ENGLISH) AND SOURCE TITLES: (MINDFULNESS OR CHILDREN BASEL SWITZERLAND OR CHILDREN SOCIETY OR JOURNAL OF BODYWORK AND MOVEMENT THERAPIES OR FRONTIERS IN PSYCHOLOGY OR JOURNAL OF CONSCIOUSNESS STUDIES OR COGNITION EMOTION OR JOURNAL OF COUNSELING AND DEVELOPMENT OR CULTURAL STUDIES OF SCIENCE EDUCATION OR CONSCIOUSNESS AND COGNITION OR DEVELOPMENTAL PSYCHOLOGY OR EXPLORE NEW YORK N Y OR EXPLORE THE JOURNAL OF SCIENCE AND HEALING OR JOURNAL OF HUMAN BEHAVIOR IN THE SOCIAL ENVIRONMENT OR JOURNAL OF LEGAL EDUCATION OR JOURNAL OF ADOLESCENCE OR JOURNAL OF MANAGEMENT DEVELOPMENT OR JOURNAL OF CHILD AND FAMILY STUDIES OR CURRENT OPINION IN PSYCHOLOGY OR JOURNAL OF MANAGEMENT SPIRITUALITY RELIGION OR JOURNAL OF CONTEXTUAL BEHAVIORAL SCIENCE OR JOURNAL OF HAPPINESS STUDIES OR EATING BEHAVIORS OR JOURNAL OF HEALTH PSYCHOLOGY OR EMOTION WASHINGTON D C OR JOURNAL OF OCCUPATIONAL AND ORGANIZATIONAL PSYCHOLOGY OR ENHANCING COGNITIVE FITNESS IN ADULTS A GUIDE TO THE USE AND DEVELOPMENT OF COMMUNITY BASED PROGRAMS OR EXPERT SYSTEMS WITH APPLICATIONS OR JOURNAL OF POSITIVE PSYCHOLOGY OR WILEY BLACKWELL HANDBOOK OF MINDFULNESS VOLS I AND II OR HANDBOOK OF MINDFULNESS CULTURE CONTEXT AND SOCIAL ENGAGEMENT OR HARVARD EDUCATIONAL REVIEW OR JOURNAL OF RELIGION AND SPIRITUALITY IN SOCIAL WORK OR JOURNAL OF SOCIAL WORK PRACTICE OR MINDFULNESS FOR EDUCATIONAL PRACTICE A PATH TO RESILIENCE FOR CHALLENGING WORK OR ADVANCES IN DEVELOPING HUMAN RESOURCES OR INTERNATIONAL JOURNAL FOR THE ADVANCEMENT OF COUNSELLING OR MINDFULNESS IN BEHAVIORAL HEALTH OR INTERNATIONAL JOURNAL OF ADOLESCENT MEDICINE AND HEALTH OR AMERICAN JOURNAL OF EDUCATION OR INTERNATIONAL JOURNAL OF COGNITIVE THERAPY OR NEW DIRECTIONS FOR YOUTH DEVELOPMENT OR

		PERSONALITY AND INDIVIDUAL DIFFERENCES OR INTERNATIONAL JOURNAL OF SPORTS SCIENCE AND COACHING OR APPETITE OR INTERNATIONAL JOURNAL OF SPORTS SCIENCE COACHING OR PSYCHOLOGY IN THE SCHOOLS OR AUSTRALIAN SOCIAL WORK OR QUALITATIVE RESEARCH IN PSYCHOLOGY OR BRAIN AND COGNITION OR RESEARCH HANDBOOK ON BEHAVIORAL LAW AND ECONOMICS OR CHILD YOUTH CARE FORUM OR JOURNAL OF ADOLESCENT HEALTH OR RESEARCH HANDBOOKS IN LAW AND ECONOMICS OR CHILDREN BASEL) Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language =Auto
67	#8	#3 NOT TI=clinical NOT TS=clinical Refined by: DOCUMENT TYPE: (ARTICLE) AND LANGUAGE: (ENGLISH) AND SOURCE TITLES: (MINDFULNESS OR CHILDREN BASEL SWITZERLAND OR CHILDREN SOCIETY OR JOURNAL OF BODYWORK AND MOVEMENT THERAPIES OR FRONTIERS IN PSYCHOLOGY OR JOURNAL OF CONSCIOUSNESS STUDIES OR COGNITION EMOTION OR JOURNAL OF COUNSELING AND DEVELOPMENT OR CULTURAL STUDIES OF SCIENCE EDUCATION OR CONSCIOUSNESS AND COGNITION OR DEVELOPMENTAL PSYCHOLOGY OR EXPLORE NEW YORK N Y OR EXPLORE THE JOURNAL OF SCIENCE AND HEALING OR JOURNAL OF HUMAN BEHAVIOR IN THE SOCIAL ENVIRONMENT OR JOURNAL OF LEGAL EDUCATION OR JOURNAL OF ADOLESCENCE OR JOURNAL OF MANAGEMENT DEVELOPMENT OR JOURNAL OF CHILD AND FAMILY STUDIES OR CURRENT OPINION IN PSYCHOLOGY OR JOURNAL OF MANAGEMENT SPIRITUALITY RELIGION OR JOURNAL OF CONTEXTUAL BEHAVIORAL SCIENCE OR JOURNAL OF HAPPINESS STUDIES OR EATING BEHAVIORS OR JOURNAL OF HEALTH PSYCHOLOGY OR EMOTION WASHINGTON D C OR JOURNAL OF OCCUPATIONAL AND ORGANIZATIONAL PSYCHOLOGY OR ENHANCING COGNITIVE FITNESS IN ADULTS A GUIDE TO THE USE AND DEVELOPMENT OF COMMUNITY BASED PROGRAMS OR EXPERT SYSTEMS WITH APPLICATIONS OR JOURNAL OF POSITIVE PSYCHOLOGY OR WILEY BLACKWELL HANDBOOK OF MINDFULNESS VOLS I AND II OR HANDBOOK OF MINDFULNESS CULTURE CONTEXT AND SOCIAL ENGAGEMENT OR HARVARD EDUCATIONAL REVIEW OR JOURNAL OF RELIGION AND SPIRITUALITY IN SOCIAL WORK OR JOURNAL OF SOCIAL WORK PRACTICE OR MINDFULNESS FOR EDUCATIONAL PRACTICE A PATH TO RESILIENCE FOR CHALLENGING WORK OR ADVANCES IN DEVELOPING HUMAN RESOURCES OR INTERNATIONAL JOURNAL FOR THE ADVANCEMENT OF COUNSELLING OR MINDFULNESS IN BEHAVIORAL HEALTH OR INTERNATIONAL JOURNAL OF ADOLESCENT MEDICINE AND HEALTH OR

AMERICAN JOURNAL OF EDUCATION OR INTERNATIONAL JOURNAL OF COGNITIVE THERAPY OR NEW DIRECTIONS FOR YOUTH DEVELOPMENT OR PERSONALITY AND INDIVIDUAL DIFFERENCES OR INTERNATIONAL JOURNAL OF SPORTS SCIENCE AND COACHING OR APPETITE OR INTERNATIONAL JOURNAL OF SPORTS SCIENCE COACHING OR PSYCHOLOGY IN THE SCHOOLS OR AUSTRALIAN SOCIAL WORK OR QUALITATIVE RESEARCH IN PSYCHOLOGY OR BRAIN AND COGNITION OR RESEARCH HANDBOOK ON BEHAVIORAL LAW AND ECONOMICS OR CHILD YOUTH CARE FORUM OR JOURNAL OF ADOLESCENT HEALTH OR RESEARCH HANDBOOKS IN LAW AND ECONOMICS OR CHILDREN BASEL) AND PUBLICATION YEARS: (2016 OR 2013 OR 2010 OR 2015 OR 2012 OR 2009 OR 2017 OR 2014 OR 2011 OR 2001) Indexes = WOS, CCC, DIIDW, KJD, MEDLINE, RSCI, SCIELO Timespan= All years Language =Auto

Appendix 3.List of variables

Group: Emotional regulation						
Author	**Program**	**Length**	**N**	**Sample**	**Sub-competence**	**Variable***
Coatsworth, Duncan, Greenberg, & Nix (2010)	Adaptation of "The Strengthening Families Programme: For Parents and Youth 10-14" by infusing mindfulness activities	7 weeks	65	Families	Emotions	Anger management Emotional Style Parenting Negative affect/behaviour toward youth Positive affect/behaviour toward youth
Coatsworth et al. (2015)	The Mindfulness-Enhanced Strengthening Families Programme (MSFP)	7 weeks	432	Families	Emotions	Interpersonal mindfulness: Emotional awareness of youth Parent/youth relationship quality: Affective/Interaction Quality *Parent/youth relationship quality: Approach to emotions*
de Carvalho, Pinto, & Marôco (2017)	MindUp Programme	15 weeks	474	Students and teachers	Emotions	*Emotion Control (Reappraisal)* Emotion Control (Suppression)

						Mindfulness: Non-judging of inner experience Mindfulness: Non-reactivity to inner experience Mindfulness: Observing
Franquesa et al. (2017)	Assessment of previous mindfulness meditations	Daily meditators, 3-4 times a week or 2-times or less a week.	509	Meditators	Emotions	Mindfulness: Non-judging of inner experience Mindfulness: Non-reactivity to inner experience Mindfulness: Observing
Hildebrandt, McCall, & Singer (2017)	The ReSource Project	13 weeks	332	Adults	Emotions	*Mindfulness: non-judging* Mindfulness: non-reacting Mindfulness: observing Mindfulness: acceptance
Michel, Bosch, & Rexroth (2014)	Brief online self-training intervention with components of MBCT	3 weeks	246	Adults	Emotions	Psychological detachment Strain-based work-family conflict
Schonert-Reichl et al. (2015)	MindUp Programme	12 weeks	103	Students and teachers	Emotions	Emotional control

Sharp & Jennings (2016)	Cultivating Awareness and Resilience in Education™ (CARE)	6-weeks	8	Teachers	Emotions	Emotional reactions Present-centered awareness of emotions

*Negative or contradictory results are presented in *italics*.

Group: Empathy and social connectedness

Authors	**Intervention**	**Length**	**N**	**Sample**	**Sub-competence**	**Variable***
Brendel, Hankerson, Byun, & Cunningham (2016)	Formal mindfulness meditation	8 weeks	41	Adults	Creativity	Regulatory focus
Coatsworth, Duncan, Greenberg, & Nix (2010)	Adaptation of "The Strengthening Families Programme: For Parents and Youth 10-14" by infusing mindfulness activities	7 weeks	65	Families	Social action	Mindful Parenting
Coatsworth et al. (2015)	The Mindfulness-Enhanced Strengthening Families Programme (MSFP)	7 weeks	432	Families	Compassion Empathy	*Compassion/acceptance for parent* Compassion/acceptance for youth *Parent/youth relationship quality: Family involvement* *Parent/youth relationship quality: Support/Understandin*

						g
					Social action	*Listen with full attention*
Crowder & Sears (2017)	MBSR	8 weeks	14	Social workers	Compassion	Professional Quality: Compassion satisfaction
Duarte & Pinto-Gouveia (2017)	Adaptation of MBSR to a shorter form	6 weeks	94	Oncology nurses	Compassion	Compassion fatigue
Franquesa et al. (2017)	Assessment of previous mindfulness meditations	Daily, 3-4 times a week or 2-less times a week.	509	Meditators	Value clarification and integration	Decentering
					Values	Valued-Living
						Values-related behaviour
Gregory (2015)	Yoga and mindfulness programme	3 weeks	11	Adults	Compassion	Compassion Satisfaction
Hildebrandt, McCall, & Singer (2017)	The ReSource Project	13 weeks	332	Adults	Compassion	*Common*
						Disengagement
						Indifference
						Kindness
						Mindfulness
						Separation
						Expressing
						Responding
						Self

Kohlenberg et al. (2015)	FAP-informed mindfulness intervention	1 hour	114	Students	Interconnected thinking	Social Connectedness
					Interconnectedness	Inclusion of Other in the Self
Schonert-Reichl et al. (2015)	MindUp Programme	12 weeks	103	Students and teachers	Empathy	Empathy
					Social action	Peer behavioural assessment: breaks rules
						Peer behavioural assessment: helpful
						Peer behavioural assessment: kind
						Peer behavioural assessment: liked by peers
						Peer behavioural assessment: shares
						Peer behavioural assessment: starts fights
						Peer behavioural assessment: takes others' views
						Peer behavioural assessment: trustworthy
						Social responsibility
Sharp & Jennings (2016)	Cultivating Awareness and Resilience in Education™ (CARE)	6 weeks	8	Teachers	Compassion	Compassion
					Empathy	Empathy

*Negative or contradictory results are presented in *italics*.

Group: Resilience						
Authors	**Intervention**	**Length**	**N**	**Sample**	**Sub-competence**	**Variable***
Bluth & Eisenlohr-Moul (2017)	"Making friends with yourselves: A mindful self-compassion programme for teens."	8 weeks	47	Adolescents	Resilience	Resilience Self-compassion
Bluth, Roberson, & Gaylord (2015)	Learning to breathe	6 weeks	28	Adolescents	Resilience	Self-compassion
Brendel, Hankerson, Byun, & Cunningham (2016)	Formal mindfulness meditation	8 weeks	41	Adults	Ambiguity and frustration tolerance Resilience	*Tolerance for ambiguity* *Resilience*
Coatsworth et al. (2015)	The Mindfulness-Enhanced Strengthening Families Programme (MSFP)	7 weeks	432	Families	Resilience	*Interpersonal mindfulness: Self-regulation in parenting*
Crowder & Sears (2017)	MBSR	8 weeks	14	Social workers	Resilience	Resilience measured through self-compassion and decentering Resilience measured through self-compassion and decentering

de Carvalho, Pinto, & Marôco (2017)	MindUp Programme	15 weeks	474	Students and teachers	Resilience	Self-compassion: Common humanity *Self-compassion: Isolation* *Self-compassion: Over identification* *Self-compassion: Self-judgment* *Self-compassion: Mindfulness* *Self-compassion: Self-kindness*
Duarte & Pinto-Gouveia (2017)	Adaptation of MBSR to a shorter form	6 weeks	94	Oncology nurses	Resilience	Psychological inflexibility Self-compassion
Fernando, Skinner, & Consedine (2017)	Mindfulness and experiential exercises	10 min	83	Medical students	Resilience	*Trait Self-compassion: Caring for patient* *Trait Self-compassion: Desire to help patient* Trait Self-compassion: Objective helping behaviour *Trait Self-compassion: Patient liking* *Trait Self-compassion: Subjective closeness*
Hildebrandt, McCall, &	The ReSource	13 weeks	332	Adults	Resilience	*Self-compassion: Common humanity*

Singer (2017)	Project					*Self-compassion: Isolation* Self-compassion: Mindfulness *Self-compassion: Over identification* Self-compassion: Self-judgment Self-compassion: Self-kindness
Jha, Morrison, Parker, & Stanley (2017)	Mindfulness-based-Mind Fitness Training (MMFT)	8 weeks	55	Marine Reservists	Resilience	Cognitive resilience
Lotan, Tanay, & Bernstein (2013)	Brief Mindfulness Skills Training Programme	4 weeks	53	Adults	Resilience	*Discomfort intolerance* Distress tolerance
Schonert-Reichl et al. (2015)	MindUp Programme	12 weeks	103	Students and teachers	Resilience	Optimism Perspective taking
Sharp & Jennings (2016)	Cultivating Awareness and Resilience in Education™ (CARE)	6 weeks	8	Teachers	Resilience	Ability to reappraise situations Integration of CARE metaphors Shift perspective

*Negative or contradictory results are presented in *italics*.