

# Mind (for) the Water: An Indirect Relationship Between Mindfulness and Water Conservation Behavior

## ABSTRACT

A growing number of studies have linked mindfulness with the adoption of environmentally friendly behaviors. We aim to contribute to this emergent research by putting forward a model in which the relationship between mindfulness and a specific pro-environmental behavior, water conservation, is indirect. In this pursuit, we draw on the hierarchical model for the influence of psychological characteristics on individuals' behaviors. We propose that the relationship between mindfulness and water conservation is mediated by environmental beliefs, namely water utilitarian beliefs, and consumer abilities, specifically water-related perceived consumer effectiveness. To collect the data, we relied on a pre-tested self-report questionnaire that was distributed in a Portuguese municipality. We retained the responses from 876 individuals, for a net response rate of 54.8%. The research model was tested with structural equation modeling. The results indicate that mindfulness is negatively related to water utilitarian beliefs, that these are negatively related to perceived consumer effectiveness which, in turn, is positively associated with water conservation behavior. In addition to these direct relationships, the results show that mindfulness is indirectly related to water conservation behavior and to perceived consumer effectiveness, and that water utilitarian beliefs are indirectly related to water conservation behavior. These novel results are used to derive managerial implications.

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## 1. INTRODUCTION

Rapid population growth, increasing economic activity, and the resource-intensive lifestyle of consumers are placing ever-greater pressure on environmental resources and ecological functions (Kalamas et al., 2014). Not surprisingly, extensive research scrutinizing the drivers of pro-environmental behaviors has emerged, with emphasis being placed on those of a social and psychological nature (e.g., Barbaro & Pickett, 2016; Nguyen et al., 2016; Udall et al., 2020). Recently, research has begun to consider whether mindfulness could drive the adoption of environmentally-friendly behaviors (Panno et al., 2018). Ray et al. (2020, p. 866) also noted this as a growing research area, “though modest in its current state”. Relatedly, Fischer et al. (2017) concluded that the relationship between mindfulness and sustainable consumption is a ‘rapidly emerging area’. Some of the existing studies have directly related mindfulness to pro-environmental behaviors (Brown & Kasser, 2005; Dhandra, 2019; Jacob et al., 2009). A few others have considered mediating relationships intervening in the diffusion of mindfulness effects into environmentally friendly attitudes and behaviors (Barbaro & Pickett, 2016; Geiger et al., 2018; Panno et al., 2018; Ray et al., 2020).

Ericson et al. (2014, p. 74), in a theoretical paper, note that “there appears to be possible links between mindfulness and sustainability that are interesting to explore”, suggesting that there are indirect links between mindfulness and sustainable behavior. Drawing on the Value-Belief-Norm theory (VBN) of environmentalism, Hunecke and Richter (2019) also point to an indirect relationship between mindfulness and pro-environmental behaviors. Specifically, VBN affirms that central elements of personality, such as mindfulness and broad beliefs, create a predisposition to behave in an environmentally friendly way through mediating variables. In this context, Panno et al. (2018) argue that there are many paths still to be explored in the relationship between mindfulness and pro-environmental behavior. We contribute to filling in this gap, by further pursuing the mediating effects that help convert mindfulness into a

particular pro-environmental behavior, specifically water conservation. According to the United Nations (UN), water scarcity affects more than 40% of the world population. Unsurprisingly, the goal of clean water and sanitation has been included among the UN sustainable development goals. While agriculture and industry represent the lion's share of water demand, domestic water use has been growing substantially (Koop et al., 2019) – 600% over the past 50 years (Otto & Schleifer, 2020). Hence, residential water conservation is an important contributor to ensure sufficient water for a continuously growing population (Koop et al., 2019). This makes it important to understand the determinants of water conservation, in particular those of a psychological nature, which is a line of research with limited contributions (Diaz et al., 2020; Russell & Fielding, 2010). Moreover, we focus on a specific environmental behavior because different pro-environmental behaviors require different knowledge, efforts, and involve distinct costs (Kalamas et al., 2014), which suggests that they might have different antecedents. We accomplish our purposes by considering a hierarchical approach to the influence of psychological traits on human behavior (Allport, 1961), developing a model in which the relationship between mindfulness and the adoption of environmentally friendly behaviors is indirect, being mediated by individuals' environmental beliefs and abilities. In this model, water utilitarian beliefs and water-related perceived consumer effectiveness play such a mediating role. Hence, we innovate by investigating the extent to which water utilitarian beliefs (a consumer ideology or world view), and perceived consumer effectiveness (perceived abilities) mediate the mindfulness-pro-environmental behavior relationship.

Water utilitarian beliefs relate to a worldview of the human-nature interaction that considers water as an infinite resource for humans to use (Corral-Verdugo et al., 2003). It mirrors an anthropocentric worldview that became known as Human Exceptionalism Paradigm (Corral-Verdugo et al., 2003), comprising primitive beliefs concerning the natural world and the relationship between humans and nature (cf. Stern et al., 1995). Perceived consumer

effectiveness, which concerns individuals' beliefs regarding their ability to make an impact on the environment (cf. Ellen et al., 1991), has been determined to help in converting more abstract constructs into pro-environmental action and, thus, should help in funneling the mindfulness effects into behaviors. Our prediction is that mindfulness, with its focus on awareness, should drive individuals to be aware of the diverse problems facing the environment, namely water resources, and thus weaken water utilitarian beliefs, which in turn provides the motivation to improve one's abilities to have a positive impact on water resources, with downstream effects on pro-environmental behaviors, specifically water conservation. By doing so we comply with contentions that attitudes, beliefs and behaviors should be measured at the same level of specificity (Corral-Verdugo et al., 2003; Fishbein & Ajzen, 1975).

Worldviews appear to be increasingly recognized as key to a more ecological society (Hedlund-de Witt, 2012; Lacroix & Gifford, 2017). In this context, we add to existing knowledge by shedding light on their antecedents, as well as on their consequences. Worldviews, "the inescapable frameworks of meaning and meaning-making that profoundly inform our very understanding and enactment of reality" help shape the individuals' environmental behavioral responses (Hedlund-de Witt, 2012, p. 74), making it important to understand their antecedents. Hence, our study seeks to understand whether mindfulness contributes to the formation of such a 'folk theory' (cf. Stern et al., 1995). Moreover, we also contribute to the understanding of how such world views might turn into pro-environmental behavior, as those views comprise general beliefs that are indirect influencers of behavior (Corral-Verdugo et al., 2003; López-Mosquera & Sánchez, 2012). The relationship between such broad beliefs and the adoption of pro-environmental behaviors is tenuous, which calls for more specific effect carriers into behaviors (S. Otto & Pensini, 2017). Accordingly, we consider the extent to which perceived consumer effectiveness might help in transposing the effects of water utilitarian beliefs into water conservation behavior. Although worldviews and efficacy beliefs have been previously

related to PEB, the way in which mindfulness relates to them and whether they mediate the relationship between mindfulness and PEB is still unknown.

In short, we propose a serial mediation model to depict the relationship between mindfulness and pro-environmental behaviors. In doing so, we make two major contributions. Firstly, we contribute to the understanding of the mechanisms by which mindfulness affects the adoption of pro-environmental behaviors. Secondly, we contribute to the ongoing debate on the role of worldviews, shedding light on their antecedents and how they link to environmental behaviors. The research model is tested with a sample of 876 individuals, with the results supporting the research hypotheses.

## **2. RESEARCH BACKGROUND AND HYPOTHESES**

### **2.1. Mindfulness**

Mindfulness entails a purposeful focus of attention on momentary events and experiences, with a stance characterized by curiosity, openness, and acceptance (Bishop et al., 2004). A mindful individual is “able to disidentify from the contents of consciousness (i.e., one’s thoughts) and view his/her moment-by-moment experience with greater clarity and objectivity” (Shapiro et al., 2006, p. 377). Consciousness is a key issue in the mindfulness construction, entailing awareness and attention (Brown & Ryan, 2003). Awareness refers to the continuous monitoring of the inner and outer environment, whereas attention focuses conscious awareness on specific stimuli (Brown & Ryan, 2003). In this study we look at mindfulness as a trait or disposition, but it can also be seen as a skill that can be developed and maintained with practice (Bishop et al., 2004).

Mindfulness has been the subject of a wealth of research, which has shown its multiple benefits (e.g., Brown & Ryan, 2003), namely regarding environmental behaviors and attitudes. Brown and Kasser (2005) pioneered the empirical analysis of the relationship between trait

mindfulness and pro-environmental behavior, which has been documented in other studies since then (e.g., Amel et al., 2009; Dhandra, 2019; Jacob et al., 2009; Tang et al., 2017). Mindfulness has also been related to pro-environmental attitudes, such as connectedness to nature (Schutte & Malouff, 2018). Moreover, mediators in this relationship have also been considered, namely connectedness to nature (Barbaro & Pickett, 2016), social dominance orientation (Panno et al., 2018), and individual health behavior (Geiger et al., 2018).

We propose that the relationship between dispositional mindfulness and the adoption of pro-environmental behaviors is indirect. The theoretical rationale for this is provided by the hierarchical model for the influence of psychological traits on human behavior (Allport, 1961). This model argues that basic psychological traits, by possessing a high degree of abstractedness, may have a reduced connection with the behavior to be predicted. Accordingly, mindfulness, being a general, dispositional construct, with applicability to multiple contexts, might be too detached from specific contexts, namely in regard to the adoption of environmentally friendly behaviors, to predict them well. This is in line with previous studies (e.g., Barbaro & Pickett, 2016; Lee et al., 2014). Moreover, our model follows the VBN Theory, according to which relatively stable elements of personality and belief structure, such as the individuals' values, affect the belief structure regarding the relation between humans and the environment, as well as personal norms that activate a moral obligation to act, which ultimately influences the individuals' pro-environmental behavior (Stern, 2000; Stern et al., 1999). Hence, VBN entails a hierarchical model for the influence of individuals' characteristics on environmental behavior (López-Mosquera & Sánchez, 2012). Lee et al. (2014), for example, found that value orientations, which are an abstract construct with applicability to multiple contexts, had an indirect relationship to pro-environmental behaviors. Hence, our model predicts that mindfulness, a trait that influences individuals' values (e.g., Errmann et al., 2021), influences environmental beliefs, specifically, water

with applicability to multiple contexts, had an indirect relationship to pro-environmental behaviors. Hence, our model predicts that mindfulness, a trait that influences individuals' values (e.g., Errmann et al., 2021), influences environmental beliefs, specifically, water

utilitarian beliefs, which should activate a moral obligation to act, driving consumers to improve their understanding on how they can contribute to a better environment, i.e., consumer perceived effectiveness, which ultimately results in the adoption of water conservation behaviors. Accordingly, the research model postulates an indirect relationship between mindfulness and pro-environmental behaviors. This is in line with Cho et al. (2013) who, based on VBN, predicted an indirect relationship between individuals’ cultural orientation and environmental commitment. Hence, our study furthers the attention that past studies have dedicated to the antecedents of worldviews (Han, 2015; Wensing et al., 2019). Moreover, our research model predicts that water utilitarian beliefs also relate indirectly to pro-environmental behaviors, which is aligned with past studies (e.g., Lacroix & Gifford, 2017; López-Mosquera & Sánchez, 2012). Worldviews are “unproven, and even unprovable, but these assumptions are superordinate, in that they provide the epistemic and ontological foundations for other beliefs within a belief system” (Koltko-Rivera, 2004, p. 4). Accordingly, Lacroix and Gifford (2017), for example, considered the mediating role of psychological barriers in the relationship between cultural worldviews and energy conservation. This reasoning leads to our research model, depicted in figure 1.

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**2.2. Mindfulness and water utilitarian beliefs**

Many have noted that the environmental problems we currently face are the result of traditional values and beliefs, such as our allegiance to prosperity, faith in science and technology, and the

belief in the abundance of resources (Dunlap & Van Liere, 1978). Such beliefs result in the view of humans as dominating nature, and in a trust in technology as the instrument to achieve human progress, which has become known as the Human Exceptionalism Paradigm (Corral-Verdugo et al., 2003). Water utilitarian beliefs, which lie within this paradigm, form a set of environmental beliefs that consider water to be an unlimited resource for humans to use without restrictions (Corral-Verdugo et al., 2003).

Given that awareness and attention are central to mindfulness (Brown & Ryan, 2003; Ndubisi, 2014), it is likely that mindful individuals are more prone to pay attention to developments in the environment, namely to water scarcity and water pollution issues, thus fostering a lower water utilitarian belief. As mindfulness enables individuals to see clearly what is taking place at the present moment, without contamination from memories, emotions, and perceptions (Bahl et al., 2016), they should have a better grasp of the problems and challenges facing environmental resources. Moreover, mindfulness has been related to connectedness to the natural world (Barbaro & Pickett, 2016), and this should help supersede the vision of mankind dominating the natural world. Thus, we offer the following:

*H1: Mindfulness is negatively related to water utilitarian beliefs*

### **2.3. Water utilitarian beliefs and perceived consumer effectiveness**

Past studies have shown that the relationship between broad beliefs and the adoption of pro-environmental behaviors is tenuous, which calls for more specific effect carriers into behaviors. Stern et al. (1995) argue that worldviews are the cause of specific antecedents that operate as proximal causes of specific actions. Accordingly, we propose that water utilitarian beliefs drive perceived consumer effectiveness as a more specific proximal cause. Perceived consumer effectiveness concerns the extent to which individuals believe that they can make a difference



regarding the preservation of the environment (Ellen et al., 1991). Gist and Mitchell (1992) argue that an individual's assessment of his/her ability to perform well in a certain task is determined by the motivation to exert effort. In this context, individuals perceiving the water resources to be in danger will be motivated to acquire knowledge regarding how they can contribute to the preservation of those resources. Such individuals are more likely to try to understand how specific behaviors can impact water resources and to look for opportunities to preserve water, including learning about devices and appliances that promote water usage efficiency. Accordingly, we offer the following:

*H2: There is a negative relationship between water utilitarian beliefs and water-related perceived consumer effectiveness*

#### **2.4. Perceived consumer effectiveness and water conservation behavior**

Perceived consumer effectiveness has been consistently shown to be an important factor explaining environmentally friendly behavior, with previous empirical research suggesting a positive relation between them (Dagher & Itani, 2014; Ellen et al., 1991; Lee et al., 2014; Nguyen et al., 2016). If individuals perceive that the adoption of a specific behavior under his/her control, such as taking shorter showers, or reusing water, can make a difference in the mitigation of water-related environmental problems, then he/she is more likely to adopt such behaviors. Hence, we propose the following:

*H3: There is a positive relationship between water-related perceived consumer effectiveness and water conservation behavior*

#### **2.5. Indirect relationships**

*Water utilitarian beliefs and pro-environmental behavior.* The adoption of environmentally driven behaviors is fueled by concerns regarding the state of the environment or a positive attitude towards it (Lee et al., 2014). Such attitudes serve as a referential framework for people to interact with the environment (Corral-Verdugo et al., 2003). Hence, water utilitarian beliefs should be negatively related to water conservation behavior, but this relationship is expected to be mediated by perceived consumer effectiveness. There are mixed findings on the relationship between environmental concern and pro-environmental behavior, and this points to a gap between attitudes and behavior (Lee et al., 2014; Untaru et al., 2020). An argument for such findings is that environmental concern does not contain an evaluation of environmental behaviors, as considered in the theory of planned behavior, but rather an assessment of environmental issues (Newton et al., 2015). Newton et al. (2015) argue that concern for the environment can motivate individuals to learn about the environmental consequences of their purchase decisions. This suggests that perceived consumer effectiveness might mediate the relationship between environmental concern and pro-environmental behaviors. In our case, water utilitarian beliefs should reduce the individuals' propensity to behave in an environmentally friendly way through a lower accumulation of knowledge and abilities on how to contribute to water conservation. Accordingly, we propose the following:

*H4: Water-related perceived consumer effectiveness mediates the negative relationship between water utilitarian beliefs and water conservation behavior*

*Mindfulness and perceived consumer effectiveness.* Amel et al. (2009) note that mindful individuals are more likely to pay attention and process information regarding the environment and to look for options that are less damaging to it. Moreover, mindful individuals are less likely to act automatically and resort to the most convenient or familiar actions (Rosenberg, 2004).

Relatedly, Chatzisarantis and Hagger (2007) comment that mindless individuals pay attention to a narrow set of inner experiences and external stimuli, ending up with a more rigid behavior. This is in line with Barbaro and Pickett's (2016) contentions that mindfulness increases the awareness of pro-environmental options and suggests that mindful individuals would develop a greater knowledge about different ways of protecting the environment, thus fueling their beliefs that they can make an impact on the preservation of natural resources. We, however, predict that the relationship between mindfulness and perceived consumer effectiveness would be mediated by water utilitarian beliefs. As previously noted, mindfulness should minimize water utilitarian beliefs, which in turn provide the motivation for improving one's knowledge about how to contribute to the protection of water resources. We thus offer the following:

*H5: Water utilitarian beliefs mediate the relationship between mindfulness and water-related perceived consumer effectiveness.*

*Mindfulness and pro-environmental behavior.* Bahl et al. (2016) note that the current environmental problems we face may arise from habitual, routine behaviors, and mindfulness helps individuals to break these habits. Most consumer behavior is automatic, but the quality of consciousness embedded in mindfulness leads individuals to be aware of and reflect upon the ecological consequences of their actions (Rosenberg, 2004). Hence, mindfulness results in the adoption of more effortful behaviors, such as those involving the reuse of water and repairing leaks. Mindfulness has also been associated with heightened compassion and empathy (Birnie et al., 2010), which should result in behaviors that benefit others, namely those directed at the preservation of the environment. However, we expect that its effects are carried over through environmental beliefs and the consumers' perceptions of their ability to contribute to the preservation of the environment. As explained above, mindfulness results in a lower water

utilitarian belief, which in turn drives consumer perceived effectiveness, which ultimately results in the preservation of natural resources, namely water conservation. Hence, we propose the following:

*H6: Water utilitarian beliefs and water-related perceived consumer effectiveness mediate the positive relationship between mindfulness and water conservation behavior.*

### **3. RESEARCH METHOD**

#### **3.1. Sample**

Data was collected through a pre-tested self-report questionnaire, distributed in a Portuguese municipality with the collaboration of a group of schools. The socio-demographic characteristics of this municipality closely mirror national average figures. About 1600 printed questionnaires were handed out by homeroom teachers, who asked students to deliver them to their parents. A cover letter accompanied the questionnaire, informing parents about the overall purpose of our study and of the optional nature of their participation in it. We retained 876 replies, which correspond to a net response rate of 54.8%. Respondents' ages ranged from 20 to 74 years ( $M=40.4$ ;  $SD=7.0$ ), most of them females (80.1%) and married/living with a partner (82.8%). As to education, 32.5% of the individuals have completed the 3rd cycle of basic education (corresponding to 9 years of schooling), 24.4% have a high school diploma, and 19.1% hold a university degree. With respect to the monthly household net income distribution, 14.0% of the respondents earn below 500€, 34.5% earn between 500 and 999€, 28.3% earn between 1000 and 1499€, 17.9% earn between 1500 and 2499€, and 5.2% earn above 2500€. Given the gender imbalance, we control for this in the estimation, but also control for age, education, and income.

### 3.2. Measurement

Mindfulness was assessed by the 15-item Mindfulness Attention Awareness Scale (MAAS) proposed by Brown and Ryan (2003). This scale has the longest empirical track record as a valid measure of trait mindfulness (Black et al., 2012). Water Utilitarian Beliefs, a 6-item scale, is an instrument from Corral-Verdugo et al. (2003), designed to assess a set of beliefs specifically about water, based on the Human Exceptionalism Paradigm. This measure of worldviews thus matches our focal environmental behavior, water conservation. Perceived consumer effectiveness was measured with a 4-item scale based on previous research (Lee et al., 2014; Obermiller, 1995), with the items adapted with an explicit reference to the preservation of water resources. Water conservation behavior was assessed on a 7-item scale based on Fielding et al. (2016) and Wolters (2014), comprising a number of everyday actions related to water conservation.

Given the large number of items in some measures, we applied item parceling to the constructs used in the study (Dabholkar et al., 1996), which are unidimensional. Parceling reduces random error, enhances scale communality and the common-to-unique ratio for each indicator, mitigates the problem of item-non-normality, enhances the stability of solutions, minimizes the occurrence of dual factor loadings and of correlated residuals, and improves model fit (Little et al., 2002; Matsunaga, 2008). For building the parcels (of two or three items), we relied on random parcels (Dabholkar et al., 1996; Little et al., 2002; Matsunaga, 2008). Finally, for water conservation behavior we created an index, as individuals tend to be inconsistent in their environmental behaviors (Steg & Vlek, 2009). Thus, one may turn off water while brushing teeth, but fail to take shorter showers or reuse water.

The initial CFA indicated no need for re-specifications, yielding a good model fit:  $\chi^2=234.19$ ,  $df=60$ ,  $p < .01$ ; IFI=.964; TLI=.953; CFI=.964; RMSEA=.058. We observed that all items loaded significantly on the respective construct. Moreover, Cronbach alphas and the composite

reliabilities exceed the .70 cut-off, and the average variances extracted are all above .50. Finally, discriminant validity is obtained, given that the squared correlation between any two pairs of constructs is lower than the corresponding average variances extracted (Fornell & Larcker, 1981). Hence, this is evidence that the measures are reliable and valid. As Fornell and Larcker's (1981) criterion for discriminant validity is met, multicollinearity should not be a significant issue (Grewal et al., 2004). Additionally, our data does entail a modest deviation from normality, but past studies indicate that maximum likelihood is robust to this (e.g., Lei & Lomax, 2005). Hence, such a deviation does not endanger the findings and interpretations.

As the study relied on a single source, common method variance (CMV) offers an alternative explanation to the findings. To minimize this, and in line with Podsakoff et al. (2003), we adopted a number of procedural remedies. Additionally, we carried out a number of statistical procedures to assess the potential for CMV. Initially, we ran an exploratory factor analysis, which revealed that the first factor accounted for 33.78% of the variance. Hence, the Harman single factor test suggests that CMV is not a serious issue. Additionally, we compared simpler with more complex CFA models, by combining into the same factor items from different constructs (Chaudhuri & Ligas, 2009). There is evidence of CMV if a simpler model, with fewer factors, fits better or similarly to a more complex model. Hence, we compared the predicted four-factor model, the most complex one, with simpler models, and observed, through a series of chi-square difference tests that the predicted model always performed significantly better. In addition, we also determined that the predicted four-factor model has a much better fit than a single-factor one ( $\chi^2=4801,97$ ,  $df=66$ ,  $p < .01$ ;  $IFI=.021$ ;  $TLI=-.160$ ;  $CFI=.018$ ;  $RMSEA=.286$ ), which is also indicative of no substantial CMV (Kafetsios & Zampetakis, 2008).

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#### **4. RESULTS**

We estimated the structural model with the AMOS software, controlling for gender, age, education, and income. The statistics for fit are adequate:  $\chi^2=552.46$ ,  $df=107$ ,  $p<.01$ ; IFI=.92; CFI=.92; TLI=.90; RMSEA=.07. We also ran an alternative model to test direct effects from mindfulness on perceived consumer effectiveness and water conservation behavior, and from water conservation behavior on PEB, but none of the additional direct relationships are significant, and these results support the predicted model. As an additional check on CMV we ran an alternative model with a marker variable, satisfaction with public health services, with a path to the outcome variable. The fit of this model is as follows:  $\chi^2=603.52$ ,  $df=140$ ,  $p<.01$ ; IFI=.93; CFI=.93; TLI=.91; RMSEA=.06. A chi-square difference test indicates that model fit deteriorated significantly ( $\Delta\chi^2=51.6$ ,  $\Delta df=33$ ,  $p<.05$ ). Moreover, the significance of the direct and indirect effects did not change in a meaningful way. This is further evidence that CMV is not a major threat to the results (cf. Siemsen et al., 2010).

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H1 predicted a negative relationship between mindfulness and water utilitarian beliefs, and this is supported ( $b=-.11$ ,  $p<.01$ ), thus indicating that mindfulness drives individuals to acknowledge that water resources must be catered for. We also find that water utilitarian beliefs

are negatively related to perceived consumer effectiveness ( $b=-.30, p<.01$ ), which is in line with H2. Moreover, we also find that perceived consumer effectiveness relates to water conservation behavior in a positive way ( $b=.29, p<.01$ ), which is supportive of H3.

We now consider the indirect effects. H4 predicts that perceived consumer effectiveness mediates the negative relationship between water utilitarian beliefs and water conservation behavior, and this is supported ( $b=-.09, p<.01$ ). We predicted in H5 that water utilitarian beliefs mediate the positive relationship between mindfulness and perceived consumer effectiveness, and the results support this ( $b=.03, p<.01$ ). Finally, H6 predicted that the positive relationship between mindfulness and water conservation behavior is mediated by water utilitarian beliefs and perceived consumer effectiveness, and this also received support ( $b=.01, p<.01$ ).

## **5. DISCUSSION AND THEORETICAL IMPLICATIONS**

There is a growing attention to mindfulness as a driver of pro-environmental behaviors, but this is an endeavor that is still in its infant stages (Barbaro & Pickett, 2016). This study innovates by relying on a hierarchical approach to the influence of psychological traits on human behaviors, which drives the proposition that the relationship between mindfulness and the adoption of environmentally friendly behaviors, is indirect. Moreover, our study also contributes to the discussion on the role of worldviews concerning the human-nature interaction, clarifying their antecedents and how they convert into environmentally friendly behaviors. Our research model received broad support, as the research hypotheses were accepted.

Our results yield a number of theoretical implications. Overall, they denote that mindfulness is related to pro-environmental behaviors. The compassion and empathy accompanying mindfulness (Birnie et al., 2010) favor the adoption of behaviors that benefit others, including



those that are environmentally-friendly. Moreover, mindfulness makes individuals aware that material possessions are limited in delivering fulfilment in daily lives (Rosenberg, 2004). However, this relationship between mindfulness and environmentally-friendly behaviors is indirect, which is in line with the hierarchical approach to the influence of psychological traits on the individual's behavior and with the value-belief-norm theory (Stern, 2000). Relatedly, the study clarifies mechanisms that help convert mindfulness into pro-environmental beliefs.

The results denote that mindfulness is negatively associated with environmental beliefs, specifically water utilitarian beliefs. The latter mirrors the Human Exceptionalism Paradigm, which views human beings as culturally driven superior beings, who believe they are able to use (water) resources as they wish, without any consideration for nature. Hence, our results indicate that mindfulness helps individuals to recognize the increasing challenges we are facing in terms of the conservation of natural resources. Mindfulness entails a greater awareness of internal and external stimuli and, thus, of what is taking place in the present moment (Brown & Ryan, 2003), which should lead to a clearer understanding of the challenges humans face regarding water resources. Our result aligns with Panno et al. (2018), who found a negative link between mindfulness and social dominance orientation, which entails the preference for a hierarchical structure in society and domination over lower status groups, and which can be assimilated to a domination over nature (see Milfont & Sibley, 2012). Our study is also coherent with studies associating mindfulness with heightened compassion and empathy (e.g., Winning & Boag, 2015), which appear incompatible with the belief of humankind ruling over nature.

Moreover, the role of mindfulness is further stressed not only by the indirect relationship with the conservation of water resources but also with perceived consumer effectiveness. Our study shows that mindful individuals are more likely to become aware of environmental degradation which, in turn, appears to make individuals more likely to make an effort to improve their ability regarding the conservation of natural resources, which ultimately determines water

conservation behaviors. We argued that the awareness of problems affecting resources that are important for humankind should motivate individuals to improve their abilities on how they can protect such resources. Moreover, mindful individuals, having a wider attentional scope, end up with a richer portfolio of experiences and a more flexible behavior (Chatzisarantis & Hagger, 2007), which suggests increased abilities on how to protect the environment (perceived consumer effectiveness), with water-utilitarian beliefs mediating this relationship. In summary, water-utilitarian beliefs and perceived consumer effectiveness are mechanisms that carry the effects of mindfulness into pro-environmental behaviors. However, whereas in our study the relationship between mindfulness and pro-environmental behavior was found to be purely indirect, Panno et al. (2018) determined a partially mediated model between mindfulness and environmentally friendly behaviors. This suggests that not only further studies into other mediating mechanisms are required, but also to further explore whether, and when, such a relationship is totally or only partially mediated.

Another implication of our study lies in its contributing to a better understanding of how individuals end up forming worldviews and how these impact the adoption of pro-environmental behaviors. Worldviews have been increasingly recognized as crucial for ensuring the transition into an ecological economy and society (Hedlund-de Witt, 2012). Our study supports this contention, showing that they (worldviews) influence pro-environmental behaviors. Moreover, the existence of a purely indirect relationship between worldviews on the human-nature interaction, specifically water utilitarian beliefs, and the adoption of environmentally friendly behaviors is in line with extant research, which has noted a gap between general attitudes and environmental behavior (e.g., Newton et al., 2015). Lacroix and Gifford (2017) advanced that the relationship between worldviews and environmental behavior should be mediated by more context-specific constructs, and our study supports such contention, revealing that perceived consumer effectiveness helps channel the effects of water-

utilitarian views on environmental behaviors. Hence, it appears that individuals that look at natural resources as unlimited do not have a motive for improving their knowledge on how to preserve them.

The valuable outcomes of worldviews make it important to understand how individuals come to develop them. Accordingly, our study suggests that individuals with a particular stable individual difference, mindfulness, are less likely to develop a utilitarian vision of nature and, thus, to envision humans as culturally driven superior beings who are able to use resources as they wish, without any consideration for nature, and to overcome any limitation posed by it. Hence the importance of the revealed link between mindfulness and a specific worldview. Our findings are in line with contentions that mindful individuals perceive external stimuli in an open way and without distortions (Brown & Kasser, 2005), which should make them more aware of the mounting environmental problems. In this context, our study adds to past studies showing that individuals' dispositional characteristics relate to environmental cognitions, such as environmental concern (e.g., Lee et al., 2014). We thus add to the literature on worldviews, shedding light on their antecedents. In summary, worldviews appear to have an impact on pro-environmental behaviors, on individuals' predisposition to improve their capabilities in terms of acting pro-environmentally, and in carrying over the effects of mindfulness into conservation behaviors and perceived consumer effectiveness.

Finally, our study denotes that individuals who believe in their abilities to make an impact on the environment, adopt pro-environmental behaviors more often, as follows from VBN, (Stern et al., 1999). This accords with past studies, which have clearly positioned such perceptions of self-efficacy as an important antecedent of pro-environmental behaviors (Lee et al., 2014; Nguyen et al., 2016). Another important implication of this study is that it further underscores the role of perceived consumers' effectiveness, by showing its relevance in transposing the

effects of enduring dispositions, specifically mindfulness, and environmental beliefs into behaviors.

## **6. MANAGERIAL IMPLICATIONS**

The results of this study suggest that interventions designed to promote mindfulness would positively impact pro-environmental behaviors and, in particular, water conservation. Mindfulness could enter the curricula of schools, and particular attention should be paid to shaping mindfulness-based interventions in education for environmental sustainability. Moreover, firms selling green products can focus on more mindful consumers, as these develop a greater awareness of environmental problems, which should enhance the likelihood of their buying products that are more environmentally friendly. Acting on environmental beliefs (e.g., water utilitarian beliefs) and consumer perceived effectiveness is also important. As to the former, the results suggest that public and private institutions (e.g., ad agencies and marketing institutions) interested in the promotion of sustainable behaviors should raise awareness to environmental problems, namely by implementing environmental campaigns among the public at large, communicating key negative developments regarding environmental degradation. It is also important to capitalize on science. Hornsey et al. (2016) observed that the more individuals trust in scientists and scientific orthodoxy, the more they believe in climate change. This suggests that building trust in science should help raise awareness to environmental problems. Finally, the promotion of consumer perceived effectiveness can be induced by a continual communication informing people that their efforts have paid off, namely by putting up posters in shopping centers, schools, and gym locker rooms informing how much water and other resources were saved in the previous year. Campaigns can also be developed to demonstrate how individuals can preserve natural resources, and thus enhance knowledge and abilities.

## **7. LIMITATIONS AND FUTURE DIRECTIONS**

The above contributions of the study must be weighted by its limitations. The study has a cross-sectional design, which does not permit causal conclusions. In addition, reliance on a single informant opens the possibility of CMV. However, we adopted a set of procedures to tackle the issue and conducted statistical tests, which attest that CMV should not be a problem. Our sample also has a gender imbalance, resulting from mothers usually taking on the role of the responsible parent in school affairs. Notwithstanding, we note that we have included gender as a control variable, which should have minimized the impact of such imbalance. Our model considers water conservation, measured by the individuals' reports of their behaviors. However, there might be a gap between actual and reported behavior. Moreover, our model focused on water conservation behavior. Thus, future research could extend the study to other pro-ecological activities such as energy saving, recycling, and the use of sustainable transport modes. Additionally, our study proposes water utilitarian beliefs and perceived consumer effectiveness as mediators of the relationship between mindfulness and water conservation. However, there are many other potential mediators to explore, and pursuing this would be useful, by further shedding light on the mechanisms through which mindfulness results in the adoption of environmentally friendly behaviors.

## **CONCLUSION**

In summary, research on mindfulness and the adoption of environmentally friendly behaviors is still an emergent field of study. Our study innovates by showing that individuals' environmental beliefs and perceived abilities transpose the effects of mindfulness into a pro-environmental behavior. This path was based on a hierarchical approach related to the influence of dispositional psychological characteristics on the individuals' behavior. Specifically, the

study shows that the relationship between mindfulness and water conservation is totally mediated by water utilitarian beliefs and perceived consumer effectiveness. Moreover, perceived consumer effectiveness helps convert water utilitarian beliefs into water conservation. In doing so, the paper shed light on the mechanisms through which mindfulness affects pro-environmental behaviors. Additionally, we contributed to the literature on worldviews, unveiling novel antecedents, but also how they end up affecting the adoption of environmentally driven behaviors.

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**Figure 1: Mindfulness and pro-environmental behavior**

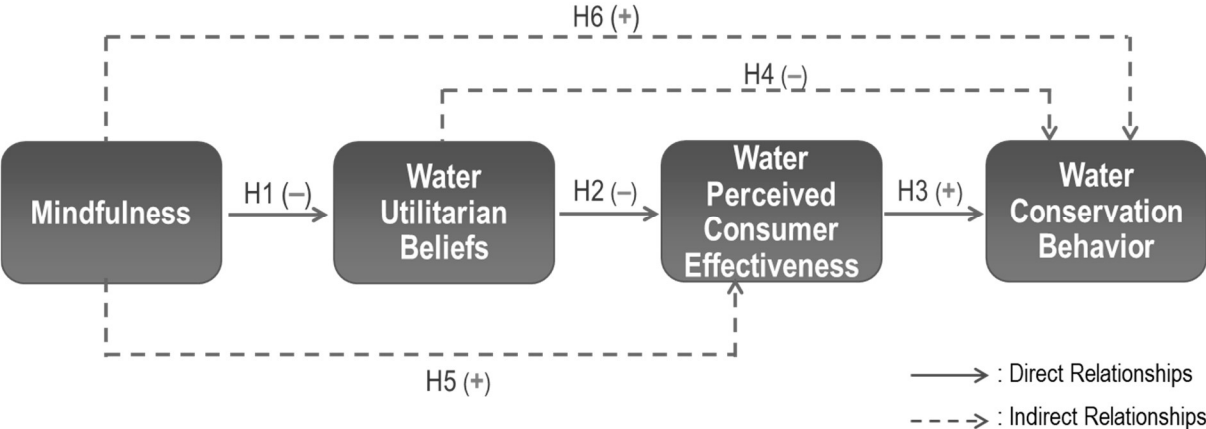


Table 1: Results of Confirmatory Factor Analysis

Constructs and items/parcels	Stand. Loadings	t-value
<b>Mindfulness</b>		
I could be experiencing some emotion and not be conscious of it until sometime later / I find myself listening to someone with one ear, doing something else at the same time	0.595	18.602
I break or spill things because of carelessness, not paying attention, or thinking of something else / I forget a person's name almost as soon as it's been told to me for the first time	0.700	22.946
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way / I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there	0.791	27.222
It seems I am "running on auto pilot," without much awareness of what I'm doing / I find myself doing things without paying attention	0.821	28.817
I rush through activities without being really attentive to them / I do jobs or tasks automatically, without being aware of what I'm doing	0.819	28.715
I find myself preoccupied with the future or the past / I snack without being aware that I'm eating	0.619	19.552
I find it difficult to stay focused on what's happening in the present / I tend not to notice feelings of physical tension or discomfort until they really grab my attention / I drive places on "auto pilot" and then wonder why I went there	0.826	29.056
<b>Water Utilitarian Beliefs</b>		
There is much water in Portugal. We just have to conduct it to our cities / Water scarcity is a lie produced by politicians	0.820	26.519
Water is the cheapest natural resource. That is why the government should charge no cost / Drinkable water is an unlimited resource	0.807	26.015
Science surely will solve the problem of water scarcity / Humans have the right to use all the water they want because they are the kings of Creation.	0.741	23.480
<b>Perceived Consumer Effectiveness</b>		
Conserving water at your home will contribute to the quality of the environment / The way I use water at home has an impact on the quality of the environment.	0.832	17.572
There is a lot you can do at your home to save water / Each of us can contribute to solving the problems of water scarcity and pollution	0.757	16.706
<b>Water Conservation Behavior</b>		
Repair leaky faucets (check and fix leaks)	0.949	-
Turn off water while brushing teeth	n.a.	
Turn off water while hand washing dishes	n.a.	
Take shorter showers	n.a.	
Use half flush or do not flush every time	n.a.	
Reuse water	n.a.	
Only do full loads of washing	n.a.	

Notes: Measures of fit:  $\chi^2=234.19$ ,  $df=60$   $p < .01$ ,  $IFI=.964$ ,  $TLI=.953$ ,  $CFI=.964$ ,  $RMSEA=.058$ .

**Table 2: Correlation Matrix, Standard Deviation, Reliability, and Average Variances Extracted**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>SD</b>	<b>ME</b>	<b>CR</b>	<b>AVE</b>
<b>1. Mindfulness</b>	<b>.89</b>				.69	3.65	.90	.55
<b>2. Water Utilitarian Beliefs</b>	-.11	<b>.83</b>			.80	2.78	.83	.62
<b>3. Perceived Consumer Effectiveness</b>	.04	-.30	<b>.76</b>		.54	4.37	.78	.63
<b>4. Water Conservation Behavior</b>	.06	-.02	.27	-	.99	3.81	-	-

Notes: Diagonal entries are Cronbach's alpha coefficients; SD – Standard Deviation; ME – Mean; CR – Composite Reliability; AVE – Average Variance Extracted.

**Table 3: Results of the Structural Model**

<b>Path</b>	<b>Hyp.</b>	<b>Stand. Coef.</b>	<b>Stand. Error</b>
<b>Direct effects</b>			
Mindfulness → Water Utilitarian Beliefs	H <sub>1</sub> (-)	-.11 **	.031
Water Utilitarian Beliefs → Perceived Consumer Effectiveness	H <sub>2</sub> (-)	-.30 **	.029
Perceived Consumer Effectiveness → Water Conservation Behavior	H <sub>3</sub> (+)	.29 **	.079
Age → Water Conservation Behavior		.14 **	.005
Gender → Water Conservation Behavior		.01	.087
Income → Water Conservation Behavior		-.14 **	.039
Education → Water Conservation Behavior		.02	.029
<b>Indirect effects</b>			
Water Utilitarian Beliefs → Water Conservation Behavior	H <sub>4</sub> (-)	-.09 **	.017
Mindfulness → Perceived Consumer Effectiveness	H <sub>5</sub> (+)	.03 **	.014
Mindfulness → Water Conservation Behavior	H <sub>6</sub> (+)	.01 **	.004

Notes: **Goodness-of-fit statistics:**  $\chi^2=552.5$ ,  $df=107$ ,  $p<.01$ ; IFI=.92; CFI=.92; TLI=.90; RMSEA=.07; \* $p<.05$ ; \*\* $p<.01$  (one-tail tests).