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"If I am incapable of washing dishes joyfully, if I want to finish them quickly so I can go and have dessert, I will be equally incapable of enjoying my dessert. With the fork in my hand, I will be thinking about what to do next, and the texture and the flavor of the dessert, together with the pleasure of eating it will be lost. I will always be dragged into the future, never able to live in the present moment. I must confess it takes me a bit longer to do the dishes, but I live fully in every moment, and I am happy. (Zen Master Thich Nhat Hanh, 1991: 26-27).

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CONTENTS

Abstract

Regarding climate change, environmental concern and pro-environmental behaviour are important concepts to promote sustainability on an individual level. Past research has found links between environmental concern and mindfulness, nature connectedness and personality. The present work employs a matched-pairs design in order to analyse differences between individuals high and low in environmental concern in a German-speaking sample ($N = 69$ pairs). Controlling for age and gender, significant and medium-sized differences emerged in nature connectedness and the mindfulness facet Observe of the FFMQ. In addition, people higher in environmental concern obtained also higher values in the Big Five personality factors Openness to Experience and Agreeableness. Both effects regarding personality were small to medium in size. Overall, the results replicate previous findings and add to the importance of mindfulness, nature connectedness and personality for environmental concern. Shortcomings of existing scales for measuring environmental concern and pro-environmental behaviour are discussed in detail. Lastly, practical implications to increase sustainable behaviour and directions for future research are given.

Zusammenfassung

In Anbetracht des Klimawandels sind Umweltbewusstsein und umweltfreundliches Verhalten zwei wichtige Konzepte, um Nachhaltigkeit auf einer individuellen Ebene zu stärken. In der Vergangenheit konnten Zusammenhänge zwischen Umweltbewusstsein und Achtsamkeit, Naturverbundenheit und Persönlichkeit empirisch nachgewiesen werden. Die vorliegende Arbeit verwendet ein Matched-Pairs Studiendesign, um Unterschiede zwischen Personen, die hoch bzw. niedrig in Umweltbewusstsein sind in einer deutschsprachigen Stichprobe ($N = 69$) zu untersuchen. Unter Kontrolle der Variablen Alter und Geschlecht zeigten sich signifikante Effekte mittlerer Größe für Naturverbundenheit und die Achtsamkeitsfacette Observe des FFMQ. Zusätzlich erzielten umweltbewusstere Personen höhere Werte in den Big Five Persönlichkeitsfaktoren Offenheit für Erfahrungen und Verträglichkeit. Diese beiden Unterschiede in der Persönlichkeitsstruktur waren von kleiner bis mittlerer Größenordnung. Zusammengefasst replizieren die vorliegenden Ergebnisse Befunde früherer Forschungsarbeiten und unterstreichen die Wichtigkeit von Achtsamkeit, Naturverbundenheit und Persönlichkeit für das Konzept Umweltbewusstsein. Mängel in bestehenden Messinstrumenten für Umweltbewusstsein werden diskutiert. Abschließend werden praktische Implikationen zur Erhöhung des Umweltbewusstseins erläutert und Ideen für zukünftige Forschung gegeben.

1. Introduction

Environmental sustainability is a key concept of the 21st century since it is essential for the future existence of humanity and other species. The engagement in sustainable development, however, is often associated with effort, restrictions or even prohibitions. Therefore, not everybody supports this development which can also be seen when it comes to global politics. Since the inauguration of Donald J. Trump, the 45th President of the United States of America in 2017, the U.S. citizens are repeatedly confronted with questionable decisions and statements. Among those are decisions that have a worldwide impact, such as the decision to withdraw from the Paris Agreement in June 2017 (UNFCCC, 2017).

The Paris Agreement introduced by the United Nations Framework Convention on Climate Change (UNFCCC) in 2015 aims to bind both developed and developing countries to a clear limit on temperature rise. In detail, it entails that global warming in this century should be kept below 2 °C above pre-industrial times and that all 197 signed parties have to pursue efforts via nationally determined contributions to limit the temperature increase even to 1.5 °C (UNFCCC, 2018). This may sound promising, but also critical voices about the accord's shortcomings came up and reports revealed that efforts of emission reduction necessary to achieve the goals stated above fall short (Clémençon, 2016; UNEP, 2017).

Nonetheless, the U.S. withdrawal sent a clear message. With this, president Trump did not only support the denial of climate change, but also affronted the international community and damaged international action to limit carbon emissions (Vaughan, 2018). This raises the pressing question how today's environmental issues can be tackled if not on a global political and industrial level. With respect to the individual level, many people felt left alone after Trump backed out of the ecological responsibility taken by his ancestor president Obama. It led some people to believe that there is nothing to be done, since an overall compliance between industry and government is necessary for emphasising sustainability and environmental protection. And indeed, their responsibility is beyond debate; however, with over one-third of many industrialized nations' carbon emissions arising from private households' travel and domestic energy use, it also calls for individual actions (Whitmarsh, Seyfang, & O'Neill, 2011).

Many governments are recognising the urgent need to encourage individuals to adopt a "low-carbon" lifestyle. Accordingly, European policy paints a different picture than the U.S. policy. To give an example, in May 2018, the European Commission released a proposal about targeting the reduction of marine litter. This proposal was of urgent need since the

oceans are being polluted with tons of plastic (European Commission, 2018).
By this, the European Commission encouraged latest debates about environmental pollution and enabled a political and public discourse about environmental protection. Furthermore, this also takes individual responsibility into account by informing people about the negative side effects of plastic utensils or disposable plastics.

This arbitrament comprises rules that manage the reduction of the ten most-found single use plastics on European beaches and fishing gear, which account in total for 70% of all marine litter (European Commission, 2018). This proposal represents the general environmental concern of the European citizens in 2017 with 94% stating that the protection of the environment is important to them personally and that industry and retailers should reduce their plastic packaging (European Commission, 2017). Furthermore, 93% of the Austrian residents and 96% of the German residents reported that it is important to them that products are designed to facilitate recycling (European Commission, 2017). These numbers show that sustainability became a more popular topic within society and moved away from the "eco-image". There are, for example, local litter cleaning campaigns organised by communities (e.g., Rhine clean up in North Rhine-Westphalia, Germany or coastal clean ups all over the world) and even a new form of sport called "plogging", emerged through picking up litter whilst jogging. In addition, some universities extended their efforts to contribute to a sustainable environment (e.g., "Sussex Sustainability Research Programme, Brighton, United Kingdom or the "Green Office" at University of Groningen, The Netherlands). Even on new media platforms like YouTube, people inform in an entertaining way about how to produce less garbage (zero waste) or live more environmentally friendly. All in all, the environment appears to be important to most people these days and hardly someone willingly admits placing no value on sustainability (European Commission, 2017).

However, past research frequently found that it is hard for people stick to their intention and to actually behave and consume in a sustainable manner (Lanzini & Khan, 2017). Not only engagement in unsustainable habits or lack of sustainable options prevent a more environmentally friendly living, but also the intention-behaviour gap contributes to it (Bargh, 1994; Rosenberg, 2004; Sheeran & Webb, 2016). Since its relevance to society, more psychological research is needed to gain a better understanding of determinants and factors influencing environmental concern (EC) and pro-environmental behaviour (PEB) on an individual as well as societal level.

1.1. Environmental Concern (EC) and Pro-Environmental Behaviour (PEB)

1.1.1. Definition

In a broad sense, pro-environmental behaviour refers to human behaviour that either benefits the environment or at least damages it to an absolute minimum (Steg & Vlek, 2009). Environmental concern includes attitudes gained through considering the potential negative impacts on the environment caused by human influence (Oreg & Katz-Gerro, 2006). Past research on EC and PEB did reveal a plethora of factors contributing to the conceptualisation of it, at the same time, exemplifies the lack of a unified definition (Poortinga, Steg, & Vlek, 2004). Many articles concerned with PEB fail to define it comprehensively and do not follow an overall line (Larson, Stedman, Cooper, & Decker, 2015).

Bamberg and Möser (2007) for example look at it as an interplay "of self-interest (e.g., to pursue a strategy that minimises one's own health risk) and […] concern for other people, the next generation, other species, or whole eco-systems (e.g., preventing air pollution that may cause risks for others' health and/or the global climate)" (p. 15). With their definition, they include the social aspect of PEB, whilst other authors include more individual motives, like environmental values (Stern, 2000). The general principle of behaving environmentally friendly becomes clearer when looking at the ecological definition of sustainability.

Sustainability describes a persistent condition of biological systems that is characterised by variety, robustness, resilience and productivity. Furthermore, it is seen as an unconditional requirement for the well-being of humans and other species (Kopnina & Shoreman-Ouiment, 2015). Human behaviour that aims to keep, support or at least does not to harm this condition can be seen as pro-environmental and ecological conscious. What induces this behaviour is not yet fully understood and the diversity of factors associated with EC and PEB do not follow a clear line.

1.1.2. Conceptualisation of EC and PEB

The missing consensus on defining EC and PEB also applies when it comes to conceptualising and measuring it. Researchers approached the problem of lacking compelling measurement differently, resulting in multiple approaches to measure the relationship between human behaviour and the environment. Some studies relied upon the development of an own scale to measure "green behaviour" (e.g., see Green Scale by Amel et al., 2009). Other authors relied upon early invented inventories like the Ecology Scale by Maloney and Ward (1973) which emphasises environmental attitude and knowledge as crucial part of capturing a general concern for the environment or the Environmental Concern Scale by

Weigel and Weigel (1978). One inventory developed during the same period of time was the New Environmental Paradigm (NEP) by Dunlap and Van Liere (1978). This tool aims to measure one's ecological worldview and can be described as most frequently used within the ecological psychology. In addition, the NEP was revised (Dunlap, Van Liere, Mertig, & Jones, 2000) and now includes a wider range of ecological aspects, more balanced items and modernised terminology. Other researcher like Markle (2013) criticised the unsatisfying situation of scale measurement and developed and validated a new scale for the assessment of pro-environmental behaviour, i.e. the Pro-Environmental Behavior Scale (PEBS). However, until November 2018 it was barely used and only cited twelve times according to the database "Scopus" and eleven times according to the database "Web of Science". PEB as such is often considered to be part of the concept of environmental concern (Schahn, Damian, Schurig, & Füchsle, 2000).

A problem contributing to the broad spectrum of measurement is that the concepts aimed to be measured are not clearly separated from each other. Some scales like the NEP try to capture a general worldview regarding the relation between human and nature. Other scales solely try to capture environmental behaviour, thus how people actually behave towards "nature" and again other inventories try to assess all parts of environmental concern, like attitude, intention and behaviour. It would be relevant to clearly differentiate between them and be careful on choosing one for the question of interest. Furthermore, it would be important to draw the right conclusion, since intention does not always go along with actual behaviour as to say worldview does possibly not resemble daily decision making.

For psychological and sociological research, it would be highly important to be able to use a proper tool for capturing the aspects of interest. Additionally, it is necessary to be clear about the different terms in the first place. What is intended to be captured and can it be assessed with or without considering a specific term? But of all aspects it would be of great importance to follow common line and taking past findings together for a clearer picture of environmental concern.

1.1.3. Psychological Concepts related to EC and PEB

A great body of research on sustainability and PEB highlights a range of aspects influencing the outcome of environmentally-significant behaviours. Past research did identify several determinants of pro-environmental behaviour. For instance, a meta-analysis by Hines, Hungerford and Tomera (1987) on psychosocial determinants revealed mean correlations of medium to large sizes between pro-environmental behaviour and attitudes; locus of

control/self-efficacy; the feeling of moral obligation to behave environmentally friendly and behavioural intention. Based on this, Bamberg and Möser (2007) conducted a meta-analysis and could replicate these findings with the additional finding of a mediating role of behavioural intention on PEB (27% explained variance). Furthermore, they revealed perceived behavioural control, attitude and moral norm as predictors of behavioural intention (52% explained variance).

Next to the psychosocial determinants of PEB, numerous studies could identify factors that are associated with PEB and EC in general, like personality factors (Markowitz, Goldberg, Ashton, & Lee, 2012), education (Meyer, 2015) or nature connectedness (Restall & Conrad, 2015). One study by Barbaro and Pickett (2016) did focus on mindfulness due to its quality to encourage awareness and impact on behavioural choices. Before it is possible to uncover the working mechanisms of mindfulness, there is a need to replicate the past research findings of the association between engagement in EC/PEB and mindfulness (Amel, Manning, & Scott, 2009; Brown & Kasser, 2005; Ericson, Kjønstad, & Barstad, 2014; Siqueira & Pitassi, 2016). There is, however, appealing evidence for a relation between PEB and mindfulness.

1.2. Mindfulness

1.2.1. Definition

In the western world, the concept of mindfulness is mostly associated with the work by Jon Kabat-Zinn. He drew on the Buddhist tradition to introduce and popularise mindfulness by founding the Stress Reduction Clinic at the University of Massachusetts Medical School and by inventing the Mindfulness-Based Stress Reduction (MBSR) program in the late 1970's (Williams & Kabat-Zinn, 2013). Although he contributed to the non-religious use of mindfulness and referred to it as an internal resource, he concluded along the lines of the Eastern approach that mental ruminations or poor mental discipline is the main reason for human distress (Bahl et al., 2016; Kabat-Zinn, 2003).

Mindfulness has the ability to sustain an enduring moment-to-moment awareness of present inner and outer experiences like thoughts, bodily sensations or environmental surroundings. Furthermore, it includes a kind of "non-reactiveness" which refers to adopting an observing rather than reactive perspective and prevents an automatic and habitual way of processing (Bishop et al., 2004; Kabat-Zinn, 1994). Next to programs that aim to train mindfulness (e.g., MBSR), the concept can also be considered as dispositional, in a way that

some individuals are more mindful than others (Bishop et al., 2004; Brown & Ryan, 2003). In regard to self-regulation, Brown and Ryan (2003) postulate that mindfulness enhances individuals' abilities to meet or detect their inner needs and in turn to better regulate themselves. Considering the work by Vago and Silbersweig (2012), mindfulness strengthens self-awareness, self-regulation and self-transcendence (referred to as S-Art), which in turn is associated with greater well-being. Thus, mindfulness seems to enhance self-regulation and could therefore possibly contribute to a more conscious decision-making.

Past research could identify many positive effects of mindfulness in regard to psychological and physical health (e.g., Baer, 2003; Brown, Ryan, & Creswell, 2007; Chambers, Way, Creswell, Eisenberg, & Liebermann, 2010; Lakey, Campbell, Brown, & Goodie, 2007). To which extent mindfulness can enact upon pro-environmentalism will be discussed in the following sections.

1.2.2. Connection between EC/PEB and Mindfulness

The ancient teachings of Buddhism, "recognizes the significance of one's environment, not just its influence upon humans, as an intrinsic part of personal well-being" (Mabsout, 2015, p. 93) Besides, Buddhism assigns an interconnectedness to all existing phenomena and claims that one's own existence should never exploit any of these phenomena (Mabsout, 2015). This strongly resembles the definition of sustainability as stated on page six and already makes a slight similarity between mindfulness and PEB visible. Past research revealed promising results regarding the relationship between mindfulness and environmental concern.

One of the first attempts to measure mindfulness empirically was made by Brinkerhoff and Jacob (1999) who analysed the back-to-the-landers movement in the late 20st century. This lifestyle of being close to nature, engaging in small farming and emphasising community made the back-to-the-landers a good contender of mindful living. It became apparent that mindfulness was a good predictor of sustainable values, which resulted in a self-sufficient way of a life in harmony with nature.

Further research tested the relation between mindfulness and a sustainable orientation more directly. Visitors of a sustainability expo with higher scores in the Acting with Awareness facet of the Five Facets Mindfulness Questionnaire (FFMQ) by Baer, Smith, Hopkins, Krietemeyer and Toney (2006) did score higher on the Green Scale aimed to measure self-reported green behaviour (Amel et al., 2009). Barbaro and Picket (2016) found a significant positive correlation between mindfulness and PEB in two different study samples.

Especially the FFMQ facets Observing and Nonreactivity were associated with higher PEB.

Research dealing with the topic of sustainable consumerism revealed that mindful consumers attach more importance to ecological facets of a product (Brown & Kasser, 2005) and that the FFMQ facet Acting with Awareness relates to more sustainable food choices, like buying seasonal fruits and vegetables (Hunecke & Richter, 2018). Next to this, a vegetarian diet has been found to be associated with mindfulness, which is also characterised as environmentally friendly behaviour since the reduction in meat consumption is one of the most effective climate mitigation strategies (De Boer, de Witt, & Aiking, 2016). A recent systematic literature review on mindfulness and sustainable consumption found support for the assumptions made by past research on mindfulness' quality to cultivate non-materialistic values, aid the conversion of intention to behaviour and disrupt automatic behaviour (Fischer, Stanszus, Geiger, Grossman, & Schrader, 2017). The alleged working mechanism of mindfulness will be further elaborated in the following.

Sustainable consumption is often prevented by the overwhelming amount of choices an individual has nowadays, restricted time limits, appealing advertisement or just "quick and easy" habits (Nielsen, 2017). This often goes along with automatic cognitive processes. Rosenberg (2004) suggests that these can be overcome by mindfulness. Several other studies could confirm a positive effect of mindfulness on behavioural regulation, decision-making processes and on the reduction of automatic choices (Chatzisarantis & Hagger, 2007; Black, Sussman, Johnson, & Milam, 2012, Bahl et al., 2016). This suggests that mindfulness could act as a "catalyst".

1.2.3. The Intention-Behaviour Gap and the Potential Impact of Mindfulness

When considering the societal contributions to climate change, it is imperative to take individual consumerism into account. Current consumption and the required industrial production patterns have without doubt caused increased emissions of greenhouse gases, pollution and the depletion of natural resources (UNEP, 2017). This was also powerfully shown by the so called "Earth Overshoot Day" on August 1. in 2018. This day marked the date when all the world's inhabitants did use more from nature than the earth can renew in an entire year.

Bahl et al. (2016) claimed mindlessness to be the major determinant of this problematic situation and also Mabsout (2015) blames non-conscious processes and emotions to be the reason why people feel drawn to material values and consumerism. Research on the

connection between mindfulness and automatic decision-making support this direction and describes mindfulness as an effective "antidote to automaticity" (Rosenberg, 2004, p. 115).

Past studies and opinion surveys revealed a widespread environmental concern among people (European Commission, 2017), but when it comes to decision-making people tend to choose non-sustainable products or engage in rather environmental harmful behaviour (Lanzini & Khan, 2017). A number of experimental and correlational studies have shown that intentions do not always go along with the same amount of behaviour change but that only one-half of the time intention will be actually translated into action (Fife-Shaw, Sheeran, & Norman, 2007; Sheeran & Webb, 2016; Webb & Sheeran, 2006). This is known as the intention-behaviour discrepancy or gap.

Intentions can be seen as "people's decisions to perform particular actions" (Sheeran, 2002, p. 2). Various theories (e.g., the theory of planned behaviour by Ajzen, 1991) address the intention-behaviour relationship and conclude that behaviour can mostly be predicted through a person's intentions. However, there are several obstacles to overcome when people aim to translate their intentions into actions. In the first place, they are challenged to get started, then to stick to it and execute it on a longer run and finally to successfully end it. Every step entails individual factors influencing the actual behavioural outcome, including, among others, the amount of self-regulation, perceived behavioural control, moral obligation, self-concept and social norms (for a summary, see Sheeran, 2002, or Sheeran & Webb, 2016). Furthermore, distractions like competing goals can challenge intention-behaviour consistency, especially because they can be initiated automatically by situational factors (Sheeran & Webb, 2016). Past studies revealed that habits and other automatic processes act upon the intention-behaviour relation as well (Aarts, Verplanken, & van Knippenberg, 1998). Bargh (1994) holds automaticity, often referred to as unconscious mechanisms of the mind, more responsible for particular behaviour than intention.

Habits as a part of automatic behaviour refer to behaviour that is goal dependent (Bargh, 1994). The initiation of the goal pursuit is consciously processed, but consequent action can be accomplished without deliberate thought. With a consistent and repeated success of goal accomplishment a habitual behaviour will develop. In addition, situational factors will become strongly attached to it and are also able to activate habits. Thus, a particular goal as well as situational cues can activate the fitting habitual plan automatically (Aarts & Dijskterhuis, 2000). Studies regarding social behaviour revealed that within the theoretical framework of planned behaviour, habits are better predictors of behaviour than intentions (Armitage & Conner, 2001; Conner, McEachan, Lawton, & Gardner, 2016).

Assuming that the nature of a particular automatic behavioural process is non-intentional or mindless rather than conscious, it is legitimate to conclude that the process is characterised by decreased attention and awareness to the goal (Chatzisarantis & Hagger, 2007). In comparison to this, mindfulness acts exactly opposite: it enhances attention and awareness of the present moment (Brown & Ryan, 2003). Considering decision-making within daily life, mindfulness could encourage a more direct experience of goal pursuit, available options and, as Langer (1992) points out, make novel aspects of a situation more salient. This would in turn facilitate deliberate choices and diminish the effects of advertisement or product marketing (Rosenberg, 2004).

It is also important to recognise that mindfulness promotes people's capacity of self-regulation (Hölzel et al., 2011). Self-regulation is essential when it comes to bridging intention and behaviour. The self-regulatory technique of creating if-then plans has been proven to make plans more concrete and enhance goal attainment (Sheeran & Webb, 2016). However, until now, there is limited research in regard to the effects of mindfulness on the intention-behaviour relation. A study by Chatzisarantis and Hagger (2007) empirically revealed moderating effects of mindfulness on the intention-behaviour relationship regarding physical activity in a way that individuals who act mindful are more likely to realise their intentions than vice versa.

Black et al. (2012) conducted a study in regard to smoking behaviour and discovered the potential of trait mindfulness to possibly shield unhealthy intentions from translating into unhealthy habits. Therefore, high intentions to smoke did only significantly predict smoking frequency among individuals low in trait mindfulness, but not among individuals high in trait mindfulness. The same held true for smoking refusal self-efficacy (SRSE), i.e. low SRSE predicted higher smoking frequency only among individuals low in trait mindfulness. They concluded that mindfulness may strengthen the translation of intention into healthy behaviour and acts protective against unhealthy behavioural outcomes. Applying this to decision-making in terms of environment-relevant shopping it may be possible that people high in mindfulness are more successful in realising their intention to buy eco-friendlier products than less mindful people.

Research on self-control supports this assumption. It was found that mindfulness has indeed the ability to improve self-control, thus the ability to control cognitive and emotional subsystems. This in turn helps against counter-intentional distractions (Chatzisarantis & Hagger, 2007; Kuhl & Fuhrmann, 1998). Also, self-focus is an important factor when it comes to attentional behaviour monitoring. Empirical studies on automatic behaviour

investigated the effects of manipulating attention away from the environment to the self. This is often done via the presence of a mirror. Conclusions indicated that this helps to focus on general functioning as well as one's behaviour and that it helps to prevent undeliberate execution of behaviour (Carver, Blaney, & Scheier, 1979; Carver & Scheier, 1981; Dijksterhuis & van Knippenberg, 2000).

Given that mindfulness makes a person more aware of inner experience and own responses to specific surroundings, it is possible to conclude that this applies to automaticity in the field of consumerism. The ways in which humans enact upon the world's ecosystems can make a big difference for their future functioning. In regard to the social norm of consumption, inhabitants of developed countries often possess materialistic values (Polonsky, Kilbourne, & Vocino, 2014). What we want and how we consume is partly determined by intrinsic or extrinsic value orientation. Resource dilemma tasks revealed for instance that individuals with an intrinsic value orientation (appreciating e.g., personal growth and stable relationships) showed better ecological stewardship (Kasser & Sheldon, 2000) than individuals with extrinsic value orientation (appreciating e.g., status, financial resources). In regard to pro-environmental behaviour, Brown and Kasser (2005) reported that higher ecological behaviour was associated with intrinsic value orientation compared to extrinsic value orientation. Additionally, they found an association between mindfulness and intrinsic values.

Having all these findings in mind, one can conclude that mindfulness enables mindful consumption in terms of being more aware regarding automatic behaviour and habitual action, of making new options salient, reflect about inner wants and needs, being less drawn to materialistic values, and follow a more choiceful decision-making in daily life (Brown & Ryan, 2003) with a possible greater chance of a healthy lifestyle.

An additional factor contributing to deal with the environment in a more resource-conserving manner is nature connectedness (NC). For instance, Barbaro and Picket (2016) discovered that NC mediates the relationship between mindfulness and PEB. Mayer and Frantz (2004) describe it as an affective trait and assume that the feeling of being connected to nature is embedded within the self. As a result, they draw the conclusion that being connected to nature prompts people to harm the environment less. Many studies provided evidence for this assumption (e.g., Rosa, Cabicieri Profice, & Collado, 2018; Schultz, Shriver, Tabanico, & Khazian, 2004). Independent from NC, simple visits of natural areas were found to improve PEB as well (Lawrence, 2012).

1.3. Nature Connectedness

1.3.1. Definition

"Biophilia" is a term dropped by Wilson (1984) which describes humans' innate kinship to nature. According to him, spirituality is essential for a sense of nature belonging and hence experiencing an ecological self. In less spiritual terms, nature connectedness refers to the relationship between human and nature and as part of behavioural science targets the individual's identification with the natural environment (Restall & Conrad, 2015). Within the literature different descriptions of NC exist. This is also reflected by researchers' preferred terminology of NC in general. For this construct, terms range from nature relatedness (Nisbet, Zelenski, & Murphy, 2009) to love and care for nature (Perkins, 2010) or dispositional empathy with nature (Tam, 2013).

This work will follow the definition by Mayer and Frantz (2004) who define connectedness to nature as an affective trait of "individuals' experiential sense of oneness with the world" (2004, p. 504). Assuming that NC is integrated within the self it is reasonable to assume, that people with a strong connection towards nature are more environmentally concerned.

1.3.2. Connection between EC/PEB and NC

Wilson was one of the first researchers concerned with nature connectedness. With "biophilia" he contributed to capturing the connection between human and nature. Since then researchers are not only exploring the connection but also the disconnection between humans and their natural environment. From an evolutionary point of view, this development could have started during the agricultural revolution. With permanent settlement and the domestication of wheat and animals, the human perspective regarding the natural environment started to change (Harari, 2015). In terms of the industrialisation in Western countries in the 1920's, natural areas disappeared due to urban and industrial planning. Later, the appearances of indoor workplaces, the technical development and the circumstance of people moving to cities contributed to the separation between outdoor environment and human daily life (Vining, Kalnicky, & Merrick, 2008).

Taken together, these developments might have contributed to the fact that people were less in need to rely upon nature which led to a psychological, material and physical disconnection from the environment (Cumming et al., 2014).

However, direct experiences with nature seem to affect people emotionally (Louv,

2008) and play an important role when it comes to physiological and psychological health (Bratman, Hamilton, & Daily, 2012; Haluza, Schönbauer, & Cervinka, 2014; Maller, Townsend, Pryor, Brown, & St. Leger, 2005; Piccininni, Michaelson, Janssen, & Picket, 2018).

Research on the relation between nature connectedness and environmental concern is a rather new field and approximately going on for about 20 to 30 years (Klaniecki, Leventon, & Abson, 2018; Schultz et al., 2004). This resulted in a vast amount of promising results regarding the effectiveness of NC for promoting environmental concern and PEB (Bruni, Chance, Schultz, & Noland, 2012; Gosling & Williams, 2010; Larson, Green, & Castleberry, 2011; Rosa et al., 2018; Schultz et al., 2004).

A study by Pensini, Horn and Caltabiano (2016) found that spending time in nature, such as camping, is related to higher connectedness to nature and PEB. Having the urge to be outside and engage in outdoor recreation activities was also found to be positively correlated with environmental attitudes (Bjerke, Thrane, & Kleiven, 2006). Most of these studies used self-report measurements for NC assessment (e.g., Mayer & Frantz, 2004). However, Schultz et al. (2004) were able to predict PEB out of NC without using self-report questionnaires. They used an adjusted implicit-association test (IAT) that aims to measure the strength of automatic associations through reaction time and discovered results that were in line with those obtained via self-report questionnaires.

It is also worth mentioning, that childhood seems to play an important role in the development of connecting with nature. The amount of time spent in nature and interacting with it as a child was also found to enhance environmental conservation (Soga, Gaston, Yamaura, Kurisu, & Hanaki, 2016). This outcome held true for developed countries like Japan (Soga et al., 2016) as well as for developing countries like Brazil (Rosa et al., 2018). Lawrence (2012) conducted an experiment with undergraduate students who needed to visit rural areas to successfully attend a university course. Students who felt a greater identification with this area felt also more obligated to conserve it. An IAT experiment by Bruni et al. (2012) revealed that people in general feel a greater connection towards natural than built environments. Furthermore, they discovered that people are equally connected to positive (e.g., glacier) and negative (e.g., insect) valenced stimuli of nature.

Past research did not only reveal a correlational association between NC and environmental concern, some studies did also find a mediating role of NC. Markowitz et al. (2012) tried to profile the PEB individual by using a broad spectrum of personality measures to reveal personality feature in regard to pro-environmental behaviour. This resulted not only

in detecting a relation between Openness to Experience and PEB, but also showed that this effect was fully mediated by attitude and NC. A similar mediation was found by Barbaro and Picket (2016) who identified NC's indirect influence on the relationship between mindfulness and PEB. Restall and Conrad (2015) reviewed literature of the past decade (2002 – 2011) regarding the contribution of NC to environmental management and concluded that attachment to nature could lead to greater interest in environmental conservation and to more engagement in PEB.

Personality psychology has a long tradition within psychological research since it is valuable for explaining individual differences in human behaviour and experience. In the context of environmental research, it adds explanatory value to the understanding of EC/PEB and sheds light upon the possible impact of stable individual personality traits on environmental behaviour. Moreover, it helps to gain insight into denial of responsibility and ignorance of consequences of polluting behaviour (Feygina, Jost, & Goldsmith, 2010). Past research by Whitmarsh and O'Neill (2010) could reveal that self-identity seems to be an important predictor of environmentally friendly behaviour. When individuals are having a pro-social value orientation they also seem to have greater intentions to behave sustainable and are more prone to consider future consequences of harming the environment (Joireman, Lasane, Bennett, Richards, & Solaimani, 2011). Regarding the Big Five personality traits, a body of research could link higher levels of Agreeableness and Openness to Experience to a greater concern for the environment (e.g., Hirsh, 2010, 2014).

1.4. Personality

1.4.1. Definition

The assessment of personality is essential when it comes to the description of and research on various human aspects of behaviour. It is often assessed within the context of clinical psychology, opinion research and marketing research. Personality traits may also play an important role regarding individual environmental conservation. A common approach for personality assessment has been the Five Factor model of personality (Big Five), which describes personality variations along five trait dimensions (McCrae & John, 1992). Encompassed traits are: Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness.

Neuroticism was found to be related to more anxious, insecure, angry and moody individuals (Barrick, Mount, & Judge, 2001). Extraversion reflects social potency such as being talkative and outgoing and is characterised by a need for activity (Barrick et al., 2001;

Costa & McCrae, 1992). Openness to Experience reflects individuals that are unconventional, open-minded and sensitive towards their inner and outer experiences (Barrick et al., 2001; Costa & McCrae, 1992). People with high scores in Agreeableness are concerned for others, compassionate and cooperative and value reciprocal relationships (Barrick et al., 2001). The factor Conscientiousness relates to achievement orientation, self-discipline and a preference for long-term panning (Barrick et al., 2001, Costa & McCrae, 1992).

The following section sheds light upon the contribution of the Big Five personality factors to environmental research.

1.4.2. Connection between EC/PEB and Personality

Regarding the relationship between the Big Five personality traits and environmental concern, past studies could repeatedly identify two factors as significant predictors of environmental concern. These traits were Agreeableness and Openness to Experience (Hirsh, 2010; Hirsh & Dolderman, 2007). Hirsh (2014) furthermore assessed whether nationally-aggregated personality Big Five traits (51 countries) were capable to predict a country's environmental sustainability. The results provided evidence that nations with higher aggregated population levels of Agreeableness and Openness to Experience had significantly higher scores on the Environmental Performance Index.

Milfont and Sibley (2012) found, next to Agreeableness and Openness to Experience, Conscientiousness to be associated with higher efforts in environmental conservation. Keeping the theoretical model of the Big Five traits in mind, it appears as if concern for others (as seen in agreeable individuals) could also lead to concern for the welfare of other species and the natural environment. Individuals high in Openness to Experience are assumed to be curious about how their behaviour may affect natural resources and be open minded regarding environmentally friendly behaviours or products and therefore be more prone to behave in sustainable ways.

A study by Markowitz et al. (2012) tried to identify the PEB individual. In doing so, they aimed to conceptualise a specific type of individual who demonstrates a "stable pattern of PEB performance across time, space, and behavioral domains" (p. 86) by conducting multiple personality measures (the revised NEO Personality Inventory; Costa & McCrae, 1992; HEXACO Personality Inventory; Lee & Ashton, 2004; Six Factor Personality Questionnaire; Jackson, Paunonen, & Tremblay, 2000; and the Big Five Inventory; John et al., 1991). However, only a consistent correlation between the broad trait of Openness to Experience and PEB was found and no support for the Agreeableness trait could be given. Obtaining this result could have been caused by their self-constructed nine-item

Environmental Practice Scale which was retrieved out of a 400 item Objective Behaviour Inventory (originally based on Leohlin and Nichols's work in 1976). With this in mind, it would be even more important to have access to a universal and unified measurement for environmental concern, as stated earlier.

Taken together, the aforementioned results are promising in terms of shedding light to the concepts of EC and PEB and associated factors. The present study will complement existing research by addressing the concepts of mindfulness, nature connectedness and personality, which were all found to be associated with EC/PEB in the past.

The conceptualisation of environmental concern will follow Schahn et al. (2000) and their Scales for Assessing Environmental Concern (Skalensystem zur Erfassung des Umweltbewusstseins; SEU). The scale is divided in the three subscales of environmental attitude, behavioural intention and self-reported behaviour and thus has the strength of including psychological constructs that are frequently found to be associated with environmental concern as well as pro-environmental behaviour (Bamberg & Möser, 2007).

Based on this, it will be examined whether people high in EC and PEB are more mindful, more connected to nature and prone to certain personality traits. Due to the current replication crisis within psychology and other research domains (Open Science Collaboration, 2015), the present study aims to replicate the findings mentioned above with adding the value of a matched-pairs study design. In doing so, it allows to control for differences in gender and age.

The hypotheses will be as follows:

1. There is a significant difference in mindfulness between people who score high in environmental concern and people who score low in environmental concern.
2. There is a significant difference in nature connectedness between people who score high in environmental concern and people who score low in environmental concern.
3. There is a significant difference in personality traits (especially Openness to Experience and Agreeableness) between people who score high in environmental concern and people who score low in environmental concern.

2. Methods

2.1. Participants

The sample was composed of 48 pairs of adults (total $N = 96$), i.e. individuals who formed a pair and fulfilled the study criteria regarding pro-environmental behaviour, gender and age (cf. 2.2.), out of a total of $N = 140$ participants of an online survey. In addition, 44 participants filled out the entire questionnaire but failed to provide a matching partner. The remaining 44 individuals were paired using the following algorithm: Based on the same gender and age cohort (+/- 10 years) participants with the highest score in environmental concern were matched with individuals with the lowest scores in environmental concern, starting with the data pair that yielded the highest possible difference in environmental concern. This procedure was followed until no further match was possible (e.g., because data pairs could no longer be matched according the gender or age restrictions). This resulted in additional 21 data pairs and the exclusion of two individuals. In total, the 48 original data pairs were combined with the 21 artificial data pairs; this resulted in an overall $N = 69$ data pairs.

Women comprised 73.91% of the sample. Regarding nationality, 72.46% were German citizens, 25.36% Austrian citizens, 0.73% Danish citizens and 1.47% British citizens. Participants' age ranged from 18 to 68 years ($M = 40.08$, $SD = 14.25$). The educational level was comparably high with 54.35% having a university degree, 21.01% having a university of applied science degree, 7.97% holding an apprenticeship certificate, 14.49% having a high-school diploma and 1.45% completed compulsory school (0.7% other). The sample is therefore not entirely representative of the general (German and Austrian) population (Statistisches Bundesamt, 2018; Statistik Austria, 2016).

2.2. Procedure

The online survey took place from mid-January 2018 until mid-March 2018. The survey link was distributed via e-mail to family members, friends and acquaintances from work (occupational and social work sector). The e-mail included, next to some information and relevance of the study, the request to distribute the survey link to familiar people. Next to this, participants were asked to partner up in order to fulfil the study design criteria and to successfully complete the survey (cf. 2.3.). After one month, the survey link and invitation was also introduced to public Facebook Groups that had a topic of relevance to the study theme ("Outdoor activities in Vienna" and "Zero waste Vienna"). The participation was

voluntarily and participants could only start the survey after confirming an informed consent. At the end of the questionnaire, there was the possibility to take part in a lottery to win a 15€ voucher that could be either redeemed at the online shops of "ArmedAngels", "Patagonia" or "Dopper". The online survey was hosted by SoSciSurvey and took about 15 minutes to complete.

2.3. Study Design

The matched-pairs design of the study aimed to control for gender and age differences within the sample. The advantages of this design are the reduction of the standard error (variance between people) and that there are less participants needed to ensure sufficient power (Posepeschill, 2006). The study invitation asked the participants to contact an acquaintance, friend or colleague of the same sex and within their age generation (+/-10 years) who owns, compared to them, an opposite opinion regarding environmental concern and environmental behaviour. Besides controlling for gender and age, the study design at hand did also control to a certain extent for education, socialisation and background. This resulted in same-sex pairs with roughly the same age, but contradicting attitudes towards environmental protection, who were then assigned to either a group high in environmental concern or low environmental concern.

2.4. Measurements

Environmental Concern

The Scales for Assessing Environmental Concern (3rd, revised version) were introduced by Schahn, Damian, Schurig and Füchsle (2000). The self-report questionnaire (German language) aims to assess individual environmental attitudes (e.g., *"Es ist erfreulich, wenn eine Umweltschutzorganisation mit ihren Aktionen Erfolg hat."*), behavioural intentions (e.g., *"Ich bin dazu entschlossen, in Zukunft (weiterhin) in meinem Haushalt möglichst wenig Wasser zu verbrauchen."*), as well as self-reported behaviour (e.g., *"Für Parties und Gartenfeste verwende ich das praktische Einweggeschirr aus Pappe oder Plastik"*).

Since Schahn et al. (2000) are not offering a detailed description with respect to their subscales, it will be briefly discussed how environmental attitude, environmental intention and self-reported behaviour are described in other literature. The subscale attitude tackles environmental attitude, which is often referred to as ''the collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues'' (Schultz et al., 2004, p. 31). This definition prioritises the evaluative character of attitudes and

can be seen as the individual opinion ones has towards factors affecting the natural environment (Milfont & Sibley, 2012). The subscale intention to behaviour aims to measure people's willingness to engage in a specific behaviour. Intention itself is formed through the combination of cognitive (e.g., action ability) and personality (e.g., attitudes, self-efficacy) variables (Bamberg & Möser, 2007). On average, intention was found to explains 27% variance of self-reported PEB (Bamberg & Möser, 2007). Thus, it accounts for future behaviour that may include to abandon habits for a more environmentally friendly way of living. Lastly, the self-reported behaviour subscale is concerned with peoples' actual past ecological behaviour. This includes behaviours regarding recycling, transportation and other more daily activities. Thus, this scale aims to measure PEB (see Appendix for precise items).

The questionnaire comprises a global 84-item scale (UG) and four different, unidimensional short forms of the global scale (UGK; each including 21 items). In this study, the short scale UGK-V (Validity) was used due to its advantage of having the highest correlation between self-assessment and external assessment and its proper fit for the question of interest. Content-related redundancy of two items led to a removal which resulted in the inclusion of 19 items from the UGK-V scale.

Because of its relevance to the question of interest, eight items were added from the UG (e.g., *"Beim Kochen benutze ich einen Deckel für Topf oder Pfanne, damit nicht unnötige Energie verloren geht"*). In total, the scale to measure environmental concern including attitude, intention and pro-environmental behaviour contained 27 items. For the current sample, a Cronbach's Alpha of .83 was found. The three concepts of environmental attitude, behavioural intention and self-reported behaviour revealed Cronbach's Alphas that were comparable with the data found by Schahn et al. (2000) with $\alpha = .85$, $\alpha = .86$ and $\alpha = .57$, respectively.

Mindfulness

The Five Facet Mindfulness Questionnaire was introduced by Baer, Smith, Hopkins, Krietemeyer and Toney (2006). For the use of this study, mindfulness was assessed with the validated German shortened version of the Five Facet Mindfulness Questionnaire FFMQ-K by Tran, Glück and Nader (2013). However, in comparison to Baer et al. (2006) the FFMQ-K as well as the full FFMQ seem to have a two-factor higher order structure of mindfulness rather than a single higher order factor. There is strong evidence for mindfulness being governed by the two-higher order factors Self-regulated Attention and Orientation to Experience within the general population (Burzler, Voracek, Hos, & Tran, 2018), among

experienced meditators (Tran et al., 2014), as well as for the Spanish version of the FFMQ (Aguado et al., 2015).

The short version contains 20 items measured on a five-point Likert scale from 1 (*trifft nie zu*) to 5 (*trifft immer zu*). In compliance with Baer et al. (2006), a total mindfulness score (α = .60) was calculated as well as a score for each facet of mindfulness. The five facets include Observe (e.g., "*Ich nehme Gerüche und Düfte der Dinge wahr"*; α = .77), Describe (e.g., *"Ich kann normalerweise recht genau beschreiben, welche Gefühle ich im Moment habe"*; α = .78), Nonjudge (Nonjudging of Inner Experience; e.g., *"Ich sage mir, dass ich nicht so denken sollte, wie ich denke"*; α = .79), Actaware (Acting with Awareness; e.g., *"Wenn ich etwas tue, dann schweifen meine Gedanken ab, und ich bin leicht abzulenken"*; α = .82), and Nonreact (Nonreactivity to Inner Experience; e.g., *"Ich weiß über meine Gefühle Bescheid, lasse mich aber nicht von ihnen mitreißen"*; α = .70).

Nature Connectedness

Nature connectedness was measured using the German translation by Cervinka and Hefler (2009) of the Connectedness to Nature Scale by Mayer and Frantz (2004). This unidimensional scale aims to measure the relationship between the self and nature (e.g., *"Ich fühle mich oft als Teil der Natur"*). However, instead of the original 14-item scale, a short seven-item version was used as recommended by Pasca, Aragonés and Coello (2017). The shorter version measured on a five-point Likert scales with endpoints 1 = *strongly disagree* and 5 = *strongly agree*. In the current sample an internal consistency (Cronbach's Alpha) of .90 was measured.

Personality

The short version of the German Big Five Inventory (BFI-K; Rammstedt & John, 2005) is a 21-item, self-report measure, designed to capture the Big Five personality traits: Neuroticism (e.g., *"Ich mache mir viele Sorgen"),* Extraversion (e.g., *"Ich gehe aus mir heraus, bin gesellig"*), Openness to Experience (e.g., *"Ich bin vielseitig interessiert"*), Agreeableness (e.g., *"Ich neige dazu andere zu kritisieren"*), and Conscientiousness (e.g., *"Ich erledige Aufgaben fründlich"*) in the most economic fashion. Items are designed to rate the agreement on multiple statements on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alphas were .75 (Neuroticism), .87 (Extraversion), .77 (Openness to Experience), .56 (Agreeableness), and .65 (Conscientiousness).

Self-Deception

The Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1984) is a two-factor measurement of socially desirable responding and differentiates between Self-Deceptive Enhancement (SDE; e.g., *"Ich bin ein vollkommen rational denkender Mensch)* and Impression Management (IM; e.g., *"Ich fluche niemals*). The present study used the validated German version of the questionnaire (Musch, Brockhaus, & Bröder, 2002). For the purpose of the study and because of economic reasons concerning the length of the survey, only the 10-item SDE scale was used. The 10-item IM scale was less relevant to the present self-report measure, because the questions were not administered face-to-face, many participants did not know the survey taker personally and due to the guarantee of anonymity, participants had no need to worry about the impression they make. Answers were obtained through a seven-point Likert scale (1 = *total disagreement* to 7 = *total agreement*). Internal consistency for the Self-Deceptive Enhancement scale was $\alpha = .55$.

3. Results

The statistical analyses were conducted using SPSS version 23. Each of the $N = 69$ data pairs was split based on the variable environmental concern, resulting in one group that was rated comparably high in environmental concern and in another group, that was low in environmental concern.

To ensure that the 21 artificial matches (cf. 2.1.) did not confound/alter the statistical results, all analyses were conducted on two separate data sets. One data set included the original matched pairs only ($N = 48$) while the other set included the original and the artificial matched pairs ($N = 69$). Since statistical analyses revealed no significant differences in results (see Appendix) only the second data set with $N = 69$ will be displayed in the following.

Because of its larger sample size, the second data set did enhance the statistical power of the analysis and allowed for more reliable conclusions. A power analysis revealed that, based on a significance level of $\alpha = .05$ and two-tailed testing, the given sample size of $N = 69$ was sufficient to detect a small-to-medium sized effect ($d = 0.34$) in a matched-pairs study design with a power of .80 (Faul, Erdfelder, Buchner, & Lang, 2009). Alternatively, a power of .98 was obtained to detect a medium-sized effect of $d = 0.50$.

Due to the fact that the present study was based on participants' self-reported perceptions, the answers were reviewed regarding social desirability. Since all the scale values did exceed the threshold values of 1 and 2 given by Paulhus (1984, p. 600), social

desirability could be neglected in regard to the statistical analyses. Multiple paired-samples *t* tests were conducted in order to analyse the differences between the group high in environmental concern and the group low in environmental concern. Descriptive statistics of the independent variables are displayed in Table 1.

All variables were checked in regard to the requirements of a paired-samples *t* test. The dependent variables were metric in scale and the assumption of dependency between the groups was assured by the study design. However, five variables violated against the assumption of a normal distribution of the differences between the two groups (Describe, Actaware, Agreeableness, Neuroticism and age). Nevertheless, due to the central limit theorem, the robustness of results can be assumed. To be one the safe side, the Wilcoxon signed-rank test was conducted for the five variables that did not display normally distributed differences (Field, 2009). The results obtained by the Wilcoxon signed-rank test were comparable in significance and magnitude (effect size measured by Cohens' d). Therefore, only the outcomes obtained by the paired-samples *t* test are mentioned in the following (cf. Table 1).

There was a significant difference in EC among the groups high and low in EC. This result held also true for three subscales attitude, intention to behaviour and self-reported behaviour of EC (cf. Table 1).

Regarding mindfulness, no significance differences for the overall FFMQ-K scale could be obtained. The matched-pairs *t* test for the mindfulness facet Observe revealed a significant difference among the groups high and low in EC, whilst the other facets Describe, Actaware and Nonreact were not significant. However, a trend for the facet Nonjudge could be obtained, such as that a lower score of Nonjudge did go in hand with higher levels of EC.

Further analyses proofed a significant difference in Nature Connectedness between the groups high and low in EC.

In regard to personality and the Big Five facets, the facet Agreeableness was significantly different among the groups high and low in EC. Also, Openness to Experience emerged to be significantly different between the groups high and low in EC. However, differences in Neuroticism, Extraversion and Conscientiousness did not reach a significant level.

To be sure that outcomes are not confounded by the difference in age among the two groups, a samples-paired *t* test was also conducted regarding the participants' age. This revealed no significant difference in age between participants high and low in EC. The overwhelming majority of the present sample contacted a same sex partner, ruling out gender

as a confounding variable.

Lastly, due to the conduction of multiple *t* tests a Bonferroni correction was conducted. This resulted in a corrected significance level of $p = .003$. All previously mentioned significant findings remained significant after the correction, with the exception of Agreeableness.

Table 1

Descriptive statistics and psychometric properties of the study variables for the group high and low in EC

	Group high EC		Group low EC				95% CI		
Variable	*M*	*SD*	*M*	*SD*	*t*(68)	*p*	*LL*	*UL*	Cohen's *d*
Environmental Concern	5.76	0.47	4.70	0.76	-11.81	<.001*	-1.24	-0.88	1.42
Attitude	6.05	0.51	5.00	1.00	-8.57	<.001*	-1.30	-0.81	1.03
Intention to behaviour	5.80	0.09	4.30	1.06	-11.74	<.001*	-1.77	-1.25	1.41
Self-reported behaviour	5.48	0.47	4.76	0.70	-7.86	<.001*	-0.90	-0.53	0.95
Mindfulness	18.57	2.31	18.40	2.07	-0.47	.637	-0.88	0.54	0.06
Observe	4.18	0.60	3.80	0.70	-4.07	<.001*	-0.57	-0.20	0.49
Describe	3.83	0.79	3.64	0.68	-1.43	.157	-0.44	0.07	0.17
Nonjudge	3.68	0.88	3.92	0.67	1.67	.099	-0.05	0.53	0.20
Actaware	3.49	0.79	3.64	0.72	1.57	.122	-0.04	0.34	0.19
Nonreact	3.39	0.62	3.39	0.62	0.08	.934	-0.19	0.21	0.01
Nature Connectedness	4.01	0.71	3.40	0.94	-4.48	<.001*	-0.90	-0.34	0.54
Personality									
Neuroticism	2.82	0.80	2.69	0.81	-0.98	.332	-0.40	0.14	0.12
Extraversion	3.72	0.88	3.60	0.78	-1.28	.206	-0.43	0.09	0.15
Openness to Experience	4.22	0.59	3.86	0.71	-3.30	.002*	-0.57	-0.14	0.40
Agreeableness	3.51	0.69	3.27	0.71	-2.32	.023*	-0.44	-0.03	0.28
Conscientiousness	3.85	0.67	3.82	0.55	-0.27	.790	-0.21	0.16	0.03
Self-Deception	4.39	0.72	4.43	0.62	0.41	.681	-0.17	0.26	0.05

Note: CI = confidence interval; *LL* = lower limit; *UL* = upper limit; *p < .05

4. Discussion

The present work examined the relationship between environmental concern (with focus on pro-environmental behaviour) and the concepts of mindfulness, nature connectedness and personality. Based on the reported findings, several conclusions can be drawn:

To begin with, a significant relationship between the mindfulness facet Observe and environmental concern was found, including the subscales attitude, intention to behaviour and self-reported behaviour. This effect was of medium size. Furthermore, a trend regarding the facet Nonjudge could be observed, such that individuals higher in EC obtained also higher values in Nonjudge. However, the effect of this result was only small. Regarding the facet Observe, the result is in line with past research by Barbaro and Picket (2016), who found this to be true in two different samples and obtained a medium-sized effect as well. Observing sensations goes in hand with a less absent-mind (Baer et al., 2006) and relates to a better attentional capability to internal and external experiences (Tran et al., 2013). By doing so, it contributes to mindfulness' ability to improve of self-regulation (Hölzel et al., 2011; Langer & Moldoveanu, 2000). Moreover, I share the opinion of Barbaro and Picket (2016) in the sense that the facet Observing could be of particular interest in terms of EC and PEB, since it puts emphasis on attentiveness towards external stimuli, e.g., environmental surroundings. This characteristic could enable individuals to focus on the environment and, in combination with being connected to nature, intensifies natural experience and the willingness to conserve it.

In regard to the trend in Nonjudge, no comparable findings could be retrieved from past research. The Nonjudge facet refers to accepting inner feelings and experience rather than judging them. In terms of environmental protection, it could be speculated that people who are high in environmental concern have built an opinion in the past regarding the topic of environmental conservation and how their personal existence impacts the planetary well-being. In the course of doing so, they could have been confronted with inner conflicts (e.g., being comfortable and taking the car to work or taking the train/bike and keep the ecological footprint low or buying more expensive organic food vs. buying cheaper nonorganic food and save the money for other occasions). Consequently, they might have become more reactive and more susceptible towards their inner voice and feelings and, in turn, decision-making. This does also fit the statement by Bahl et al. (2016) that "nonjudgmental consideration of stimuli entails being deliberate in evaluations and not acting on automatic or unconscious

judgments" (p. 200). In addition, I would highly recommend looking at the FFMQ facets separately and not just composing an overall mindfulness value. Positive and negative values in different facets could cancel each other out and impede valuable insights into the mindfulness-EC/PEB relation.

Contradicting Amel et al.'s (2009) finding of a significant result regarding the facet Acting with Awareness and PEB, the present study lacks this relation. However, since this result could not be obtained by Barbaro and Picket (2016) either, I agree with them that Amel et al.'s (2009) finding might be due to a difference in methodology and measurement.

In addition, the present study did not obtain any evidence for the relationship between Nonreactivity and EC/PEB as found by Barbaro and Picket (2016). Since further evidence is rather sparse, there is more research needed to be sure which of the FFMQ facets can most definitely be assigned to EC/PEB. Until now, it appears to be only Observing.

In regard to connectedness to nature, a significant relationship with environmental concern and the three subscales attitude, intention to behaviour and self-reported behaviour was found. The results obtained a medium-sized effect and are in accordance with past research within the field of ecological psychology (Bruni et al., 2016; Lawrence, 2012; Mayer & Frantz, 2004; Restall & Conrad, 2015; Schultz et al., 2004). Furthermore, the results show that using the adapted version of the Nature Connectedness Scale (Mayer & Frantz, 2004), as suggested by Pasca et al. (2017), does reveal similar results compared to research relying on the original 14-item scale (Rosa et al., 2018). This entails the advantage of a more economic but equally reliable way of testing the human-nature relation. This result supports once again the assumption that feeling part of nature as a human being leads to the willingness of conserving nature and maintain it as a habitat for other species and future generations.

Present analyses on personality and environmental concern revealed that two of the Big Five factors were indeed associated with being more concerned about the environment: Openness to Experience and Agreeableness. Both outcomes had a small to medium effect size. This finding was also in line with past findings within environmental personality research (Hirsh, 2010, 2014; Milfont & Sibley, 2012). However, Milfont and Sibley (2012) did also obtain significant results regarding the factor Conscientiousness and so did Hirsh (2010), with additionally finding Neuroticism to be significantly associated with EC/PEB. Since the current research landscape and the outcomes added by the present work both entail promising results for potential attribution of personality factors to environmentalism, it would be relevant to conduct more studies to replicate and underpin the contribution of Agreeableness and Openness.

The reason for Openness being related to more EC can be explained with higher levels of cognitive flexibility leading to more awareness of behavioural consequences upon nature and having more interest in trying new things (e.g., sustainable options) (McCrae, 1994). Furthermore, open individuals tend to be more curious and adaptable regarding the status quo, therefore experimenting with alternative ways of living (Goldberg & Strycker, 2002). Additionally, Markowitz et al. (2012) concluded that Openness and its relation to aesthetic appreciation leads individuals to a greater enjoyment of nature and therefore to more sustainable behaviour.

Agreeable persons tend to be empathic and show a greater interest in other people's well-being. This empathic engagement could be transferred to the natural world and other species, leading to an environmentally friendly mind and less exploiting behaviour (Schultz, 2000).

4.1. Limitations

No scientific work comes without its limitations. First of all, the present analyses were conducted on a rather educated sample. Therefore, the aforementioned findings might apply in particular to individuals with an academic degree and one should be cautious in generalising the findings to the entire population. Meyer (2015) found that individuals with higher education are in general more concerned about the environment.

In regard to methodological biases, it should be mentioned that using self-report questionnaires, which the present study did, constitutes as potential risk of error. The validity of respondents' answers might be threatened by social desirability. However, socially desirable answers could be ruled out as an explanation for the present findings, because the observed values fell into the negligible range. Furthermore, past research demonstrated validity of self-reporting in environmental research (Kaiser, Frick, & Stoll-Kleeman, 2001).

In utilising the questionnaire by Schahn et al. (2000) to measure environmental concern, the present study cannot escape from the lacking compliance in environmental research regarding a unified measurement of environmentally relevant variables (see Fischer, Stanszus, Geiger, Grossman, & Schrader, 2018). For the purpose of the study, the questionnaire was of proper fit; however, it lacks an established body of prior research. To make a suggestion for further research and to enhance comparability, it might be a viable approach to see EC as the overarching concept, which encompasses facets of attitude, intention and behaviour. This should also be validated by future research. Consequently, techniques such as factorial analyses and/or structural equation modeling might constitute promising paths for future work in the realm of environmental psychology. Following the

rationale for EC as the overall concept, the scale developed by Schahn et al. (2000) would be a suitable option. However, there are some minor drawbacks that should be resolved before more research is conducted with this scale: First, as of now, the scale is only available in German, hence a professional translation to at least English seems warranted. Second, the scale dates from 2000. Even though the items deployed in the present work did not appear to be outdated in any fashion, an update, also regarding validity and reliability, would be desirable.

In terms of measuring nature connectedness, it seems that the shortened seven-item version of the Nature Connectedness Scale (Mayer & Franz, 2004) by Pasca et al. (2017) has a proper fit and future studies can rely on it. However, it should be recognised that there are discrepancies whether the cognitive or affective component of NC is measured. Mayer and Frantz (2004) state that the scale measures NC as an affective construct, whereas Perrin and Benassi (2009) found that participants responded similarly to items using either the term "feel" or "think/recognize". They concluded that it measures the cognitive component only. However, the seven-item scale comprises only two of seven items that use cognitive terms and it should therefore be checked again whether this circumstance influences the measuring quality. Another suggestion would be adding a behavioural measure, such as the adjusted IAT used by Schultz, Shriver, Tabanico, and Khazian (2004).

4.2. Implications

The aforementioned findings entail multi-layered practical implications. First of all, I agree with Wamsler and Brink (2018) who state that "climate change and its devastating impacts cannot be resolved by new technology or governance alone. They require a broader, cultural shift" (p. 55).

However, this cultural shift needs a change in priorities on different societal levels. Education in general, as well as specific education regarding a sustainable life-style and information about current problems could be one step towards change (Mayer, 2012). Another option to make individuals behave eco-friendlier is to reconnect them to nature (Klaniecki, 2018). To integrate more nature in urban settings could be done via urban planning and offering more green areas, flowerbeds and parks, since simple nature visits did enhance NC and PEB (Lawrence, 2012; Pirgie, Schwab, Sudkamp, Höltge, & Cervinka, 2016). Again, schools could integrate this aspect via nature visits, school trips or, if possible, even by holding classes outside every once in a while. Another aspect of NC is that the experience of nature during childhood influences one's perception of nature as an adult and can enhance pro-environmentalism (Rosa et al., 2018; Soga et al., 2016). This in turn would also take

parenting into responsibility in a way that it should support or enable nature-related experiences of children (This bears also many more advantages; see McCurdy, Winterbottom, Mehta, & Roberts, 2010).

The aspect of Observing sensation contributing to the characteristics of mindfulness was found to enhance EC and PEB. To improve the ability of being attentive towards inner and external experiences, it could be helpful to strengthen this via the mindful meditation practice of focused attention (Tran et al., 2013). Focused attention meditation (FA) is defined by a sustained selective attention during meditation on something like the sensation caused by every inhalation and exhalation or a mantra (Lutz, Slagter, Dunne, & Davidson, 2008). With more practice comes a greater ability to notice wandering of the mind and to focus on an object with awareness. By doing so, it can be presumed that environmental experiences become perceptible or even intensified. This in turn would probably increases NC and could lead to more ecological engagement. This would also explain the mediation of NC between mindfulness and PEB (Barbaro & Picket, 2004). Future research should address this and conduct research on the mediation of NC in regard to the relation between EC and PEB.

With respect to consumerism, mindfulness could oppose automatic behaviour like habits (Dijksterhuis & van Knippenberg, 2000) and entails the possibility to strengthen the intention-behaviour relationship (Chatzisarantis & Hagger, 2007). Being mindful about consumption would include being more deliberate regarding choices, less susceptible regarding advertisement and be more aware about the implications of consumerism for the world (Mabsout, 2015). However, to be sure about mindfulness' mode of action, further studies are needed.

Integrating personality into practical implications for fostering sustainable choices does not come easy. Markowitz et al. (2012) proposed that interventions should be framed as "new, exciting, cutting-edge, and of great importance" (p. 105), in order to address people high in the Big Five factor Openness. Applying this frame however, probably entails that these interventions would be unappealing to individuals who value a more conservative lifestyle and are less excited about alternatives to the status quo alter. Concerning Agreeableness, advertisements or information concerning environmental behaviour could be based on values such as empathy and cooperation.

Political interventions can also contribute to a more sustainable and eco-friendly societal development. For instance, on the level of local politics, it would be an option to enhance accessibility of public transportation in terms of costs and availability. Furthermore, individuals could be encouraged to take the bicycle by increasing the number of bike paths

and make those more salient to cars and pedestrians. Past findings on determinants of PEB across countries revealed that people of developed countries have higher perceived behavioural control when intending to behave environmentally friendly due to accessibility of green technology and better infrastructure (Morren & Grinstein, 2016). They further draw the conclusion that this makes a translation of ecological intentions into behaviour more convertible. Further interventions could resemble the proposal by the European Commission in 2018 regarding the reduction of marine litter. To discuss such measures in detail would be beyond the scope of this paper.

All in all, it is noteworthy that today's world is more connected than ever before and this should be used for an international exchange about practical solutions regarding environmental protection. Those solutions can range from small initiatives like waste recycling as seen in Capannori, Italy where strict recycling leads to almost zero waste and a reduction of taxes for residents (Tansey, 2014) to greater initiatives like the Paris Agreement. In addition, policy should bear in mind that the majority of people do care for a sustainable development (European Commission, 2017) which should be reflected in political decisions rather than policy-making being governed by lobbyism and strictly economic interests.

4.3. Conclusion

The present work sheds light upon the effects of mindfulness, nature connectedness and personality on environmental concern. The results indicate that facets of mindfulness enhance characteristics associated with more deliberate decision-making and in turn facilitate sustainable behaviour. In addition to that, nature connectedness was found to be a strong predictor of environmental concern and behaviour, which opens up the possibility of interventions in this field. Furthermore, specific personality factors seem to be attributed to more environmental concern. Being more empathic and caring about others as well as being open to new experiences and cognitive flexible relate to more interest in eco-friendly living.

Apart from that, the differences in mindfulness, nature connectedness and personality between more and less environmentally concerned people did not occur only due to differences in gender and/or age, but remained visible after controlling via a matched-pairs design. To enhance theoretical knowledge behind practical implications and enable new practical approaches, more research is needed to gain further valuable insights into the individual level of environmental protection.

5. References

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6. Appendix

1) *Subscale self-reported behaviour of the Scales for Assessing Environmental Concern* (3rd, revised version) by Schahn et al. (2000).

	Sehr selten 1	2	3	4	5	6	Sehr häufig 7
Beim Kochen benutze ich einen Deckel für Topf oder Pfanne, damit nicht unnötig Energie verloren geht.							
Wenn es in der Wohnung etwas kühler ist, drehe ich die Heizung auf oder verwende einen Heizlüfter, statt mich wärmer anzuziehen.							
Ich bin aktiv in einer Umweltschutzorganisation tätig.							
Wenn ich Abfälle wie Leuchtstoffröhren, Altöl, Reste von Lacken, Klebstoffen, Pflanzenschutzmitteln oder Heimwerkerchemikalien habe, gebe ich sie in eine Sondermüllsammlung.							
Für Parties und Gartenfeste verwende ich das praktische Einweggeschirr aus Pappe oder Plastik.							
Ich betreibe alpinen Skilauf (Abfahrtslauf).							
Beim Autofahren gestalte ich meinen Fahrstil so, dass ich möglichst wenig Benzin verbrauche.							
Ich wasche mein Auto vor der Haustür anstatt in der Waschanlage oder an Waschplätzen von Tankstellen.							
Ich kaufe Getränke in Dosen.							

2) Table 2: Psychometric properties of the study variables of original matched-pairs only *(N = 48)*

For details see page 23.

	Group high EC		Group low EC				95% CI		
Variable	*M*	*SD*	*M*	*SD*	*t*(47)	*p*	*LL*	*UL*	Cohen's *d*
Environmental Concern	5.65	0.48	4.71	0.78	-9.54	<.001*	-1.24	-0.88	1.38
Attitude	5.94	0.54	5.03	1.03	-6.42	<.001*	-1.19	-0.62	0.93
Intention to behaviour	5.62	0.74	4.23	1.04	-10.31	<.001*	-1.70	-1.12	0.67
Self-reported behaviour	5.42	0.49	4.80	0.70	-5.88	<.001*	-0.83	-0.41	1.90
Mindfulness	18.29	2.19	18.38	2.12	0.22	.830	-0.68	0.85	0.10
Observe	4.07	0.58	3.81	0.77	-2.27	.028	-0.49	-0.03	0.33
Describe	3.71	0.81	3.61	0.64	-0.67	.506	-0.40	0.19	0.09
Nonjudge	3.66	0.73	4.00	0.66	2.15	.037	0.02	0.59	0.31
Actaware	3.50	0.75	3.69	0.71	1.73	.090	-0.03	0.41	0.24
Nonreact	3.50	0.57	3.30	0.61	-0.42	.675	-0.28	0.18	0.05
Nature Connectedness	3.91	0.76	3.48	0.96	-2.58	.013*	-0.90	-0.34	0.37
Personality									
Neuroticism	2.89	0.78	2.74	0.80	-0.93	.356	-0.47	0.17	0.13
Extraversion	3.56	0.85	3.50	0.77	-0.64	.524	-0.43	0.22	0.09
Openness to Experience	4.11	0.59	3.86	0.68	-2.06	.047*	-0.49	-0.01	0.29
Agreeableness	3.63	0.64	3.21	0.73	-3.34	.002*	-0.66	-3.34	0.48
Conscientiousness	3.82	0.71	3.81	0.60	-0.09	.932	-0.25	0.23	0.12
Self-Deception	4.30	0.65	4.41	0.67	0.78	.441	-0.16	0.36	0.11

Note: CI = confidence interval; *LL* = lower limit; *UL* = upper limit; *p < .05

3) Eidesstattliche Erklärung

Ich versichere, dass ich die Masterarbeit ohne fremde Hilfe und ohne Benutzung anderer als der angegebenen Quellen angefertigt habe, und dass die Arbeit in gleicher oder ähnlicher Form noch keiner anderen Prüfungsbehörde vorgelegen hat. Alle Ausführungen der Arbeit, die wörtlich oder sinngemäß übernommen wurden, sind als solche gekennzeichnet.

Wien, am Unterschrift