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Pro-environmental behaviour in sport and outdoor activities: a literature review

Cecilia de Bernardi, Stefan Linde and Dimitri Ioannides

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Abstract

Sport and outdoor activities are an important part of many people's everyday lives. Nevertheless, because of how they are organized and practiced, these activities can have a considerable impact on the environment. The Mistra Sport & Outdoors programme aims to make such activities more sustainable in Sweden. This report aims at contributing to this programme's main purpose by investigating previous research on pro-environmental behaviour (PEB) with a focus on the sports and outdoor recreation sectors. We provide an overview of the theoretical concepts of PEB and the factors that explain them. This overview also includes a discussion of behaviours and also different concepts, which determine whether or not a behaviour is more or less environmentally friendly. The methods are based on the procedures of a scoping review while the analysis is a qualitative content analysis. We used the software NVivo for all the different parts of the analysis and coding. In the results we provide an overview of some basic characteristics related to the studies' approach, activities that are analysed and countries in which the research was conducted. We then provide some examples of the behaviours that have been studied and also of the determinants and relevant variables that determine these behaviours. Finally, we make recommendations for the future work of the Mistra Sport & Outdoors programme.

Keywords

Mistra Sport & Outdoors programme; Sweden; environmental sustainability; pro-environmental behaviour; sports; outdoor recreation.

Svensk sammanfattning

Idrott och friluftsaktiviteter är en viktig del av många människors vardag och ofta, på grund av hur de organiseras och utövas, kan dessa aktiviteter ha en betydande inverkan på miljön. Mistra Sport & Outdoors-programmet syftar till att göra sådana verksamheter mer hållbara. Denna rapport syftar till att bidra till detta huvudmål genom att undersöka tidigare forskning om miljövänligt beteende (pro-environmental behaviour, PEB) med fokus på idrott- och friluftslivssektorerna. PEB kan kortfattat definieras som ”alla beteenden utförda av en enskild individ för att minska sin negativa miljöpåverkan med en tydlig avsikt att förändra miljön” (Blankenberg & Alhusen, 2019, s. 2). Rapportens huvudforskningsfråga är följande: Hur är idrott- och friluftsaktiviteter kopplade till PEB empiriskt i den publicerade vetenskapliga litteraturen? Den här frågan delas i två underfrågor: Vilka PEB har undersökts inom idrott- och friluftslivssektorerna? Vilka faktorer har visat sig påverka PEB i dessa domäner?

PEB kan också definieras som ett ”beteende som medvetet strävar efter att minimera den negativa påverkan av ens handlingar på den naturliga och byggda världen (t.ex. minimera resurs- och energiförbrukning, användning av giftfria ämnen, minska avfallsproduktionen)” (Kollmuss & Agyeman, 2002, s. 240). Förutom PEB finns det även flera andra liknande termer som används för att beskriva samma fenomen. Några exempel är "miljömässigt ansvarsfulla beteenden", "ekologiska beteenden", "bevarandebeteenden", "miljöstödjande beteenden" och "miljöbeteenden" (Blankenberg & Alhusen, 2019). Det finns flera olika typer av beteenden som brukar analyseras. Stern (2000, s. 409–410) delade in dem i fem kategorier: Miljö-aktivism, Icke-aktivistiska beteenden i den offentliga sfären, Ekologism i den privata sfären och Andra miljömässigt betydelsefulla beteenden. Några exempel på beteenden i den privata sfären är individuella vardagliga beteenden (Steg & Vlek, 2009), som till exempel återvinning och energisparande. Icke-aktivistiska beteenden inkluderar volontärarbete, underteckna besvärsskrifter eller helt enkelt genom att utbilda andra. Slutligen inkluderar Miljö-aktivism deltagande i miljögrupper och policystöd. PEB påverkas av olika faktorer. Först och främst påverkas den av människors

socio-demografiska och personliga faktorer. Detta inkluderar genus, inkomst och utbildning (t.ex. Kollmuss and Agyeman 2002; Wicker, 2019). Denna kategori inkluderar också kunskap (Stern, 2000). Sedan finns attitydfaktorer. Dessa inkluderar normer och värden. Till exempel att tro på de negativa konsekvenserna av klimatförändringar (t.ex. Drews & Van den Bergh, 2016). Sedan finns det kontextuella faktorer som handlar om priser, styrmedel och infrastruktur (Stern, 2000). Sist finns det rutiner. Några exemplen är återvinning (Thomas & Sharp, 2013) och energianvändning (Pothitou, Hanna, & Chalvatzis, 2016). Det är inte lätt att ändra rutiner (Kolmuss & Agyeman, 2002).

Metoderna är baserade på procedurerna för en scoping review och analysen är en kvalitativ innehållsanalys. Programvaran NVivo används för alla olika delar av analysen och kodningen. Vissa aspekter som kunde klassificeras med en kategori som till exempel ”metod” har analyserats genom att sättas i relation till varandra med hjälp av NVivo. Andra aspekter har samlats i Word- och Excelfiler och har sedan presenterats i en sammanfattad format enligt de kategorierna som finns i tidigare forskning.

Denna litteraturöversikt har analyserat 45 artiklar som har publicerats under de senaste 5 åren. Det finns ett högre antal artiklar som har publicerats under 2021 både generellt och även för alla behandlade aktiviteter (förutom turism). Två möjliga orsaker till denna ökning kan bero på en högre omsättning av artiklar under covid-19-pandemin (Aviv-Reuven & Rosenfeld, 2021), och även det ökade besöket till nationalparker under samma period (Geng et al., 2021).

Den analyserade litteraturen diskuterar först och främst friluftsaktiviteter, följt av turism, sport och slutligen evenemang och fysiska aktiviteter. Studier av PEB genomförs mestadels genom kvantitativa angreppsätt med undersökningar och frågeformulär följt av experiment som metoder. Den näst mest använda angreppsätt är den kvalitativa med intervjuer som den mest populära metoden. Nästa är tillvägagångssätt som använder både kvantitativa och kvalitativa metoder. Dessa har klassificerats som blandade metoder. Resultaten av litteraturöversikten visar en betydande geografisk

spridning. Det finns dock vissa områden som är mer studerade än andra. Dessa är USA, följt av Tyskland, Kanada och Sydkorea.

Sociodemografiska faktorer visar sig inte alltid spela en roll för hur människor utövar PEB, ofta är resultaten motsägelsefulla mellan studierna. Kön har dock visat sig påverka beteenden kopplade till energibesparing och avsikt att återvinna (Han et al., 2019), medan äldre människor är mindre benägna att begå vandalism (Wu, Lin, & Liu, 2020). Ökad kunskap har visat sig inte nödvändigtvis leda till mer miljövänliga praktiker (Blye & Halpenny, 2020). Brist på tid var en av anledningarna till att inte agera mer miljövänligt hemma som studiedeltagarna gjorde på destinationen dit de reste (Achu, 2019). Detta visar att det finns vissa saker som människor är villiga att göra och andra som upplevs som för kostsamma i ansträngningstermer. Ett exempel är att byta från att åka till träning, evenemang och på idrottssemester med ett annat transportmedel än den personliga bilen (t.ex. Carmichael, 2020, Wicker, 2018). Å andra hand, vissa kategorier av utövare, såsom fågelskådare och jägare, har visat sig vara mer benägna att anta ett miljövänligt beteende (Espenshade et al., 2018; Larson et al., 2018), men detta beror också på deras värderingar. Faktum är att människors värderingar, uppfattningar, medvetenhet och attityder har visat sig vara mycket viktiga för att agera på ett miljövänligt sätt.

Samma betydelse har noterats för kontextuella faktorer som platsanknytning och anknytning till naturen. Människor som visar en djupare koppling till naturen och/eller till en plats kommer att vara mer benägna att vilja spara vatten och energi (Hoover, 2021) och skydda vildmarken (Wynveen et al., 2021). Detta har dock inte visats vara fallet för stadsområden (Yamashita & Bang, 2022), vilket är ett relevant fynd för urbanisering och friluftsliv och rekreation i tätbefolkade områden.

Slutligen finns det vanor som är svåra att bryta och som kan få människor att fortsätta agera på ett ohållbart sätt. Studierna som ingår i denna litteraturöversikt nämnde dock de positiva sidorna av vissa vanor. Såsom fördelarna med regelbundna aktiviteter i naturen och fysiska aktiviteter

kan skapa PEB (t.ex. Cunningham, McCullough, & Hohensee, 2020; Hanna et al., 2019; Pasek & Mytskan, 2022).

Denna litteraturgenomgång visar att det finns flera aspekter av människors liv som behöver undersökas ytterligare för att modifiera deras beteende. Behov av att förändra människors attityder och medvetenhet, utnyttja positiva friluftsidentiteter och undersöka upplevda kostnader och begränsningar är alla viktiga områden där forskarna inom Mistra Sport and Outdoors-programmet skulle kunna samarbeta kring och nå ny kunskap. De positiva effekterna av deltagande i naturbaserade aktiviteter, fysiska aktiviteter och platsanknytning bör också undersökas ytterligare för att förstå hur dessa kan vara till nytta för att skapa rörelse och om det finns några hinder på grund av vanor eller tidigare nämnda kostnader och begränsningar.

Studien inkluderar bara studier som har hittats genom en begränsad sökning och kan leda till att viktiga studier har uteslutits. Dessutom har PEB som term bara används i studien, vilket gör att andra viktiga studier som använde en annan metodologi kan ha missats i litteratursökningen.

Introduction

The environmental effects of sport and outdoor activities have been gaining increased attention (e.g., Huddart & Stott, 2019; Mascarenhas et al., 2021) at the same time as general concerns for environmental sustainability grow. These have become particularly evident through the appearance of movements such as "Fridays for Future," which began to gain popularity before the global pandemic. In order to increase sustainability in sport and outdoor activities, a more thorough understanding of people's behaviour is needed. This is especially true when, as often is the case, attitudes do not necessarily translate into concrete behaviours (Scott, Gössling, & Hall, 2012).

In order to achieve a shift in how people practice sport and outdoor activities, policies must change and effectively direct people's behaviour towards sustainable practices. In the case of Sweden, one example is the Ministry of Finance's "Strategy for sustainable consumption," which has been translated into reports and commissions aimed at different agencies (Government Offices, 2017). This strategy touches upon several policy areas such as school education, consumer behaviour and circularity, support for businesses, waste management, transportation and housing, among others (Government Offices, 2017). This shows a coordinated effort to integrate sustainability in the Swedish governance and policy systems in a very comprehensive way (Government Offices, 2017).

In order to provide a solid basis for the mobilization of several people and in order to formulate future policy suggestions for the integration of sustainability in sport and outdoor practices, our aim in this report is to present an overview of previous research focusing on pro-environmental behaviour (PEB) in the sports and outdoor recreation sectors. PEB can be briefly defined as "all behaviors undertaken by a single individual to reduce one's negative environmental impact with a clear intention to change the environment" (Blankenberg & Alhusen, 2019, p. 2). Thus, the research question guiding this review is:

- How are sports and outdoor recreation activities connected to PEB empirically in the published scientific literature?
    - ◊ Which PEBs have been examined in the sport and outdoor recreation sectors?
    - ◊ Which factors have been found to influence PEB in these domains?

To answer these research questions, we begin this report with an overview of PEB and different factors that may influence people's behaviour. This background will provide the theoretical focus that will later be connected specifically to sport and outdoor activities. This section is followed by a description of the methods used. Finally, we present the results in relation to the literature included in the overview. Conclusions are drawn and recommendations made. We also discuss the limitations of our study.

Background

The overarching aims of the Mistra Sport and Outdoors programme are to uncover and apply solutions for sustainability, to initiate a movement for sustainability and to establish a nationwide research centre focusing on sport and outdoor activities. The Mistra Sport and Outdoors programme is organized in six themes and every theme deals with a different aspect of sustainability relating to sport and outdoor activities. These aspects are: knowledge gathering; history; transportation; land and water use; materials; events; and behaviour, policy and future trends. Mistra Sport and Outdoors is a programme based on cooperation, meaning that researchers and different stakeholders, from both the public and the private sector, engage in activities and dialogue to fulfil the programme's goals. The programme's Theme 6, "Behaviour, policy and future change" focuses on gaining an understanding of how policies shape and are shaped in relation to outdoor activities and sports. The goal is to eventually make concrete suggestions on which kinds of policy are best suitable to modify people's behaviour towards more sustainable practices. In order to achieve this, we do not only have to look at policies, but also how people behave and how they accept policies or not.

During a future second phase (if funding is provided), the policy theme will be integrated with behavioural dimensions so that recommendations on practical policy instruments related to more sustainable practices can be made. This will also be connected to the previously mentioned initiation of a national movement towards the attainment of environmental sustainability. The structure of Mistra Sport and Outdoor will allow the opportunity to study context-specific aspects of behaviour through a collaboration of different disciplinary traditions as recommended by Steg and Vlek (2009). The aim of this report is closely connected to Mistra Sport and Outdoor's second overarching aim, namely to initiate a movement for sustainability. Thus, the knowledge gathered will support the work of the programme towards creating a movement for the integration of sustainability in sport and outdoor activities and to later formulate policies that can produce a shift in behaviour.

Pro-environmental behaviour (PEB)

As previously mentioned, this report focuses on PEB. Since this is a term that is widely used and discussed in many branches of science, in this section we provide a more detailed overview of the concept.

One of the definitions to PEB was provided in the introduction, but that is not the only one. PEB can also be defined as a "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g., minimize resource and energy consumption, use of non-toxic substances, reduce waste production)" (Kollmuss & Agyeman, 2002, p. 240). Besides PEB, there are also several other similar terms that are used to describe the same phenomenon. Some examples are "environmentally responsible behaviours," "ecological behaviours," "conservation behaviours," "environmentally supportive behaviours," and "environmentally significant behaviours" (Blankenberg & Alhusen, 2019).

According to Stern (2000, p. 408), "environmentally significant behavior can be reasonably defined by its impact: the extent to which it changes the availability of materials or energy from the environment or alters the

structure and dynamics of ecosystems or the biosphere itself." Stern (2000, pp. 409–410) divided types of environmentally significant behaviour in five categories: Environmental Activism; Nonactivist Behaviours in the Public Sphere; Private-Sphere Environmentalism; and Other Environmentally Significant Behaviours. Some examples of private-sphere behaviours are individual everyday behaviours (Steg & Vlek, 2009), relating for instance to recycling and conserving energy. Nonactivist behaviours include volunteering, signing petitions, or simply educating others. Finally, environmental activism includes participating in environmental groups and policy support. In the group labelled "Other Environmentally Significant Behaviors", Stern (2000) includes behaviours connected to the manufacturing of products as well as maintenance.

Policy support is also dependent on a number of specific individual perceptions of government policy, so called 'policy specific beliefs' (Eriksson, Garvill, & Nordlund, 2008). People have, for example, been found to be more positive towards a certain policy if they perceive that the implementation of the policy will be accompanied by positive results. Nevertheless, it is not always clear how people judge a policy to be effective. For instance, policies that are perceived not to incur personal costs tend to be favoured although many people are often also willing to pay extra in support of climate-related policies. Fuel taxation, for instance, is accepted because it has positive environmental as well as human health consequences (Kallbekken & Sælen, 2011), at least in some contexts. However, people are also prone to overestimate but also underestimate costs. The preference is also for soft regulatory measures rather than 'hard' ones (Drews & Van den Bergh, 2016).

Further, people are concerned about the fairness of policies, including whether they are affected by policy equally. This applies both on a local, but also an international level. People are more favourable towards policies if they perceive that the burden is shared both between citizens, countries and actors such as companies (Drews & Van den Bergh, 2016). In connection to the perception of fairness, it is important for people to understand how tax revenue is shifted towards supporting environmental

purposes (Drews & Van den Bergh, 2016). In the case of fuel taxes for instance, people believe that there will be a negative effect on the poorer groups in society (Kallbekken, Garcia, & Korneliussen, 2013); an increase on fuel taxes could negatively impact the workers, especially those who live in sparsely populated areas, who depend heavily on their vehicle for their travel to work.

Factors explaining PEB

Some of the earlier models put forth to explain PEB were based on a linear correspondence between environmental knowledge, environmental attitude and, consequently, environmental behaviour (Kollmuss & Agyeman, 2002). However, research has proven that the relationship between knowledge, attitudes and behaviour is far more complex than this, and that a multitude of different factors are relevant to understand PEB. In a recent literature review, Blankenberg and Alhusen (2019) identified four groups of factors that commonly are considered important: socio-demographic, attitudinal, habitual and contextual. This does not deviate much from Stern's (2000) original theoretical framework, which was divided into attitudinal factors, contextual factors, personal capabilities and habit/routine. The following section is structured following both Stern's (2000) and Blankenberg and Alhusen's (2019) categorizations in order to provide a complete picture.

Socio-demographic and personal factors

When it comes to socio-demographic factors, age, education, income, and gender, among others, all these traits influence the pro-environmental behaviours people end up adopting. Specifically, PEB is often found to be more common among the young, among women and among those with high levels of education, but as in the case of income, this is not always the case (e.g. Kollmuss and Agyeman 2002; Wicker, 2019). Knowledge is another important factor in the study of PEB and it is classified as a personal capability (Stern, 2000). The role of knowledge needs to be appraised carefully. People do need some environmental knowledge to act

in a pro-environmental way, but too detailed and technical knowledge may have the opposite effect (Kollmuss & Agyeman, 2002).

Attitudinal factors

Another important group of factors are attitudinal. This group includes a range of different explanatory factors, such as "norms, beliefs, and values" (Stern, 2000, p. 416). Individuals who are driven by pro-social or pro-environmental value orientations and who identify a threat to these values, tend to develop personal norms and attitudes mandating an adoption of PEB (Kollmuss & Agyeman, 2002; Stern, 2000). Concepts such as environmental concern and risk perceptions (Drews & Van den Bergh, 2016; Lubell, Zahran, & Vedlitz, 2007) as well as a belief in the role of humans in causing climate change and its negative consequences (Drews & Van den Bergh, 2016; Lubell, Zahran, & Vedlitz, 2007; Zahran et al., 2006) are closely related to PEB. Emotions have, for instance, been found to be related to car use and to what owning a certain vehicle means for people (Steg & Vlek, 2009). Similarly, emotions can also be a positive driver for PEB, for example, in the form of an emotional attachment to a place. This, in turn, can promote PEB in relation to that specific area (Halpenny, 2010). Related to this, studies have also found that emotions are connected to people's involvement and investment in environmental problems (Kollmuss & Agyeman, 2002).

Furthermore, people are influenced by their perceived locus of control, and their habits, as argued by Stern (2000). The locus of control "refers to the perception of individuals as to whether they can change or achieve a desired outcome by their own actions or not" (Blankenberg & Alhusen, 2019, p. 14). That is, whether an individual perceives that his or her own actions matter for the achievement of a bigger task, such as reducing environmental harm. Not only does this affect individual behaviour, but the locus of control also influences our perceived responsibilities and priorities. People thus tend to prioritize things that they feel they are in control over, such as their own well-being and that of their family (Kollmuss & Agyeman, 2002). Attitudes also include a perception of

personal cost (not intended in economic terms) that a change in behaviour would incur (Stern, 2000).

Additionally, different actions have different impacts and the ones with less impact may be prioritized (Larson et al., 2015). Since goals (such as saving the environment) sometimes are in direct competitions with others (family-related ones for instance), norms may be moralized to strengthen their significance (Lindenberg & Steg, 2007). It is also important to make PEB more attractive in terms of choices (Steg & Vlek, 2009). In fact, alternatives that are not as environmentally friendly (non-green) are also usually more attractive than the environmentally friendly ones (Han, 2015).

Contextual factors

A final group of factors found to affect people's environmental behaviour are contextual ones. Some examples of contextual factors are social factors regarding people's peers, such as social norms, as well as individual and institutional factors (Blankenberg & Alhusen, 2019). Stern (2000) described factors such as prices, regulations and policies, capabilities and constraints and also advertising. Regarding social factors and peers, it has been observed that PEB often is influenced by how much conflict there is between people's individual interests and collective ones (Karp, 1996). In fact, as previously mentioned, people both tend to prioritize their own and their family's well-being and consider economic factors as very important (Kollmuss & Agyeman, 2002). Some contextual factors may also clash with some others. For instance, people may want to recycle, but the possibility to do so may not be available where they live (Larson et al., 2015). This is an example of a barrier or limiting factor. Such aspects are to be investigated thoroughly in order to change consumers' behaviours (Stern, 1999). Pro-environmental contextual factors can lead to increased PEB intentions (Qin & Hsu, 2022). Likewise, when people perceive that there is available infrastructure their PEB intention is affected (Wu, Font, & Liu, 2021).

Stern (2000) also identified another important factor that can be studied together with the ones that have been mentioned so far: policy support. Policy support is, for example, stronger among people who are 'alarmed'

about climate change. Further, studies have shown that people are influenced by social norms and others' perceptions of their behaviour (Drews & Van den Bergh, 2016; Linde, 2018; Steg & Vlek, 2009), even though research on specific behaviours has revealed that people are more highly influenced by their own personal norms (Thøgersen, 2009). The way people conceptualize their own behaviour and how their behaviour influences a larger group as well as how trust works in bigger groups are also relevant aspects (Duit, 2011). Choices related to recycling, for instance, are supported by elevated levels of social trust (Sønderskov, 2011).

Habits

Habits are related to routine behaviour (Blankenberg & Alhusen, 2019) and actions are not taken consciously, but automatically (Steg & Vlek, 2009). As argued by Kolmuss and Agyeman (2002) it is not easy to change habits. When it comes to PEB, habit has been studied in relation to recycling behaviour (Thomas & Sharp, 2013) and energy use (Pothitou, Hanna, & Chalvatzis, 2016). In relation to habit, people may make choices that confirm what they have always been doing, disregarding what is not coherent with how they have usually been doing things (Steg & Vlek, 2009). According to Steg and Vlek (2009, p. 313), "in order to design effective interventions to modify habitual environmental behaviour, it is important to consider how habits are formed, reinforced and sustained."

In conclusion, drivers are fundamental in order to understand behaviour. If some determinants are taken into considerations, but not others, this could lead to misinterpretation (Blankenberg & Alhusen, 2019). Furthermore, research results can provide good information on practices and policies that are more or less effective in terms of changing people's behaviour towards PEB.

Methods

In order to conduct this review, we adopted a scoping review. This is defined as "a form of knowledge synthesis, which incorporates a range of study designs to comprehensively summarize and synthesize evidence

with the aim of informing practice, programs, and policy and providing direction to future research priorities" (Colquhoun et al., 2014, p. 1291). This is done by following a series of steps, which are meant to define the research strategy and research question, collect and select the studies, coding, summarization and reporting (Colquhoun et al., 2014). Furthermore, this review aimed at giving an overview of research on pro-environmental behaviour in the context of sports and outdoor activities. This is done by "mapping key concepts" (Colquhoun et al., 2014, p. 1294). In order to do this, criteria have been established to keep the focus and answer the research questions.

Data collection

This report is based on a qualitative literature review of scientific literature on PEB in connection to sport, leisure and outdoor activities.

The search of the scientific literature was based on the following criteria. We were looking for documents that would include a discussion of PEB, specifically related to sport and outdoor activities. We searched on the Scopus, Web of Science and Proquest Social Sciences databases. The combination of keywords and Boolean operators for both searches were the following: outdoor recreation AND pro-environmental behaviour. In a separate search we instead used: sport AND pro-environmental behaviour. These searches were all conducted separately and the results for each search is presented in Table 1. The searches were limited to articles in English published in the last 5 years. Proquest allowed for a criterion related to peer-review. For all databases the search looked through all sections of the papers.

Table 1 - The preliminary result of the search

Database	**Outdoor recreation**	**Sports**
Web of Science	30 results	44 results
Proquest Social Sciences	31 results	89 results
Scopus	15 results	20 results

A total of 229 papers was uploaded in Zotero, which is a reference management software (Stanford libraries, n.d.). After we eliminated duplicates, 180 papers remained. PDFs for all the papers could be retrieved from the library. From 180 papers, some studies were eliminated based on the following criteria (Table 2):

Table 2 - The criteria applied for the inclusion/exclusion of studies

Criterium for exclusion	**Number of papers excluded**
Relevance (concepts only mentioned briefly or in sections such as the reference list)	46
Not relevant in term of topics (about PEB, outdoor recreation and/or sports)	57
Publisher/peer-review process not seen as trustworthy	26
Conceptual paper/not empirical	2
Not a full paper	1
Older than 5 years[1]	2
Duplicates	1

We analysed the remaining 45 papers (Appendix A).

Data analysis

This study is based on a content analysis (Hsieh & Shannon, 2005) conducted with the data analysis software NVivo. This programme was used to handle both parts of the analysis and data management (Kent State University, n.d.). Content analysis is a summative process in which categories are built through a coding process. In this case, the process was deductive, and the articles were coded based on certain key points of basic information (this process is further explained in the next section). The categories emerged from existing literature, which is presented in the

[1] In one database the limit had to be set manually and due to an oversight, two studies older than 2018 inadvertently made it into the final sample.

section discussing PEB, and also based on the results and conclusions that the analysed studies have reached.

The studies were classified based on the following criteria: year of publication; country where published; the outdoor/leisure activity the study appraises; the aim/research questions; the approach of the study (quantitative, qualitative or mixed methods); the specific methods used; the conclusions and findings; as well as the recommendations made. The information that could be classified as an attribute of one word (such as the method used) was summarized and analysed in NVivo by comparing different case characteristics. One example is to show how the approach of the study is related to the methods used (Fig. 4). The aims/objectives, results and recommendations of the studies have been summarized in main categories stemming from the literature presented in the background and placed in Excel and Word and, subsequently discussed. The results of the NVivo and qualitative analyses are presented in the following section.

Results

General characteristics of the analysed studies

Figure 1 reveals the years in which the studies were published. We note that there was a spike in publication of studies in 2021, towards the end of the COVID-19 pandemic. This sudden increase in publications most likely relates to the fact that more studies achieved their publication stage during this period (Aviv-Reuven & Rosenfeld, 2021), reflecting the likelihood that the data had been previously collected and perhaps even the papers submitted before the outbreak of the COVID-19 pandemic.

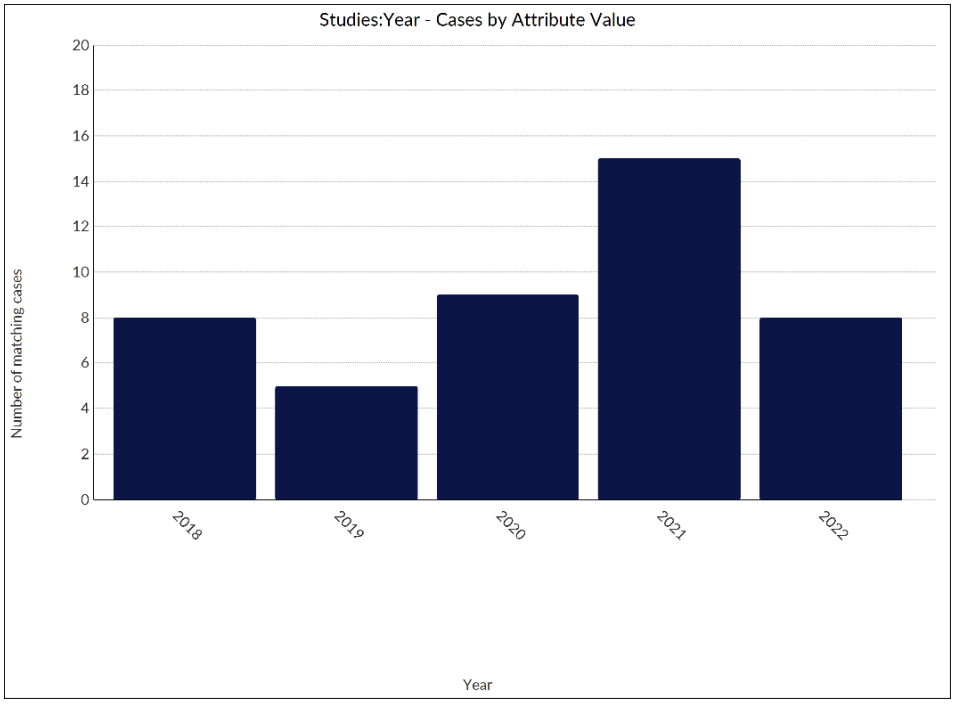

Figure 1 - A summary of the years in which the included studies were published (Source: authors via NVivo)

However, when comparing the kind of activity that the study focuses on compared to the publication year, we note that the number of studies on outdoor recreation activities (such as hiking, visits to parks, climbing and surfing) has been quite stable through the years, while studies on sports increased (Figure 2). From Figure 2 we can also see that there was not only an increase in publications in 2021, but also an increase in all of topics, except for tourism. This could be due to the surge in visitation to natural areas that surfaced because of the restrictions imposed during the pandemic (Geng et al., 2021), while the results are also impacted by the standstill in tourism activities.

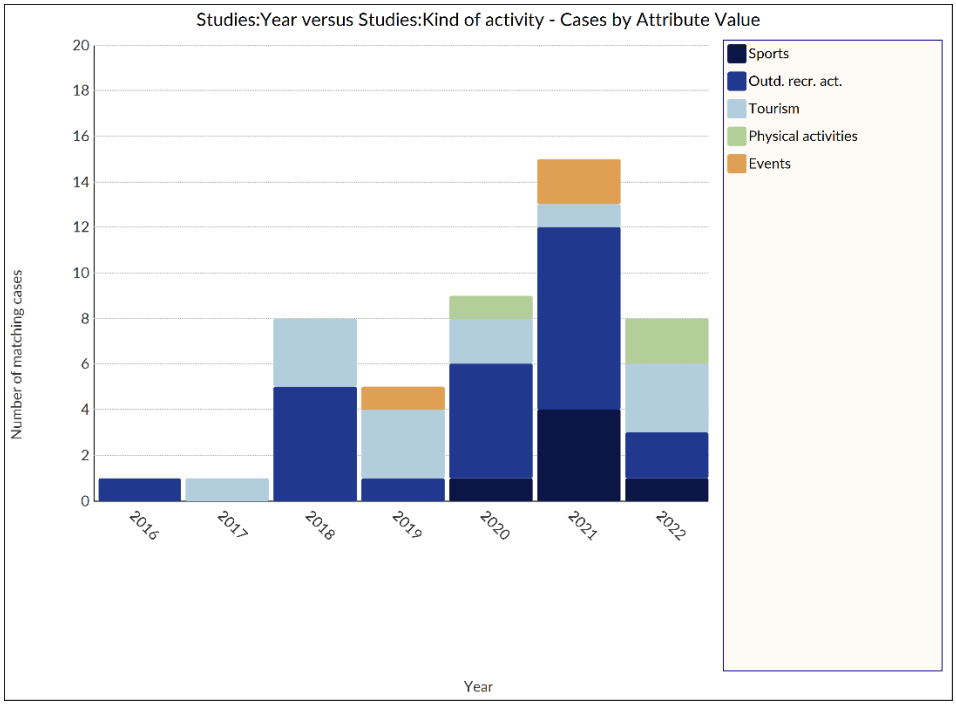

Figure 2 - A summary of the publication years and activities (Source: authors via NVivo)

Some of the most popular activities that are discussed are outdoor recreation activities, followed by tourism, sports and lastly events and physical activities. The grouping of activities has been done based on how the author(s) have described them. One example is visits to parks. In some instances, these have been included in "outdoor recreation activities" and in some other instances these are part of "tourism". The grouping depends on the author(s)' classifications as well as on the nature of the activity, as in the case of events. In this phase of the study, we classified the studies based on the topic of the paper that indicate the macro context in which activities were conducted.

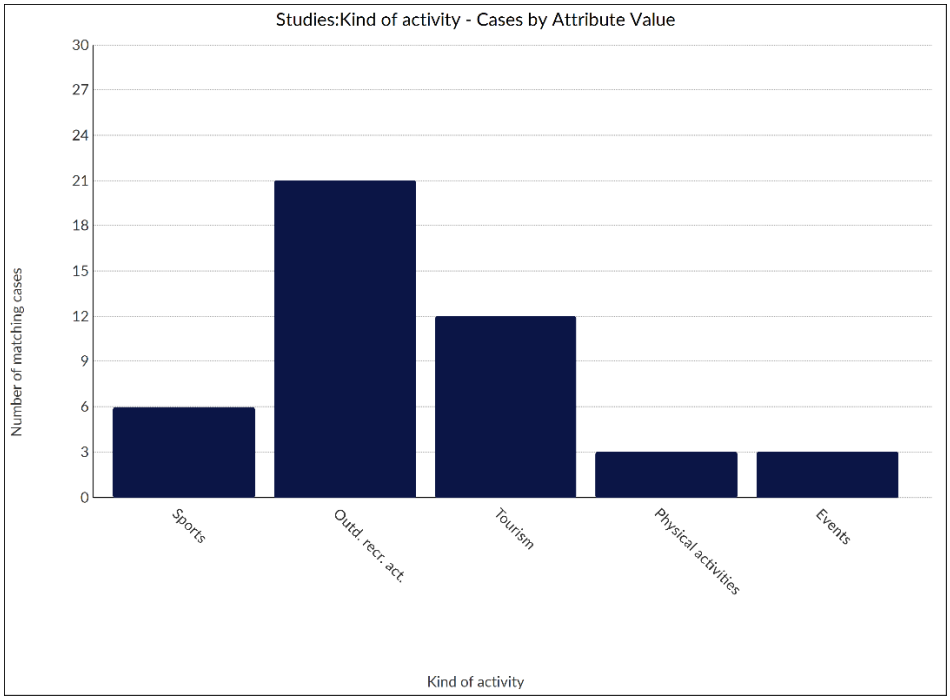

Figure 3 - A summary of the activities (Source: authors via NVivo)

The studies included in the literature review have been classified depending on the research design and the choice of methods used in every specific case (Figure 4). Most of the studies are quantitative in character, with data collected through different kinds of surveys and questionnaires, followed by experiments. The next most popular approach is qualitative. Qualitative studies in the investigated literature mostly were based on interviews. Studies that use both quantitative and qualitative methods were classified as Mixed methods and this is the least recorded approach in the analysed literature. Not all the authors declare that they used a Mixed methods approach. Excluding the studies that used different methods in the exploratory phase of the research, we classified the papers that used more than one approach as Mixed methods.

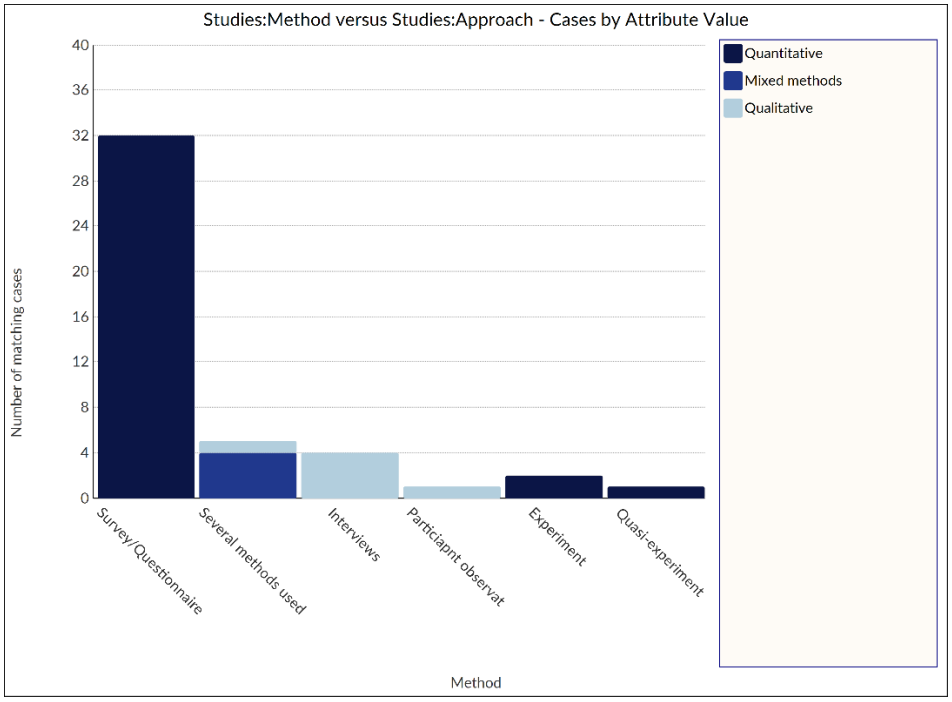

Figure 4 - (Source: authors via NVivo)

Furthermore, the studies in our analysis have been classified depending on the activities they referred to as well as the country in which the research took place. In Figure 5, we give an overview of the countries in which the included studies were conducted. Most occurred in the USA, followed by Germany, Canada and South Korea. Figure 5 shows that this literature review includes a considerable variation of studies with a considerable geographical spread.

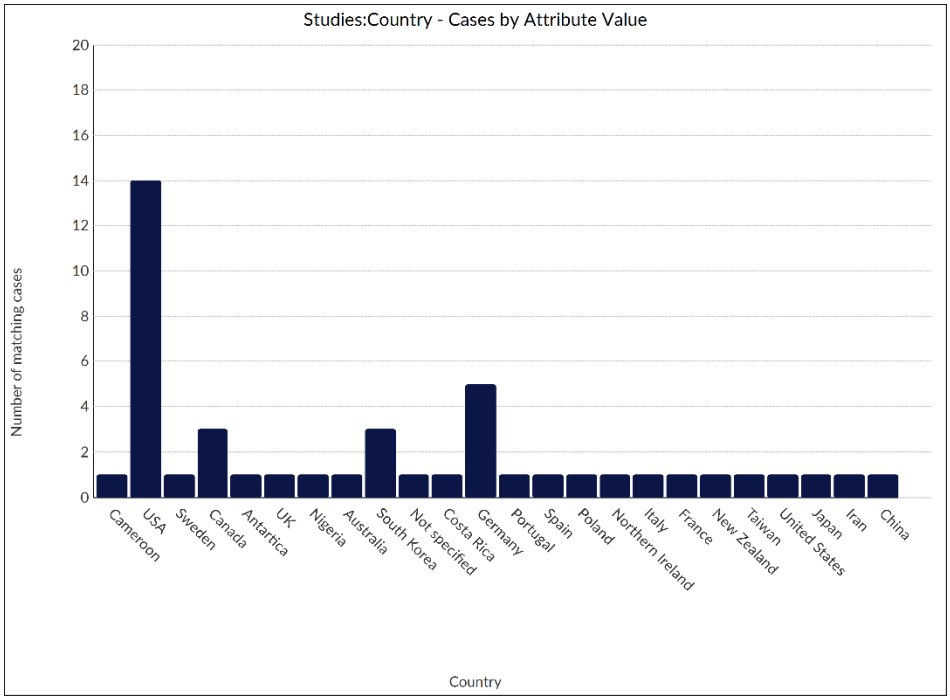

Figure 5 - an overview of the country in which the studies were conducted

Which PEBs have been examined in the sport and outdoor sectors?

The analysed studies encompass a variety of pro-environmental behaviours across the different activities that have been used to categorize the studies. In order to summarize, the table includes all kinds of variables, constructs and definition, as long as these are related to PEB. Since the studies employ different methods, the manner in which pro-environmental behaviours are defined and operationalized varies considerably.

Table 3 - A summary of the behaviours discussed in the reviewed studies

Activity	**Examples (See Appendix A for a complete reference)**	**Kind of PEB examined (from Stern, 2000)**
Tourism	Support for conservation policies (Study 6), Support for Sustainable tourism (Study 29); Compliance with traffic restrictions (Study 36).	Nonactivist Behaviours in the Public Sphere

Tourism	Recycling when travelling (Study 13), No littering (Study 41), Not taking the private car to the slopes (Study 39), Reduce consumption (Study 15).	Private-Sphere Environmentalism
Outdoor recreation activities	Becoming part of an environmental organization or group (Study 16, 22), coastal cleaning campaigns (Study 24), beach cleaning (Study 31).	Environmental Activism
Outdoor recreation activities	Signing a petition for environmental protection (Study 21, 42, 43), participating in a hearing for an environmental issue (Study 11), fundraising (Study 2), Not walking off-trail at National parks (Study 12), Leave No Trace (Study 18), comply with rules (Study 33).	Nonactivist Behaviours in the Public Sphere
Outdoor recreation activities	Recycle waste (Study 28), properly dispose of/sort waste (Study 37), reduce consumption (Study 38), take eco-friendly transportation (Study 45).	Private-Sphere Environmentalism
Sports	Signing a petition for environmental protection (Study 43); volunteer for green initiatives (Study 19).	Nonactivist Behaviours in the Public Sphere
Sports	Recycle waste (Study 35, 40), properly dispose of/sort waste (Study 23), reduce consumption of single-use bags (Study 32), take eco-friendly transportation (Study 7).	Private-Sphere Environmentalism
Physical activities	Volunteering (Study 34); Support for policies to curb climate change (Study 8)	Nonactivist Behaviours in the Public Sphere
Physical activities	Recycling (Study 30), Conserving energy (Study 30), green travel (Study 34).	Private-Sphere Environmentalism
Events	Recycle waste (Study 27), properly dispose of/sort waste (Study 27, 1), Conserving energy (Study 1), use of public transport (Study 25), purchase green products (Study 1).	Private-Sphere Environmentalism

As shown in Table 2, the kinds of behaviours discussed in the reviewed literature are very similar across the different activities. The "Environmental activism" described by Stern (2000) was only present in studies dealing with Outdoor recreation activities. This is not a strange observation as participation in nature-based activities throughout one's life (including organized outdoor recreation) can be a contributing factor to environmental activism (Matsuba & Pratt, 2013).

The other main behaviours found in the analysed literature are related to the public and private spheres (Stern, 2000) and concentrate on petition signing, policy support and compliance with restrictions. These are especially relevant regarding tourism and the support of sustainable tourism and for outdoor recreation in relation to respecting restrictions at National Parks and participation cleaning or leave no trace activities. Volunteering for different kinds of initiatives is instead a behaviour described in the case of sport and physical activities, while for events the only behaviours that are considered relevant are the ones in the private sphere. In all cases, individual activities are related to proper disposal and recycling of waste, energy conservation, consumption habits and choice of mode of transportation.

Which factors have been found to influence PEB in these domains?

Now that we have talked about which kinds of behaviours are described in the analysed literature, we must find out how these studies appraise the possibility that people who engage in sport and outdoor activities will actually adopt these behaviours. Since studies often examine different behaviours and different predictors, this section focuses on different types of examples from each study to exemplify recurrent themes and patterns.

Socio-demographic and factors and personal capabilities

One aspect that is often studied in PEB scholarship is how different socio-demographic factors are associated to other variables. Since this is done in every study and the results are usually highly inconsistent from study to

study, in this section we recorded some notable examples where links between socio-demographic factors and PEB were found. For instance, environmental awareness in relation to the intention to recycle and the conservation of resources has been found to be significantly influenced by gender in a study focusing on young students. In this case the relationship between variables was stronger among female study participants (Han et al., 2019). Men who own dogs, older women and employed women are more likely to adopt PEBs in the context of physical activities and visits to natural areas (Teixeira et al., 2022), while older tourists have been found to be less likely to commit vandalism (Wu, Lin, & Liu, 2020).

Another aspect that we examined in our reviewed literature relates to resources. One example of a resource relates to time. People may act differently when they are at home as opposed to when they travel. People mostly recycle and take public transport when they are at home and display more PEB when they are travelling to an event (a sport event in this case). Also, when avoiding environmentally friendly practices, a common reason given by respondents relates to a limited amount of time (Achu, 2019). Time is classified as a resource together with income (Blankenberg & Alhusen, 2019; Stern, 2000).

Another relevant personal capability is knowledge. Beach cleaning experiences have been found to create the possibility to learn and, in turn, to foster PEB (Power, 2022). Considering this kind of result, it may be intuitive to assume that the more knowledge one has results in PEB. However, in the case of the Leave No Trace movement, a comparison of front-country and back-country visitors, found that backcountry campers had higher levels of knowledge, but it was the ones camping in the front-country that showed more PEBs in line with Leave No Trace (Blye & Halpenny, 2020). Back-country and front-country distinguishes the presence of more or less infrastructure close to where people are camping (Werner, 2021).

Attitudinal factors

Attitudinal factors include a series of different categories. One straightforward example relates to attitudes themselves. A positive environmental attitude towards green urban infrastructure can, in turn, lead to pro-environmental behaviour (Dipeolu et al., 2021). In fact, experiences in urban nature lead to both well-being as well as PEB (Whitburn, Linklater, & Milfont, 2019).

Positive attitudes have also been recorded in different contexts. When people have favourable attitudes towards athletic departments' pro-environmental initiatives, they will be more likely to participate and to engage in PEBs (Kim, Nam, & LaPlaca, 2021). People also display positive attitudes towards practicing PEB at small-scale sport events and are found to actually practice PEBs in this context (Mchunu, Nyikana, & Tichaawa, 2021).

Tourists' attitudes and motivations support the choice of a sustainable tourism destination. Furthermore, tourists' attitude is positive towards the development of sustainable tourism and is connected to the positive effects of this kind of tourism development (Palacios-Florencio et al., 2021).

This group of factors also includes values, norms and identity. Different studies have examined different kinds of outdoor recreation participants. Birdwatchers and hunters are some of the types of outdoor recreation in which participants are likelier to exhibit PEB (Espenshade et al., 2018; Larson et al., 2018). However, when hunters display values related to domination, then the propensity to PEB diminishes (Ghasemi & Kyle, 2022). Another example in which values correlate negatively with PEB is hiking, Goh (2020, p. 16) found that "pro-environmental values of visitors had no influence over off-trail walking behavior." Similarly, specialized interest in outdoor recreation activities, may lead to PEBs or not depending on whether their motivations are more bio-centric or egocentric (Lee & Lee, 2021). This is in line with the study of van Riper et al. (2020), which found that biospheric and altruistic values are positively correlated with PEB. In this section we also mentioned how perceived costs impede behavioural

changes. Wicker and Thormann (2021) found that the altruistic and generous sides of PEB outweigh perceived costs.

Still in relation to identity, Romano and Sotis (2021) developed a nudge that is based on people's identity such as football fans in Italy. By drawing on people's pride and connection to their favourite team, their experiment showed a decrease in the consumption of single-use plastic carrier bags.

In the case of fishing, the belief relating to catch-and-release practices and the perception of an environmental threat have been found to predict several kinds of PEBs (Jeanson, Cooke, Danylchuk, & Young, 2021). In the case of anglers, referring to those engaged in sport fishing with a hook and line (Merriam-Webster, n.d.), the study participants were aware of the litter produced by their activity and its negative consequences, but other factors mediated how this could lead to PEB. Well-placed and highlighted litter bins proved to be an improvement in this direction (Lewin, Weltersbach, Denfeld, & Strehlow, 2020).

Attitudinal factors are also related, according to Stern (2000) to perceived costs of PEB. One example is sports and related transportation to training, matches and sport events. Changes in transportation modes are not common (Carmichael, 2020), and this is usually related to the perceived personal cost of making such as change (Loewen & Wicker, 2021). The same has been recorded in the behaviour of snow-sport tourists (Wicker, 2018). A factor that is related to perceived costs is constraints. Moghimehfar, Halpenny, and Walker (2018) studied constraints to PEB and found that, through the mediation of other variables, they affect behavioural intentions. Constraints have also been studied in the context of mountain hikers' PEB. Constraints negatively affect PEB while, by contrast, the provision of restrooms and parking spaces become facilitators (Zarei et al., 2021).

At the same time, people who display more awareness and concern for environmental problems in the context of sports, also display more PEB (Thormann & Wicker, 2021). Furthermore, people who are more concerned

about marine issues "tended to report a more responsible behavior with regard to marine debris prevention" (Lyon, Bidwell, & Pollnac, 2018, p. 501).

Contextual factors

Facilities such as nature centres, provide environmental education and can foster environmental behaviour. In a study of the likelihood that people will support such institutions, Browning et al. (2018) found that support may increase if centres, in addition to their core mission of providing environmental education, also engage with the local community and with issues such as the opportunity to gather and to bring different people together. This may, in turn, foster PEB in visitors.

Other relevant contextual factors in the study of PEB are the connection to nature and place attachment. Connection or connectedness to nature has been found to influence several factors. Firstly, when people are found to have a connection to nature they will care more about urban forests (Baur, Ries, & Rosenberger, 2020) and will display pro-environmental behaviour (Beery, Olsson, & Vitestam, 2021) such as by conserving energy and water (Hoover, 2021). Secondly, place attachment is another contextual factor that has been found to lead to low-cost PEBs (Larson, Usher, & Chapmon, 2018) and support for wilderness (Wynveen et al., 2021), even though this is mediated by other factors. However, in urban contexts, place attachment does not lead to PEB. According to Yamashita and Bang (2022), this can be due to the fact that in certain situations (such as conservation of the natural environment) every person must do their part, but individuals do not partake in this sharing of responsibility. They will instead continue with their current lifestyles because it results in a better personal gain.

Certain tourism experiences have been evaluated for their potential to reach pro-environmental outcomes. A trip to Antarctica did not lead to notable changes in people's concern for climate change, although those with the lowest levels of such a concern are likely to change their attitudes afterwards. Furthermore, people are also more likely to support tourism policies and to visit natural areas after undertaking this trip (Cajiao et al.,

2022). The study of an adventure-wellness-ecotourism experience found that several aspects of the trip, such as immersive experience, identity reinforcement and meaningful reflection have the potential to lead travellers to PEB (Hunt & Harbor, 2019). Other tourism experiences resulted in changes made in behaviour upon returning home (Zhang, Stewart, & Chan, 2020).

Contextual factors also include the relationship with peers and a factor that will likely influence people's willingness to engage in PEB. This has been found to be the case for white water rafters (Johnson et al., 2021).

Finally, Stern (2000) talked about the role of advertising in fostering PEB. Advertisement of destinations play a role in people's PEB at destinations. Lee and Jeong (2018) have found that destination image affects motivations towards PEB. In relation to this, signs are important to steer people in the right direction. Narrative signs have been shown to reduce non-compliant behaviour (Schoenleber, D'Antonio, & Hall, 2022).

Habits

Regular participation in outdoor recreation activities has been found to lead to an increased awareness of environmental impacts and can eventually lead to PEB (Hanna et al., 2019). The same goes for regular visits to a tourist destination (Trelohan, Francois-Lecompte, & Gentric, 2022).

Physical activity has been found to enhance people's belief in climate change and, consequently, their support for policies directed towards hindering climate change (Cunningham, McCullough, & Hohensee, 2020). Outdoor physical activity has also been found to enhance the potential of PEB (Pasek & Mytskan, 2022).

Conclusions and recommendations

In this report our overriding aim was to present an overview of previous research focusing on pro-environmental behaviour (PEB) in the sports and outdoor sectors. We accomplished this by conducting a scoping review and a content analysis of the papers. Overall, for our analysis, we selected 45

papers that had been published in the 5 years leading up to this study. In 2021 there was a spike in the number of published papers. This also applies for all the activities treated except for tourism, an activity that came to a complete standstill in most places during the COVID-19 pandemic. As for a possible reason for a spike in the number of publications, this could be due to a higher turnover of papers during the COVID-19 pandemic (Aviv-Reuven & Rosenfeld, 2021). The spike in the activities investigated (except for tourism) this could be due to the increased visitation to National Parks during the same period (Geng et al., 2021). The analysed literature presents first and foremost outdoor recreation activities, followed by tourism, sports and lastly events and physical activities. The majority of studies on PEB are quantitative, whereby they rely on surveys studies using questionnaires followed by experiments. The next most popular research approach is qualitative, relying heavily on interviews. Next are approaches using both quantitative and qualitative approaches, which have been classified as Mixed methods. The results show a strong focus on testing PEB and other variables quantitatively, while an integration of studies looking at the same kinds of behaviours qualitatively could provide the research field with additional and important perspectives. The results of the literature review show a considerable geographical spread when it comes to the countries of investigation. Nevertheless, certain countries including the USA and Germany tend to dominate in these studies. This suggests that it could eventually be productive to conduct more studies in additional parts of the world.

How are sports and outdoor recreation activities connected to PEB empirically in the published scientific literature?

The studies included in this review reveal a broad range of behaviours that people display when practicing sport and outdoor recreation activities.

First, despite the attention to socio-demographic factors, these are not always found to play a role in how people practice PEBs. Indeed, it is not unusual for the results of some studies to contradict those of others.

Nevertheless, gender has been found to influence behaviours connected to energy conservation and intention to recycle (Han et al., 2019), while older people are less likely to commit acts of vandalism (Wu, Lin, & Liu, 2020). Meanwhile increased knowledge has been found to not necessarily lead to more environmentally friendly practices (Blye & Halpenny, 2020). Lack of time was one of the reasons given for not acting more environmentally friendly at home. However, people did act more environmentally friendly at the destination where they were travelling (Achu, 2019).

The results of the investigated studies show that there are some actions people are willing to undertake and others they perceive as too costly in terms of effort. One example where people appear unwilling to shift their behaviour is to switch from travelling to training sessions, events and sport-related holidays by personal automobile to another means of transportation (e.g., Carmichael, 2020, Wicker, 2018). However, persons engaging in other categories of outdoor recreation, such as birdwatchers and hunters have been shown to be more prone to adopt a pro-environmental behaviour (Espenshade et al., 2018; Larson et al., 2018), although this also depends on their respective values. In fact, people's values, perceptions, awareness and attitudes have been found to be very important for acting in a pro-environmental manner.

The same importance has been recorded for contextual factors such as place attachment and connection/connectedness to nature. People who display a deeper connection to nature and/or to a place will be likelier to wish to spare water and energy (Hoover, 2021) and to protect wilderness (Wynveen et al., 2021). However, this has not be proven to be the case for urban areas since people in these contexts do not see their shared responsibility for nature conservation and continue to act in ways that result in the most personal gain (Yamashita & Bang, 2022). This finding is relevant finding for cases where outdoor recreation occurs in highly populated urbanized areas.

Finally, there are habits, which are difficult to break and which may lead people to continue to act in unsustainable ways. However, the studies

included in this review mentioned the positive sides of some habits. Examples are the benefits of regular activities in nature and physical activities, which can foster PEBs (e.g., Cunningham, McCullough, & Hohensee, 2020; Hanna et al., 2019; Pasek & Mytskan, 2022).

This literature review shows that there are several aspects of people's lives that must be investigated further in order to modify their behaviour. A need for changing people's attitudes and awareness, harnessing positive outdoor recreation identities and investigating perceived costs and constraints are all important areas in which the researchers in the Mistra Sport and Outdoors programme could cooperate and reach new knowledge. The positive effects of participation in nature-based activities, physical activities and place attachment should also be further investigated to understand how these can be beneficial for the creation of a movement and to overcome barriers due to habits or the previously mentioned costs and constraints.

Limitations

Our study has several limitations. We carried out the sampling of the studies using keywords, which only revealed the existing literature in the particular areas we specified. Because of this restriction, we are likely to have missed other studies dealing with energy conservation, recycling and transportation. Pro-environmental behaviour is also defined by other terms, suggesting that we most probably omitted studies that failed to use this specific term.

Photo: Dileep Divakaran

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Appendix A

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Baur, J. W. R., Ries, P., & Rosenberger, R. S. (2020). A relationship between emotional connection to nature and attitudes about urban forest management. *URBAN ECOSYSTEMS*, *23*(1), 187–197. https://doi.org/10.1007/s11252-019-00905-2	Study 2
Beery, T., Olsson, M. R., & Vitestam, M. (2021). Covid-19 and outdoor recreation management: Increased participation, connection to nature, and a look to climate adaptation. *Journal of Outdoor Recreation and Tourism*, *36*. https://doi.org/10.1016/j.jort.2021.100457	Study 3
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