Review

A comprehensive review (1963–2024) of environmental psychology: Trends, themes, and future directions

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Abstract: Multidisciplinary environmental psychology studies the dynamic link between humans and their natural and manmade settings. This thorough study synthesises 443 works from 1963 to 2024 on topics such as physical surroundings' effects on behaviour, environmental stressors, pro-environmental behaviour, and applying psychological theories to environmental interactions. This literature is synthesised to identify patterns, themes, and future directions. Growing environmental concerns and the need for sustainable development have changed the profession. Green areas have been demonstrated to boost mental health and reduce stress. Nature helps mental exhaustion recuperation. Hospitals and workplaces' design and structure affect health and productivity. Walkable, green urban development improves citizens' well-being and promotes sustainable living. Environmental stresses including noise, pollution, and overpopulation harm mental and physical health. Children exposed to noise pollution are more likely to develop cardiovascular illness and cognitive deficits. Anxiety and despair caused by climate change are also becoming more apparent. Pro-environmental behaviour is emphasised, with notions like planned behaviour and community-based social marketing working. Behaviour interventions using social norms and feedback have decreased energy and waste. Personal values-driven intrinsic motivation promotes long-term behavioural change better than extrinsic incentive. Environmental psychology uses surveys, experiments, and mixed-methods research. Virtual and augmented reality provide for environmental simulations and psychological studies. Good health and well-being, excellent education, sustainable cities, responsible consumerism, climate action, and living on land are among the field's major contributions to the UNSDGs. Environmental psychology will help establish sustainable and healthy settings that correspond with the UNSDGs as environmental issues grow.

Keywords: environmental psychology; physical environment; pro-environmental behavior; environmental stressors; methodological approaches; interdisciplinary collaboration

1. Introduction

As a specialist in heavy metal ecotoxicology in Malaysia since 1998, I've long wondered—and continue to do so—how to handle our severe environmental concerns. While entirely resolving these difficulties may be a distant goal, we may at least strive to alleviate and remediate them to make our world a better place, particularly as I near the conclusion of my academic career. There is a natural evolution from public health to eco-health, then one health, and finally planetary health.

On the day I gave my first professorship lecture at Universiti Putra Malaysia in September 2023, someone mentioned Environment, Social, and Governance (ESG) and its relationship to human personality traits. ESG overlaps directly with the environmental component of my ecotoxicological research. As we try to address

climate change and match our activities with sustainability goals, it is evident that the social component is critical—just as curry is necessary to craft the ideal Nasi Lemak sambal. Essentially, a truly sustainable ecosystem or planet requires the convergence of social, economic, and environmental concerns. These three pillars must work together and maintain their aggregate power regularly. When we extensively examine the social side, we discover that human personality qualities are crucial to attaining environmental goals. People's willingness to follow instructions is influenced and motivated by various circumstances. It's not as simple as stating, "You must follow me because I am your boss."

Personality characteristics are inextricably tied to human psychology, and environmental psychology (EP) has the ability to address and buffer many of today's climate change challenges. EP is an interdisciplinary area that studies the intricate interactions between people and their environments, with an emphasis on how environmental influences influence human behaviour, well-being, and mental health. The discipline has grown since its start in the 1960s, fuelled by growing concerns about environmental deterioration and the critical need for sustainable development. Environmental psychologists use a variety of theoretical frameworks and approaches to study how people interact with their surroundings (Steg et al., 2018; Uzzell and Moser, 2009; Uzzell and Räthzel, 2009).

EP has traditionally addressed a wide variety of issues, including the psychological consequences of natural and constructed environments, environmental stresses, and pro-environmental behaviours. For example, research shows that exposure to natural settings enhances psychological healing and decreases stress, highlighting the need of including green areas into urban development (Kaplan and Kaplan, 1989; Berman et al., 2008). Similarly, the design of physical locations, such as hospitals and workplaces, has a substantial impact on health outcomes and productivity (Becker, 2002; Ulrich, 1984).

Over the years, EP has grown to include new fields such as climate change psychology, environmental justice, and the use of technology in environmental behaviour study. The rising frequency of extreme weather events, along with the ongoing climate catastrophe, has heightened interest in understanding the psychological effects of climate change and fostering adaptive behaviours (Clayton et al., 2017; Cunsolo and Ellis, 2018). Furthermore, technologies such as virtual and augmented reality provide novel approaches to model environmental changes and investigate their psychological consequences (Loomis et al., 1999).

EP includes a wide range of research tools, including quantitative methods like surveys and experiments as well as qualitative approaches like interviews and ethnographic studies. Mixed-methods research is gaining popularity, allowing for a more thorough knowledge of environmental phenomena by integrating the strengths of qualitative and quantitative data (Hanson et al., 2005; Oishi, 2014). This methodological diversity reflects EP's multidisciplinary character and dedication to tackling real-world environmental issues.

Despite its progress, EP continues to confront problems, such as the need for more cross-cultural study and inter-disciplinary collaboration. Researchers may design more effective sustainable development and environmental quality solutions by combining ideas from psychology, sociology, urban planning, and environmental

science. As EP evolves, it will play an important role in addressing 21st-century environmental challenges by fostering a better understanding of how humans interact with their surroundings and how these interactions can be used to create a more sustainable future (Stewart, 2019; van der Werff et al., 2016).

While EP has made great advances in understanding how physical settings impact human behaviour, with applications in education, urban planning, sustainability, and volunteerism, there is still a large knowledge gap. Specifically, the integration of results from several domains to generate comprehensive, multidisciplinary answers to global concerns such as climate change, mental health, and sustainability is restricted. Research is sometimes isolated inside specialised sectors, such as education or transportation, without considering the broader application of EP concepts across these areas. Furthermore, while quantitative research dominates the area, the importance of qualitative insights in capturing the nuances of human-environment interactions is largely unexplored. This gap emphasises the need for more comprehensive, cross-sectoral research that uses both qualitative and quantitative methods to guide interventions that might improve individual well-being and society results on a broader scale.

This paper aimed to do a comprehensive review that can synthesize research from 443 papers published between 1963 and 2024. These papers cover key themes such as the impact of physical environments on behaviour, environmental stressors, pro-environmental behaviour, and the application of psychological theories to environmental interactions. This literature is synthesised to understand the trends, themes, and future directions.

2. Methodology

On 1 August 2024, using the keywords 'Environmental Psychology', 443 papers were reached using the Scopus database, which had high relevancy. Bibliometric analyses are an established method to evaluate research literature, particularly in scientific fields benefiting from computational data treatment and witnessing increased scholarly output (Ellegaard and Wallin, 2015). VOSviewer is a software that generates a clear graphical representation of bibliometric maps, especially for extensive datasets (van Eck and Waltman, 2009). To highlight the trends of studies conducted on 'Environmental Psychology' from 1963–2024, we performed a bibliometric analysis using the VOSviewer software (VOS stands for visualization of similarities—see www.vosviewer.com).

Scopus comprises many significant research papers and offers integrated analysis tools for creating informative visual representations (Guz and Rushchitsky, 2009). VOSviewer was employed to analyze each keyword, calculating links, total link strengths, and co-occurrences with other keywords.

3. Results

The VOS map in **Figure 1** offers a rich visualization of keyword co-occurrences within EP, revealing intricate relationships and diverse research themes. By examining the clusters of keywords, we can gain a deeper understanding of the core focus areas and the interdisciplinary connections that define this field.
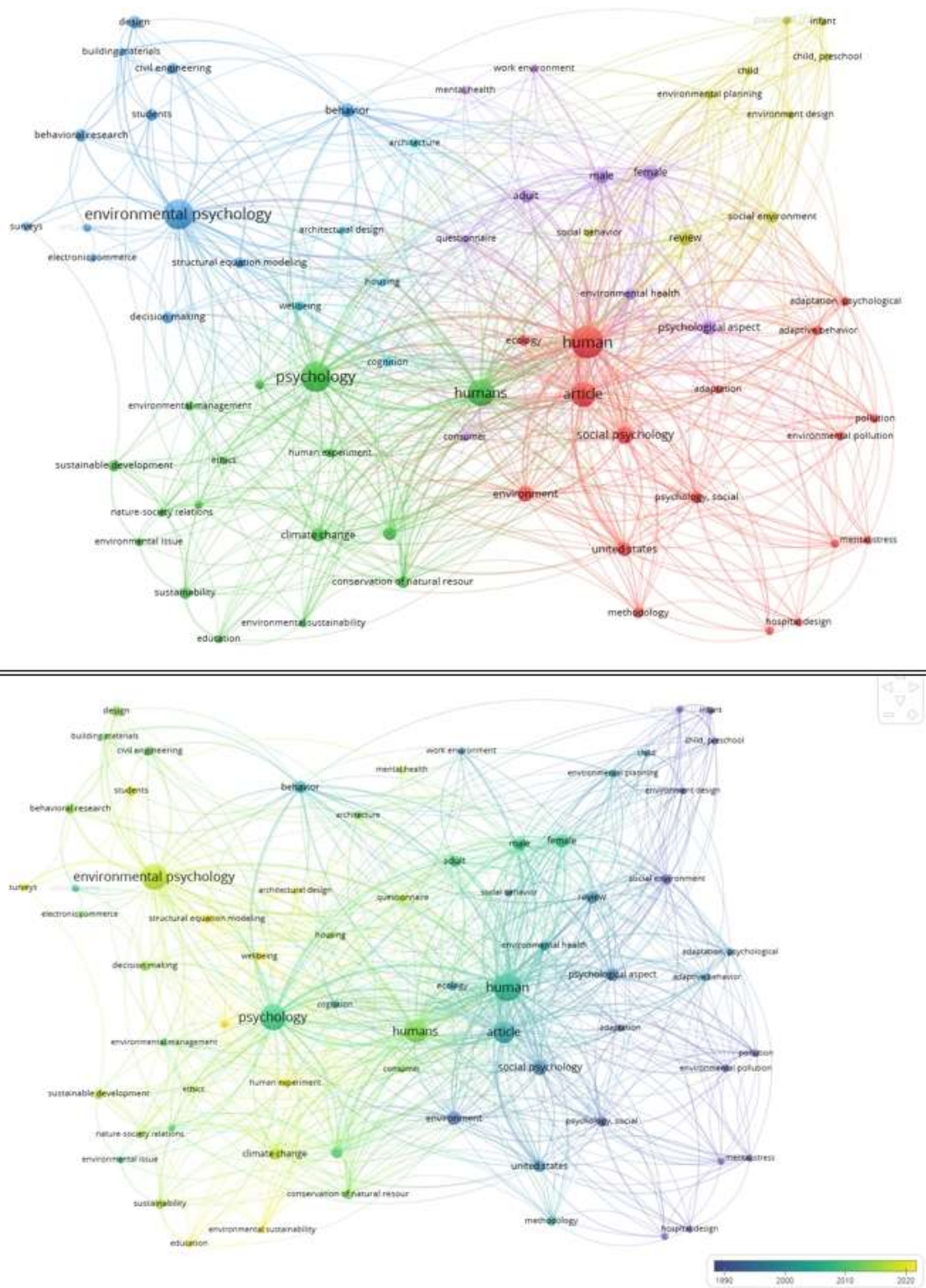
Figure 1. A bibliometric analysis of research themes on 'Environmental Psychology' using Network Visualization in VOSViewer based on 443 papers found in the Scopus database, with at least 3 times repeated keywords, searched on 1 August 2024.

Note: Top Panel: Visualize the paper network to confirm the main themes of the research. Bottom Panel: Evolution of research trends between 1963 and 2024 based on the Scopus database. The colours in the top panel indicate the themes of research that the papers are discussing, while the colours in the bottom panel indicate the year of publication. N = 443 papers. Of the 876 keywords, 68 meet the threshold with a minimum of three occurrences of a keyword.

3.1. Cluster 1: Human and social psychology (red cluster)

The red cluster is prominently centred around the keyword "human," signifying a robust focus on human behaviour and its relationship with environmental factors. Within this cluster, keywords such as "article," "social psychology," "environment," and "pollution" are closely linked. This suggests a strong research emphasis on understanding how human behaviour and social psychological principles intersect with environmental issues.

The presence of terms like "social behaviour," "psychological aspect," and "adaptive behaviour" indicates that researchers are exploring the psychological mechanisms that drive human interactions with the environment. Studies in this cluster may investigate how social norms, attitudes, and behaviours influence environmental outcomes, such as pollution levels and environmental health. This cluster underscores the importance of applying social psychology to address pressing environmental challenges and develop interventions that promote sustainable behaviours.

3.2. Cluster 2: Psychology and environmental sustainability (green cluster)

The green cluster is centred on the keyword "psychology," encompassing terms like "environmental management," "sustainability," "ethics," and "climate change." This cluster highlights the integration of psychological theories and practices in promoting environmental sustainability. It reflects the growing recognition of psychology's role in addressing global environmental issues, particularly those related to sustainable development and ethical environmental management.

Key terms such as "environmental issue," "sustainable development," and "conservation of natural resources" suggest that researchers are examining the psychological factors that influence pro-environmental behaviours and attitudes. This includes studying the motivations behind sustainable practices, the psychological barriers to behaviour change, and the effectiveness of various interventions designed to foster environmental responsibility. Including "ethics" indicates an interest in the moral and ethical considerations underpinning environmental decision-making, further emphasizing the multidisciplinary nature of this research area.

3.3. Cluster 3: Methodological approaches in environmental psychology (blue cluster)

The blue cluster revolves around the term "environmental psychology" and includes keywords such as "behavioural research," "structural equation modelling," "decision-making," and "well-being." This cluster indicates the methodological and analytical approaches employed in EP research. The focus here is on developing and applying rigorous scientific methods to understand the psychological dimensions of environmental issues.

Keywords like "surveys," "questionnaire," and "human experiment" suggest that researchers are utilizing a variety of research methods to gather data on environmental attitudes and behaviours. "structural equation modelling" points to the use of advanced statistical techniques to analyze complex relationships between variables. Studies in this cluster may aim to elucidate the factors influencing environmental decision-

making, the psychological impacts of environmental changes, and how environmental conditions affect overall well-being.

3.4. Cluster 4: Demographic variables and environmental psychology (purple cluster)

The purple cluster includes terms related to demographic variables, such as "male," "female," "adult," and "child." This cluster focuses on how different demographic groups perceive and interact with their environment. Researchers within this cluster are likely exploring how age, gender, and life stage influence environmental attitudes and behaviours.

Keywords like "child," "preschool," and "infant" suggest studies on the developmental aspects of EP, examining how early experiences and education shape environmental awareness and behaviour. Including "adult" and "female" points to research on gender differences in environmental perceptions and actions, highlighting the need for tailored interventions that address different demographic groups' specific needs and characteristics.

3.5. Cluster 5: Interdisciplinary connections (yellow cluster)

The yellow cluster encompasses terms related to "environmental planning," "environment design," and "social environment." This cluster underscores the interdisciplinary nature of EP, linking it with fields such as architecture, urban planning, and environmental design. The focus here is on creating built environments that promote psychological well-being and facilitate positive social interactions.

Keywords like "architectural design," "housing," and "work environment" indicate that researchers are examining the psychological impacts of various environmental settings. Studies in this cluster may explore how the design of residential, commercial, and public spaces influences mental health, social behaviour, and overall quality of life. Including "environmental health" and "mental health" highlights the holistic approach researchers take, considering both physical and psychological aspects of environmental well-being.

In conclusion, the VOS map of keyword co-occurrences in EP reveals a rich tapestry of interconnected research themes and interdisciplinary linkages. The map highlights the centrality of human behaviour and social psychology in addressing environmental issues, the importance of integrating psychological principles in promoting sustainability, the application of advanced methodological approaches, the influence of demographic variables, and the crucial role of interdisciplinary collaboration in creating environments that support psychological well-being. This comprehensive overview provides valuable insights into the current state of research in EP and points to potential directions for future studies.

4. Discussion

4.1. Human and social psychology

The first prominent cluster, depicted in red, revolves around the central keyword "human." This cluster includes related terms such as "article," "social psychology,"

"environment," and "pollution." The red cluster highlights the significant focus on the interplay between human behaviour and social psychology in the context of environmental issues. It underscores the importance of understanding how humans interact with their environment and how social psychological principles can be applied to address issues like pollution and environmental health.

The presence of terms like "psychological aspect," "adaptive behaviour," and "environmental health" indicates that researchers are exploring the psychological mechanisms that drive human interactions with the environment. Studies in this cluster may investigate how social norms, attitudes, and behaviours influence environmental outcomes, such as pollution levels and environmental health. This cluster underscores the importance of applying social psychology to address pressing environmental challenges and develop interventions promoting sustainable behaviours.

Tailored information, goal setting, and feedback have been shown to significantly influence household energy use and related behaviours, illustrating the practical applications of these psychological principles (Abrahamse et al., 2007). These findings highlight the importance of personalized interventions in promoting sustainable behaviour. Additionally, understanding the social aspects of adaptive capacity is crucial for developing effective climate change adaptation strategies (Adger, 2003). Integrating social psychological principles can lead to more effective environmental policies and interventions.

4.2. Psychology and environmental sustainability

The second major cluster, shown in green, centres on the keyword "psychology" and encompasses terms like "environmental management," "sustainability," "ethics," and "climate change." This cluster highlights the integration of psychological principles in promoting environmental sustainability. It reflects the growing recognition of psychology's role in addressing global environmental issues, particularly those related to sustainable development and ethical environmental management.

The Theory of Planned Behaviour has been instrumental in predicting pro-environmental intentions and behaviours, emphasizing the importance of attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). This theoretical framework provides valuable insights into the psychological determinants of sustainable behaviour. By understanding these determinants, researchers can develop more targeted and effective interventions to promote pro-environmental actions.

Research on the psychological impacts of climate change has demonstrated how environmental identity and ecological grief affect mental health, further underscoring the relevance of psychological insights in this domain (Clayton et al., 2017; Cunsolo and Ellis, 2018). These studies highlight the importance of addressing the psychological impacts of environmental changes to promote resilience and adaptive capacity. Including "ethics" in this cluster indicates a focus on the moral and ethical considerations underpinning environmental decision-making, emphasizing the need for a multidisciplinary approach to sustainability.

4.3. Methodological approaches in environmental psychology

The third cluster, illustrated in blue, is anchored around "environmental psychology" and includes terms like "behavioural research," "structural equation modelling," "decision-making," and "well-being." This cluster highlights the methodological approaches and analytical techniques used in EP research. It focuses on understanding the psychological factors that influence environmental decision-making and well-being.

Structural equation modelling has been used to analyze the relationships between value orientations, motivational types, and pro-environmental behavioural intentions, providing valuable insights into the drivers of sustainable behaviour (De Groot and Steg, 2010). This methodological approach allows researchers to explore complex interactions between multiple variables, enhancing our understanding of the psychological determinants of environmental behaviour.

The presence of terms like "surveys," "questionnaire," and "human experiment" suggests that researchers are utilizing a variety of research methods to gather data on environmental attitudes and behaviours. These methods are essential for capturing the diverse factors that influence environmental decision-making. Behavioural research in this cluster focuses on understanding the psychological processes that drive environmental behaviours, providing a foundation for developing effective interventions.

4.4. Demographic variables and environmental psychology

The fourth cluster, in purple, includes terms like "male," "female," "adult," and "child," indicating a focus on demographic variables and their influence on EP. This cluster suggests that researchers are exploring how different demographic groups perceive and interact with their environment, considering factors such as gender and age.

Studies have shown that place attachment and identity can explain place-protective actions, highlighting the importance of demographic factors in environmental behaviour (Devine-Wright, 2009). Gender differences in environmental concern and behaviour have been explored in various cultural contexts, revealing nuanced patterns of pro-environmental engagement (Tam and Chan, 2017). These studies underscore the need for tailored interventions that address different demographic groups' specific needs and characteristics.

Keywords like "child," "preschool," and "infant" suggest studies on the developmental aspects of EP, examining how early experiences and education shape environmental awareness and behaviour. Understanding these developmental factors is crucial for fostering pro-environmental attitudes from a young age. Additionally, including "adult" and "female" points to research on gender differences in environmental perceptions and actions, further highlighting the importance of demographic variables in EP.

4.5. Interdisciplinary connections

The fifth cluster, represented in yellow, includes terms related to "environmental planning," "environment design," and "social environment." This cluster points to the

interdisciplinary nature of EP, linking it with fields like architecture and urban planning. It underscores the importance of designing environments that promote psychological well-being and facilitate positive social interactions.

Research on the impact of classroom design on pupils' learning has demonstrated the significant effects of environmental factors on cognitive and emotional outcomes (Barrett et al., 2015). These findings highlight the critical role of environmental design in promoting educational success and well-being. The role of green space in urban settings has been linked to various health benefits, including reduced stress and improved well-being, further emphasizing the intersections between environmental design and health (Maas et al., 2006).

The presence of terms like "architectural design," "housing," and "work environment" indicates that researchers are examining the psychological impacts of various environmental settings. Studies in this cluster explore how residential, commercial, and public spaces design influences mental health, social behaviour, and overall quality of life. Including "environmental health" and "mental health" highlights the holistic approach researchers take, considering both physical and psychological aspects of environmental well-being.

4.6. Trends in environmental psychology research

Over the past six decades, EP research has highlighted significant trends in understanding the interplay between human behaviour and the environment. One prominent trend is the increasing focus on the psychological benefits of natural environments. Kaplan and Kaplan's (1989) Attention Restoration Theory has been foundational, demonstrating that natural settings can replenish cognitive resources and reduce stress. Numerous studies have validated this theory, showing that interactions with nature improve mood and mental well-being (Berman et al., 2008; Hartig et al., 1991).

Another trend is the investigation of environmental stressors and their impact on health and behaviour. Research by Evans and Cohen (1987) has shown that exposure to noise, pollution, and overcrowding can lead to significant psychological distress. Studies have expanded this understanding by examining the effects of climate change-related stressors, such as extreme weather events, on mental health. Clayton et al. (2017) and Cunsolo and Ellis (2018) have documented the psychological impacts of climate change, highlighting the increasing relevance of this research area in contemporary EP (Stokols, 1995).

EP has seen substantial methodological advancements, with a growing emphasis on mixed-methods approaches that combine quantitative and qualitative data. This methodological pluralism allows for a more comprehensive understanding of environmental phenomena. For example, Brown and Corcoran (2014) used both surveys and interviews to assess the impact of community gardens on urban residents' well-being, revealing quantitative improvements in health outcomes and qualitative insights into participants' experiences and motivations (Vischer, 2017).

The use of virtual reality (VR) and augmented reality (AR) technologies has also emerged as a significant methodological innovation. These technologies enable researchers to simulate environmental changes and study their psychological effects in controlled settings. Studies by Loomis et al. (1999) and de Kort et al. (2003) have

explored the comparability of real and virtual environments, providing valuable insights for urban planning and environmental design (Klöckner, 2015).

Research on pro-environmental behaviour has been a central focus in EP. The theory of planned behaviour (Ajzen, 1991) has been widely used to predict and understand environmental behaviours, suggesting that behaviour is driven by intentions influenced by attitudes, subjective norms, and perceived behavioural control. Studies have applied this theory to various behaviours, including recycling, energy conservation, and sustainable transportation (Bamberg and Schmidt, 2003; Klöckner, 2015).

Community-based social marketing (CBSM) has proven effective in promoting pro-environmental behaviour. McKenzie-Mohr (2000) demonstrated the success of CBSM in reducing household waste and promoting energy conservation. This approach involves identifying barriers to behaviour change, developing strategies to overcome these barriers, and continuously evaluating the effectiveness of interventions. CBSM integrates psychological insights with practical applications, making it a powerful tool for environmental psychologists (Tam and Chan, 2017).

Cross-cultural research in EP has expanded, providing insights into how cultural differences influence environmental attitudes and behaviours. Studies have shown that cultural values shape pro-environmental behaviours, with individualism and collectivism playing significant roles. Tam and Milfont (2020) emphasized the importance of incorporating cross-cultural perspectives to enhance the generalizability of research findings across different cultural contexts (Chen, 2020).

Interdisciplinary collaboration has become increasingly important in addressing global environmental challenges. Researchers can develop more effective and comprehensive solutions by integrating insights from psychology, sociology, urban planning, and environmental science. This interdisciplinary approach is crucial for advancing the field and addressing complex issues such as climate change, environmental justice, and sustainable development (Uzzell and Räthzel, 2009).

4.7. Connections to united nations' sustainable development goals

4.7.1. Goal 3: Good health and well-being

Achieving good health and well-being is a core component of the United Nations Sustainable Development Goals (UNSDGs). EP has significantly contributed to understanding how the environment impacts mental and physical health. Research has shown that access to green spaces can improve mental health and reduce stress levels (Berman et al., 2008; Kaplan and Kaplan, 1989). Studies have indicated that individuals living in more natural environments report better mental health outcomes than those in more urbanized areas (Maas et al., 2006). The restorative effects of nature have been well-documented, suggesting that exposure to green spaces can help recover from mental fatigue and stress.

The design and structure of environments in healthcare settings have been shown to significantly influence patient outcomes. Ulrich (1984) found that hospital rooms with views of nature facilitated faster recovery times for patients, emphasizing the importance of incorporating natural elements into healthcare design. Furthermore, workplace environments that include natural elements can reduce employee stress and

enhance overall well-being (Becker, 2002). These findings underscore the potential of EP in designing spaces that promote health and well-being.

Urban planning and design also play a crucial role in public health. Integrating green spaces in urban areas can increase residents' physical activity, contributing to better physical health (Hartig et al., 2003). Moreover, parks and recreational areas encourage social interactions, which are essential for mental well-being. Thus, EP provides valuable insights into how urban environments can be designed to enhance the health and well-being of their inhabitants.

Environmental stressors such as noise, pollution, and overcrowding harm health. Studies have shown that chronic exposure to noise pollution can lead to increased risks of cardiovascular diseases and cognitive impairments in children (Stansfeld et al., 2000). Similarly, air pollution has been linked to respiratory and cardiovascular diseases, underscoring the need for policies that reduce environmental stressors to improve public health outcomes (Dockery et al., 1993).

The impact of climate change on mental health is an emerging area of research in EP. Extreme weather events and environmental changes can lead to significant psychological distress, including anxiety, depression, and post-traumatic stress disorder (Clayton et al., 2017; Cunsolo and Ellis, 2018). Understanding these impacts is crucial for developing interventions to help communities build resilience against climate-related stressors.

4.7.2. Goal 4: Quality education

EP contributes to the goal of quality education by providing insights into how learning environments can be designed to enhance educational outcomes. Research has shown that well-designed educational environments, which include natural light, appropriate acoustics, and comfortable temperatures, can significantly improve students' academic performance (Barrett et al., 2015). The physical environment of classrooms influences students' ability to concentrate, participate, and engage in the learning process.

Studies have also highlighted the importance of incorporating green spaces into educational settings. Natural environments within schools have been associated with better cognitive functioning and reduced stress among students (Wells and Evans, 2003). Outdoor learning experiences, such as school gardens and nature-based education programs, can enhance students' connection to nature and promote pro-environmental behaviours (Williams and Dixon, 2013).

Educational programs integrating environmental education with traditional curricula have been shown to foster environmental stewardship and sustainability awareness among students (Rickinson et al., 2004). These programs encourage students to understand and address environmental issues, promoting a sense of responsibility towards the environment. The role of EP in developing and evaluating these programs is crucial for ensuring their effectiveness and impact.

Virtual and augmented reality technologies offer new opportunities for environmental education. These technologies can simulate real-world environmental scenarios, providing immersive learning experiences that enhance students' understanding of complex environmental concepts (Loomis et al., 1999). Technology

in education also supports innovative teaching methods, making learning more engaging and accessible.

EP's role in promoting quality education extends to the design of inclusive learning environments. Ensuring that educational spaces are accessible and accommodating to students with diverse needs is essential for fostering an inclusive education system. Research in EP can inform the development of inclusive design principles that support the participation and engagement of all students, regardless of their abilities (Moore, 2008).

4.7.3. Goal 11: Sustainable cities and communities

EP provides valuable insights into creating sustainable cities and communities, a key objective of UN SDG 11. The design of urban environments significantly impacts residents' quality of life, well-being, and environmental behaviour. Research has shown that walkable neighbourhoods with access to green spaces and public transportation promote sustainable living and enhance community well-being (Leyden, 2003). Urban design that prioritizes pedestrians and cyclists over cars can reduce pollution and improve public health.

Community gardens and urban green spaces foster social cohesion and community engagement. Studies have shown that these spaces provide opportunities for social interactions, strengthen community bonds, and promote a sense of belonging (Brown and Corcoran, 2014). Additionally, urban green spaces can serve as venues for environmental education and awareness, encouraging residents to engage in sustainable practices.

Place attachment is crucial for understanding residents' relationships with their urban environments. Place attachment refers to the emotional bonds people form with specific places, which can influence their environmental attitudes and behaviours. Research has shown that strong place attachment is associated with greater environmental stewardship and participation in community sustainability initiatives (Devine-Wright, 2009). EP helps identify strategies to enhance place attachment, fostering community involvement in sustainability efforts.

Addressing environmental stressors in urban areas is essential for creating sustainable communities. Noise and air pollution are significant challenges in many cities, affecting residents' health and well-being. EP research highlights the importance of mitigating these stressors through urban planning and policy interventions (Evans and Cohen, 1987). Creating green buffers, implementing noise reduction measures, and promoting clean energy solutions can improve urban living conditions.

Climate resilience is a critical aspect of sustainable cities and communities. EP contributes to understanding how communities can adapt to climate change and build resilience against environmental threats. Studies have shown that community-based approaches to climate adaptation, which involve residents in planning and decision-making processes, are more effective and sustainable (Adger, 2003). Environmental psychologists are crucial in facilitating these participatory processes and ensuring community voices are heard.

4.7.4. Goal 12: Responsible consumption and production

Promoting responsible consumption and production is a central goal of the UN SDGs, and EP provides insights into how to achieve this objective. Understanding the psychological factors influencing consumption behaviours is crucial for developing effective interventions. The theory of planned behaviour, which posits that behaviour is driven by intentions influenced by attitudes, subjective norms, and perceived behavioural control, has been widely used to predict and understand environmental behaviours (Ajzen, 1991). This theory has been applied to various contexts, including recycling, energy conservation, and sustainable transportation.

Community-based social marketing (CBSM) is an effective approach to promoting responsible consumption and production. CBSM involves identifying barriers to behaviour change, developing strategies to overcome these barriers, and continuously evaluating the effectiveness of interventions. McKenzie-Mohr (2000) demonstrated the success of CBSM in reducing household waste and promoting energy conservation. This approach integrates psychological insights with practical applications, making it a powerful tool for environmental psychologists.

Behavioural interventions that leverage social norms and peer influence effectively promote sustainable behaviours. For example, studies have found that providing feedback on energy consumption compared to neighbours can motivate individuals to reduce their energy use (Schultz et al., 2007). These interventions harness the power of social comparison and the desire for social approval to encourage responsible consumption.

Intrinsic and extrinsic motivations have been extensively studied in pro-environmental behaviour. Deci and Ryan's (1985) Self-Determination Theory suggest that intrinsic motivation, driven by personal values and interests, is more sustainable in promoting long-term behavioural change than extrinsic motivation, such as rewards or punishments. This theory has been applied to various environmental behaviours, including recycling, energy conservation, and sustainable transportation (De Groot and Steg, 2010).

Technological advancements offer new opportunities for promoting responsible consumption and production. Mobile applications and smart technologies can provide real-time feedback on energy use, water consumption, and waste generation, helping individuals make informed decisions and adopt sustainable practices. EP research can inform the design and implementation of these technologies to maximize their effectiveness and user engagement (Abrahamse et al., 2007).

4.7.5. Goal 13: Climate action

Climate action is a pressing global challenge, and EP is critical in understanding and promoting behaviours that mitigate climate change. Research has shown that climate change communication strategies that emphasize climate impacts' local and personal relevance are more effective in motivating action (Moser, 2010). Tailoring messages to specific audiences and framing them in ways that resonate with their values and beliefs can enhance engagement and support for climate policies.

The psychological impacts of climate change, including eco-anxiety and climate grief, are becoming increasingly recognized. Studies have documented the mental health effects of climate change-related events, such as extreme weather and environmental degradation (Clayton et al., 2017; Cunsolo and Ellis, 2018). Understanding these impacts is essential for developing interventions that support individuals and communities in coping with climate-related stressors.

EP research has focused on behavioural interventions to reduce carbon footprints. Promoting energy-efficient behaviours, reducing car use, and encouraging sustainable consumption can significantly reduce greenhouse gas emissions (Steg and Vlek, 2009). Interventions that combine individual behaviour change with structural changes, such as providing infrastructure for cycling and public transportation, are particularly effective.

The role of social identity and collective action in climate mitigation is an emerging area of research. Studies have shown that people are more likely to engage in pro-environmental behaviours when they identify with a group that values environmental protection (Reese et al., 2020). Collective action approaches that involve communities in climate action projects can build social cohesion and enhance the effectiveness of interventions.

EP also contributes to understanding the barriers to climate action. Factors such as a perceived lack of control, scepticism about climate change, and competing priorities can hinder engagement in climate mitigation behaviours. Addressing these barriers through targeted communication and interventions is crucial for fostering widespread climate action (Gifford, 2011).

4.7.6. Goal 15: Life on land

EP provides insights into the human-nature relationship, central to conserving terrestrial ecosystems and biodiversity. Research has shown that exposure to natural environments fosters a connection to nature, promoting pro-environmental attitudes and behaviours (Mayer and Frantz, 2004). Programs facilitating direct experiences with nature, such as nature-based education and ecotourism, can enhance environmental awareness and stewardship.

Studies have highlighted the importance of place attachment in motivating conservation behaviours. People who feel a strong emotional bond to a place are likelier to engage in actions that protect and preserve that environment (Vaske and Kobrin, 2001). EP research can inform strategies to strengthen place attachment, such as community involvement in conservation projects and environmental education programs. Environmental identity, which refers to how individuals perceive themselves as part of the natural environment, is also relevant to conservation efforts. Research has shown that a strong environmental identity is associated with greater engagement in conservation behaviours (Clayton, 2003). Environmental education programs emphasising the interconnectedness of humans and nature can foster environmental identity and support conservation efforts.

Human-wildlife interactions are another important area of research in EP. Understanding how people perceive and interact with wildlife is crucial for developing strategies to mitigate human-wildlife conflicts and promote coexistence. Studies have

shown that positive experiences with wildlife can enhance support for conservation initiatives (Manfredo et al., 2009). Environmental psychologists can contribute to designing and evaluating programs that promote positive human-wildlife interactions.

The role of cultural values and beliefs in shaping conservation behaviours is an emerging area of research. Different cultures have unique relationships with nature, and understanding these cultural dimensions can enhance the effectiveness of conservation strategies. EP research can provide insights into how cultural values influence environmental attitudes and behaviours, informing culturally sensitive conservation programs (Heberlein, 2012).

4.8. Influence of environmental psychology on educational environments and behavior

Azeez et al. (2023) and Lee and Lee (2023) examine the influence of design on behaviour and well-being inside educational environments. Azeez et al. examine the influence of active design on enhancing the EP of university campuses, emphasising that students often exhibit more social engagement off-campus due to psychological impediments such as worry and time limitations. Lee and Lee examine the impact of a library makeover in an elementary school, discovering that flexible seating and accessible spaces enhanced user happiness, especially in reading sections. Both findings underscore the significance of environmental design in promoting well-being; however, Azeez et al. prioritise higher education and physical exercise, whilst Lee and Lee concentrate on basic education and user pleasure. These studies demonstrate that well constructed educational environments may profoundly influence students' behaviour and well-being, despite variations in their focal points and results.

El-Didy et al. (2024) contribute to this discourse by investigating the impact of crowding in metropolitan settings on well-being, a concern that may also be applied to educational contexts. Their findings indicate that crowding might adversely impact mental health, a consideration that educational institutions should consider when constructing campuses to enhance well-being. Yue (2024) examines the design of applied art and the development of design skills, highlighting that principles of EP may improve creative potential by creating more favourable learning environments. These studies demonstrate how instructional design, applicable to general learning and specialised creative endeavours, may leverage EP to enhance outcomes.

Subsequent research, such as that conducted by Hao (2024), which examines the incorporation of EP into ideological and political education, illustrates the extensive impact of EP on academic achievement and cognitive involvement. The psychological environment of classrooms may profoundly influence students' motivation and cognitive growth, hence underscoring the necessity for meticulously crafted instructional frameworks. Furthermore, Ratcliffe et al. (2024) underscore the necessity of qualitative research methodologies in EP, which may yield more profound insights into the influence of educational settings on student well-being and engagement.

4.9. Environmental psychology and sustainable behavior

Sustainability is a recurring theme in EP research, and numerous researchers have emphasised the impact of environmental concerns on behavioural change. Jamaluddin

et al. (2024) and Collet et al. (2023) both investigate the ways in which EP influences pro-environmental behaviours, including the conceptualisation of CO_2 emissions and the use of mass rapid transit (MRT). Jamaluddin et al. discover that the intention of private vehicle users to transition to MRT is substantially influenced by factors such as perceived behavioural control and environmental concerns. Collet et al. demonstrate that loss framing substantially enhances pro-environmental behaviours by employing valence-based CO_2 framing. This suggests that subtle psychological interventions can be implemented to promote sustainability.

Feng and Yang (2023) contribute by investigating the interaction between EP, green finance, and government expenditures to reduce carbon emissions. They discover that EP is instrumental in developing policies that encourage sustainable behaviour at both the individual and national levels. Their research is consistent with Zhang and Dong's (2023) research on the intentions to recycle second-hand apparel, which demonstrates how sustainable decisions are influenced by factors such as social media trust and face consciousness. These studies demonstrate that sustainable behaviours can be influenced by economic and psychological interventions in various sectors, thereby underscoring the significance of interdisciplinary approaches in sustainability research.

Lloyd and Gifford (2024) also propose that qualitative research could improve our comprehension of these behaviours. Their examination of qualitative methodologies illustrates the potential for in-depth, context-sensitive studies to offer more comprehensive insights into the factors influencing sustainable behaviour. In addition, Aruta (2023) emphasises the expansion of EP in the Philippines, demonstrating how local environmental challenges can influence research agendas and contribute to global sustainability initiatives. Even though there is still a knowledge deficit in the integration of findings across various cultural and economic contexts, these studies collectively emphasise the critical role of EP in promoting sustainability.

Additionally, Diniz et al. (2023) examine the evolution of EP in Latin America, underscoring the region's significance in global EP research. Their bibliometric analysis demonstrates the importance of sustainability themes in Latin American research, consistent with the emphasis observed in other regions. These results indicate that EP has the potential to be a potent instrument for addressing global sustainability challenges. However, there is still a need for increased cross-regional collaboration and the integration of various methodological approaches.

4.10. Behavioral intentions and well-being in volunteerism and event participation

The overall insights of EP based on the literature reviewed in the present study are presented in **Figure 2**. Insights into the impact of EP on behavioural intentions in volunteerism and event participation are provided by Chiu et al. (2023) and Alén-González et al. (2023). Chiu et al. (2023) employed Mehrabian and Russell's (1974) EP model to examine the correlation between volunteer management and satisfaction. They conclude that volunteer management has a substantial impact on continuance intentions. Alén-González et al. (2023) investigated music festivals and demonstrate

that attendee satisfaction and loyalty are influenced by the perceived value and quality of the festival. In the context of volunteerism or event participation, both studies underscore the importance of satisfaction as a critical factor in the development of behavioural intentions.

Figure 2. The insights of environmental psychology based on the literature reviewed in the present study.

Cho et al. (2024) contribute to this by investigating the impact of volunteer management and personality on quality of life and intention to donate in the context of compulsory volunteering. They discover that volunteer satisfaction is moderated by personality, which implies that comprehending individual differences can enhance volunteer retention and satisfaction. This study emphasises the significance of effective volunteer administration, echoing the findings of Chiu et al. (2023). However, it introduces a psychological component by concentrating on personality characteristics.

Feng et al. (2024) further develop this discourse by investigating the impact of colour design on psychological well-being in architectural spaces, including those utilised for volunteer programs or events. Their results indicate that applying mindful colour design can enhance emotional well-being and self-control, underscoring the significance of EP in developing positive behaviours. A foundational understanding of the psychological mechanisms that drive behaviour in social contexts such as festivals and volunteer programs is provided by Marchand et al. (2023), who also contribute by delineating key concepts in EP.

Lastly, the research conducted by El-Didy et al. (2024) on congestion offers valuable insights for event management. They demonstrate that the perception of congestion can have a detrimental impact on well-being and satisfaction, which is a

critical factor for event organisers to take into account when organising volunteer activities or festivals. This is consistent with the results of Alén-González et al. (2023), who underscore the correlation between attendee satisfaction and loyalty and a positive event experience. These studies collectively underscore the intricate relationship between environmental factors and behavioural intentions in social contexts, despite the fact that there is still a deficit in comprehension regarding the manner in which these factors interact across various types of events and volunteer programs.

4.11. The overall timeline of the evolution of environmental psychology

Figure 3 shows the overall timeline of the evolution of EP based on the literature reviewed in the present study.
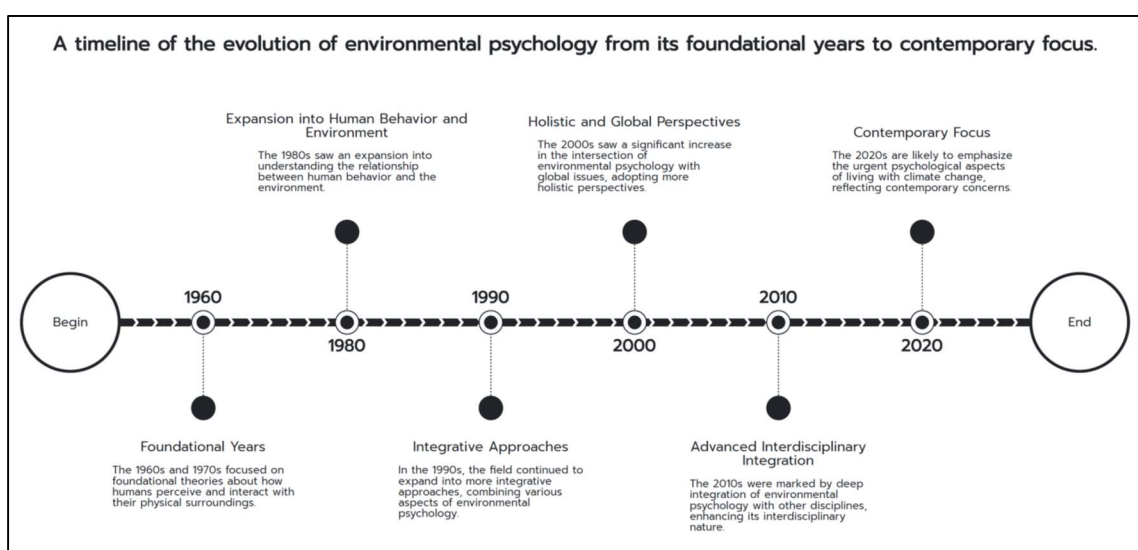

Figure 3. The overall timeline of the evolution of environmental psychology based on the literature reviewed in the present study.

In the 1960s–1970s, EP was founded. Early EP focused on hypotheses about how humans perceive and interact with their physical surroundings. Kaplan (1972) presented a functionalist approach to EP problems that focused on human-environment interactions. Cappon (1973) examined the relationship between EP and psychiatry, arguing that environmental knowledge may improve mental health procedures. Proshansky (1972) noted the methodological challenges of investigating these relationships. Chaney (1973) showed how hospital décor affects patient well-being through EP. Mehrabian and Russell (1974) developed a verbal information rate measure to study environmental effects on behaviour. Spada, Hoffmann, and Lucht-Wraage (1977) used EP to analyse student attitudes towards nuclear power plants in a classroom experiment. Finally, Craik (1977) noted that EP has numerous scientific perspectives, highlighting its variety. Early studies on human elements in environmental design and the psychological effects of architecture and urban planning would be less prominent in the early literature until the 2020s.

EP expanded into human behaviour and the environment in the 1980s. Psychology of crowding, personal space, and environmental stress would be

studied in environmental situations. Ray (1980) examined psychological elements that affect human environmental views using Australian data. EP developed under specific sociopolitical settings in the Soviet Union, according to Niit, Kruusvall, and Heidmets (1981). EP has changed, and Darroch and Miller (1981) discussed its relevance and future in Australia. In the first issue of the Journal of EP, Canter and Craik (1981) introduced EP and its theoretical and practical applications. These subjects may emerge in literature as linkages between psychology, human behaviour, and the environment.

In the field of EP, the decade of the 1990s encompasses many integrative methods. The field would continue to expand into more integrated methods, considering psychological well-being about environmental quality, sustainable development, and the emerging conversations surrounding climate change (Ajzen, 1991; Hartig et al., 1991). Dockery et al. (1993) and Loomis et al. (1999) are two examples of studies that demonstrate the more extensive linkages that exist between EP and connected topics such as sustainability and environmental management.

There has been a shift towards a more holistic and global approach in EP research since the beginning of the 2000s. According to Becker (2002) and Adger (2003), throughout this time period, there would be a major growth in the interaction of EP with global challenges such as climate change, conservation, and sustainable living. In addition to this, research would start to integrate more information regarding the social aspects of environmental policies and activities (Abrahamse et al., 2007; Clayton, 2003).

In the 2010s, there has been a significant advancement in the integration of a wide range of academic disciplines. At this point in time, the field would have become thoroughly interwoven with other fields of study, allowing for the investigation of intricate topics such as environmental justice, the psychological effects of global environmental changes, and the role of psychology in the promotion of sustainable practices (Cunsolo and Ellis, 2018). Brown and Corcoran (2014), Barrett et al. (2015), and Clayton et al. (2017) all point to the fact that EP encompasses a wide range of topics, which is reflected in the literature, which reveals a complex web of interrelationships that spans a variety of professions.

In the twenty-first century, environmental and psychological research has been concentrating on challenges that are now relevant. It is expected that the most recent time will place an emphasis on the urgent psychological components of climate change, such as adaptation methods, resilience, and the mental health repercussions of environmental calamities (Cho et al., 2024; Feng and Yang, 2023). Because of the pandemic's influence on people's views of space and the environment, the literature reveals new themes about virtual contact with nature (Feng et al., 2024; Lloyd and Gifford, 2024). These themes are developing as a result of technology evolution.

4.12. Integrating environmental psychology for sustainable development: The importance and future directions

With the importance of EP as outlined in **Figure 4**, future EP endeavours should prioritise the development of interdisciplinary collaboration to confront global

challenges, with a particular emphasis on sustainability and well-being, in accordance with the results of these diverse studies.

Figure 4. The importance of environmental psychology based on the literature reviewed in the present study.

The integration of EP with disciplines such as urban planning, education, and economics is a critical direction in the development of more effective interventions to improve human-environment interactions. For example, the integration of psychological principles into urban design, as emphasised by El-Didy et al. (2024), could alleviate issues such as congestion in densely populated areas, thereby enhancing the mental health and quality of life of residents. In educational environments, future research should investigate the systematic integration of active design approaches (Azeez et al., 2023) into learning environments to enhance physical, mental, and social well-being across various age groups and educational levels.

Additionally, sustainability initiatives could be enhanced by psychological interventions that are more precisely targeted, particularly in the context of fostering pro-environmental behaviours. Psychological factors, including perceived behavioural control and CO_2 framing, can significantly influence transportation and consumption decisions, as evidenced by research conducted by Jamaluddin et al. (2024) and Collet et al. (2023). Future research should investigate the potential of these psychological variables to be applied across various sectors to develop comprehensive strategies that address individual behaviours and systemic challenges, including government policies and green finance (Feng and Yang, 2023). Additionally, the utilisation of qualitative

research methodologies (Lloyd and Gifford, 2024) could provide more comprehensive insights into the underlying motivations for sustainable behaviour, thereby enabling the development of interventions that are more specifically tailored to the needs of the individual.

Finally, future endeavours should concentrate on comprehending how EP can improve long-term engagement, loyalty, and satisfaction in the context of volunteerism and event management. Research conducted by Chiu et al. (2023) and Alén-González et al. (2023) has demonstrated that well-managed environments and positive user experiences can substantially increase behavioural intentions. Culturing a more engaged and motivated volunteer base will be contingent upon understanding the function of personality and environmental design (Cho et al., 2024), as volunteerism becomes more deeply ingrained in educational and organisational frameworks. Furthermore, the integration of colour psychology and spatial layout, which have been demonstrated to influence well-being, into the design of volunteer programs, spaces, and events (Feng et al., 2024), could be expanded.

5. Conclusions

EP is pivotal in understanding and addressing the intricate relationship between humans and their environments. This review, encompassing research from 443 papers over six decades, highlights the field's evolution and contributions to human well-being, environmental sustainability, and urban planning. By examining how natural and built environments influence mental and physical health, EP provides valuable insights that can inform the design of spaces that promote well-being and resilience. The integration of green spaces in urban areas, incorporating natural elements in healthcare settings, and designing inclusive and conducive educational environments are some of the critical areas where EP has made significant contributions.

Moreover, the field's emphasis on understanding and mitigating environmental stressors, promoting pro-environmental behaviour, and fostering community engagement is crucial for achieving the UNSDGs. Environmental psychologists' work on climate change communication, responsible consumption, and the development of resilient communities underscores the importance of interdisciplinary collaboration and innovative approaches. As the challenges of environmental degradation and climate change continue to intensify, the insights provided by EP will be essential in developing effective strategies for creating sustainable and healthy environments, ultimately contributing to the well-being of individuals and communities worldwide in the future.

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