

Research Paper

## Sustainable Commuting and Well-Being: The Role of Environmental Identity among Cyclists and Mountain Bikers

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### ABSTRACT

The study aimed to investigate the relationship between environmental identity (EID) and overall well-being among athletes involved in Mountain Biking and Cycling. This research aims to understand how strongly an athlete's identification with environmental values (EID) influences their psychological well-being, particularly in the context of eco-friendly commuting. The study analyzed a sample of 30 international, national, and state-level athletes using correlational methods to explore this dynamic. The results indicate a significant positive correlation between Environmental Identity and overall well-being ( $r = 0.694$ ,  $p < 0.01$ ), suggesting that athletes with a stronger environmental identity tend to experience higher levels of well-being. Additionally, the study explores the relationship between commuting variables such as duration and distance with well-being, finding a significant negative correlation between commute duration and well-being ( $r = -0.377$ ,  $p < 0.05$ ). This implies that longer commutes are associated with lower well-being, potentially due to physical fatigue, stress, and reduced time for personal activities. However, no significant correlations were found between Environmental Identity and commuting duration or distance, indicating that the positive impact of Environmental Identity on well-being is not directly related to these commuting factors. These findings underscore the importance of fostering a strong environmental identity as a potential pathway to enhance well-being, particularly for athletes engaged in green commuting practices. The study concludes with recommendations for future research to further explore these relationships and to develop interventions aimed at improving well-being through enhanced environmental identity and sustainable commuting behaviors.

**Keywords:** *Well-Being, Environmental Identity, Commuting, Cyclists and Mountain Bikers*

**G**reen commuting refers to the use of environmentally friendly transportation methods, such as cycling, walking, or public transport, which reduce the reliance on traditional fuel-based vehicles. These eco-friendly modes of commuting not only lower carbon emissions but also contribute to sustainable urban development by reducing traffic congestion and improving air quality (Creutzig et al., 2015). With growing awareness

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of environmental degradation and climate change, green commuting has emerged as an essential approach to mitigating the negative impacts of traditional commuting, which significantly contributes to global greenhouse gas emissions (International Energy Agency, 2021). Encouraging the adoption of green commuting is essential in transitioning toward more sustainable and eco-friendly cities.

Today, there is a growing focus on integrating sports and nature into everyday life to improve both individual health and environmental sustainability. Governments, like in Europe, have begun promoting active transportation methods, such as cycling and running, by building infrastructure to support these activities (European Commission, 2021). Raising awareness and educating the public about the benefits of active transportation can encourage more people to adopt greener commuting habits (Transportation Research Board, 2020). Technological advancements, such as electric bikes, are making active transportation more convenient and accessible, blending physical exercise with the benefits of modern technology (The International Transport Forum, 2022). This helps people stay fit while reducing their carbon footprint, making sustainable transportation a practical choice for the future.

### ***Well-being***

Well-being is a comprehensive concept that encompasses various dimensions of physical, mental, and emotional health. According to the World Health Organization (1946), it is a complete state of physical, mental, and social health, not merely the absence of disease. Physical well-being includes aspects such as cardiovascular fitness, muscle strength, and overall bodily health, while mental and emotional well-being relate to factors like stress reduction, mood improvement, and psychological resilience (Diener et al., 2009). Economic resources significantly impact the quality of life, and freedom and growth are crucial to achieving well-being (Sen, 1999). Additionally, access to clean environments and healthy living conditions boosts environmental well-being (Haines & McMichael, 2008).

Commuting plays a critical role in shaping well-being, especially when it involves active forms of transportation like walking or cycling. These activities have been shown to improve both physical health and mental well-being (Pucher & Buehler, 2010). In addition to reducing stress levels and promoting a more active lifestyle, green commuting fosters a stronger connection between individuals and their natural environment, further enhancing their overall sense of well-being (Korpela et al., 2018). As urbanization continues to rise, adopting greener forms of commuting is not only a vital environmental strategy but also a means to improve individual and collective well-being.

The PERMA model, developed by Martin Seligman, outlines five core components essential for well-being: Positive Emotions, Engagement, Relationships, Meaning, and Accomplishment (Seligman, 2011). In sports psychology, this model offers valuable insights into enhancing both the mental health and performance of athletes. Positive emotions, such as joy and gratitude, help athletes build resilience and cope with stress, while engagement refers to the deep focus athletes experience during training or competition. Relationships, particularly with coaches and teammates, are crucial for social support. Meaning involves athletes finding purpose in their sport beyond winning, and accomplishment pertains to achieving personal goals that foster self-efficacy (Weinberg & Gould, 2019). The PERMA model helps athletes maintain a healthy balance between psychological well-being and high-level performance, supporting long-term success.

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### ***Cycling and Mountain Biking for Well-being***

Cycling is a popular activity that offers numerous benefits, including physical fitness, mental health, social connections, and practical movement. Physically, cycling strengthens the heart, supports muscle health, aids in weight management, improves bone density, and increases lifespan when done regularly (Pucher & Buehler, 2021). It enhances cardiovascular health, muscle strength, and flexibility while also promoting longevity. Mentally, cycling reduces stress, lowers symptoms of depression, and boosts mood by releasing endorphins, which contribute to an improved sense of well-being (Broman et al., 2013). Socially, group cycling helps foster social connections, strengthens community bonds, and promotes a sense of belonging (Gordon-Larsen et al., 2006). Additionally, cycling outdoors increases physical activity levels and reduces the risk of declining physical abilities over time (Morris et al., 2017).

Mountain biking, a specific form of cycling, offers similar benefits with an added emphasis on challenging terrains. It provides physical, mental, and emotional advantages, making it an excellent cardiovascular exercise that reduces the risk of heart disease and enhances respiratory endurance (Pucher & Buehler, 2010). The varied terrain in mountain biking strengthens both upper and lower body muscles and improves flexibility (Ainsworth et al., 2011). It also helps manage body weight by burning calories (Caspersen et al., 2000), while the weight-bearing aspect of mountain biking increases bone strength and lowers the risk of bone loss (Liu-Ambrose et al., 2011). Mentally, mountain biking reduces stress by lowering cortisol levels (Pretty et al., 2005), improves mood through the release of endorphins (Meyer et al., 2018), and sharpens focus and reaction time, enhancing cognitive function (Strohle, 2009). Emotionally, the challenges presented by mountain biking boost self-confidence and foster a sense of personal achievement (Schneider et al., 2011). Furthermore, mountain biking strengthens social bonds and emotional well-being (Boulangue et al., 2016), with riding in natural environments further enhancing emotional health and overall well-being (Barton & Pretty, 2010).

### ***Environmental Identity***

Environmental identity refers to an individual's sense of self in relation to the natural environment and the degree to which they perceive themselves as being interconnected with and responsible for the environment. This concept emphasizes how people perceive their role in protecting and preserving nature, and it influences their behaviours and attitudes towards environmental conservation (Clayton, 2003). Environmental identity is shaped by personal experiences with nature, cultural and societal influences, and participation in pro-environmental activities, such as recycling, conservation efforts, or choosing sustainable modes of transportation.

Engaging in green commuting, such as cycling, walking, or using public transport, reinforces and strengthens environmental identity. By opting for sustainable commuting practices, individuals actively reduce their carbon footprint, contributing to environmental preservation. This direct involvement in eco-friendly behaviors often leads to a deeper sense of responsibility toward nature, as individuals see tangible outcomes of their actions, such as reduced air pollution or lower energy consumption. According to research, environmentally friendly behaviors, such as commuting green, can help people feel more connected to their surroundings and foster a sense of pride in contributing to the health of the planet (Whitmarsh & O'Neill, 2010).

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In addition, green commuting can serve as a form of environmental advocacy. Commuters who actively choose to cycle or walk, instead of driving, often become visible symbols of sustainability, influencing others in their communities. This form of modelling behaviour encourages more individuals to adopt similar practices, thus strengthening collective environmental identity (Bamberg, 2013). Moreover, as green commuting integrates physical activity with environmental conservation, individuals benefit from enhanced well-being, which positively reinforces their connection to nature (Korpela et al., 2018). Environmental identity is a crucial aspect of how individuals perceive their relationship with the natural world, and engaging in green commuting serves as a way to solidify this identity. By reducing environmental impact and promoting sustainability, green commuting contributes not only to the individual's well-being but also to a broader sense of ecological responsibility.

The positive impact of environmental identity extends beyond environmental concerns, as it significantly influences both personal and collective well-being. People who participate in green commuting often experience a sense of pride and fulfilment from contributing to environmental protection, which enhances their personal well-being. This sense of accomplishment not only supports emotional health by reducing feelings of guilt or helplessness related to environmental degradation but also promotes psychological resilience by aligning daily actions with values of sustainability (Kals, Schumacher, & Montada, 1999). Moreover, these practices encourage collective well-being, as communities engaged in sustainable commuting efforts develop stronger social bonds and a shared commitment to environmental preservation, further reinforcing positive mental and emotional health on a societal level (Uzzell, Pol, & Badenas, 2002). This research seeks to explore the relationship between environmental identity, and well-being. By examining how different commuting how commuting duration and environmental identity, study aims to provide valuable insights that can guide urban planning and environmental policies. As cities continue to grow, understanding the benefits of green commuting can contribute to the development of sustainable urban environments that support both individual well-being and environmental health. Based and on the review of literature the study try to find out the relationship between environmental identity and wellbeing, relationship between commute duration and wellbeing and the impact on psychological well-being.

### ***Aim of the study***

The present study aims to examine the relationship between environmental identity and psychological well-being, to assess the association between commute duration and psychological well-being, and to investigate the combined impact of environmental identity and commute duration on the psychological well-being of commuters.

### ***Hypotheses of the study***

- H1: There is a significant positive relationship between environmental identity and psychological well-being among commuters.
- H2: There is a significant relationship between commute duration and psychological well-being.
- H3: Environmental identity and commute duration significantly predict psychological well-being.

## METHOD

This study is employed quantitative research design, including the Revised Environmental Identity Scale and the PERMA profiler. The sample inclusion criteria required participants to be athletes engaged in mountain biking or cycling, aged 18-35, with a minimum educational qualification of 10th standard. Data were collected through surveys, with additional information on socio-demographic factors, including commute distance, training duration, and time spent in nature. Descriptive and correlational analyses were performed to explore the relationships between environmental identity, well-being, and various extrinsic factors.

### *Participants*

The study involved 30 participants, consisting of cyclists and mountain bikers with a mean age of 25.13 years (SD = 5.02) and an average of 75.73 months (SD = 43.0) of cycling experience. Participants were selected using convenience sampling, with 23 completing online surveys and 7 participating in interviews. The research aimed to investigate the relationship between environmental identity and well-being using the PERMA well-being model.

### *Measures*

- **Revised Environmental Identity Scale (EID):** The Revised Environmental Identity Scale is a 14 item scale based on a 7 point likert scale. It measures the extent to which individuals perceive themselves as connected to nature. EID scores of 1-3 indicate lower environmental identity, 4 indicates neither low nor high, and 5-7 indicates high environmental identity. The construct validity of the scale was found to be optimum. (Olivos, 2011) The researchers found 5 underlying dimensions, environmental identity, enjoying nature, appreciation of nature, environmentalism, out of which one was redacted due to having a single item. The authors found that Environmental Identity Scale significantly correlates with Connectedness to Nature Scale (CNS), the Inclusion of Nature in Self (INS) scale, and the Eco-biocentrism scale. The cross-cultural validation of the revised version was assessed by Clayton et al. (2021), and proved strong internal consistency across all locations evaluated.
- **PERMA Profiler:** The PERMA profiler by Butler & Kern (2016) measures wellbeing in the contextual model by Seligman (2011) explaining 5 pillars of wellbeing. The measure consists of 23 items, and has been found that subjective wellbeing and PERMA factors show negligible discriminant validity, meaning both measures same type of wellbeing but with different facets. According to the study, average correlation of any two facets of wellbeing pointed at 0.61, which notes some distinction. There isn't much similarity, neither is disposable, it suggests that models that try to merge these facets together are significantly correlated to one another (Goodman, 2017).

### *Statistical analysis*

The collected data was analyzed using correlation of the variables of PERMA and Revised Environmental Identity. The PERMA profiler factor for overall wellbeing and happiness was considered, where the mean of all the scores of the different factors were amassed and interpreted. The extrinsic variable, time spent in natural environment, commute distance, commute duration and training distance, training duration, along with educational qualification, experience (covered to months), access to vehicle apart from bicycle, level of participation were also considered and correlated.

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### *Ethical consideration*

Ethical approval was not required for this study as it did not involve any invasive procedures or sensitive data collection. All participants took part voluntarily, provided informed consent, and were assured of confidentiality and the right to withdraw from the study at any stage.

## **RESULTS**

**Table 1: Profile of survey respondents**

		Frequency	Percentage (%)
Gender	Male	2	6.7
	Female	28	93.3
Education	10th Pass	2	6.7
	12th Pass	5	16.7
	Post graduate	7	23.3
	Undergraduate	16	53.3
Sport	Cycling	9	30.0
	Mountain Biking	20	66.7
	Tracklocross	1	3.3
	International	12	40.0
	Nationals	12	40.0
Mode of transport to reach practise	State	6	20.0
	Cycle	21	70.0
	Private vehicle	9	30.0

### *Participant Details*

A total of 30 participants were included in the study, comprising 28 females (93.3%) and 2 males (6.7%). Regarding educational qualifications, 2 participants (6.7%) had completed their 10th grade, 5 (16.7%) had passed 12th grade, 16 (53.3%) were undergraduates, and 7 (23.3%) had completed postgraduate studies. Participants were involved in three types of sports: Mountain Biking, Cycling, and Tracklocross. Most of the participants (66.7%, n = 20) were engaged in mountain biking, followed by cycling (30.0%, n = 9), and one participant (3.3%) participated in Tracklocross. In terms of competitive level, 12 participants (40%) had competed at the international level, 12 (40%) at the national level, and 6 (20%) at the state level. The majority of participants (70.0%, n = 21) used cycles as their mode of transport to reach practice sessions, while 9 participants (30.0%) relied on private vehicles. This distribution highlights the diverse educational backgrounds, competitive levels, and modes of transportation used by the athletes, which may influence various aspects of their environmental identity and well-being.

**Table II Correlation coefficients between study variables**

	EID	Well Being	Commute Duration
EID	1		
Well Being	.694**	1	
Commute Duration	-.089	-.377*	1

\*\**. Correlation is significant at the 0.01 level (2-tailed).*

\**. Correlation is significant at the 0.05 level (2-tailed).*

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The study aimed to examine the relationship between Environmental Identity (EI) and well-being, operationalized using the PERMA model (Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment). A sample of 30 participants, primarily athletes, was analyzed for this purpose. The descriptive statistics revealed a mean EI score of 5.74 (SD = 1.65) and a mean PERMA score of 6.52 (SD = 2.37). A Pearson correlation was conducted to examine the strength and direction of the relationship between EI and well-being. The results indicated a significant positive correlation between EI and PERMA,  $r(30) = .694, p < .001$ . This suggests that individuals with higher levels of Environmental Identity tend to report higher levels of well-being as defined by the PERMA model (Seligman, 2011). The correlation coefficient of .694 demonstrates a moderately strong association, highlighting the potential impact of environmental identity on well-being outcomes.

The correlation analysis examined the relationship between commute duration, environmental identity (EID) score, and well-being score among the participants (N = 30). The results revealed a weak, negative correlation between commute duration and EID score ( $r = -.089, p = .640$ ), indicating that longer commutes did not significantly impact participants' environmental identity. Additionally, a significant, moderate negative correlation was found between commute duration and overall well-being score ( $r = -.377, p = .040$ ), suggesting that longer commute durations were associated with lower levels of overall well-being. These findings align with previous research suggesting that prolonged commuting can have detrimental effects on mental well-being (Chatterjee et al., 2020).

**Table III Linear Regression Analysis between Environmental Identity (EID) and Well-Being (WB)**

Variable	B	Std. Error	$\beta$	t	$\Delta R^2$	Sig
EID WB	.997	.196	.694	5.095	.463	.000

The results of the regression analysis indicate a significant positive relationship between environmental identity and psychological well-being ( $\beta = .694, p < .001$ ). The unstandardized beta coefficient ( $\beta = .997$ ) suggests that a one-unit increase in environmental identity results in a .997 unit increase in psychological well-being, controlling for other factors. The model explains 46.3% of the variance in psychological well-being ( $\Delta R^2 = .463$ ), demonstrating that environmental identity is a substantial predictor of well-being. The t-value ( $t = 5.095$ ) also supports the significance of this relationship.

### DISCUSSION

The findings of this study (Table II) align with previous research, which suggests a strong link between one's connection to nature or environmental identity and their psychological well-being (Clayton, 2003; Mayer & Frantz, 2004). The positive correlation between EI and well-being, particularly with the PERMA model, supports the notion that an individual's environmental orientation can serve as a resource for enhanced psychological functioning (Seligman, 2011). This reflects the broader literature, where connections with nature have been associated with positive emotions, meaning, and accomplishment (Capaldi et al., 2015). This result is consistent with Capaldi et al.'s (2015) findings that nature connectedness fosters positive emotions and a sense of life satisfaction. Furthermore, the significant positive correlation indicates that environmental identity may play a key role in shaping not only sustainable commuting behaviors but also personal well-being.

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Table III explore the potential psychological impacts of commute duration on environmental identity and overall well-being. The findings show that while commute duration does not appear to significantly influence environmental identity, it does have a significant negative relationship with overall well-being. This is consistent with prior studies, such as Chatterjee et al. (2020), which have identified commuting as a stressor that can detract from quality of life.

There is a significant negative correlation between commute duration and overall well-being could be attributed to the stress, fatigue, and time loss commonly associated with long commutes (De Vos, 2019). In urban environments, extended commute times may result in reduced opportunities for physical activity, social interaction, and engagement in recreational activities, which are known to enhance well-being (Martin et al., 2014). Moreover, the lack of a significant correlation between commute duration and environmental identity suggests that factors influencing one's environmental consciousness may be more complex and not necessarily tied to daily routines like commuting. These findings contribute to the growing body of literature on commuting and mental health, emphasizing the need for city planners and policymakers to consider the psychological costs of long commute times when designing sustainable and liveable urban spaces (Chatterjee et al., 2020; De Vos, 2019).

Table III demonstrates a significant impact of environmental identity on psychological well-being, aligning with previous research on the psychological benefits of identifying with nature and environmentally conscious behaviors (Clayton, 2018). The finding that environmental identity explains 46.3% of the variance in well-being suggests that individuals who strongly identify with the environment experience higher levels of psychological well-being, potentially due to increased feelings of purpose, connectedness, and reduced stress levels associated with nature exposure (Mayer & Frantz, 2004).

This study's findings echo previous work by Nisbet, Zelenski, and Murphy (2011), who found that environmental identity plays a crucial role in enhancing personal well-being through emotional and psychological benefits derived from nature engagement. These results underscore the importance of fostering environmental identity in promoting well-being, particularly for individuals whose lifestyles or professional responsibilities involve environmental interactions, such as athletes, outdoor professionals, and environmental activists. Additionally, the significant relationship between environmental identity and well-being suggests that interventions designed to strengthen environmental identity could be effective in improving mental health outcomes (Korpela, 2012).

In line with the conservation of resources theory (Hobfoll, 1989), the strong association between environmental identity and psychological well-being may be attributed to the psychological resources gained from a connection with nature. This connection provides emotional stability, reduces anxiety, and enhances overall life satisfaction, as shown in the present findings. Future research could explore whether these results extend to other populations and contexts, as well as investigate the potential for environmental identity to act as a protective factor against mental health issues. The implications of these findings are critical for the development of interventions aimed at improving well-being through environmental engagement. Incorporating green commuting strategies can serve a dual purpose: promoting eco-friendly habits while enhancing individuals' psychological well-being. Given that the participants were athletes, future research should explore if similar

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results would be found in broader populations with varying levels of environmental identity and commuting behavior. This would extend the findings beyond the athletic context, ensuring greater applicability and generalization.

### CONCLUSION

The findings of this study highlight the significant role of Environmental Identity (EI) in predicting psychological well-being, as measured by the PERMA model. A strong positive correlation between EI and well-being suggests that individuals who have a deep connection with nature experience enhanced well-being, reinforcing the importance of fostering environmental consciousness. Additionally, the study identified a significant negative relationship between commute duration and well-being, which indicates that longer commute times may detract from overall mental health. However, commute duration did not significantly impact Environmental Identity. The study explored environmental identity has a positive impact on psychological well-being. These results underscore the psychological benefits of promoting green and nature-connected lifestyles, particularly for athletes and other individuals who frequently engage with natural environments.

However, several limitations should be acknowledged. The small sample size of 30 participants, combined with the use of convenience sampling, may limit the generalizability of the findings. Additionally, the reliance on self-reported measures introduces potential biases, and the demographic homogeneity of the sample restricts the diversity of experiences captured. The cross-sectional design limits causal inferences, and the focus on specific activities may not reflect the experiences of a broader population. Furthermore, the absence of longitudinal data constrains our understanding of how EI and well-being may evolve over time.

Future research should aim to address these limitations by employing larger and more diverse samples, utilizing longitudinal designs, and exploring the impacts of EI in various contexts and populations. Investigating additional factors that may influence the relationship between EI and well-being, such as cultural and socio-economic variables, will also enhance our understanding. Integrating environmental engagement into well-being interventions could be a fruitful avenue for future studies, providing insights into practical applications for enhancing mental health. Ultimately, the implications for urban planners and policymakers remain significant: efforts to reduce commute times and promote environmental identity can contribute to both sustainable living and improved psychological well-being.

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