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How does ethical climate attract employees' low-carbon behaviour? The role of environmental passion and green mindfulness

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Abstract

This study employs social cognitive theory to examine the dynamics of ethical climate, environmental passion, and low-carbon behaviours among Malaysian public servants based on data from 407 employees across 37 departments. Although ethical climate did not have a direct impact on low-carbon behaviour, a significant association with environmental passion was observed. Additionally, environmental passion exhibited a noteworthy relationship with low-carbon behaviour, and emerged as a mediator between ethical climate and low-carbon behaviour, with green mindfulness moderating this relationship. These findings underscore the importance of nurturing environmental passion and green mindfulness to promote low-carbon behaviour among employees and aid organisations in addressing environmental challenges. By addressing these empirical gaps, this study contributes to the literature on low-carbon behaviour and offers both theoretical insights and practical implications for sustainability initiatives.

Keywords: ethical climate; low-carbon behaviour; environmental passion; green mindfulness; multilevel analysis

Introduction

Environmental issues, such as climate change, carbon dioxide emissions, waste management, resource and water conservation, biodiversity protection, and ecosystem services, remain significant challenges. According to the International Energy Agency (IEA) (2022), global carbon emissions from energy reached approximately 36.3 billion tonnes in 2021. Consequently, various programmes, including Industry 4.0, Sustainable Development Goals 13, and initiatives by the United Nations Environment Programs, have been proposed to address and curb carbon emissions. Industrial development and individual behaviour are the main contributors to escalating carbon emissions, with research indicating that individual daily activities account for 80% of global emissions (Bin & Dowlatabadi, 2005; Xia, Liu, Han, Gao, & Lan, 2022).

Malaysia's primary source of carbon dioxide emissions is combustion engine cars (Khazaei & Tareq, 2021). However, pandemic-related restrictions and social distancing protocols have led to a significant decrease in emissions (Anjum, 2020), prompting organisations to increasingly adopt environmental management systems and green initiatives to mitigate their environmental impacts (Osuntuyi & Lean, 2022). This trend underscores the growing responsibility of public organisations to integrate environmental concerns into public administration, ultimately promoting sustainable development.

Encouraging public sector employees to implement environmental policies presents a critical challenge. Every public sector organisation must inspire its employees to act in an environmentally responsible manner, thereby reducing the organisation's environmental footprint and advancing sustainability goals. Therefore, the public sector should adopt a risk-taking, proactive, and innovative approach to achieve extraordinary results (Kamil, Robert, & Rahman, 2022). With mounting environmental pressure and the urgent need to reduce carbon emissions, it is necessary to increase knowledge of low-carbon behaviour (Huang et al., 2020).

Embracing carbon consciousness drives cost savings and operational efficiency within organisations thus holding significant importance for public entities. Demonstrating environmental leadership is crucial to fostering trust and confidence among employees and encouraging the adoption of low-carbon behaviours. Public sector organisations play a significant role in shaping environmental policies and ensuring compliance. To achieve sustainable outcomes, employee participation and ownership of carbon reduction initiatives through engagement programmes and innovation platforms is paramount. Organisations can foster innovation and a shared commitment to reducing carbon emissions in the workplace by facilitating a space for idea exchange. Thus, organisations must practice environmental protection through eco-friendly activities that lower carbon emissions.

Low-carbon behaviour is an ecological behaviour that describes the range of human acts influenced by their aspirations to protect the environment. The term *low-carbon behaviour* refers to '*a person's actions in reducing energy consumption, such as turning off the switch when not in use, using energy-efficient appliances, setting the temperature of conditioner below 24 degrees Celsius, and other related behaviours*' (Whitmarsh, Seyfang, & O'Neill, 2011). The ethical climate must be discussed to address how employees behave appropriately because individual behaviour is more easily impacted by the psychological climate in the workplace. The ethical climate is considered '*the perceptual lens through which employees diagnose and evaluate situations*' (Parboteeah & Cullen, 2003). To foster low-carbon behaviour among employees, organisations must focus on creating a suitable ethical climate to address environmental issues in the workplace (Kim & Miller, 2008). Therefore, the relationship between ethical climate and low-carbon behaviour must be investigated. However, it remains unclear whether ethical climate significantly affects the low-carbon behaviour of employees and how and when this effect takes place.

Our study, guided by the social cognitive theory (Bandura, 2000), explores how an ethical climate in the workplace influences employees' adoption of low-carbon behaviour. The social cognitive theory elucidates how individuals derive self-beliefs from their social environment and establish internal standards of behaviour to regulate their actions. Thus, organisations fostering a high ethical climate are posited to shape employees' internal moral cognition and individual engagement in specific behaviour, such as low-carbon behaviour (Martin et al., 2014).

Previous research on low-carbon behaviour has primarily focused on various aspects such as low-carbon behaviour awareness among households (Büchs et al., 2018; Neo, Choong & Ahamad, 2017), low-carbon tourism (Wang, Gan, Ou, & Liu, 2019), low-carbon communities and society (Kaffashi & Shamsudin, 2019; Moser & Kleinhückelkotten, 2018), and low-carbon technology (Curtin, McInerney, & Gallachóir, 2017). However, there remains a significant gap in understanding individual-level behaviours within organisational settings. The focus on low-carbon behaviour at the individual level has been minimal, with limited attention paid to how organisational factors such as ethical climate influence such behaviours. While studies have investigated the impact of leadership on low-carbon behaviour (Xia et al., 2022), research regarding the role of ethical climate in shaping individual low-carbon behaviour is still in its early stages. Moreover, there is a scarcity of studies investigating low-carbon behaviour in the context of individuals working within organisations, necessitating additional research in this field. This academic gap gave rise to our interest in considering the possible relationship between the use of ethical climate in an organisation and sustainability in encouraging employees' low-carbon behaviour. This study delves into exploring the potential influence of employee behaviour on sustainability initiatives, thereby enhancing our understanding of how organisational factors shape employees' low-carbon behaviours in the workplace.

We also introduce the concept of environmental passion, which refers to employees' positive emotions towards promoting low-carbon behaviour. Factors such as cognitive perception, emotional inference, and well-being influence this passion, all of which an ethical climate workplace fosters. Despite its significance, we believe that organisations have overlooked environmental passion among employees. An ethical climate can encourage public servants, who are crucial in delivering public services, to adopt low-carbon behaviour. Hence, we advocate that environmental passion acts as a pivotal mediator, elucidating how ethical climates catalyse employees' adoption of low-carbon behaviour, an area that remains underexplored in current research.

We also introduced green mindfulness as a crucial moderator to deepen our understanding of how environmental passion influences low-carbon behaviour. Green mindfulness encompasses various aspects of environmental awareness such as sensitivity and proactive engagement in eco-friendly actions among employees. Positive emotions further strengthen mindfulness, particularly in the public sector, where commitment to sustainability drives proactive behaviour. Despite limited prior research, we see the exploration of green mindfulness as pivotal, given its potential to shape low-carbon behaviours within organisations. Considering the increasing importance of environmental sustainability, investigating the moderating role of green mindfulness can yield valuable insights into fostering low-carbon behaviour among employees.

In a nutshell, the purpose of this study is to deepen our understanding of how an organisation's ethical climate affects its employees' low-carbon behaviour. This study contributes to the literature in three ways. First, our research offers fresh perspectives on how ethical climate and low-carbon behaviour relate to one another. The second contribution of our research is the inclusion of environmental passion as a mediator between ethical climate and low-carbon behaviour. Third, we included green mindfulness as a moderator of employees' environmental passion and low-carbon behaviour. A multilevel design was used to empirically test the research hypothesis that was developed for this study.

This paper is structured to provide a comprehensive exploration of our research. We begin with a review of relevant literature and develop hypotheses to frame our study. Next, we outline the methodology employed in our research and present the results of our analysis. Subsequently, we discuss these findings, highlighting their theoretical implications and practical significance. Our study rounds off each section with a conclusion, summarising the key insights. Finally, we acknowledge the limitations of our research and suggest avenues for future investigation to further enrich our understanding of the topic.

Literature review and hypotheses

Theoretical background

Drawing from the social cognitive theory, our study aligns with Bandura's (2000) concept of reciprocal causation, which posits that individual beliefs underpin behavioural judgements influenced by personal and contextual factors (Wood & Bandura, 1989). This theory suggests that behaviours, individual characteristics, and environmental stimuli interact within organisational settings, and personal factors interact with environmental cues to shape behaviour. According to Schwarzer and Luszczynska (2005), an individual's thoughts significantly influence their behaviour while executing tasks assigned by an organisation.

The social cognitive theory offers valuable insights into interpreting the relationship between ethical climate and low-carbon behaviour. Organisations with a robust ethical climate are inclined to encourage employees to engage in low-carbon behaviour (Bandura, 2000). By nurturing a moral environment that emphasises environmental stewardship, organisations can shape the attitudes and actions of employees towards sustainability, consequently diminishing harmful emissions. A positive ethical climate serves as a model for employees to shape their beliefs and attitudes towards environmental sustainability. According to social cognitive behaviour (Bandura, 2000), this modelling process can lead to the development of personal factors, such as a strong sense of environmental

passion and mindfulness, which promote low-carbon behaviour. Therefore, by promoting an ethical climate that emphasises environmental accountability, organisations can motivate and empower employees to embrace and uphold low-carbon behaviours, thus playing a pivotal role in advancing sustainability initiatives overall.

A conceptualisation of low-carbon behaviour

Low-carbon behaviour has received significant attention from researchers (Bai & Liu, 2013; Wang, Su, Sun, Zhou, & Zhou, 2015; Wang, Zhang, Yin, & Zhang, 2011). Prior studies initially investigated organisational citizenship behaviour (Anwar et al., 2020; Yin, Ma, Gong, Chen, & Zhang, 2021), green behaviour (Fawehinmi, Yusliza, Ogbeibu, Tanveer, & Chiappetta Jabbour, 2022; Kamil, Nordin, & Matsat, 2024), ecological behaviour (Farooq et al., 2021), and pro-environmental behaviour (Colombo et al., 2023), before shifting their focus to analysing low-carbon behaviour. Low-carbon behaviour involves employees adopting eco-friendly habits in their daily lives to help reduce carbon emissions and protect the environment (Zhang et al., 2022). Conceptualised low-carbon behaviour is a low-carbon lifestyle that reduces energy consumption and carbon emissions (Wei, Chen, & Long, 2016). It also refers to voluntary actions taken by individuals to protect the environment (Boiral, Paillé, & Raineri, 2015).

Low-carbon behaviour is a major determinant in shaping human behaviour towards the environment and is a prerequisite for coping with environmental disasters (Klöckner, 2013). Such behaviours can be classified into four categories: practising energy conservation, taking public transportation, buying green-themed products, and other low-carbon behaviours (Moloney, Horne, & Fien, 2010). These categories of low-carbon behaviour change the status quo as activism for the environment (Wiernik, Ones, & Dilchert, 2013).

Low-carbon behaviour can also be practised among employees in the workplace, as described by Bissing-Olson, Iyer, Fielding, and Zacher (2013). Therefore, predicting low-carbon behaviour has a substantial impact on understanding behavioural performance patterns as it acts as a guide in decision-making (Ingwersen, Garmestani, Gonzalez & Templeton, 2014). This means that employees can incorporate environmentally friendly behaviours into their daily routines while accomplishing their required tasks at the workplace, and they can also aggressively participate in larger environmentally friendly improvements in their organisation's policies and procedures (Pichel, 2008).

Ethical climate and low-carbon behaviour

Ethical climate has been the focus of scholarly enquiry for over four decades, consistently emerging as a pivotal predictor of organisational behaviours (Schneider, 1975). Defined as employees' shared perceptions of vertically correct behaviour and the handling of ethical issues within an organisation (Victor & Cullen, 1988), ethical climate is influenced by various factors such as organisational environment, structure, and developmental history. The determinants of an organisation's ethical climate span multiple perspectives, including departmental dynamics, organisational culture, industry context, and community concerns (Bourne & Snead, 1999).

Ethical practices extend beyond mere compliance with legal standards in order to align with the underlying ethical ideas of the community (Valentine, Godkin, Fleischman, Kidwell, & Page, 2011). The organisational behaviour system, shaped by employees' perceptions of organisational signals and behaviours, profoundly impacts ethical decision-making processes (Martin & Cullen, 2006). Studies examining intra-organisational aspects of ethical environments highlight the need to consider structural elements when shaping organisational climates (Ford & Richardson, 1994).

Drawing from earlier studies that demonstrate the positive impact of an ethical climate on job satisfaction, turnover intention, and ethical behaviour (Brown & Peterson, 1993; Ferrell & Skinner, 1988; Schwepker, 2001; Weeks & Nantel, 1992) as well as the correlation between organisational ethical

climate and employee behaviours (Tsai & Huang, 2008), this study explores how ethical climate shapes employees' low-carbon behaviour.

In an ethical climate that fosters trust, predictability, and accountability towards all elements of the organisational ecosystem (Rahimiaghdam & Niroumand, 2021), employees are more likely to engage in environmentally responsible actions, which is crucial in promoting low-carbon behaviour. According to the social cognitive theory, ethical climate influences individuals' behaviour regulation through ongoing assessment, comparing personal standards with environmental cues (Bandura, 1986). Domino et al. (2015) also showed that individuals tend to enhance their behaviour based on prevailing ethical climates, regardless of whether it is perceived as 'good' or 'bad'. Therefore, we assume that

Hypothesis 1: Ethical climate is positively related to low-carbon behaviour.

Ethical climate and environmental passion

The significance of ethical climate lies in its role in fostering environmental passion among employees. According to Valentine et al. (2011), employees' environmental passion contributes to environmental preservation by aligning with the legal standards of conduct established in ethical climates. Vallerand et al. (2003) indicate that employees are more likely to embrace an ethical climate when they feel pleased, inspired, and energised. Martin and Cullen (2006) argued that these norms can influence organisational behavioural systems, specifically organisational signals and ethical decision-making among employees. The social cognitive theory suggests that the intricate interplay between environmental influences, such as climate, and individual factors, such as positive emotions, shapes the dynamics of moral reasoning and its impact on moral conduct. This perspective, rooted in the interactionist approach, posits that understanding how these elements converge is crucial for unravelling the complexities of human behaviour (Bandura, 1986). We found no studies indicating that employees' environmental passion drives their increase in low-carbon behaviour. However, we believe that environmental passion can assist in developing low-carbon behaviours. According to Valentine et al. (2011), an ethical climate is one of the antecedents of employee behaviour that can improve the overall nature of the workplace, particularly when it comes to minimising climate change. Therefore, we propose a link between an ethical climate and environmental passion by examining the following hypotheses:

Hypothesis 2: An ethical climate is positively related to environmental passion.

Environmental passion and low-carbon behaviour

Robertson and Barling (2013) describe environmental passion as '*a positive emotion that results in an individual wanting to engage in pro-environmental behaviours*'. We posit that this definition can foster positive emotional responses among employees, thus influencing their adoption of low-carbon behaviour within an organisation. Environmental passion is pivotal in driving substantial organisational change, catalysing inspiring actions that promote environmental preservation. Social cognitive theory is instrumental in fostering individuals' positive emotive emotions, thereby enhancing their learning, knowledge, and experience to cultivate low-carbon behaviour. In the workplace environment, individuals acquire behaviours and cognitive strategies by observing the actions of colleagues, peers, and leaders (Green & Peil, 2015), in turn shaping their attitudes and behaviours towards sustainability. Therefore, an individual's involvement in various environmental issues can form the basis of their commitment to change (Vidyapeetham, 2019).

Therefore, there is a plethora of studies on environmental passion as a vital influence on low-carbon behaviour among employees. Environmental passion is a positive emotion that expresses

an individual's desire to engage in constructive environmental practices (Akhshik, Ozturen, & Rezapouraghdam, 2021). Passionate employees about the environment will exhibit positive emotions towards engaging in low-carbon behaviour. Additionally, employees with experience in contributing to environmental conservation will feel inspired, display positive emotions, and show enthusiasm for environmental efforts. This behaviour earns them the description of having environmental passion. This situation demonstrates their confidence in prioritising their interest in low-carbon behaviour (Vallerand et al., 2003, 2007). Environmental passion is a significant predictor of low-carbon behaviour in empirical studies. An earlier study by Afsar et al. (2016) on Thai software and banking employees demonstrated that environmental passion is a comprehensive construct that covers the assessment of activities and the desire for low-carbon behaviour. A study involving 431 employees from the manufacturing sector (Yin et al., 2021) also revealed a relationship between environmental passion and low-carbon behaviour. Based on the discussion above, we propose the following hypothesis:

Hypothesis 3: Environmental passion is positively related to low-carbon behaviour.
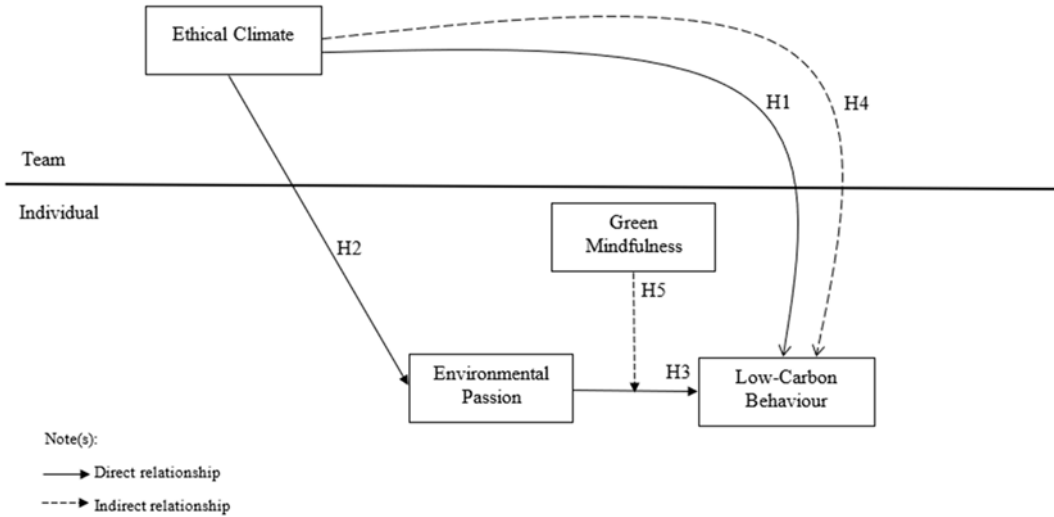
Environmental passion as a mediator

An ethical climate significantly influences employees' low-carbon behaviour by impacting their environmental passion. As employees share similar views on what constitutes appropriate behaviour in reducing carbon emissions and how to address ethical concerns, they feel better (Robertson & Barling, 2013; Victor & Cullen, 1988). Organisational environmental management policies predict and strongly influence low-carbon behaviour, which is a significant emotional experience related to the environment (Yin et al., 2021). The social cognitive theory posits that incorporating green standards into organisational ethics not only boosts employee passion but also offers increased opportunities for practising environmentally friendly behaviour, ultimately leading to enhanced organisational performance. Individuals are motivated to engage in environmental activities that align with their interests when their psychological state ignites passion within them (Vallerand et al., 2007). Therefore, we believe that employees' environmental passion motivates them to act in ways that are advantageous to the environment, such as adopting low-carbon behaviour. However, there is currently a lack of studies demonstrating the mediation of environmental passion by ethical climate in influencing low-carbon behaviour. Based on the reasons mentioned above, we propose that environmental passion might serve a significant mediating role in establishing an ethical climate at the organisational level that encourages employees' low-carbon behaviour, with the following hypothesis:

Hypothesis 4: Environmental passion mediates the relationship between ethical climate and low-carbon behaviour.

The moderating role of green mindfulness

Mindfulness has gained prominence in the Western literature for its potential as a preventative measure against irresponsible human behaviour (Geiger, Grossman, & Schrader, 2019). As environmental consciousness grows, there is heightened interest in influencing low-carbon behaviour (Barbaro & Pickett, 2016). This shift in awareness highlights the importance of green mindfulness, which aims to improve employees' dedication to low-carbon practices, and underscores the intrinsic value of environmental stewardship. Defined as 'a state of conscious awareness', green mindfulness empowers individuals to grasp both the context and the content of environmental information and knowledge (Chen, Chang, Yeh, & Cheng, 2015).

In the realm of environmental psychology, Dharmesti, Merrilees, and Winata (2020) illuminate the concept of green mindfulness as a catalyst for enhancing environmental behaviour, echoing the sentiments of Kalyar, Ali, and Shafique (2021), who underscore the profound emotional connection

Figure 1. Research framework.

and environmental passion exhibited by mindful employees. According to the social cognitive theory (Bandura, 1997), green mindfulness signifies employees' confidence in recognising opportunities to engage in low-carbon behaviour, leading to positive environmental outcomes. Previous studies have consistently highlighted the substantial relationship between environmental passion, green mindfulness, and low-carbon behaviour (Amemiya & Sakairi, 2019; Panno et al., 2018; St-Louis, Verner-Filion, Bergeron, & Vallerand, 2018; Yin et al., 2021). However, a notable gap exists in understanding how green mindfulness moderates the relationship between environmental passion and low-carbon behaviour. Therefore, we propose that cultivating green mindfulness may not only elevate positive emotions but also have a tangible impact on the uptake of low-carbon behaviours, prompting the formulation of hypotheses to further explore this connection:

Hypothesis 5: Green mindfulness moderates the relationship between environmental passion and low-carbon behaviour.

The proposed research framework is illustrated in Fig. 1.

Method

Sample and procedure

This study used a cross-sectional multilevel design, engaging a sample of 407 public servants across 37 departments within the Malaysian public sector, with one department per organisation. Data collection was conducted between October 2022 and January 2023, adhering to the requirements of a multilevel study as outlined by Maas and Hox (2005), which necessitates a minimum of 30 groups and 5 group sizes for robust analysis. This timeframe was selected to maintain the integrity and validity of the data-collection process within the specified parameters. Furthermore, Maas and Hox (2005) describe multilevel research that examines how individuals interact within their social context, how their social group or organisation influences them, and how a group is affected by its members. A common challenge in multilevel research is the disparity in the sample size between the individual and team levels. Three conditions – number of groups, group size, and intraclass correlation (ICC) – are typically used to define multilevel studies, with variations such as number of groups = 30, 50, 100; group size = 5, 30, 50; and ICC = 0.1, 0.2, 0.3.

The public sector's proactive stance in promoting low-carbon behaviour, esteemed above the private sector (Blok, Wesselink, Studynka, & Kemp, 2015), inspired our decision to select it as our research sample. Therefore, we adopted purposive sampling to target Malaysian public servants. This sampling was chosen based on prior findings indicating low response rates and cost inefficiencies associated with simple random sampling for such designs (Snijders & Bosker, 2012). By focusing on this approach, we aimed to ensure a more targeted and effective investigation into the behaviours and attitudes of public servants regarding sustainability initiatives.

We approached Directors in the Management Services Divisions in each public sector to undertake research in their organisations using a combination of snowball approaches and professional connections. Thirty-seven of the fifty-five organisations notified (with a response rate of 67%) agreed to participate. In general, the majority of participants in the current study were male (77.6%), aged between 31 and 40 years (46.7%), Malay (90.7%), had a range of educational backgrounds (secondary school 59%; diploma, 7.9%; bachelor's degree, 18.2%; master's degree, 15%), and had a total work experience of 1–10 years (68.1%), 11–20 years (23.3%), 21–30 years (7.9%), and more than 30 years (0.7%).

Measures

The initial construction of each item in this study was conducted in English. Following the common back-translation method (Brislin, 1970), we developed Malay versions of all items. The first translator translated the original English version into Malay. This version was then translated back into English by a second translator who was not seen in the original version to ensure that the meanings of the words were the same. The two translators are Malaysian citizens who speak both Malay and English fluently, and their expertise is in management.

Ethical climate

Ethical climate was assessed using 14 items designed by Victor and Cullen (1988). The phrases '*The most important concern is the good of all the employees in the organisation as a whole*' and '*In this organisation, employees are expected to comply with the law and professional standards over and above other considerations*' are examples of a statement. For this scale, the Cronbach's α ranges between 0.50 and 0.81.

Environmental passion

Robertson and Barling (2013) established 10 items, which were to develop the environmental passion in this study. An example statement is '*I am passionate about the environment*', and '*I passionately encourage others to be more environmentally responsible*'. This scale has a Cronbach's α of .87.

Green mindfulness

The six items created by Williams and Seaman (2010) were used to measure green mindfulness. '*I feel free to discuss environmental issues and problems*' and '*I am encouraged to express different views with respect to environmental issues and problems*', which are the statements for this measure. The degree of reliability for green mindfulness was .93.

Low-carbon behaviour

A 5-item scale was used to assess low-carbon behaviour (Bai & Liu, 2013). '*I encourage family and friends to save energy and resources*' and '*I encourage discuss low-carbon issues with my family and friends*', are the sample items for this measure. The reliability for the scale was .81.

All the aforementioned items were scored on a scale from 1 (strongly disagree) to 5 (strongly agree).

Control variables

We considered age, gender, and overall work experience in our analysis because these factors could influence low-carbon behaviour.

Aggregation procedures

We evaluated the evidence for inter-rater agreement within groups to determine whether the ethical climate was appropriate for aggregation. To determine an appropriate level of agreement within the organisation, we used the mean r_{wg} and a value of >0.90 was considered appropriate (LeBreton & Senter, 2008; Mathieu, Maynard, Taylor, Gilson, & Ruddy, 2007). We discovered a significant F value using one-way random effects ANOVA, $F_{(III)} = 1.78$, $p < .01$. This provides more evidence that there are differences between organisations in terms of ethical climate. The ICC (1) intraclass coefficient, which measures the variance in ethical climate between groups, was 0.07, demonstrating that 7% of the variance in ethical climate might be attributed to random team effects. Based on previous studies, between-group variation is sufficient for exploration at ICC values between 0.05 and 0.20 (Bliese, 2000; Peugh, 2010). It is preferable to aggregate ethical climate measures to the organisational level using the mean r_{wg}, F-value, and ICC (1) values.

Hypothesis testing

We used hierarchical linear modelling (HLM version 7) to evaluate all the hypotheses because the data for this study are multilevel (individuals are nested inside teams) (Raudenbush, Bryk, Cheong, Congdon, & Du Toit, 2011). First, we tested the null model to confirm the degree of group variance in the measurements for the mediator and moderator (Model 1, Tables 2 and 3). We explored Level 2, representing aggregate team data, and Level 1, representing individual data. We followed the steps suggested by Mathieu and Taylor (2007) to investigate the hypothesis of the cross-level effects from Level 2 (team) to Level 1 (individual). First, we tested Hypothesis 1, which states that an ethical climate is associated with low-carbon behaviour. We regressed lower-level low-carbon behaviour onto upper-level ethical climate using the following equation:

$$\text{Low} - \text{carbon behaviour} = \beta_0 + r$$

$$\beta_0 = \Upsilon_{00} + \Upsilon_{01}\,(\text{Ethical climate}) \ + u_0$$

We tested Hypothesis 2 by asserting that ethical climate is related to environmental passion by regressing lower-level environmental passion on upper-level ethical climate, using the following equation:

$$\text{Environmental passion} = \beta_0 + \ r$$

$$\beta_0 = \Upsilon_{00} + \Upsilon_{01}\,(\text{Ethical climate}) \ + u_0$$

For the lower-level direct effect (Hypothesis 3), we tested environmental passion in relation to low-carbon behaviour, using the following HLM equation:

Low-carbon behaviour $= \beta_0 + \beta_1(\text{Environmental passion}) + r$

$$\beta_0 = \Upsilon_{00} + \ u_0$$

$$\beta_0 = \Upsilon_{01} + \ u_0$$

Table 1. Means, standard deviations, Cronbach's α and correlations ($n = 407$)

Variables	M	SD	1	2	3	4	5	6	7
1 Age	2.23	.82							
2 Gender	1.22	.42	−.04						
3 Overall work experience	1.41	.67	.51***	.22***					
4 Ethical climate	3.31	.50	−.05	1.12*	−.10*	(.88)			
5 Environmental passions	4.23	.56	−.06	−.01	−.06	.45***	(.91)		
6 Green mindfulness	4.06	.61	−.09	−.05	−.09	.42***	.73***	(.86)	
7 Low carbon behaviours	3.75	.78	−.06	.06	−.002	.18***	.41***	.41***	(.85)

***$p < .001$; **$p < .01$; *$p < .05$.

To evaluate the mediation effect (Hypothesis 4), each component of the mediation path is used to estimate path a (X → M) (as indicated above). Then, the following equation was used to estimate M → Y, controlling for X (path b):

$$\text{Low} - \text{carbon behaviour} = \beta_0 + \beta_1 \left(\text{Environmental passion}\right) + r$$

$$\beta_0 = \gamma_{00} + \gamma_{01} \left(\text{Ethical climate}\right) + u_0$$

$$\beta_1 = \gamma_{10} + u_1$$

The Monte Carlo Method was used to formally assess the significance of mediation while considering paths a and b, as suggested in Hypothesis 4. According to MacKinnon, Lockwood, and Williams (2004), Monte Carlo Method is appropriate for assessing mediation effectiveness in a multi-level model. We used a Monte Carlo Method with a 95% confidence interval and 20,000 replications, reporting the lower and upper levels.

Finally, we examined the moderating effect (Hypothesis 5) by implementing the procedures provided by Dawson (2014) and computing the interaction variables using standardisation variables. Then, we plotted the interaction effects using the worksheet available at http://www.jeremydawson.co.uk/slopes.htm. We entered the coefficient values for the independent, moderator and product terms.

We present multilevel outcomes in accordance with the suggestions of Aguinis, Gottfredson, and Culpepper (2013). The report included the intercept value (γ_{00}), the within-team Level 1 variance level (σ^2), the intercept Level 2 variance (τ_{00}), the – 2 log likelihood (full information maximum likelihood estimation), the number of estimated parameters, and pseudo (R^2) value.

Results

Descriptive statistics

The mean, standard deviation, internal consistency, reliability (α), and correlations between the variables are summarised in Table 1. At the individual level, the reliability of the variables in the current study ranged from 0.85 to 0.91. These results showed that the reliability scale is very good for each measure.

Hypothesis testing

We suggest that Hypothesis 1, ethical climate (Level 2), and low-carbon behaviour (Level 1) have positive relationships. However, we discovered that ethical climate does not significantly influence low-carbon behaviour ($\gamma = 0.002$, SE = 0.19, $p = $ not significant) (Model 3, Table 2).

Table 2. Multilevel analysis predicting low carbon behaviour

	Model	
Level and variable	1	2
Level 1		
Intercept ($\hat{\gamma}_{00}$)	4.23(0.03)	2.95(0.48)
Level 2		
Ethical climate		0.39(0.14)**
Cross-level interaction		
Environmental passion × Low carbon behaviour		
Variance components		
Within-team (L1) variance (σ^2)	0.31	0.31
Intercept (L2) variance (τ_{00})	0.00004	0.00003
Additional information		
ICC(1)	0	0
−2log likelihood (deviance)	680.83	673.70
Number of estimated parameters	3	4
Pseudo R^2	0	0

*$p < .001$; values in parentheses are standard errors (SEs).

Table 3. Multilevel analysis predicting environmental passion

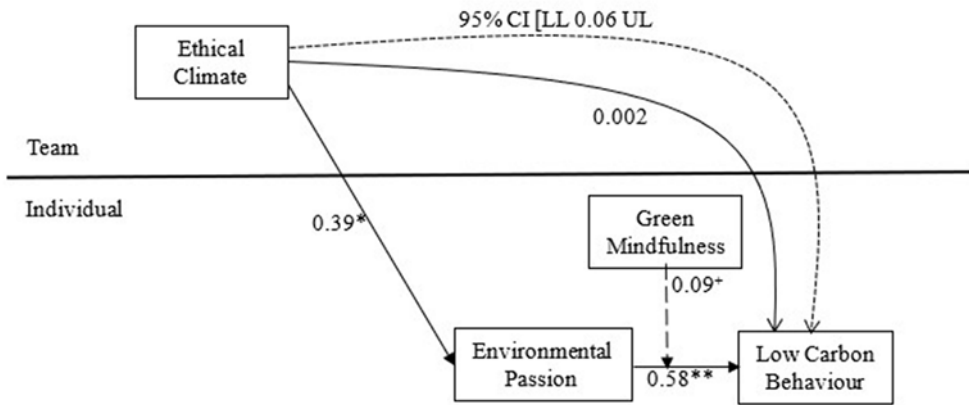|	Model		
Level and Variable	1	2	3
Level 1			
Intercept ($\hat{\gamma}_{00}$)	3.75(0.04)	1.31(0.27)	1.30(0.64)
Environmental passion		0.58(0.06)***	0.58(0.06)***
Level 2			
Ethical climate			0.002(0.19)ns
Variance components			
Within-team (L1) variance (σ^2)	0.61	0.51	0.51
Intercept (L2) variance (τ_{00})	0.001	0.001	0.001
Additional information			
ICC(1)	0.002	0.002	0.002
−2log likelihood (deviance)	952.83	876.14	876.14
Number of estimated parameters	3	4	5
Pseudo R^2	0	0.16	0.16

*$p < .01$; $p < .001$; values in parentheses are standard errors (SEs).

This demonstrates that ethical climate does not significantly influence between-group variation in low-carbon behaviour.

We anticipated that ethical climate would have a significant cross-level effect on environmental passion (Hypothesis 2), which was confirmed. Ethical climate was found to have a significant positive effect on environmental passion ($g = 0.39$, SE $= 0.14$, $p < .01$) (Model 2, Table 3). Therefore, the variances in environmental passion between groups were considerably influenced by the ethical climate.
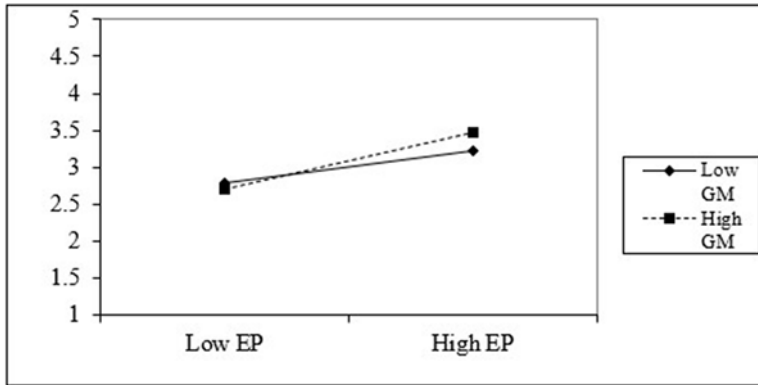
Figure 2. Interaction Effect of Green Mindfulness on the Relationship between Environmental Passion and Low-Carbon Behaviour.

Figure 3. Final Model.

Hypothesis 3 proposes that environmental passion has a positive relationship with low-carbon behaviour. The current results demonstrate a significant and positive relationship between environmental passion and low-carbon behaviour ($\beta = 0.58$, SE $= 0.06$, $p < .001$) (Model 2, Table 2), which supports this hypothesis.

We predicted that ethical climate would be related to low-carbon behaviour through environmental passion for mediation hypothesis 4. The parameter estimate for path *a* of the relationship between ethical climate and environmental passion is $\gamma = 0.39$, SE $= 0.14$, $p > .01$ (Model 2, Table 3), whereas for path *b*, the relationship between environmental passion and low-carbon behaviour, with ethical climate is $\beta = 0.58$, SE $= 0.06$, $p > .001$ (Model 3, Table 2). Ethical climate has a significant effect on low-carbon behaviour through environmental passion, indicating that this hypothesis was supported. This was demonstrated through the 95% confidence interval [0.06, 0.40], where the relationship was significant if the confidence interval did not contain zero.

Finally, we proposed Hypothesis 5, which suggests that green mindfulness moderates the relationship between environmental passion and low-carbon behaviour. For this hypothesis, we found a significant interaction effect ($\beta = 0.09$; SE $= 0.05$; $p > .10$) (see Fig. 2), which was supported. Figure 3 depicts the final model, which includes direct, mediation, and moderation directions.

Discussion

This study developed a multilevel model based on social cognitive theory to explain how ethical climate and low-carbon behaviour interact. We examined how the ethical climate in an organisation influences employees' tendency towards low-carbon behaviour in addressing environmental issues through environmental passion and green mindfulness. The data were collected using self-administered questionnaires. Finally, the data analysis findings support most of the hypotheses. Hence, we present confirmation that the ethical climate is unrelated to low-carbon behaviour among employees. This finding contradicts that of Tsai and Huang (2008), who found that ethical climate is closely related to low-carbon behaviour. However, we found that environmental passion acts as a bridge between ethical climate and low-carbon behaviour. This finding illustrates that while organisational ethical climate alone may not enhance employees' low-carbon behaviour; employees with robust environmental passion can influence the ethical climate to promote low-carbon behaviour, aligning with previous research (Yin et al., 2021). Moreover, the findings show that green mindfulness effectively moderates the indirect effect of environmental passion on low-carbon behaviour. The findings indicate that employees with a heightened sense of green mindfulness are more prone to experiencing the impact of environmental passion on low-carbon behaviour. Individuals who maintain a high level of mindfulness regarding the importance of environmental well-being can influence their environmental behaviour (Dharmesti et al., 2020). In summary, the results of this study have intriguing theoretical and practical implications.

Theoretical implications

This study has several implications. We built a research model to confirm the beneficial impact of ethical climate in the workplace on employees' environmental passion and how employees' environmental passion increased their low-carbon behaviour. Previous research has demonstrated that adhering to the environmental laws found in an ethical climate encourages employees to be more passionate about the environment (Valentine et al., 2011). Indeed, earlier studies (Yin et al., 2021) demonstrated that environmental passion is a comprehensive construct that encourages low-carbon behaviour. However, there is a gap in the literature on ethical climate that addresses novelties in the relationship between ethical climate and employees' environmental passion in the workplace, which ultimately increases their low-carbon behaviour. This study adds to the body of knowledge on ethical climate by demonstrating that there is an important relationship between ethical climate, environmental passion, and low-carbon behaviour.

Second, we contribute to the literature on low-carbon behaviour by demonstrating how employees' environmental passion can serve as a useful mediator between an ethical climate and low-carbon behaviour. Employees are passionate about acting in a low-carbon behaviour when they exhibit positive emotions or show that they like the organisation's stance on ethical issues related to reducing carbon emissions (Robertson & Barling, 2013; Victor & Cullen, 1988). Environmental passion is variable at an individual level and is related to promoting low-carbon behaviour. We believe that environmental passion can provide fresh explanations for the function and effects of ethical climate on low-carbon behaviour. Organisations that foster an ethical climate by demonstrating conditions that reduce environmental issues and encourage ethical decision-making will encourage employees to adhere to and accept these conditions (Martin & Cullen, 2006; Valentine et al., 2011). Therefore, employees who comply will promote high environmental passion. Employees are motivated and inspired to engage in environmental practices when they exhibit low-carbon behaviour (Akhshik et al., 2021). In light of this, we believe that our research contributes to a better understanding of how environmental passion affects ethical climate and low-carbon behaviour.

Our study also found that green mindfulness can serve as a beneficial moderator between environmental passion and low-carbon behaviour. In other words, employees' environmental passion may

have a greater impact on their low-carbon behaviour when they have high green mindfulness. Despite the important roles of environmental passion and green mindfulness (Amemiya & Sakairi, 2019; St-Louis et al., 2018) and environmental passion and low-carbon behaviour (Panno et al., 2018; Yin et al., 2021) in previous studies, our research used green mindfulness as a moderator to strengthen evidence of the relationship between environmental passion and low-carbon behaviour. We demonstrated that employees with a high level of green mindfulness are fascinated and driven to engage in environmental activities in their jobs. Because they care deeply about the environment, they will behave in a low-carbon manner. By contrast, employees' environmental passion does not have a greater impact on their low-carbon behaviour when they have low green mindfulness. Therefore, environmental passion has almost never been associated with low-carbon behaviour if employees have lower levels of green mindfulness.

Practical implications

In terms of practical implications, encouraging employees to adopt low-carbon behaviour is an essential strategy to help organisations address environmental issues. Our research offers some recommendations for how organisations can more successfully encourage employees to adopt low-carbon behaviour practices. First, we discovered that an ethical climate can boost employees' environmental passion, which in turn increases their low-carbon behaviour. To maximise the effectiveness of an ethical climate, organisations should focus on the application of employees' environmental passion. In response, our research offers several recommendations. Organisations should set high ethical standards so that they can recognise and promote an ethical climate related to the environment. This is important because employees often imitate behaviour within the organisation.

Additionally, organisations need to implement environmental development strategies to be conscious of potential environmental ethics problems in the future. By doing this, employees are expected to be able to increase their passion for the environment (Wood, Eid & Agag, 2021). Second, organisations must strive to foster low-carbon behaviour among their employees and promote a culture of environmental development by giving them opportunities to engage in environmental activities. It is beneficial to increase employees' environmental passion and green mindfulness of the value of environmental protection for employees to engage in low-carbon behaviour.

Furthermore, our findings demonstrate that employees with high green mindfulness have a significant impact on their environmental passion for low-carbon behaviour. We suggest that organisations should organise training programmes related to environmental conservation to educate employees about the environment. Environmental training should be provided to employees to increase their awareness about the importance of promoting low-carbon behaviour and to develop their skills to instil a high level of passion for environmental protection.

This study has significant implications in various sectors. For the industry, implementing policies and initiatives to curb climate change within the public sector underscores the importance of fostering low-carbon behaviour among employees. Such measures not only contribute to environmental preservation but also catalyse societal change. From the government's perspective, these findings emphasise the necessity of formulating and implementing climate change prevention programmes to mitigate carbon emissions. These initiatives can extend beyond the workplace, empowering employees to advocate sustainable practices in their communities. Additionally, this prompted academia to delve deeper into this area of research, exploring the effectiveness of low-carbon behaviour in addressing climate change and utilising the latest data for more comprehensive insights. It also encourages exploring the impact of society by explaining its potential to improve quality of life, promote social cohesion, and build a more resilient and equitable society for current and future generations. Ultimately, the implications extend beyond individual sectors, highlighting the interconnectedness between environmental sustainability and societal well-being.

Limitations and directions for future research

This study has some limitations. First, we applied a self-assessment questionnaire that might have exposed the research to a common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff & Organ, 1986). However, our study used multilevel data, that is, aggregating data and evaluating within-group variance, to examine the impact of ethical climate on low-carbon behaviour. Consequently, this model can reduce the potential flaws in the common method bias.

Second, the cross-sectional design of our research limits the conclusions that can be drawn or patterns that result from causality. Cross-sectional studies are unable to predict the causal effects of variables and cannot provide highly accurate relationships between variables. Future studies in this field are advised to conduct longitudinal studies to better comprehend the mediating pathways in this study.

Additionally, the generalisability of the findings is somewhat limited because this research was only conducted in the public sector. Future studies could investigate how ethical climate affects employees' low-carbon employees through environmental passion and green mindfulness in other sectors, which have diverse work cultures and different perspectives on environmental issues.

Given the lack of research on the mechanisms we use in low-carbon behaviour studies, future researchers can explore the paradox of how ethical climate influences low-carbon behaviour. It has been demonstrated that the relationship between ethical climate and low-carbon behaviour can be mediated by environmental passion. Therefore, it is important to consider other psychological factors (e.g., green self-efficacy) as mediating factors.

The limitation of this study is that the data collected cover only the period from 2022 to 2023, which may limit the reliability of our findings on current carbon emission issues, as the data do not fully capture recent developments or changes in environmental policies and practices. However, we plan to conduct a follow-up study using data collected in 2024 to investigate the latest trends and issues surrounding carbon emissions. By incorporating more recent data, we aim to provide a more accurate and up-to-date analysis, thus enhancing the reliability and relevance of our research findings.

Conclusions

In conclusion, this research expands our understanding of why, how, and when ethical climates affect employees' low-carbon behaviour by examining the mediating role of environmental passion and the boundaries of green mindfulness in practice. Based on the social cognitive theory, we found that an ethical climate has a positive impact on employees' environmental passion, including their environmental passion towards low-carbon behaviour. Environmental passion plays a crucial mediating role between an ethical climate and low-carbon behaviour, and an ethical climate at the organisational level fosters employees' low-carbon behaviour by igniting their passion for the environment. Additionally, we discovered that green mindfulness has a moderating role that strengthens the positive influence of environmental passion on low-carbon behaviour. Our research contributes to the literature on the antecedents of low-carbon behaviour and provides individual and contextual variables that may impact low-carbon behaviour. The findings may serve as useful guidance for organisations seeking to address environmental issues in the organisation. Given the limitations of our findings, we encourage future research to expand the scope of data collection and test the relevant individual and contextual variables related to low-carbon behaviour.

Conflict(s) of interest. The authors declare that there is no conflict of interest.

Data availability statement. The data sets generated during and/or analyses during the current study are available from the corresponding author on reasonable request.

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