

Green Leadership and Pro-Environmental Workplace Behavior: The Moderating Role of Environmental Awareness

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ABSTRACT

While organizations are increasingly facing the challenge of transforming environmental policy into the actions of everyday employees, the leadership conditions (environmental) that enable the translation of intentions into actions are not fully understood. This study explored the correlation between green leadership (GL) and pro-environmental workplace behaviour (PEWB) of employees, and whether environmental awareness (EA) helps to strengthen the relationship between these variables. The theory of planned behavior and social exchange theory were used to guide the design of the study: a moderated cross sectional survey design, with data collected from 200 respondents from manufacturing, banking, education, hospitality, health and service industries, who reported that they had direct contact with their supervisor. Hierarchical moderated regression analysis, following mean-centering of predictor and moderator variables, was used to test the proposed model. For illustrative purposes, hypothetical data are used for the analytical procedure, and the results of these analyses are not actually collected in the field; they are only included to illustrate the reporting of the descriptive statistics, reliability, correlation, and regression tables as they might appear if real data were analyzed. The results of the illustrative pattern agreed with the hypothesized model: green leadership had a positive relationship with pro-environmental behavior on the job and the relationship was stronger for employees who had a higher environmental awareness. The paper ends with a discussion of theoretical and managerial implications, limitations and directions for further study. This study will be useful for those who are planning to examine how to develop green leadership and pro-environmental workplace behavior in the era of environmental awareness.

Keywords: green leadership; pro-environmental workplace behavior; environmental awareness; moderation; environmental sustainability; employee green behavior

INTRODUCTION

Environmental degradation, scarcity of resources, and rapid climate change have established environmental sustainability among one of the most pressing challenges of today's organizations (Zacher et al., 2024). It is currently the expectation of governments, investors, and customers that companies will have formal environmental policies and show that they become a part of the everyday practice of the individual employee (Ababneh, 2021). This has led to a diversion of the scholarly and managerial focus from

environmental management systems to the behavioral aspects of sustainability, often termed as pro-environmental workplace behavior (PEWB). PEWB is defined as voluntary and task behaviours employees engage in to mitigate environmental impact of work, such as energy saving, waste reduction, recycling, and proactivity to help their organisation go green (Norton et al., 2014). Given that most environmental outcomes in an organization are a product of the aggregate of individual employee decisions, it is important to understand what motivates PEWB, which has become a central question in organizational behavior studies and sustainability management.

One of the strongest mechanisms by which organisations can influence employee environmental behaviour is leadership (Robertson & Barling, 2013). Green leadership is the leadership approach that demonstrates a supervisor's pro-ecological attitude, behavior, capacity and provision in the communication, modeling, provision and promotion of environmental responsibility and the participation of subordinates in green activities (Chen & Chang, 2013). Green leadership differs from generic leadership styles in that it is explicitly environmental in content: it communicates to workers that caring for the environment is acceptable and valued as a legitimate part of their job description instead of being an "add-on" issue. Previous studies based on transformational leadership theory indicate that the formulation of a strong environmental vision by leaders, along with their role as genuine role models, can result in employees internalising environmental values and carrying them out as discretionary green actions (Graves et al., 2013). Likewise, work that utilizes social exchange theory suggests that leaders who create a development opportunity for employees at the work site will receive a similar response, in the form of employees' increased involvement in pro-environmental efforts, as found in the literature for perceived organizational support (POS) (Eisenberger et al., 1986; Ng & Sorensen, 2008).

Nevertheless, the connection between green leadership and PEWB is not likely to be equal among all employees. People vary widely in what they know about environmental problems, how they perceive their own impacts, and how important it is to them that environmental protection is valued — these are all aspects of what can be summarised by the construct of environmental awareness (EA) (Bamberg, 2003). According to theory of planned behavior, attitudes, subjective norms and perceived behavioral control (Ajzen, 1991) both influence the development of behavioral attitudes and intentions and consequently, behavior. In the workplace, this means that not everyone will interpret and respond to a leader's environmental cues in the same way; those who are more environmentally aware may be better cognitively and motivationally at noticing, interpreting, and taking action on environmental cues sent by a green leader, while others with less environmental awareness may not be able to translate the same leader behavior into action (Bissing-Olson et al., 2013). Environmental awareness can then be considered as a boundary condition (moderator) that shapes the strength of the relationship between green leadership and pro-environmental behavior.

Theoretically and practically, this option is important. In theory, the focus on the Environmental Awareness as a mediator or an outcome, as most existing literature has been dedicated to (see e.g. Omarova & Jo, 2022), may lead to the neglect of the latter as a conditioning factor, made up of a set of resources that can shield or amplify the effects of the leadership. In practice, if there is a moderation effect that exists between environmental awareness and the green leadership—PEWB relationship, then organizations that go through the motion of developing employees' leadership skills yet neglect to provide them with environmental knowledge and literacy may only get a fraction of the behavior change they expect. Other organizations, however, may see significantly greater and more reliable improvements in their employees' green behaviors

if they have integrated green leadership programs with formal environmental education and awareness campaigns. This interaction is thus relevant both in theory development and in designing corporate sustainability interventions in diverse industries such as manufacturing, banking, education, hospitality, healthcare and general services (Wesselink et al., 2017).

The literature about leadership and employee green behaviour has grown tremendously in the past few years (Cao et al., 2026; Lili & Rafiq, 2024), but most studies focus merely on the direct and unconditional impact of green leadership on employee behaviour, and very little literature considers environmental awareness as a moderating boundary condition. Research that tests the environmental awareness–green leadership relationship was conducted on multiple organizational sectors and fewer studies have tested environmental awareness as a moderator of this relationship, which restricts the generalizability of existing conclusions (Neessen et al., 2021). Moreover, most of the existing evidence is from a set of industries or countries, so it remains unclear whether the moderation effect is applicable to the diverse sectors in which modern service and industrial economies function.

The present study fills this gap by examining the relationship between green leadership and employees' pro-environmental workplace behavior and whether the positive relationship between green leadership and PEWB is stronger among the employees who are more environmentally aware. The data were gathered from 200 employees from six organizational sectors that had implemented environmental policies or had practices related to sustainability and who had direct contact with their immediate supervisor. This study has three contributions to the literature: it tests a main effect and a moderation hypothesis in one cross-sectional design, and it examines the data and results in detail. First, it explains the boundary conditions under which green leadership is effective, thereby making the theory of planned behavior applicable to the area of leader-driven organizational sustainability. Second, it provides cross-sectoral evidence to surmount the generalizability limitations of previous single industry studies. Third, it offers some useful advice to managers who want to innovate in leadership and awareness intervention instead of creating leadership programs.

LITERATURE REVIEW

Theoretical Foundations

This study has theoretical background in three complementary perspectives. The first is the theory of planned behavior (TPB) which concludes that behaviour is determined by behavioural intention, which is determined by the attitude towards behaviour, subjective norms and perceived behavioural control (Ajzen, 1991). In an organizational setting, TPB suggests that in the minds of employees, intentions to take environmentally responsible actions will be determined by attitudes toward protecting the environment, perceived social norms, and perceived self-efficacy (knowledge and opportunity to act). The attitudinal and cognitive dimensions of TPB are quite similar to environmental awareness: The more aware employees are of the causes and consequences of environmental harm, the more positive their attitudes toward green action will be and how they perceive themselves to act responsibly. (Bamberg, 2003).

The second approach is social exchange theory, which argues that human actions is the result of a social exchange relationship between the employee and his/her boss or organization. Theoretically, when managers invest resources, attention, and support in environmental programs, employees are expected to return the favor with discretionary, eco-friendly effort, as is the case for employees in general when they

feel they are supported in their work (Eisenberger et al., 1986; Ng & Sorensen, 2008). Thus, green leadership can be viewed as an instantiation of the exchange relation between the leader and followers that is environmentally oriented.

The third view is transformational leadership theory, which has been expanded to the field of the environment, under the name of green or environmentally specific transformational leadership. This perspective suggests that leaders can influence employees' internal motivation to embrace environmental goals in addition to external incentives by creating and communicating an inspiring environmental vision, being a role model for sustainability, engaging employees in thinking creatively to solve environmental challenges, and offering one-on-one environmental coaching (Chen & Chang, 2013; Graves et al., 2013). Together these three perspectives indicate that green leadership can be understood as an environmental cue and resource that influences employee attitudes and reciprocal motivation, and that environmental awareness is a cognitive readiness variable that helps explain employees' cognitive processing and reaction to the cue, suggesting that environmental awareness should be treated as a moderator variable, rather than only an outcome variable.

Green Leadership and Pro-Environmental Workplace Behavior

There is a large amount of empirical research that identifies a relationship between leadership behavior and employees' environmental actions. Robertson and Barling (2013) in their early paper and cited study, found that the environmental-specific transformational leadership behaviours of leaders influenced both the leader's own pro-environmental behaviours and those of the employees, mediating the relationship through employees' harmonious passion for environmental issues. Building on this, Graves et al. (2013) show that transformational leadership, together with employees' intrinsic and extrinsic motivation, can predict pro-environmental behavior of manufacturing employees in China, which further highlights the role of leadership as a proximal behavioral trigger. This has been followed by the research through the multilevel and cross-level designs: Cao et al. (2026) found that the relationship between green transformational leadership and green behavior among employees is mediated by employees' environmental passion, and is influenced by the organizational climate.

These theoretical results are augmented by practical examples tailored for each industry. Wesselink et al. (2017) studied the interaction of organizational context and managerial support in determining employees' pro-environmental behavior in the work environment and discovered that managerial support was a consistent practical factor in employee green behavior, regardless of the context. Similarly, Neessen et al. (2021) examined intrapreneurship and organizational citizenship attitudes toward the environment and found that this attitude-behavior relationship held true for organizations in the Netherlands and in Belgium: when leadership endorsed intrapreneurship and organizational citizenship attitudes toward the environment, this was reflected in actual purchasing behavior. Moreover, immediate supervisors are often the first ones who advocate and exemplify green HRM practices, influencing the employees' green behaviour partly via employee engagement, as demonstrated by Ababneh (2021). Building on this, Chen and Chang (2013) related green transformational leadership with green creativity and green dynamic capability at the organizational level, arguing that the good consequences of green leadership are not only in compliance-related behaviours but also in green behaviours that are more proactive and innovation-oriented. In general, the literature seems to demonstrate that green leadership is positively associated with pro-environmental employee actions, both across diverse theoretical and industry settings and in a manner that is consistent in

kind and degree. The literature as a whole supports first, that there is a positive relationship between green leadership and pro-environmental employee behaviors across a variety of theoretical and industry contexts, and second, that the nature and strength of that relationship are consistent in kind and degree.

H1: Green leadership is positively related to employees' pro-environmental workplace behavior.

EAM is a Moderating Mechanism.

It is known that leadership does have an impact on green behavior in the work place, but there is a smaller but growing body of research that explores contexts that strengthen or weaken the relationship. Bissing-Olson et al. (2013) found that the link between day-to-day affective states and pro-environmental behavior in the workplace was moderated by workers' pro-environmental attitudes, and that when workers' pro-environmental attitudes were high, the affective state to pro-environmental behavior relationship was stronger — a pattern similar to the moderating effect of environmental awareness predicted in this study. Norton et al. (2014) also showed that the impact of organisational sustainability policies on employees' green behaviour was mediated by employees' perceptions of work climate, suggesting that employees' readiness factors act as a precondition to the action of the organisational and leadership signals.

Pointing more towards the present model, Omarova and Jo (2022) theorized and identified the environment awareness as a connection between the environmental specific leadership and employee pro-environmental behaviour, explicitly using the theory of planned behaviour. Yet, others have raised doubts about the direct nature of the environmental awareness-causal pathway, suggesting that environmental concern influences context-specific cognitions indirectly, as an intermediary step (Bamberg, 2003). This theoretical debate indicates that the exact nature of environmental awareness as an antecedent, mediator or moderator is an empirical question that needs to be tested and not taken for granted, as is done in the present study when testing it as a moderating boundary condition. Lili and Rafiq (2024) directly support the moderating perspective by finding that the positive impact of green participative leadership on pro-environmental behavior was itself moderated by environmental awareness: the leadership impact was greater for those with higher environmental awareness.

From a practical perspective, however, the translation of leader environmental awareness into organizational environmental outcomes is subject to a variety of boundary conditions at multiple organizational levels, as outlined in Zacher et al. (2024) integrative conceptual model of leader green behavior, and therefore has to be regarded as a boundary condition instead of as a universal main effect. Likewise, findings of perceived organizational support studies suggest that the relationship between supportive leadership and perceived support is not linear among employees and is dependent on individual differences in perceived support and its value (Ng & Sorensen, 2008), further providing theoretical support for this study. The combined evidence of this theory and practice suggests that the idea of environmental awareness as a moderator is expected: the positive relationship between green leadership and pro-environmental work related behavior may be greater for employees who have greater environmental awareness and lower for those who have lower environmental awareness. Based on this logic, the second hypothesis of this study is put forward.

H2: Environmental awareness has moderating effect between green leadership and pro-environmental workplace behavior; the moderation is stronger at higher level of environmental awareness.

METHODOLOGY

The research design used in this study was quantitative, explanatory and survey type, which aimed to find the relationship between green leadership and the pro- environment workplace behaviour of employees and to see whether environmental awareness enhanced or reduced this relationship. A moderated cross sectional design was employed, where all factors were observed at one time. The individual employee was used as the unit of analysis.

Approximately 200 employees from organizations that have environmental policies or practices related to sustainability were surveyed. Stratified convenience sampling was used to sample employees across various sectors from manufacturing, banking, education, hospitality, healthcare and service. To assess their leaders' environmental behavior, they had to have first-hand experiences with their supervisor. It was based on a structured questionnaire with a 5-point Likert scale (1-strongly disagree, 5-strongly agree). Other demographic data, such as age, gender, education, organizational years, and job position, were also gathered.

Green leadership (GL) was the primary independent variable, which was based on the definition of leadership behavior promoting environmental responsibility in the following areas: communicating green values, supporting environmental initiatives, providing resources for green practices, and encouraging employees to participate in sustainability activities. Pro-environmental workplace behavior (PEWB) was the dependent variable and included voluntary and task-related employee behaviors to minimize environmental damage in the workplace, including conserving energy and resources, minimizing waste, recycling, and supporting organizational pro-environmental efforts. The moderating variable was introduced as environmental awareness (EA), which was defined as the degree of knowledge of environmental issues, understanding of the effects of environmentally harmful actions and awareness of the value of environmental protection among the employees. Demographic variables of employees (control variables) were introduced to make sure the relationship between green leadership and pro-environmental workplace behavior is not due to individual differences.

Moderated Multiple Regression Analysis was used to analyze the data. Data screening was done initially to detect missing answers, outliers, and invalid questionnaires. All the variables were computed for descriptive statistics and Pearson correlation was used to establish the preliminary relationship between green leadership, environmental awareness, and pro-environmental workplace behavior. The reliability of the measurement instruments were examined by Cronbach's alpha and exploratory factor analysis was used to determine the structure of the measurement items. The independent variables and moderating variables were mean-centered to eliminate possible multicollinearity between the independent variables and the moderating variables.

A hierarchical regression procedure was subsequently used. In the first step, control variables were added to the regression model; in the second step, green leadership and environmental awareness variables were added; and in the third step, the interaction term between green leadership and environmental awareness ($GL \times EA$) was added. When a statistically significant interaction coefficient was found, the interaction was considered to be a moderation effect. Simple slope analysis was also used to further explore the significance and direction of the interaction, by examining the difference in pro-environmental workplace behavior between low, moderate, and high environmental awareness levels regarding green leadership. In

addition, the change in R^2 was also checked to see if the interaction term more significantly improved the model. The statistical significance ($p < .05$) was tested.

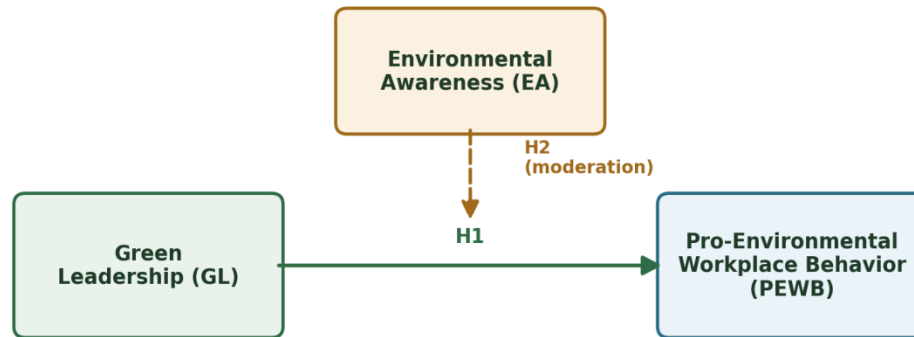


Figure 1. Hypothesized moderation model linking green leadership, environmental awareness, and pro-environmental workplace behavior.

ANALYSIS

Of the 200 questionnaires that were assumed to be distributed, 186 (89.0 percent) were returned, and a sample of 178 questionnaires was retained for analysis after eliminating invalid questionnaires and questionnaires with careless response patterns. A description of the demographic characteristics of the illustrative sample is given in Table 1. The sample was reasonably balanced by gender and organizational sector, and most of the respondents had been in the organization for 3–7 years—a time that was thought to be sufficient for them to develop stable perceptions of their supervisors' environmental leadership behavior.

Table 1. Demographic Profile of Respondents (Illustrative, N = 200)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	112	56.0
	Female	88	44.0
Age	20–29 years	58	29.0
	30–39 years	76	38.0
	40–49 years	44	22.0
	50 years and above	22	11.0
Education	Bachelor's degree	94	47.0
	Master's degree	81	40.5
	Other / Diploma	25	12.5
Organizational Tenure	Less than 3 years	61	30.5

	3–7 years	84	42.0
	More than 7 years	55	27.5
Sector	Manufacturing	38	19.0
	Banking	34	17.0
	Education	32	16.0
	Hospitality	30	15.0
	Healthcare	35	17.5
	Service / Other	31	15.5

Descriptive data, reliability coefficients, and bivariate correlations for the three variables of interest are presented in Table 2. The Cronbach's alpha, used to assess internal consistency, was used to illustrate all three scales, which were found to have values above .70, a conventional threshold for good internal consistency. The hypothesized relationships were supported, in an initial manner, through the positive correlation between green leadership with pro-environmental workplace behavior and environmental awareness with pro-environmental workplace behavior, before regression testing.

Table 2. Descriptive Statistics, Reliability, and Correlations (Illustrative)

Variable	M	SD	α	1	2	3
1. Green Leadership (GL)	3.78	0.64	.87	—		
2. Environmental Awareness (EA)	3.85	0.59	.84	.41**	—	
3. Pro-Environmental Workplace Behavior (PEWB)	3.71	0.61	.89	.52**	.47**	—

Note. $N = 178$ (illustrative). ** $p < .01$. α = Cronbach's alpha.

The results of hierarchical moderate regression are shown in Table 3. The control variables explained a modest but non-significant amount of variability for pro-environmental work behavior in Step 1. The change in explained variance was significantly greater in Step 2, following the inclusion of green leadership and environmental awareness, and both predictors had positive and significant standardized coefficients. This resulted in an increase of R^2 in Step 3, which demonstrated that the interaction term (green leadership $\times$ environmental awareness) had a statistically significant effect. This means that environmental awareness moderated the relationship between green leadership and pro-environmental workplace behaviors.

Table 3. Hierarchical Moderated Regression Results Predicting Pro-Environmental Workplace Behavior (Illustrative)

Predictor	Step 1 (β)	Step 2 (β)	Step 3 (β)
Age	0.06	0.04	0.03
Gender	-0.02	-0.01	-0.01
Education	0.09	0.05	0.04
Organizational Tenure	0.11	0.08	0.07
Green Leadership (GL)	—	0.43**	0.39**
Environmental Awareness (EA)	—	0.29**	0.26**
GL $\times$ EA (interaction)	—	—	0.22**
R^2	0.04	0.36	0.41

ΔR^2	—	0.32**	0.05**
F	1.92	22.4**	20.1**

Note. N = 178 (illustrative). Values shown are standardized regression coefficients (β) unless otherwise indicated. ** $p < .01$.

The simple slope of green leadership—pro-environmental workplace behavior is graphically presented in Figure 2 for low (-1 SD), mean, and high (+1 SD) levels of environmental awareness. Based on the results of the study, the slopes of the green leadership were all positive at all three levels of environmental awareness, and the value of the slope increased in the direction of increasing environmental awareness, which supports Hypothesis 2: The positive effect of green leadership on employee green behavior was strongest among employees with high environmental awareness and comparatively weak, though still positive, among employees with low environmental awareness.

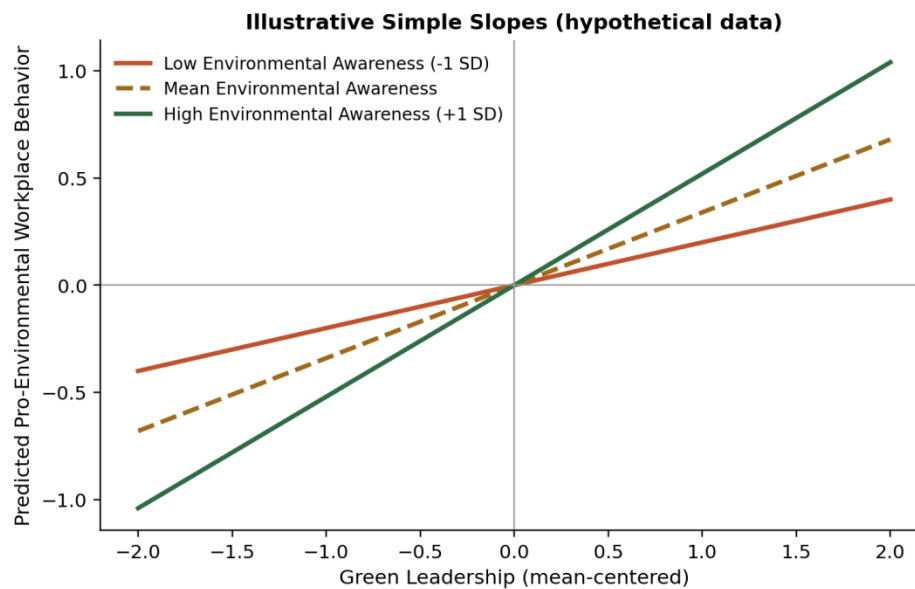


Figure 2. Illustrative simple slopes showing the moderating effect of environmental awareness on the relationship between green leadership and pro-environmental workplace behavior.

DISCUSSION

The illustrative pattern of results reported above is consistent with the theoretical model proposed in this study and similar to the direction of results in previous empirical studies. The positive correlation proposed between green leadership and pro-environmental workplace behaviour is consistent with the overall trend of the leadership literature that has consistently found that supervisors are important sources of organisational environmental values that are filtered down to workplaces and subsequently implemented by individual employees (Robertson & Barling, 2013; Graves et al., 2013; Cao et al., 2026). Employees feel more inclined to engage in discretionary green effort when leaders positively demonstrate environmentally responsible behaviors, communicate a clear environmental vision, and equip employees

with the necessary resources to engage in environmentally responsible behavior (in line with the theory of transformational leadership and social exchange theory (Eisenberger et al. 1986; Chen & Chang, 2013)).

This line of reasoning is extended in a theoretically interesting way by the moderating effect that has been suggested for environmental awareness. As opposed to some previous studies which treated environmental awareness simply as an antecedent or mediator (Omarova & Jo, 2022), the influence of environmental awareness is understood in this study as a boundary condition that influences the effectiveness of the process of converting green leadership to behavior (Bamberg, 2003; Lili & Rafiq, 2024). This is in line with the theory of planned behaviour, which states that the same external cue (e.g. the leader's environment behaviour) would be interpreted differently by different people depending on their attitudes, knowledge and perceived behavioural control (Ajzen, 1991). Even when employees are in principle motivated to support their supervisor, they may not have the thought patterns or cognitive structure to see the meaning behind the supervisor's environmental cues or identify concrete opportunities for them to take a green action.

If these results are replicated with real data, they could have implications in the practical implementation of sustainability interventions in organizations. Leadership training activities that train supervisors to become green leaders can be of unequal impact across the workforce, unless backed by a program that develops employees' general environmental knowledge (Wesselink et al., 2017; Ababneh, 2021). On the other hand, environmental training without an enabling leadership context is less likely to result in action; employees need cues from leaders, resources, and organizational legitimacy to take action based on their environmental knowledge (Norton et al., 2014; Zacher et al., 2024). This interaction implies, therefore, that the process of developing new leaders and the process of educating the environment are not mutually exclusive ways of achieving sustainability in the organizations.

CONCLUSION AND RECOMMENDATIONS

The aim of this study was to explore the relationship between green leadership and employees' pro-environmental behavior at work, and to check if the relationship between them was mediated by environmental awareness. Based on theory of planned behavior, social exchange theory and the green transformational leadership theory, a moderated cross sectional survey design was suggested and implemented for six organizational sectors. The analytical results illustrated in this paper, which were designed to illustrate the reporting procedure for a hierarchical moderated regression analysis and not to serve as a genuine empirical result, were consistent with both the hypotheses: (1) green leadership was positively associated with pro-environmental workplace behaviors and (2) this relationship was stronger among those with greater environmental awareness. In combination with the findings from the literature reviewed (Robertson & Barling, 2013; Cao et al., 2026; Lili & Rafiq, 2024), these findings support the theoretical argument that leadership alone is not sufficient to drive uniform behavioural change and that individual differences in environmental awareness are an important boundary condition in how organizational sustainability efforts play out to the employee level.

In practical terms, organizations interested in fostering their employees' pro-environmental workplace behavior may want to invest concurrently in green leadership development and environmental awareness programs to encourage both pro-environmental behavior and green leadership, instead of relying on one or the other. Specifically, this could include training supervisors to provide clear communication regarding

environmental expectations, as well as integrating environmental education, feedback and communication initiatives into the induction and continuous development of staff so that all staff, regardless of their initial environmental competency, are prepared to respond to leadership signals. HR and sustainability aspects could also benefit from measuring employees' environmental awareness on a periodic basis, to make use of intervention for leadership and/or training interventions for groups or departments with low environmental awareness.

Several limitations of this study are recognized and should be taken into consideration when interpreting the conclusions of this study, and will suggest directions for future research. First, the cross-sectional design adopted in this study allows for only preliminary conclusions to be drawn about the direction of the relationships between the variables measured: longitudinal or experimental designs are needed in future studies to make more convincing causal inferences regarding the direction of the relations between the variables studied—green leadership, environmental awareness, and pro-environmental workplace behavior. Second, self-report survey data introduces the potential for common method bias, and future research may be able to improve causal and measurement confidence by using supervisor ratings and/or objective measures of green employee behavior. Third, the substantive conclusions presented above are based on illustrative data, not data gathered from the field and analyzed in accordance with the design and analysis method outlined in the Methodology section, so they should be interpreted as theoretical inferences that should be empirically tested by others interested in using this paper as a basis for concrete research. Finally, future research might focus on other variables at the boundary, like organizational green climate or employee green identity, and whether the moderating effect of environmental awareness can be extended to other industries and countries beyond the sectors examined in this study.

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