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Article

Fostering sustainable behavior through green leadership: The mediating role of environmental consciousness and moderating effect of goal clarity

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Abstract: This study investigates the mechanisms through which green transformational leadership (GTL) and green authentic leadership (GAL) influence employees' green behavior for sustainable development (EGB). Drawing from social cognitive and goal-setting theories, we examined the mediating role of environmental consciousness (EC) and the moderating role of goal clarity (GC) using survey data collected from 532 employees across diverse organizational contexts in China. Partial least squares structural equation modeling (PLS-SEM) via SmartPLS was employed to analyze the data. Results indicate that GTL and GAL positively impact EC and EGB directly. EC significantly mediates the relationship between both leadership styles and EGB, highlighting its critical psychological function in translating leadership practices into concrete environmental actions. Additionally, GC significantly strengthens the positive relationship between EC and EGB, demonstrating the importance of clearly articulated sustainability objectives in fostering sustainable workplace behaviors. These findings provide essential theoretical insights and practical implications for enhancing sustainability performance through targeted leadership practices, environmental awareness initiatives, and effective sustainability goal-setting strategies.

Keywords: green transformational leadership; green authentic leadership; environmental consciousness; goal clarity; sustainable behavior

1. Introduction

The urgency and magnitude of contemporary environmental challenges demand that organizations globally shift toward more sustainable practices. Organizations significantly contribute to environmental degradation through excessive resource consumption, waste generation, and greenhouse gas emissions, necessitating systemic transformations in organizational behavior and management [1]. Consequently, employees' pro-environmental behaviors (PEB) within organizational contexts have emerged as a critical domain for academic inquiry and practical sustainability initiatives [2]. Employees' engagement in pro-environmental behaviors, including activities such as recycling, energy conservation, and sustainable innovation, can substantially mitigate organizational environmental impacts, fostering sustainable development [3]. Thus, understanding the drivers of such behavior represents a fundamental requirement for organizations seeking genuine ecological transformation.

While previous research extensively explored technological solutions and compliance-based environmental management, recent academic discourse underscores the necessity of understanding the human behavioral aspects underpinning sustainable practices [4]. Specifically, scholarly attention has increasingly turned towards identifying organizational factors and leadership styles capable of fostering and enhancing employees' pro-environmental behaviors. Two

leadership styles have received particular attention for their potential efficacy in enhancing organizational sustainability: Green transformational leadership and green authentic leadership. Green transformational leadership emphasizes inspiring and motivating employees through a compelling vision of sustainability, fostering innovation and proactive environmental behaviors [5]. Conversely, green authentic leadership builds trust through transparent, consistent, and ethically aligned sustainability actions, encouraging employees to internalize environmental values and demonstrate authentic pro-environmental behaviors [6].

Despite the growing recognition of these leadership approaches, existing literature often examines these leadership styles in isolation, with limited consideration for how they may jointly influence environmental outcomes. Furthermore, the psychological mechanisms through which these leadership styles enhance employees' pro-environmental behaviors are not sufficiently explored. Addressing this gap, this study integrates Green Transformational and green authentic leadership into a unified conceptual framework, proposing environmental consciousness as a mediating psychological construct that explains how leadership influences employee behaviors toward sustainability [7].

Environmental consciousness, defined as an individual's awareness, understanding, and emotional commitment toward ecological issues, serves as a significant predictor of employees' behavioral commitment to sustainability practices [8]. Employees possessing high environmental consciousness exhibit greater intrinsic motivation, stronger moral responsibility, and consistent engagement in organizational sustainability initiatives [9]. Thus, leaders who successfully nurture employees' environmental consciousness significantly increase the likelihood of sustained pro-environmental behaviors within their organizations.

Additionally, research highlights that clarity of organizational environmental goals (goal clarity) significantly strengthens employees' pro-environmental engagement by explicitly articulating expectations, reducing uncertainty, and enhancing employees' perceived self-efficacy and motivation [10]. Clear environmental goals provide employees with structured behavioral guidelines, measurable sustainability targets, and consistent motivational feedback, thereby facilitating effective translation of environmental consciousness into actionable and sustained pro-environmental behaviors.

Integrating these constructs, this study proposes a comprehensive conceptual model examining how Green Transformational and green authentic leadership styles influence employees' pro-environmental behaviors through enhanced environmental consciousness, and how goal clarity moderates this relationship. Specifically, the model hypothesizes that Green Transformational and Authentic Leadership styles positively impact environmental consciousness, which subsequently leads to increased pro-environmental behavior. Moreover, goal clarity is proposed to amplify this relationship by providing essential clarity and direction for employees to translate consciousness into practical, actionable behaviors that advance organizational sustainability.

The empirical exploration of this integrative model contributes significantly to sustainability research by clarifying the interplay between leadership, psychological processes, and organizational practices influencing pro-environmental behavior.

Additionally, this study offers valuable practical insights for organizational leaders aiming to design targeted interventions fostering sustainable behavior and achieving substantial environmental performance improvements. Through systematic quantitative assessment using structural equation modeling (SEM), this study aims to empirically validate the proposed relationships, thereby enhancing theoretical understanding and practical applicability of behavioral approaches to sustainability within organizational contexts [11].

2. Literature review

2.1. Definitions of constructs

2.1.1. Green transformational leadership

Green transformational leadership refers to a leadership style characterized by inspiring, motivating, and intellectually stimulating followers toward achieving organizational sustainability objectives [12]. Building upon Bass and [13] foundational work on transformational leadership, green transformational leaders explicitly articulate a compelling environmental vision, communicate high expectations regarding sustainability, and foster innovative and proactive environmental behaviors among employees [14]. Such leaders use inspirational motivation and intellectual stimulation to encourage followers to look beyond personal interests toward broader ecological goals. Moreover, they consistently model sustainability behaviors, signaling the organization's genuine commitment to environmental responsibility [12].

2.1.2. Green authentic leadership

Green authentic leadership refers to leadership characterized by transparency, ethical consistency, and genuine commitment to environmental values, practices, and outcomes. Originating from the broader construct of authentic leadership, green authentic leadership emphasizes genuine environmental ethics, transparency in decision-making, and consistency in sustainability behaviors. Such leaders foster trust and openness by aligning their words, actions, and core environmental values, thereby promoting authenticity and ethical commitment among employees [13]. Employees who perceive their leaders as authentically committed to sustainability are more likely to internalize similar values and demonstrate consistent, intrinsically motivated pro-environmental behaviors [15].

2.2. Environmental consciousness

Environmental consciousness is a multidimensional psychological construct defined as an individual's level of awareness, understanding, and emotional concern regarding ecological issues, along with the willingness to engage actively in environmental protection and sustainable practices [16]. Environmental consciousness encompasses cognitive, affective, and behavioral dimensions [17]. Specifically, cognitive awareness pertains to understanding ecological problems and human environmental impacts; affective concern involves emotional responses such as empathy, guilt, or moral responsibility regarding ecological degradation; and behavioral intentions reflect the proactive willingness to perform sustainable actions

[18]. Employees with high environmental consciousness recognize the intrinsic and societal value of ecological preservation, motivating consistent participation in organizational sustainability initiatives.

2.3. Goal clarity

Goal clarity refers explicitly to the extent to which individuals within an organization clearly understand, accept, and are committed to achieving clearly defined organizational goals [19]. In sustainability contexts, goal clarity encompasses explicit communication of environmental objectives, transparent articulation of expected behaviors, clear instructions on achieving these goals, and comprehensive understanding of individual roles in meeting sustainability targets. Clear environmental goals significantly reduce ambiguity and uncertainty, enhancing employee self-efficacy, intrinsic motivation, and behavioral alignment with organizational objectives [20]. Additionally, organizations that establish clear, specific, measurable sustainability goals enable employees to systematically monitor progress, facilitating effective feedback mechanisms and continuous improvement of pro-environmental behaviors [21].

Green behavior for sustainable development (pro-environmental behavior)

Green behavior for sustainable development, often termed pro-environmental behavior (PEB), refers to individual actions that contribute positively to environmental sustainability by reducing negative ecological impacts or actively improving environmental conditions [22]. Within organizational contexts, PEB includes behaviors such as energy conservation, waste reduction, recycling, sustainable commuting, and advocacy for sustainability initiatives [23]. Such behaviors are characterized by voluntary, discretionary actions beyond formal job requirements, motivated by intrinsic environmental values, personal commitment, or organizational citizenship behaviors towards the environment (OCBE). Employees engaging in pro-environmental behaviors significantly contribute to organizational sustainability by collectively reducing environmental footprints, enhancing organizational compliance with ecological regulations, and improving overall environmental performance [24].

2.4. Hypotheses development

2.4.1. Green transformational and authentic leadership and environmental consciousness

Leadership significantly influences employees' psychological states and attitudes within organizations. Green transformational leadership, characterized by the articulation of an inspiring sustainability vision and intellectual stimulation, fosters a heightened awareness and intrinsic motivation among employees towards environmental issues [23]. Leaders employing transformational strategies actively communicate the severity of ecological challenges, the importance of collective environmental responsibility, and potential solutions, thereby enhancing employees' cognitive and affective dimensions of environmental consciousness [12]. By providing consistent examples of sustainable behaviors and openly supporting pro-environmental initiatives, transformational leaders help employees internalize these values and develop a deep-rooted commitment to environmental stewardship.

Similarly, green authentic leadership significantly influences environmental consciousness by fostering trust, transparency, and ethical congruence within sustainability contexts [24]. Authentic leaders consistently demonstrate genuine environmental commitments, transparently communicate environmental values, and consistently practice ethical behaviors. Such transparency builds trust and enhances the perceived authenticity of sustainability initiatives, thereby deepening employees' emotional connections to ecological goals and elevating their internalized commitment towards environmental protection [25]. Employees under authentic leaders tend to reflect similar ethical standards, amplifying their intrinsic motivation and affective concern toward sustainability.

Considering these arguments, the following hypotheses are proposed:

H1: Green transformational leadership positively influences employees' environmental consciousness.

H2: Green authentic leadership positively influences employees' environmental consciousness.

2.4.2. Green transformational and authentic leadership and green behavior for sustainable development

Green transformational leaders inspire employees to transcend self-interest and commit proactively to organizational sustainability objectives. By clearly articulating a compelling environmental vision and intellectually stimulating employees, transformational leaders encourage proactive, voluntary engagement in sustainable practices such as recycling, energy conservation, and waste reduction. Employees inspired by transformational leadership exhibit higher levels of pro-environmental behavior, perceiving sustainability as an intrinsic part of their roles rather than as an external imposition.

Green authentic leaders similarly drive employees toward sustainable behaviors by consistently demonstrating genuine, ethically aligned environmental practices. Authentic leadership fosters trust, ensuring that employees perceive organizational sustainability actions as sincere, transparent, and ethically justified. This perceived authenticity motivates employees to actively participate in voluntary environmental behaviors, enhancing intrinsic motivation, internal accountability, and pro-environmental actions. Consequently, the following hypotheses are posited:

H3: Green transformational leadership positively influences green behavior for sustainable development.

H4: Green authentic leadership positively influences green behavior for sustainable development.

2.4.3. Environmental consciousness and green behavior for sustainable development

Environmental consciousness, characterized by cognitive awareness, emotional concern, and intrinsic motivation regarding ecological issues, significantly predicts employees' pro-environmental behaviors [16]. Employees with heightened environmental consciousness are intrinsically motivated, perceiving sustainability behaviors as morally and ethically necessary. Such employees consistently engage in voluntary pro-environmental behaviors, including conservation practices, recycling efforts, and advocating sustainable practices among colleagues.

Empirical research supports a strong positive relationship between environmental consciousness and pro-environmental behaviors [18]. Employees who understand the consequences of environmental degradation, feel responsible for ecological outcomes, and emotionally engage with sustainability issues consistently demonstrate proactive sustainability actions, significantly enhancing organizational environmental performance.

Based on these theoretical foundations and empirical support, the following hypothesis is proposed:

H5: Employees' environmental consciousness positively influences their green behavior for sustainable development.

2.4.4. Mediating role of environmental consciousness

Environmental consciousness is hypothesized to mediate the relationship between green leadership (both transformational and authentic) and green behavior for sustainable development. Specifically, green transformational and authentic leaders enhance employees' environmental consciousness through inspirational communication, intellectual stimulation, transparent ethical actions, and consistent role-modeling of sustainability behaviors [23]. Enhanced environmental consciousness, in turn, translates into proactive and sustained engagement in pro-environmental behaviors.

Empirical evidence suggests that leadership styles influence pro-environmental behaviors indirectly, primarily through psychological mechanisms such as awareness, values internalization, and intrinsic motivation [26]. Employees under leadership that explicitly prioritizes and communicates sustainability are more environmentally aware, emotionally engaged, and intrinsically motivated, leading to consistent, voluntary sustainability behaviors. Thus, environmental consciousness acts as a critical intermediary psychological process that explains how and why green leadership translates into actual pro-environmental behaviors within organizational contexts.

Accordingly, the following mediation hypotheses are proposed:

H6: Environmental consciousness mediates the relationship between green transformational leadership and green behavior for sustainable development.

H7: Environmental consciousness mediates the relationship between green authentic leadership and green behavior for sustainable development.

2.4.5. Moderating role of goal clarity

Goal clarity also plays a moderating as mentioned in **Figure 1** role by strengthening the influence of environmental consciousness on green behaviors for sustainable development. When employees understand clearly articulated sustainability objectives, they are better able to translate their environmental consciousness into specific actions. Clear goals facilitate actionable strategies and enhance employees' self-efficacy, thereby significantly amplifying the relationship between employees' environmental consciousness and actual sustainability behaviors [19].

Thus, the following moderation hypothesis is proposed:

H8: Goal clarity moderates the relationship between environmental consciousness and green behavior for sustainable development, such that the positive relationship becomes stronger when goal clarity is high.

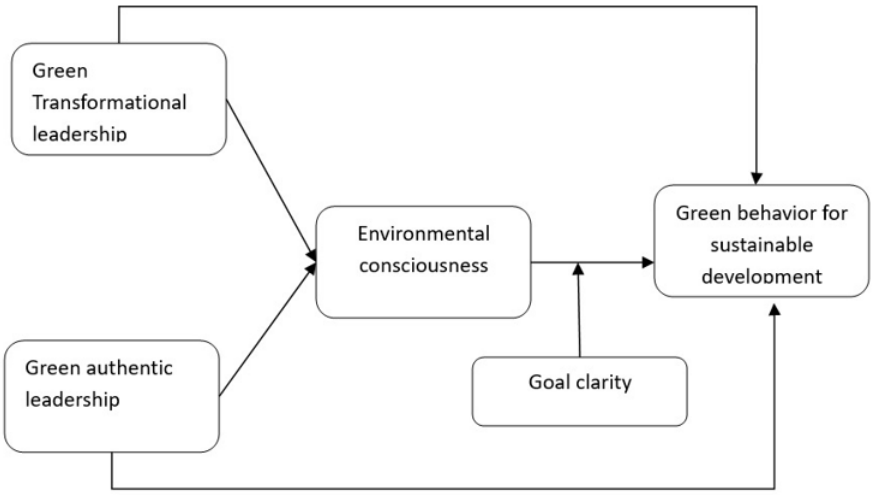

Figure 1. Conceptual model of study.

3. Methodology

3.1. Research design and approach

This study employed a quantitative research design utilizing a cross-sectional survey method to empirically examine the relationships depicted in the proposed theoretical model. A cross-sectional approach was selected due to its effectiveness in capturing data on leadership styles, psychological states, and behavioral outcomes at a specific point in time [27]. Additionally, the approach allows for robust statistical testing of hypotheses involving direct, mediating, and moderating relationships among the study variables.

3.2. Population and sample

The target population for this research comprised employees from various industries in China, representing diverse organizational contexts where sustainability initiatives are actively pursued. Employees at multiple hierarchical levels were selected to obtain comprehensive insights into how leadership styles influence sustainability behaviors across organizational roles. A purposive sampling technique was utilized, focusing on organizations actively implementing environmental initiatives, as this ensures respondents had relevant experience with organizational sustainability practices. The final sample included 420 respondents, an adequate size to conduct structural equation modeling (SEM) analyses effectively, as recommended by [28].

3.3. Data collection procedure

Data were collected using a structured self-administered questionnaire, distributed online via professional platforms, email, and mobile messaging applications (WeChat) commonly used in China. Participation was voluntary, and respondents were assured anonymity and confidentiality to encourage honest responses and minimize social desirability bias. Prior to data collection, ethical approval and organizational consent were obtained to comply with ethical research standards. Clear instructions accompanied the questionnaire to ensure respondent

clarity regarding the study objectives and questionnaire completion procedures.

3.4. Measures

Validated measurement scales from existing literature were utilized to ensure reliability and validity. Responses were recorded using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) to maintain consistency and facilitate statistical analysis.

3.5. Green transformational leadership

Green transformational leadership was measured using the 6-item scale developed by [23]. Sample items include "My supervisor articulates a clear vision for environmental sustainability" and "My supervisor encourages innovative thinking about environmental issues".

3.6. Green authentic leadership

To measure green authentic leadership, a 5-item adapted version of the Authentic Leadership Questionnaire (ALQ) was used, with environmental aspects explicitly integrated. Sample items included, "My supervisor demonstrates genuine environmental concern through consistent actions," and "My supervisor communicates environmental objectives transparently and honestly".

3.7. Environmental consciousness

Environmental consciousness was measured through the 7-item scale adapted from [16] reflecting cognitive, affective, and behavioral intention dimensions. Representative items included "I am aware of the consequences of my actions on the environment" and "I feel a moral obligation to protect the environment".

3.8. Goal clarity

Goal clarity was assessed using the 5-item measure adapted from Locke and Latham's goal-setting research. Items included "Environmental goals in my organization are clearly communicated" and "I understand exactly what is expected from me to achieve environmental goals".

Green behavior for sustainable development (pro-environmental behavior)

Employees' pro-environmental behaviors were measured using a validated 8-item scale from [29], adapted specifically to the Chinese organizational context. Representative items included, "I regularly engage in practices aimed at reducing environmental harm at work," and "I actively participate in my organization's sustainability initiatives.

4. Results

For this study, we utilized SmartPLS (Partial Least Squares Structural Equation Modeling) to analyze data collected from 532 respondents. PLS-SEM is a robust analytical tool for testing complex theoretical models involving latent constructs, enabling simultaneous evaluation of measurement and structural models. The primary

aim of the analysis was to assess the relationships among green transformational leadership (GTL), green authentic leadership (GAL), environmental consciousness (EC), goal clarity (GC), and green behavior for sustainable development (EGB) [30].

4.1. Measurement model evaluation

Before assessing the structural relationships, we evaluated the measurement model to ensure the reliability and validity of the constructs. This assessment involved examining indicator loadings, internal consistency reliability, convergent validity, and discriminant validity.

4.2. Indicator loadings

Table 1 presents the outer loadings, which represent the association strength between indicators and their respective latent constructs. All indicators showed loadings exceeding the recommended threshold of 0.7 [27], except GAL4 (loading = 0.678), retained due to its theoretical significance.

Table 1. Outer loadings.

Indicators	EC	EGB	GAL	GC	GTL	GC × EC
EC1	0.832					
EC2	0.741					
EC3	0.800					
EC4	0.774					
EC5	0.832					
EGB1		0.867				
EGB2		0.844				
EGB3		0.868				
EGB4		0.865				
EGB5		0.882				
GAL1			0.838			
GAL2			0.816			
GAL3			0.828			
GAL4			0.678			
GAL5			0.762			
GAL6			0.774			
GAL7			0.833			
GAL8			0.802			
GC1				0.846		
GC2				0.796		
GC3				0.876		
GC4				0.844		
GTL1					0.769	
GTL2					0.708	
GTL3					0.747	

Table 1. (*Continued*).

Indicators	EC	EGB	GAL	GC	GTL	GC × EC
GTL4					0.798	
GTL5					0.835	
GTL6					0.806	
GTL7					0.855	
GTL8					0.681	
GTL9					0.692	
GC x EC						1.000

4.3. Construct reliability and validity

Table 2 presents the reliability and validity assessment results, including Cronbach's Alpha, composite reliability (CR), and Average Variance Extracted (AVE). All constructs surpassed the recommended thresholds, ensuring reliability and convergent validity.

Table 2. Construct reliability and validity.

Construct	Cronbach's Alpha	Composite Reliability	AVE
EC	0.855	0.896	0.634
EGB	0.916	0.937	0.749
GAL	0.915	0.931	0.629
GC	0.862	0.906	0.707
GTL	0.912	0.928	0.589

4.4. Discriminant validity: HTMT criterion

Table 3 demonstrates the discriminant validity through the Heterotrait-Monotrait ratio (HTMT). All HTMT values are below the threshold of 0.85, confirming the distinctiveness of constructs.

Table 3. HTMT matrix.

	EC	EGB	GAL	GC	GTL	GC × EC
EC						
EGB	0.762					
GAL	0.473	0.650				
GC	0.440	0.464	0.492			
GTL	0.519	0.666	0.359	0.270		
GC x EC	0.045	0.106	0.033	0.463	0.108	

4.5. Structural model evaluation

4.5.1. Direct path analysis

Table 4 provides the path coefficients for direct relationships among constructs. All hypothesized relationships were significant, confirming their positive associations.

Table 4. Direct paths.

Path	Path Coefficient (*β*)	*T*-Statistic	*P*-value
EC → EGB	0.372	9.281	0.000
GAL → EC	0.296	7.031	0.000
GAL → EGB	0.280	7.417	0.000
GC → EGB	0.145	3.265	0.001
GTL → EC	0.370	7.119	0.000
GTL → EGB	0.294	7.727	0.000

4.5.2. Mediation analysis

Table 5 demonstrates the mediation results. Environmental consciousness partially mediated the relationships between both types of green leadership and green behavior.

Table 5. Mediation analysis.

Mediation Path	Effect (*β*)	*T*-Statistic	*P*-value
GAL → EC → EGB	0.110	5.918	0.000
GTL → EC → EGB	0.138	5.574	0.000

4.5.3. Moderation analysis

Table 6 shows the moderation effect of goal clarity, which significantly strengthens the relationship between environmental consciousness and green behavior.

Table 6. Moderation analysis.

Interaction Path (Moderator)	Effect (*β*)	*T*-Statistic	*P*-value
GC x EC → EGB	0.168	4.679	0.000

Table 7 indicates the explanatory power of the model, demonstrating robust predictive ability.

Table 7. R^2 and adjusted R^2 values.

Construct	R^2	Adjusted R^2
EC	0.299	0.296
EGB	0.676	0.673

These results confirm the robustness of the proposed theoretical model, demonstrating that green leadership significantly enhances employees' environmental consciousness and sustainable behaviors, with goal clarity playing a vital moderating role.

4.6. Discussion

The findings of this study offer critical insights into the interplay among GTL, GAL, EC, GC, and EGB within organizational sustainability contexts. The structural model tested via SmartPLS provided strong empirical support for the hypothesized

relationships.

Firstly, the results confirmed that GTL significantly influences EC ($\beta = 0.370$, $p = 0.000$) and EGB ($\beta = 0.294$, $p = 0.000$). This aligns with prior research suggesting that transformational leadership effectively promotes sustainability by shaping employees' intrinsic motivation, awareness, and proactive behavior toward environmental goals [12,23]. Similarly, GAL showed positive direct impacts on both EC ($\beta = 0.296$, $p = 0.000$) and EGB ($\beta = 0.280$, $p = 0.000$), supporting existing literature emphasizing authenticity, ethical consistency, and transparency as crucial elements in cultivating sustainable employee behaviors [31]. Thus, consistent with theory, employees perceive leaders who transparently demonstrate genuine environmental commitments as credible role models, significantly enhancing their EC and subsequent behaviors.

Further, EC demonstrated a significant and substantial positive impact on EGB ($\beta = 0.372$, $p = 0.000$), confirming theoretical propositions that heightened awareness, affective concern, and personal responsibility directly translate into sustainable actions [18, 16]. The mediation analyses revealed that EC partially mediated relationships between GTL and EGB ($\beta = 0.138$, $p = 0.000$) and between GAL and EGB ($\beta = 0.110$, $p = 0.000$). This mediation provides evidence that EC acts as a critical psychological mechanism, explaining how green leadership influences EGB. These findings contribute to the leadership and sustainability literature by empirically validating EC as a key intermediary between leadership practices and employee sustainability outcomes.

Additionally, GC exhibited significant direct effects on EGB ($\beta = 0.145$, $p = 0.001$), albeit weaker than leadership and consciousness factors. However, its moderating role proved substantial ($\beta = 0.168$, $p = 0.000$), emphasizing that clearly articulated goals substantially amplify the positive influence of EC on employees' sustainable behaviors. These results support prior goal-setting literature, underscoring the crucial role clear sustainability objectives play in transforming abstract consciousness into concrete sustainability actions. The moderation effects further illustrate that organizations aiming to enhance sustainability outcomes must pair elevated employee awareness with explicitly communicated, measurable sustainability goals.

Overall, the structural model's high explanatory power (EGB $R^2 = 0.676$, EC $R^2 = 0.299$) confirms the robustness of the proposed theoretical framework, providing empirical evidence of significant interplay among leadership styles, psychological processes, and practical sustainability behaviors within organizations.

4.7. Practical implications

These findings have substantial practical implications. Firstly, organizations should adopt and integrate GTL and GAL practices as strategic managerial approaches to improve sustainability outcomes. Specifically, organizations should emphasize the selection, training, and development of leaders capable of articulating inspiring environmental visions, transparently demonstrating authentic environmental commitments, and consistently modeling sustainable behaviors.

Secondly, managers should focus systematically on enhancing employees' EC

through targeted educational initiatives, structured sustainability training, awareness campaigns, and internal communication that reinforce the cognitive, affective, and motivational dimensions of environmental responsibility. Fostering employees' EC not only enhances direct sustainability behaviors but also serves as a crucial mechanism through which leadership influences long-term environmental outcomes.

Thirdly, the significant moderating role of GC highlights the necessity for clear, explicit, and measurable sustainability objectives. Organizations should develop and communicate clear sustainability targets, ensure transparent progress reporting, and provide consistent feedback to maintain and enhance employee engagement. By coupling elevated EC with explicit goal-setting practices, organizations can effectively maximize employees' voluntary engagement in sustainability actions, ensuring robust, sustained environmental outcomes.

From a strategic perspective, organizations operating in contexts similar to China's, characterized by strong regulatory pressures and collective societal expectations, must strategically leverage the interplay between green leadership, EC, and GC. Specifically, integrating leadership practices that reflect cultural values and emphasizing collective responsibility and societal norms could further strengthen employees. This research aimed to comprehensively address the scope of the topic; however, there are some limitations regarding the generalizability of the findings. As the study was conducted within the context of China, future researchers are encouraged to test the model in other countries to enhance its applicability across different cultural and geographic settings.

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