Leading by example: understanding the trickle-down effect of voluntary green behavior in the workplace

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Abstract

Purpose – Drawing on the framework of the trickle-down effect and social learning theory, this study aims to examine how and when leaders' voluntary green behavior (VGB) stimulates that of employees.

Design/methodology/approach – This study conducted a time-lagged multisource field survey. The final sample consisted of 417 employees matched to 67 leaders. The unconflated multilevel modeling (MLM) approach was employed.

Findings – A social learning mechanism underlies the trickle-down effect of leaders' VGB, which involves observation and imitation. The green role model influence serves as a mediator of these two processes. Moreover, leader-member exchange (LMX) moderates the strength of the social learning mechanism.

Practical implications – Leaders can gain useful insights of how to promote employees' VGB and are further inspired to reflect on the managerial philosophy of leading by example.

Originality/value – This study contributes to workplace green behavior literature by examining the trickle-down effect of leader VGB and uncovering a social learning mechanism. This study also offers promising directions for leadership research concerning about role modeling.

Keywords Voluntary green behavior, Trickle-down effect, Social learning theory, Leader-member exchange

Paper type Research paper

To mitigate the ongoing ecological deterioration and respond to growing public concerns about the consequences of climate change and other environmental issues, organizations worldwide are making efforts to improve their environmental responsibility and performance (Bresciani *et al.*, 2023; Schillebeeckx *et al.*, 2022). Scholars have suggested that successful green practices among organizations rely to a large extent on collective efforts by employees, including the accumulation of green behaviors (Tang *et al.*, 2023; Zacher *et al.*, 2023). Recently, a growing body of research has focused on workplace green behavior, particularly voluntary green behavior (VGB) (e.g. Ahmad *et al.*, 2021; Kim *et al.*, 2017; Ren *et al.*, 2023), defined as "discretionary employee actions that contribute to the environmental sustainability of the employer organization but are not under the control of any formal environmental

management policies or system" (Kim *et al.*, 2017, p. 1337). Workplace VGB includes actions such as saving office supplies and separating trash at source (Kim *et al.*, 2019).

Due to its voluntary and spontaneous nature, scholars have shown great interest in exploring the antecedents of VGB (e.g. Kim *et al.*, 2017; Shah and Soomro, 2023). Among these, leadership—which includes different notions such as environmental transformational leadership (Graves and Sarkis, 2018) and ethical leadership (Ahmad *et al.*, 2021)—has emerged as an important antecedent. These studies showed that leaders can elicit employees' pro-environmental motivations by leading in certain ways. The present study aims to advance this research stream by examining the role of leading by example (also termed leading by doing). Adding the concept of leading by example to VGB literature is important, because organizations typically cannot rely on formal systems of skill training, position description and rewards to facilitate VGB.

The notion of leading by example suggests that, rather than only providing verbal instructions, leaders should personally engage in desired behaviors to influence subordinates (Eldor, 2021). Essentially, leading by example reveals a trickle-down effect, which describes how perceptions, feelings, attitudes and behaviors flow down the organizational hierarchy (Wo *et al.*, 2019). To date, the trickle-down effect has been found to operate in various organizational aspects such as trustworthiness (De Cremer *et al.*, 2018), empowerment (Byun *et al.*, 2020) and incivility (Xiao and Mao, 2022). Accordingly, this study proposes a trickle-down effect of VGB, for which the underlying mechanism is social learning. According to social learning theory, individuals' behaviors are driven by observing and then emulating behaviors of credible role models (Bandura, 1977, 1986).

Specifically, in the observation process, employees determine which behaviors are acceptable and desirable in the workplace by attending to and observing credible and appealing leaders (Bandura, 1977, 1986). In the imitation process, employees tend to mimic leaders and thereby engage in similar behaviors to those that have been judged as acceptable and desirable. These two processes suggest that leaders will serve as green role models when employees notice their leaders exhibiting VGB (Ogunfowora, 2014). Furthermore, the framework of the trickle-down effect suggests that the observers' processing route (i.e. central or peripheral) has implications for the strength of the effect (Wo *et al.*, 2019). This is consistent with social learning theory, which posits that observers will learn more from targets who are reliable, likable and respectable (Bandura, 1977, 1986). In line with these logics, this study proposes that the relationship between leader VGB and green role model influence is constrained by leader-member exchange (LMX) (Graen and Uhl-Bien, 1995), which describes the quality of the social relationships between leaders and employees.

The theoretical contributions made by this study are threefold. First, we explicitly examine the role of leading by example in facilitating employee VGB, which contributes to research on organizations' ecological imperatives. By conducting the unconflated multilevel modeling (MLM) analysis, we simultaneously highlight the importance of leaders' exhibition of VGB and employees' perception to leader VGB in driving role modeling. Second, we capture a social learning process underlying the trickle-down effect of VGB, enabling us to better understand how leader VGB can be learned by employees. Third, our work provides nuanced knowledge regarding the conditions under which VGB will be most strongly stimulated in the context of social learning. Figure 1 presents our proposed research model.
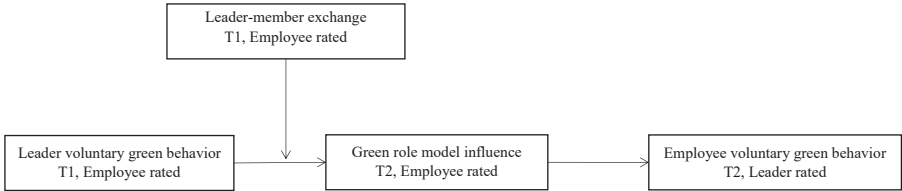

Figure 1.
The proposed model of the current research

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Theoretical foundation and hypotheses development
The trickle-down effect of VGB
With respect to green behavior literature, researchers use different names to represent VGB, such as voluntary pro-environmental behavior, voluntary eco-friendly behavior and organizational citizenship behavior towards the environment (Zacher *et al.*, 2023). Despite the differences in naming, the connotations of these concepts are highly similar; they all refer to discretionary, positive and environmentally friendly behaviors. The present study utilizes the term VGB as it has relatively broad implications and is predominantly used in existing literature. Studies that examined specific leadership as the antecedent of employee VGB have emphasized that leaders can stimulate employee VGB in various ways, such as by describing a future where work activities are environmentally sustainable (Graves and Sarkis, 2018). The trickle-down effect of VGB, however, offers a different perspective; it explicitly depicts how leader VGB flows down to employees through organizational hierarchy (Wo *et al.*, 2019).

This study theorizes the trickle-down effect of VGB from the perspective of social learning. As suggested by social learning theory, employees come to understand what is expected of them and how to behave properly not only through direct personal experiences, but also by observing and modeling others (Bandura, 1977, 1986). When choosing role models, employees are likely to attend to individuals that are considered credible, appealing and authoritative (Greenbaum *et al.*, 2018). Given their relatively high position, social status and power in organizations, leaders are usually considered as role models (Lian *et al.*, 2022; Xiao and Mao, 2022). Hence, when employees notice their leaders exhibiting VGBs, they are likely to engage in these behaviors too. Based on the above arguments, this study posits a positive and direct relationship between leader and employee VGB. Thus, we hypothesize:

H1. Leader VGB is positively related to employee VGB.

Green role model influence as a mediator
As discussed above, the social learning process of VGB involves two stages (Bandura, 1977, 1986). In the observation stage, employees learn from role models (i.e. leaders) by observing their behaviors and judging which behaviors are socially acceptable (Greenbaum *et al.*, 2018). Accordingly, employees can acquire information from their observations and then evaluate the appropriateness of the observed behaviors. In fact, VGB not only plays an important role in boosting organizations' environment management systems (Zacher *et al.*, 2023), but can also promote the social status and reputation of the individual that has demonstrated commendable green initiatives (Ahmad *et al.*, 2021). Taken together, when observing the VGB of leaders, employees are likely to view leaders as green role models. Therefore, we hypothesize:

H2. Leader VGB is positively related to green role model influence.

In the imitation process, leaders' green role model influence motivates employees to mimic VGB (Bandura, 1977, 1986). Role model influence is often considered a psychological stimulus for observers to exhibit similar behaviors (Ogunfowora, 2014), which implies that leaders' green role model influence will stimulate employees to exhibit VGB. Specifically, employees will have a willingness to exhibit VGB because they understand that such behavior is encouraged and expected by leaders. Not only that, employees are motivated to engage in VGB because they have observed the specific action of VGB, meaning that they have adequate knowledge about how to perform VGB by themselves. This argument is based on a competence perspective which roots in social learning theory rather than instinctive reaction view (Greenbaum *et al.*, 2018; Mawritz *et al.*, 2012). In sum, we propose

that leader green role model influence has a significant impact on employee VGB. Further, the processes of observing and imitating VGB are connected by green role model influence. Taken together, we hypothesize the:

H3. Green role model influence is positively related to employee VGB.

H4. Green role model influence mediates the positive association between leader VGB and employee VGB.

LMX as boundary condition

According to the trickle-down effect framework (Wo *et al.*, 2019), the strength of trickle-down effect is dependent on observers' motivation and ability to process information. In this regard, leader VGB is more likely to flow down to the employee level if employees have a strong motivation and ability to process information about leader VGB. Moreover, as suggested by social learning theory (Bandura, 1977, 1986), individuals' proximity to, identification with and admiration of role models will influence the extent to which employees observe role models' behaviors. This study predicts that high-quality LMX will enhance the observation process, because high-LMX leaders are often perceived to be well-liked, trusted and respectable role models that encourage employees to approach them both physically and psychologically (Graen and Uhl-Bien, 1995).

Employees in high-LMX relationships have more opportunities to communicate and interact with leaders (Graen and Uhl-Bien, 1995). As such, leaders are highly visible, making their behaviors also more observable. Due to the rich socioemotional bond, employees will be more attentive to and accepting of their leaders' behavior (Greenbaum *et al.*, 2018). Moreover, the high levels of liking, trust, respect and identification inherent in high-quality LMX drive employees to pay particular attention to leaders' behaviors (i.e. central information processing route; Wo *et al.*, 2019). In contrast, when LMX is characterized as low quality, interactions between leaders and subordinates are based on transactional (rather than socioemotional) roles, expectations and behaviors (Matta *et al.*, 2015). In this case, the relationship between leaders and employees is less rich, weakening employees' observation of leader VGB (i.e. peripheral information processing route; Wo *et al.*, 2019). Therefore, we hypothesize the following:

H5. LMX moderates the positive relationship between leader VGB and green role model influence, such that the relationship is strong (weak) when LMX is high (low).

A moderated mediation model

In sum, this study has associated leader VGB and employee VGB through the trickle-down effect framework (Wo *et al.*, 2019). In accordance with social learning theory (Bandura, 1977, 1986), we theorize the association as a social leaning process involving observation and imitation. As such, leader green role model influence plays a mediating role in the relationship of leader VGB and employee VGB. Moreover, this study argues that the strength of observation is constrained by the quality of LMX. These arguments indicate a conditional indirect effect of leader VGB on employee VGB via green role model influence at high versus low levels of LMX. Taken together, we propose the following moderated mediation hypothesis:

H6. The indirect effect of leader VGB on employee VGB via green role model influence is moderated by LMX, such that the indirect effect is strong (weak) when LMX is high (low).

Methodology
Samples and procedures
This study conducted a time-lagged multisource survey study at serval manufacturing enterprises in Shanghai, China. The time-lagged multisource survey was designed to minimize common method variance (Spector *et al.*, 2019). We visited these manufacturing enterprises and introduced our research purpose, content and procedures. After obtaining their approval, we solicited employees' participation by stating the voluntariness of their participation, assuring confidentiality of their responses and providing them with incentives (i.e. ¥20 cash coupon and a USB flash drive). Eight hundred fifty-six employees expressed interests in participating in our study.

The sampled employees and leaders were working in functional departments, including finance, human resource, quality inspection, etc. In the Time 1 survey, 592 employees (response rate = 69.16%) returned their responses on leader VGB, LMX and demographic information. Two months later (Time 2), we distributed questionnaire to those who had taken part in the Time 1 survey. In this wave, 455 employees (response rate = 76.86%) evaluated green role model influence. Meanwhile, we asked their immediate leaders to rate on employee VGB. After matching Time 1 and Time 2 questionnaires via a unique code (i.e. the last four digits of their mobile number), 38 questionnaires were eliminated.

In total, the final sample consisted of 417 employees matched to 67 leaders. Specifically, the ratio of sampled male (54.92%) to female (45.08%) employees was roughly equal. Nearly half of the sampled employees had earned a junior college degree or above (41.73%). They were on average 35.21 years old ($SD = 6.95$) and had an organizational tenure of 7.87 years ($SD = 7.07$). The average dyadic tenure with leaders was 4.43 years ($SD = 4.33$). Each leader on average supervised 6.22 employees ($SD = 2.18$). Of the leader respondents, 62.69% were male and 65.67% had bachelor or above education. The average age of leaders was 37.15 years ($SD = 6.17$) and the average organizational tenure of leaders was 8.36 years ($SD = 4.36$).

Measures
All constructs were measured utilizing scales adapted from extant literature. We followed a back-translation procedure to generate a Chinese version of each of the measures (Brislin, 1986). VGB was originally measured on a 6-point Likert-type scale (Kim *et al.*, 2017), while the other measures used 5-point scales. To keep the consistency of magnitude, we unified all measures into 5-point Likert-type scales, ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Leader VGB. The six-item scale developed by Kim *et al.* (2017) was used to measure leader VGB in the Time 1 survey. A question stem (i.e. "How frequently does your immediate leader do the following?") was presented. A sample item was "My immediate leader sorts recyclable materials into their appropriate bins when others do not recycle them." The Cronbach's alpha was 0.72.

LMX. Employees provided ratings of LMX using a seven-item scale developed by Graen and Uhl-Bien (1995) in the Time 1 survey. A sample item was "My immediate leader understands my job problems and needs." The Cronbach's alpha was 0.93.

Green role model influence. We measured green role model influence using Ogunfowora's (2014) three-item scale. Since the scale was originally designed to measure the role model influence of leaders' ethical behaviors, we slightly revised it to reflect on green role model influence. A sample item was "When faced with environmental issues at work, I usually follow the examples of what my immediate leader did in the past." The Cronbach's alpha was 0.92.

Employee VGB. Leaders provided ratings of employee VGB using the six-item scale developed by Kim *et al.* (2017) in the Time 2 survey. A sample item was "This employee [name] sorts recyclable materials into their appropriate bins when others do not recycle them." The Cronbach's alpha was 0.85.

Control variables. We controlled for employee gender, age, education and organizational tenure as they represent possible confounding variables on the demonstration of VGB. We also controlled for the dyadic tenure between subordinates and immediate leaders because it may affect the observation and imitation process (Greenbaum *et al.*, 2018). This study also included team size as control variable at group level. Moreover, we controlled for employee environmental attitude using an eight-item scale developed by Bamberg (2003), because one's environmental attitude has direct impact on their VGB (Graves and Sarkis, 2018). A sample item was "For the benefit of the environment we should be prepared to restrict our momentary style of living." The Cronbach's alpha was 0.91.

Statistical analyses

Since our data reflected a nested structure (i.e. multiple subordinates reported to the same leader), the assumption of independence of observations was violated. Therefore, this study utilized MLM method (González-Romá and Hernández, 2017). However, as suggested by Zhang *et al.* (2009), typical MLM models often conflate between-group and within-group effects. Their work recommended the CWC(M) (i.e. centered within context with reintroduction of the subtracted means) approach to overcome the potential confounding (Zhang *et al.*, 2009). Meanwhile, although the studied variables were conceptualized and measured at within-group level, this study was also interested in investigating the between-group effect. Taken together, this study utilized unconflated MLM method to separately report the between-group and within-group results of the direct and mediating effect. Accordingly, intraclass correlations (ICCs) were calculated. Specifically, ICC(1) and ICC(2) values were 0.30 and 0.73 for leader VGB, indicating that there is meaningful variance at the group level and that differences among groups can be reliably measured. The r_{wg} value for leader VGB also suggested a high-level agreement among employees in the same group ($r_{wg} = 0.76$). All the hypotheses were examined in Mplus 7.4 (Muthén and Muthén, 2017). We entered the corresponding estimates into the Monte Carlo simulation [1] to derive the indirect effect's 95% confidence interval (Selig and Preacher, 2008).

Results

Confirmatory factor analysis

We conducted confirmatory factor analysis to examine the distinctiveness of the main variables involved in this study. The results are presented in Table 1. As shown, the hypothesized 4-factor model yields good fit ($\chi^2 = 512.75$; $df = 203$; $\chi^2/df = 2.53$; comparative fit index (CFI) = 0.92; Tucker–Lewis index (TLI) = 0.91; root mean square error approximation (RMSEA) = 0.06; standardized root mean square residual (SRMR) = 0.05). This measurement model fits the data better than other competing models. These results provide evidence of the distinctiveness of the four constructs.

Descriptive statistics

Table 2 shows the means, standard deviations, intercorrelations and internal consistencies of study variables. As shown, employee VGB is positively correlated with leader VGB ($r = 0.23$, $p < 0.001$), green role model influence ($r = 0.36$, $p < 0.001$) and green attitude ($r = 0.15$, $p < 0.01$). The observed correlation pattern is consistent with our predication, providing preliminary basis for hypothesis testing.

Hypothesis tests

As shown in Table 3, the relationship of leader VGB and employee VGB is significant at both within-group level ($\beta = 0.14$, standardized error (*SE*) = 0.07, $p < 0.05$, Model 1) and between-

Models	χ^2	df	χ^2/df	$\triangle\chi^2(df)^a$	RMSEA	CFI	TLI	SRMR
Hypothesized 4-factor model	512.75	203	2.53	–	0.06	0.92	0.91	0.05
Alternative 3-factor model (LVGB and EVGB combined)	838.67	206	4.07	325.92 (3)***	0.09	0.85	0.83	0.09
Alternative 3-factor model (LVGB and GRMI combined)	1326.66	206	6.44	813.91 (3)***	0.11	0.73	0.69	0.10
Alternative 2-factor model (LVGB, GRMI, and EVGB combined)	1624.64	208	7.81	1111.88 (5)***	0.13	0.66	0.62	0.11
Alternative 2-factor model (LVGB, LMX, and GRMI combined)	1998.77	208	9.61	1486.02 (5)***	0.14	0.56	0.52	0.12
Alternative 1-factor model (all five constructs combined)	2289.50	209	10.96	1776.74 (6)***	0.16	0.49	0.44	0.14

Note(s): N = 417. LVGB = leader voluntary green behavior; GRMI = green role model influence; LMX = leader-member exchange; EVGB = employee voluntary green behavior. ^{a}All models are compared with the hypothesized 4-factor model
***p < 0.001
Source(s): Created by authors

Table 1.
Comparison of
measurement models

group level (β = 0.28, SE = 0.09, p < 0.01, Model 4). These results support H1. For within-group mediation, leader VGB is significantly related to green role model influence (β = 0.26, SE = 0.11, p < 0.05, Model 2) and green role model influence is significantly related to employee VGB (β = 0.23, SE = 0.06, p < 0.001, Model 3; *mediating effect* β = 0.06, SE = 0.06, p < 0.05, *95% confidence interval (CI)* = [0.01, 0.12]). For between-group mediation, leader VGB is significantly related to green role model influence (β = 0.66, SE = 0.16, p < 0.001, Model 5) and green role model influence is significantly related to employee VGB (β = 0.22, SE = 0.16, p < 0.001, Model 6; *mediating effect* β = 0.14, SE = 0.05, p < 0.01, *95%CI* = [0.05, 0.23]). These results provide support for H2, H3 and H4.

Furthermore, as shown in Table 3, the interaction term of leader VGB and LMX is significantly related to green role model influence (β = 0.24, SE = 0.09, p < 0.05, Model 7). Simple slope analysis reveals that leader VGB is significantly related to green role model influence when LMX is "high" (β = 0.52, SE = 0.15, p < 0.01), whereas the relationship is nonsignificant when LMX is "low" (β = 0.11, SE = 0.11, *n.s.*). Results also show that the difference of the indirect effect is significant (β = 0.41, SE = 0.16, p < 0.05). Figure 2 illustrates the interaction. Thus, we obtain support for H5.

The conditional indirect effect results are presented in Table 4. As indicated, the indirect effect of leader VGB on employee VGB via green role model influence is significant and positive when LMX is high (β = 0.12, SE = 0.05, p < 0.05, *95%CI* = [0.03, 0.21]). However, the indirect effect is not significant when LMX is low (β = 0.03, SE = 0.03, *n.s.*, *95%CI* = [−0.03, 0.08]). Results also show that the difference of the indirect effect is significant (β = 0.10, SE = 0.05, p < 0.05, *95% CI* = [0.01, 0.18]). Altogether, these results provide support for H6.

According to Bernerth and Aguinis's (2016) suggestion, we also performed all the analyses without control variables and found similar results (i.e. the detailed results are available on request from the corresponding author).

Discussion
In recent years, workplace green behavior has emerged as a growing field of environmental sustainability and organizational behavior research (Tang *et al.*, 2023; Zacher *et al.*, 2023). Although various types of leadership have been found as critical antecedents, the specific mechanism of role model influence remains underexplored. Drawing on the trickle-down

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
Within-group level												
1. Employee gender	1.55	0.50	–									
2. Employee age	35.21	6.95	-0.07	–								
3. Employee education	1.54	0.74	-0.10*	0.13*	–							
4. Employee organizational tenure	7.87	7.07	-0.09	0.72***	0.07	–						
5. Employee dyadic tenure with leader	4.43	4.33	-0.09	0.41***	0.08	-0.53***	–					
6. Employee green attitude	4.37	0.62	-0.06	-0.07	-0.07	-0.10*	-0.01	–				
7. Leader VGB	3.96	0.79	0.08	-0.09	-0.13*	-0.12*	-0.02	0.43***	–			
8. Green role model influence	3.57	1.02	0.05	0.13**	-0.02	-0.12*	0.02	0.21***	0.30***	–		
9. LMX	3.65	0.86	0.17***	-0.12*	-0.01	-0.17***	-0.00	0.31***	0.41***	0.36***	–	
10. Employee VGB	3.69	0.71	-0.03	-0.04	-0.05	-0.05	-0.00	0.15**	0.23***	0.36***	0.19***	–
Between-group level												
Team size	6.22	2.18										

Note(s): $N = 417$. SD = standard deviation. Gender is coded as 1 = female, 2 = male. Education is coded as 1 = high school or below, 2 = junior college, 3 = bachelor, 4 = postgraduate. VGB = voluntary green behavior; LMX = leader-member exchange
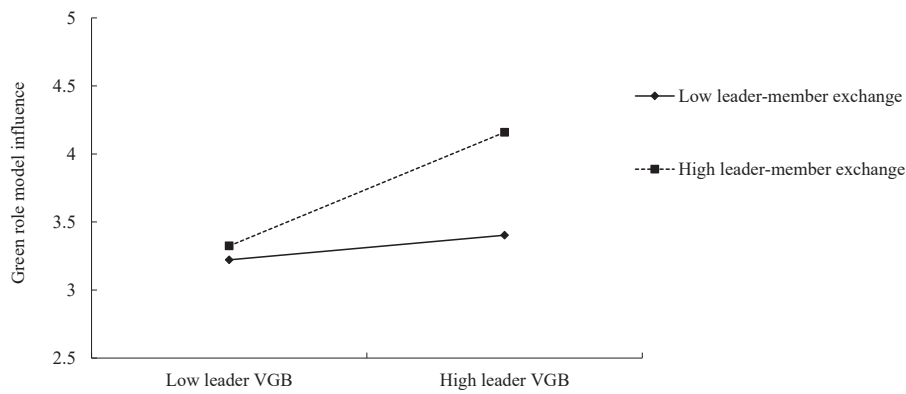*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source(s): Created by authors

Voluntary
green behavior
in the
workplace

Variables	Within-group level			Between-group level			
	Main effect	Mediating effect		Main effect	Mediating effect		Moderation effect
	Employee VGB Model 1	GRMI Model 2	Employee VGB Model 3	Employee VGB Model 4	GRMI Model 5	Employee VGB Model 6	GRMI Model 7
Control variables							
Employee gender	−0.09 (0.07)	0.07 (0.10)	−0.12 (0.09)				−0.00 (0.10)
Employee age	−0.00 (0.01)	−0.02 (0.01)	0.00 (0.01)				−0.02 (0.01)
Employee education	−0.02 (0.04)	0.04 (0.06)	−0.04 (0.05)				0.04 (0.06)
Employee organizational tenure	−0.00 (0.01)	−0.00 (0.01)	0.00 (0.01)				−0.00 (0.01)
Dyadic tenure with leader	0.00 (0.05)	0.02 (0.01)	−0.01 (0.01)				0.01 (0.01)
Employee green attitude	0.05 (0.05)	0.17 (0.17)	0.03 (0.09)				0.06 (0.11)
Team size				0.01 (0.02)	−0.03 (0.03)	0.02 (0.02)	
Main predictors							
Leader VGB	0.14* (0.07)	0.26* (0.11)	0.08 (0.06)	0.28** (0.09)	0.66*** (0.16)	0.15 (0.09)	0.32** (0.10)
GRMI			0.23*** (0.06)			0.22*** (0.04)	
LMX							0.25*** (0.07)
Interactions							
Leader VGB × LMX							0.24* (0.09)
Coefficient and 95%CI		0.06* (0.03), [0.01, 0.12]			0.14** (0.05), [0.05, 0.23]		

Note(s): *N* = 417. Unstandardized coefficient estimates (and standard errors) are reported. VGB = voluntary green behavior; GRMI = green role model influence; LMX = leader–member exchange. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source(s): Created by authors

Table 3.
Unconflated MLM
results

Figure 2.
The interactive effect of leader VGB and leader-member exchange on green role model influence

Source(s): Created by authors

| Outcome | Moderator | Stage | | Effect | |
	LMX	First (P_{mx})	Second (P_{ym})	Indirect ($P_{mx} \times P_{ym}$)	95% CI of indirect effect
Employee VGB	High (+1 SD)	0.52** (0.16)	0.23*** (0.06)	0.12* (0.05)	[0.03, 0.21]
	Low (−1 SD)	0.11 (0.10)	0.23*** (0.06)	0.03 (0.03)	[−0.03, 0.08]
	Difference	0.41* (0.15)	–	0.10* (0.05)	[0.01, 0.18]

Note(s): $N = 417$. SD = standard deviation. VGB = voluntary green behavior; LMX = leader-member exchange. P_{mx} = path from leader VGB to green role model influence; P_{ym} = path from green role model influence to employee VGB
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source(s): Created by authors

Table 4.
First-stage, second-stage and conditional indirect effect results

effect framework (Wo *et al.*, 2019) and social learning theory (Bandura, 1977, 1986), this study examined the leadership approach of leading by example in facilitating employee VGB. This study adopted a series of measures to ensure the reliability and robustness of the findings, such as collecting time-lagged multisource data, including control variables and using unconflated MLM method. The findings are of interest for both scholars and practitioners.

Theoretical implications
This study offers several theoretical implications. First, we contribute to workplace environmental management research by empirically examining the role of leading by example in facilitating employee VGB. In recent years, environmental sustainability has become an ethical and strategic imperative for organizations. Accordingly, organizations have made increasing efforts to encourage and instruct employees to behave in eco-friendly way at the workplace (Dumont *et al.*, 2017; Tang *et al.*, 2023; Zacher *et al.*, 2023). Given that VGB is neither specified in job descriptions nor systematically monitored or rewarded (Kim *et al.*, 2017), our examination of leading by example suggest an alternative mechanism for stimulating VGB. Furthermore, the unconflated MLM examination reveals that successful role modeling of VGB requires leaders not only to personally engage in VGB but also ensures that the VGB can be observed by employees. This finding is novel as existing research on trickle-down effect has mainly highlighted the function of organizational hierarchy (Wo *et al.*, 2019).

Second, we shed light on the underlying social learning process that links leader VGB and employee VGB. To date, social exchange, displaced aggression and social learning are the three main theoretical perspectives explaining the trickle-down effect (Wo *et al.*, 2015). Among them, there is limited empirical research that has examined social learning as part of a mediating mechanism (De Cremer *et al.*, 2018; Mawritz *et al.*, 2012). This study explicitly examined the role of leader green role model influence as a mediator linking leader and employee VGB. The key foundation of green role model influence is the social learning (Eldor, 2021), indicating that individuals will strive to emulate their leaders' VGB to ensure that their actions are appropriate and expected.

Third, we provide insights into the boundary condition of the social learning process of VGB; namely, it is dependent on the quality of LMX, which helps us better understand the circumstances under which social learning is more salient (Chen *et al.*, 2021; Greenbaum *et al.*, 2018). Previous studies have mainly focused on individual factors such as psychological availability (Zhang *et al.*, 2020) and core self-evaluations (Lee and Duffy, 2019). To this end, we incorporate LMX literature into workplace green behavior research, enabling scholars to gain a more comprehensive understanding of the social learning process of VGB.

Practical implications
The findings of this study also provide useful practical insights for leaders and employees.

First, since the unconflated MLM test found that the trickle-down effect of VGB is significant at both within-group and between-group level, we can provide leaders with fresh managerial wisdom. Specifically, leaders are suggested to personally show employees the behaviors they expected. In other words, leaders can try to stimulate employee VGB by engaging in VGB themselves. As such, leading by example is not a peripheral attribute of leadership; rather, it substantively and directly impacts employees (Eldor, 2021). Additionally, when personally engage in VGB, leaders should also let employees see the behavior and then guide them to form appropriate perceptions. In short, leaders should keep in mind that "doing it and also making employees perceive it" when employing the approach of leading by example. For example, leaders could particularly exhibit VGB at public area where behaviors are more easily observed.

Second, since the strength of role model influence is constrained by LMX, we recommend that both leaders and employees should invest resources to develop high-quality LMX. This infuses leader–employee interactions with liking, respect and identification (Matta *et al.*, 2015). To this end, leaders should show more of their social qualities rather than relying on their position-based authority to increase the proximity of employees (Richter-Killenberg and Volmer, 2022). Meanwhile, employees should be proactive in approaching leaders and disclosing themselves. These suggestions are especially relevant in cultures with high power distance (Daniels and Greguras, 2014).

Limitations and future research directions
Although this study is at the forefront of understanding how leader VGB can stimulate that of their employees, our findings are limited in several ways. First, other factors that can significantly influence green behavior were not included in our theoretical model, such as green human resource management (Dumont *et al.*, 2017). We suggest future studies to incorporate more potential variables to examine how leaders can influence employee VGB. Second, although we conducted time-lagged multisource survey, we cannot make strong causal inferences, because there may also exist a trickle-up influence (i.e. social influence that is transmitted upward in the organizational hierarchy; Wo *et al.*, 2019). We advise future research to adopt different methodological designs (e.g. experiment) to support conclusions on causality. Last but not least, being motivated by social learning theory, this study focused

on employee perceptions of leader VGB rather than actual leader VGB. However, the unconflated MLM test showed that both within-group and between-group effect were significant. To this end, this study suggests scholars to establish a theory including both leader's actual behavior (between-group level) and employee's perception of the behavior (within-group level), which we believe can enrich research on trickle-down effect in organizational management.

Conclusion

Recognition of the role that leaders play in the successful stimulation of employee VGB is increasing, yet the specific approach of leading by example remains underexplored. The present study empirically examined the trickle-down effect of workplace VGB. Consistent with social learning theory, our findings indicate that employees tend to view leaders who engage in VGBs as green role models and then being motivated to mimic the observed behaviors. This social learning process will be more salient when leaders and employees have high-quality LMX. Our work indicates that leaders can play an important role in mitigating the ongoing ecological deterioration by encouraging employees to go the extra mile in green behaviors.

Note

1. Available at: http://quantpsy.org/medmc/medmc.htm

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