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Employee pro-environmental proactive behavior: the influence of pro-environmental senior leader and organizational support, supervisor and co-worker support, and employee pro-environmental engagement

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Organizations are increasingly being held to account by a broad range of stakeholders to deliver products and services in an environmentally sustainable way. Within this context, employees are increasingly being recognized as important to the successful implementation of organizational environmental policies, procedures, practices, and initiatives. For organizations to successfully achieve environmental objectives, they need to enable a range of supports that promote employee enthusiasm for pro-environmental action, and that motivate employees to proactively engage in pro-environmental behaviors. The present study contributes to the employee sustainability literature by showing how four different sources of pro-environmental support influence employee pro-environmental engagement and pro-environmental proactive behavior. More specifically, and drawing from organizational support and engagement theory, the study tests a model analysing the impact of pro-environmental senior leader support, pro-environmental organizational support, pro-environmental supervisor support, and pro-environmental co-worker support on pro-environmental engagement, and, in turn, on pro-environmental proactive behavior. On-line survey responses from 347 Australian employees aged from 18 to 80 years old, working full-time or part-time, in a variety of industries were analyzed. Confirmatory factor analyses and structural equation modelling revealed support for the validity of the measures and for the relationships proposed. Overall, taking account of direct and indirect effects, the model accounted for 64% of the variance in pro-environmental engagement, and 43% of the variance in pro-environmental proactive behavior. All four sources of support significantly predicted pro-environmental engagement and, as proposed supervisor, coworker support, and pro-environmental engagement predicted pro-environmental proactive behavior. Relative weights analysis established that pro-environmental coworker support was the strongest predictor of pro-environmental engagement and proactive behavior. The results extend pro-environmental engagement theory by showing how different sources of pro-environmental support influence employee pro-environmental motivation and proactive behavior. The research also extends previous theory and research by showing that pro-environmental engagement had a significant influence on employee proactive behavior. Overall, the research suggests that through a focus on the provision of a range of supports, organizations can

implement targeted and evidence-based employee-centred initiatives to become more sustainable, and to better meet their pro-environmental strategic goals.

KEYWORDS

pro-environmental engagement model, pro-environmental senior leader support, pro-environmental organizational support, pro-environmental supervisor support, pro-environmental co-worker support, pro-environmental employee engagement, pro-environmental proactive behavior

Introduction

Given the ongoing existential threat associated with the climate crisis, organizations now face increased public, shareholder, and regulatory scrutiny regarding their environmental responsibility and sustainability practices (Burnes, 2017; Zhou and Zheng, 2023). Although many organizations now routinely publish environmental targets, policies, and strategies, many organizational pro-environmental initiatives have been criticized for being tokenistic and for having ‘greenwashing’ as an underpinning motivation (de Freitas Netto et al., 2020; Gil-Cordero et al., 2021). As a result, researchers and organizations have been paying increased attention to identifying the factors that lead to genuine, sustained, and effective pro-environmental outcomes and performance (Boiral et al., 2018; Priyankara et al., 2018; Raineri and Paillé, 2016).

Within the range of strategies for improving organizational sustainability, researchers have increasingly focused on understanding how employees can make a contribution (Lamm et al., 2015; Priyankara et al., 2018). This focus has emerged because employees are at the ‘front-line’ of implementing top-down pro-environmental policies, and can provide innovative suggestions and practical solutions to sustainability problems and opportunities (Albrecht et al., 2022a). With the World Bank in 2023 estimating there were 3.6 billion workers around the world (<https://data.worldbank.org/indicator/SL.TLF.TOTL.IN>), the potential for employee driven initiatives to make substantial and meaningful differences to local and global sustainability outcomes remains a rich, yet under-utilized, resource and opportunity (Albrecht et al., 2022a). Consequently, researchers have focused on identifying the organizational-level and job-level factors that support and enable employees to feel motivated about, and to positively engage in, pro-environmental practices and initiatives.

Numerous theoretical bases have been used to explain the emergence and maintenance of employee pro-environmental attitudes and behaviors. Such theoretical bases include social exchange theory (Blau, 1967), social learning theory (Bandura, 1977), the theory of planned behavior (Ajzen and Fishbein, 1977), social identity theory (Mael and Ashforth, 1995), and self-determination theory (Deci and Ryan, 2000). To explain positive employee pro-environmental attitudes, Albrecht et al. (2022a, 2023) proposed a model of pro-environmental employee engagement based in the Job Demands-Resources (JD-R) theory of employee engagement (Bakker et al., 2023). Pro-environmental engagement theory draws on the compatibility principle within attitude theory (Ajzen and Fishbein, 1977) to suggest that attitude-to-attitude and attitude-to-behavior relationships will be strongest when the predicting attitudes are matched in specificity to the targeted attitude or behavior being predicted. As such, domain-specific constructs such as pro-environmental organizational support (Lamm et al., 2015) will

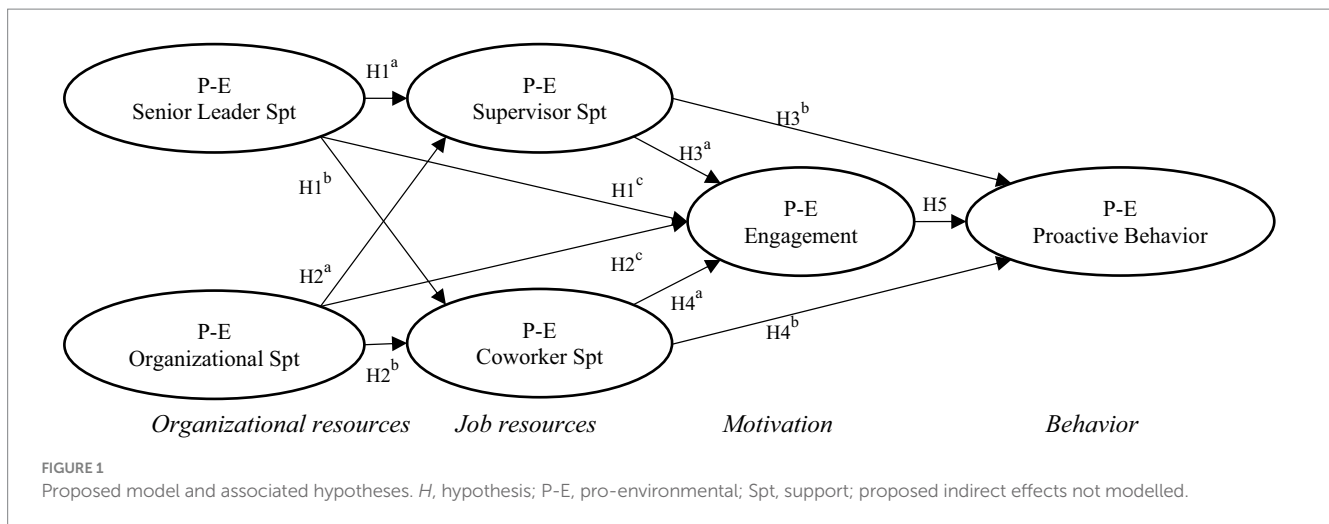
likely be more strongly related to pro-environmental motivation and behavior than more generic attitudes such as perceived organizational support (Eisenberger et al., 1986). Similarly, pro-environmental engagement, as a domain specific analog of employee engagement, will likely be more strongly related to pro-environmental behavior than would the more generic construct of job engagement.

Pro-environmental engagement has been shown to be directly and indirectly influenced by domain specific organizational-level resources such as perceived corporate environmental responsibility, and by domain specific job level resources such as employee pro-environmental autonomy and involvement in pro-environmental initiatives (Albrecht et al., 2022a). However, despite well-established theory and meta-analytic evidence showing that both organizational and job-level supports are important to employee experiences of job satisfaction, commitment and engagement (e.g., Mazetti et al., 2021; Riggle et al., 2009), the influence of different sources of pro-environmental support on pro-environmental engagement and pro-environmental proactive behavior has yet to be widely examined. As such, and as shown in Figure 1, the current research aimed to examine the influence of organization-wide pro-environmental supports (senior leader support, organizational support) on more proximal job-level pro-environmental supports (supervisor and co-worker support), and in turn, the direct and indirect influence of these supports on employee pro-environmental engagement and pro-environmental proactive behavior. The research also aimed to examine the proposed, and as yet, untested relationship between pro-environmental employee engagement and self-reported pro-environmental proactive behavior. The remainder of the introduction overviews the rationale for each of the proposed relationships and hypotheses shown in Figure 1.

Pro-environmental senior leader support

Although prior research has focused on the important influence of Chief Executive Officers (CEOs) as leaders of sustainability strategies (Fabrizi et al., 2014), Peters et al. (2019) argued in support of a broader and team focused definition of senior leadership when analyzing and evaluating sustainability performance. Typically, a senior leadership team consists of a CEO, CFO, CIO, and other divisional and functional heads who directly contribute to the formulation and execution of organizational strategy (Albrecht et al., 2018; Krause et al., 2023). Increasingly Chief Sustainability Officers (CSOs) are being included in senior leadership teams (Peters et al., 2019).

To achieve sustained and positive pro-environmental sustainability outcomes, senior leaders need to set and champion a clear pro-environmental direction and strategy, create alignment, and



maintain stakeholder commitment (Quinn and Dalton, 2009). Consistent with what has been recognized in the broader organizational change literature (Choi, 2011; Erwin and Garman, 2010), senior leader sponsored pro-environmental strategies and initiatives will rarely be effective unless they are enthusiastically embraced and adopted by employees (Paillé et al., 2013). Senior leaders therefore need to actively support supervisors, teams, and individual employees to willingly adopt and implement pro-environmental initiatives at their local level of functioning (Priyankara et al., 2018). In broad support of this proposition, research has shown that senior leader support has a positive influence on employee perceptions of supervisor support and co-worker support (Buttigieg and West, 2013), employee engagement (Albrecht et al., 2018), and employee green behavior (Quan et al., 2022).

Extrapolating from existing leadership, change and engagement theory and research, and extending previous pro-environmental engagement research (Albrecht et al., 2022a; Robertson and Barling, 2013), Figure 1 shows senior leader pro-environmental support being positively associated with pro-environmental supervisor support, pro-environmental co-worker support, and pro-environmental employee engagement (hypotheses H1^a-H1^c). Additionally, and although not explicitly modeled, given that pro-environmental senior leadership support has been shown to have an indirect effect, versus a direct effect, on employee green behavior (Caesens et al., 2016; Quan et al., 2022; Tian and Suo, 2021), it is proposed that pro-environmental senior leader support will have an indirect effect on employee pro-environmental proactive behavior through pro-environmental supervisor and co-worker support, and through pro-environmental employee engagement.

Pro-environmental organizational support

Perceived organizational support refers to the extent that employees perceive their organization values their contributions and is concerned about their welfare (Eisenberger et al., 1986). Meta-analytic research has established that perceived organizational support has a direct and positive influence on employee attitudes such as job satisfaction, commitment, and engagement (Ng and Sorensen, 2008). Research has also shown that perceived organizational support has an

indirect effect on employee behavioral outcomes such as proactive behavior through its influence on mediators such as employee engagement (Caesens et al., 2016).

Over the past few decades, and within the context of increasing awareness of the importance of organizational sustainability, researchers have extrapolated definitions and measures of employee perceived organizational support to the domain of pro-environmental organizational support (Lamm et al., 2015). With specific reference to employee contributions to organizational sustainability, Ramus (2001) reported that if employees perceive their organization has a genuine commitment to pro-environmental policy, this “more than doubled the probability that employees would have tried an environmental initiative” (p. 98). Nevertheless, researchers have yet to examine the potential explanatory role of job-level pro-environmental resources such as pro-environmental supervisor and coworker support on the relationships between pro-environmental organizational support and employee pro-environmental engagement and pro-environmental proactive behavior. Such potential relationships suggest that employees may, in part, attribute organizational support to their supervisor and coworkers as representative members of a supportive organization (Yoon and Thye, 2000).

Extrapolating from established relationships between organizational support and supervisor and co-worker support (Stinglhamber and Vandenberghe, 2003), it is here proposed that pro-environmental organizational support will be positively associated with pro-environmental supervisor support, pro-environmental co-worker support, and pro-environmental employee engagement (Figure 1, hypotheses H2^a-H2^c, respectively). It is also proposed that pro-environmental supervisor support and pro-environmental co-worker support will partially mediate the relationships between pro-environmental organizational support and employee pro-environmental engagement.

Pro-environmental supervisor support

Meta-analytic research has identified supervisor support as an important job-level resource that influences employee engagement (Lesener et al., 2019; Mazetti et al., 2021) and employee pro-active behavior (Hu et al., 2018). Similarly, and given that supervisors serve

are the primary conduit through which to motivate and support employee adoption of environmental strategy and innovations (Ramus, 2001), pro-environmental supervisor support has been shown to be positively associated with pro-environmental employee engagement (Albrecht et al., 2022a) and with pro-environmental green behavior and pro-environmental organizational citizenship behavior (Katz et al., 2022, 2023; Paillé and Meija-Morelos, 2019; Priyankara et al., 2018). These demonstrated relationships are consistent with social learning theory (Bandura, 1977) and social exchange theory (Blau, 1967) in that employees who see their supervisors voluntarily enacting and supporting pro-environmental initiatives and behaviors, will be more likely be motivated toward pro-environmental action and more likely to engage in pro-environmental behaviors. Therefore, as shown in Figure 1, it is proposed that pro-environmental supervisor support will be positively associated with pro-environmental employee engagement and pro-environmental proactive behavior (hypotheses H3^a and H3^b). Additionally, and consistent with JD-R theory (Bakker et al., 2023), pro-environmental supervisor support is proposed to have an indirect effect on employee pro-environmental proactive behavior through pro-environmental employee engagement.

Pro-environmental co-worker support

Pro-environmental co-worker support reflects the extent to which employees perceive their colleagues are supportive of, encouraging of, and have positive beliefs about environmental practices and initiatives at their work (Albrecht et al., 2023). Consistent with meta-analytic research that has established co-worker support is an important job resource that can influence employee engagement (Lesener et al., 2019; Mazetti et al., 2021), pro-environmental co-worker support has been shown to be associated with pro-environmental motivational constructs such as environmental commitment, employee pro-environmental engagement, and pro-environmental behavior (Afsar and Umrani, 2020; Albrecht et al., 2022a; Greaves et al., 2013; Katz et al., 2022). Katz et al. (2022), for example, showed that co-worker support had a stronger influence on employee task-related and proactive green behavior than well-established job characteristics such as job autonomy, supervisor support and job demands. However, and as previously noted, the influence of different sources of pro-environmental support on pro-environmental engagement and pro-environmental proactive behavior has yet to be widely examined. Therefore, to help advance an understanding of the pattern of influence of pro-environmental supports on the emergence and maintenance of pro-environmental motivation and behavior, Figure 1 shows pro-environmental co-worker support being directly associated with pro-environmental engagement (H4^a) and with pro-environmental proactive behavior (H4^b). Additionally, and consistent with JD-R theory (Bakker et al., 2023), pro-environmental co-worker support is proposed to also have an indirect effect on pro-environmental proactive behavior through its influence on pro-environmental engagement.

Pro-environmental engagement

Ongoing research and practitioner interest in employee engagement has been fuelled by multiple meta-analytic studies

demonstrating its significant influence on important outcomes such as employee wellbeing, job satisfaction, organizational commitment, turnover intention, and individual and organizational performance (Borst et al., 2020; Lesener et al., 2019; Mazetti et al., 2021; Neuber et al., 2021). Recently, researchers have broadened the scope of the work-focused employee engagement to include other 'domain-specific' engagement constructs such as 'change engagement' (Albrecht et al., 2022b, 2022c), 'engaging leadership' (Schaufeli, 2015), well-being engagement (Brokmeier et al., 2022), and pro-environmental engagement (Albrecht et al., 2022a, 2023).

Pro-environmental engagement has been defined as "an enduring and positive work-related psychological state characterized by genuine enthusiasm and willingness to support, adopt and promote work-related environmental sustainability" (Albrecht et al., 2022a; p. 2). Similar positive pro-environmental constructs such as employee environmental commitment (Paillé and Meija-Morelos, 2019), green engagement (Aboramadan, 2022), pro-environmental attitude (Bissing-Olson et al., 2013), and harmonious passion for the environment (Robertson and Barling, 2013) have been proposed and have been shown to lead to positive pro-environmental behaviors. However, many of these alternative constructs do not imply the same degree of enthusiasm and 'action readiness' for pro-environmental action as does pro-environmental engagement, and have not been explicitly embedded in a theoretical context such as pro-environmental engagement theory (Albrecht et al., 2023).

With respect to known organisational and job-level factors that influence pro-environmental engagement, Albrecht et al. (2022a, 2023) showed that organizational resources (e.g., perceived corporate environmental responsibility), pro-environmental job resources (e.g., pro-environmental information and involvement), and personal resources (e.g., pro-environmental meaningful work and PsyCap) are associated with pro-environmental employee engagement. Although the employee experience of support, manifested through multiple sources, has been shown to be important to employee engagement and to pro-environmental engagement, no research to date has established the nomological net that describes how different sources of supports influence pro-environmental engagement and pro-environmental behavior. The present study therefore aimed to make a contribution to the employee sustainability literature by proposing how four different sources of pro-environmental support influence employee pro-environmental engagement. Additionally, the present research responds to calls for further empirical research on how pro-environmental engagement relates to employee proactive pro-environmental behavior (Albrecht et al., 2022a, 2023).

Pro-environmental proactive behavior

Beyond being enthusiastic about pro-environmental initiatives, employees also need to be willing to proactively action pro-environmental initiatives and opportunities (Norton et al., 2014; Yuriev et al., 2018). That is, and consistent with attitude-behavior theory (Ajzen and Fishbein, 1977), any positive attitudes and motivation associated with employee pro-environmental engagement need to translate into tangible employee pro-environmental behavior (Zacher et al., 2023).

Employee pro-environmental behavior includes behaviors and actions that are linked to, and contribute positively to,

environmental sustainability (Magill et al., 2020; Norton et al., 2014). Pro-environmental behavior has been variously conceptualized in terms of role-mandated task behavior (e.g., using recycling procedures), pro-environmental organizational citizenship behaviors (Aboramadan, 2022; Paillé and Meija-Morelos, 2019), and pro-environmental proactive behavior (Paillé and Boiral, 2013).

Pro-environmental proactive behavior has been defined as extra-role or voluntary behaviors that go beyond an employee's expected or required formal duties (Paillé and Boiral, 2013) that are aimed at helping the workplace become more sustainable (Katz et al., 2023). Proactive pro-environmental behavior has been identified as a particularly strong means of effecting pro-environmental change (Daily et al., 2009) because individual self-initiated pro-active behavior can have a large cumulative impact on an organization's overall environmental performance (Lamm et al., 2013).

Given the important potential contribution that employee pro-environmental proactive behavior can make to organizational sustainability, and therefore to global sustainability (Albrecht et al., 2022a), it is important for researchers and practitioners to identify key resources and supports that organizations can put in place to achieve or exceed environmental goals and targets. As previously noted, and consistent with Figure 1, the current research examined the direct and indirect influence of distinct sources of organizational and job level support on employee proactive pro-environmental behavior. Furthermore, the research aimed to contribute to the literature by examining the previously unexamined link between employee pro-environmental engagement and proactive pro-environmental behavior.

Aims and hypotheses

The research aimed to test a model showing how pro-environmental senior leader support, pro-environmental organizational support, pro-environmental supervisor support, and pro-environmental coworker support directly and indirectly influence employee pro-environmental proactive engagement and pro-environmental proactive behavior. By testing the proposed model and associated hypotheses (see Figure 1), the study aimed to advance an understanding of the factors that drive employee pro-environmental proactive behavior. Based on pro-environmental engagement theory and previous research, it was hypothesized that:

H1: Pro-environmental senior leader support will be directly and positively associated with pro-environmental supervisor support^a, pro-environmental coworker support^b, and pro-environmental employee engagement^c.

H2: Pro-environmental organizational support will be directly and positively associated with pro-environmental supervisor support^a, coworker support^b, and pro-environmental employee engagement^c.

H3: Pro-environmental supervisor support will be directly and positively associated with pro-environmental employee engagement^a and pro-environmental proactive behavior^b.

H4: Pro-environmental coworker support will be directly and positively associated with pro-environmental employee engagement^a and pro-environmental proactive behavior^b.

H5: Pro-environmental employee engagement will be directly and positively associated with pro-environmental proactive behavior.

In addition to the proposed direct effects, and although not explicitly modeled in Figure 1, the following indirect effects are also proposed:

H6: Pro-environmental senior leader support and pro-environmental organizational support will be indirectly and positively associated with pro-environmental employee engagement and pro-environmental proactive behavior.

H7: Pro-environmental supervisor support and coworker support will be indirectly and positively associated with pro-environmental proactive behavior via pro-environmental employee engagement.

Method

Participants and procedure

Participants ($n = 347$) were recruited through Prolific, an online platform that enables researchers to access paid participants who meet specific inclusion criteria. Researchers have shown that data obtained from Prolific is comparable to that obtained from traditionally sourced data (Walter et al., 2019). Eligible participants were invited to complete a survey that included a Plain Language Statement approved by the researchers' university ethics committee.

To be eligible, participants had to be aged 18 or over, work a minimum of 15 h per week, and have worked for at least 3 months in an Australian organization with at least 15 employees. The sample consisted of 171 females (49.3%), 171 males (49.3%), with 5 participants responding "other" (1.4%). Participant ages ranged from 18 to 80 years (mean 34.39 years), and had a job tenure ranging from 6 months to 60 years. The employing organizations ranged in size from 15 to 300,000 employees, with respondents identifying as professionals (35.9%), clerical and administrative workers (16.3%), sales workers (10.5%), managers (9.8%), community and personal service workers (6.5%), machinery operators or drivers (0.7%), and "other" (11.1%). The participants reported working as team members (65%), team leaders (15.7%), managers (6.9%), or "other" (6.9%). Participants reported working full-time (59.2%), part-time (28.8%), or casually (10.8%) for more than 15 h per week.

An *a-priori* power analysis was performed to determine the sample size needed to confidently test the proposed model. The results showed that the obtained sample size of 347 participants exceeded the 161 participants required to achieve statistical power at 0.8 given an anticipated medium effect with a probability of $p = 0.05$ (Soper, 2022).

Measures

The measures of the six constructs included in the model, all referenced to the context of pro-environmental sustainability,

were drawn or adapted from previously validated scales. Respondents rated each item on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores reflecting more positive pro-environmental perceptions. As shown below, all alpha reliabilities, ranging from 0.89 to 0.97, exceeded the generally accepted criterion of 0.80 for adequate internal consistency (Nunnally and Bernsetin, 1994).

Pro-environmental senior leader support

Pro-environmental senior leader support was measured with four items adapted from a measure of generalized senior leader support (Albrecht et al., 2018). Example items included “Senior leaders actively encourage and support line managers and supervisors to promote environmentally sustainable work practices” and “Senior leaders are committed to the organization being environmentally sustainable” (see Table 1).

TABLE 1 Scale items, standardized loadings and common method bias loadings (in brackets).

Scale	Item	Loading (CMB loading)
<i>Pro-environmental organizational resources</i>		
Pro-environmental senior leadership support (PE-SLS)		
PE-SLS 1	Senior leaders in this organization actively promote environmental sustainability.	0.94 (0.86)
PE-SLS 2	Senior leaders are committed to the organization being environmentally sustainable.	0.95 (0.87)
PE-SLS 3	Senior leaders actively champion pro- environmental behaviour.	0.93 (0.86)
PE-SLS 4	Senior leaders actively encourage and support line managers and supervisors to promote environmentally sustainable work practices.	0.94 (0.85)
Pro-environmental organizational support (PE-OS)		
PE-OS 1	The organization values my contribution to environmental sustainability.*	0.85*
PE-OS 2	The organization would not ignore any complaint from me about environmental sustainability.	0.74 (0.64)
PE-OS 3	The organization really cares about my attitudes to environmental sustainability.	0.95 (0.82)
PE-OS 4	The organization very clearly shows respect for my views on environmental sustainability.	0.88 (0.75)
<i>Pro-environmental job resources</i>		
Pro-environmental supervisor support (PE-SS)		
PE-SS 1	The person I report to is supportive of environmental sustainability.	0.75 (0.64)
PE-SS 2	The person I report to is helpful to me in learning about how to work in a more environmentally sustainable way.	0.95 (0.79)
PE-SS 3	The person I report to actively encourages me to come up with ways to work in a more environmentally sustainable way.	0.93 (0.71)
Pro-environmental co-worker support (PE-CSpt)		
PE-CSpt1	My co-workers are helpful to me in learning about how to work in a more environmentally sustainable way.	0.91 (0.72)
PE-CSpt2	My co-workers actively encourage me to come up with ways to work in a more environmentally sustainable way.	0.92 (0.64)
PE-CSpt3	My co-workers believe it is important that our work is as environmentally sustainable as possible.	0.73 (0.58)
<i>Pro-environmental motivation</i>		
Pro-environmental engagement (PE-Eng)		
PE-Eng 1	I am enthusiastic about environmental sustainability initiatives in this organization.	0.80 (0.61)
PE-Eng 2	I feel energized about our environmental sustainability practices.	0.92 (0.78)
PE-Eng 3	I feel positive about the environmental sustainability implications of my job.	0.86 (0.75)
<i>Pro-environmental behavior</i>		
Pro-environmental proactive behavior (PE-PB)		
PE-PB 1	In my daily activities at work, I weigh the environmental consequences of my personal actions.*	0.80*
PE-PB 2	I propose new practices that improve my work group's environmental performance.	0.84 (0.73)
PE-PB 3	I voluntarily perform environmental actions and initiatives off my own bat in my daily activities.	0.62 (0.63)
PE-PB 4	In my daily activities, I initiate discussions with my colleagues about the environmental impact of our work.	0.82 (0.84)
PE-PB 5	I encourage my colleagues to adopt more environmentally conscious behaviors.	0.82 (0.84)
PE-PB 6	I actively participate in environmental events organized in and/or by my organization.*	0.86*
PE-PB 7	I volunteer for projects, endeavors or events that address environmental issues in my organisation.	0.79 (0.80)
PE-PB 8	I suggest new practices that could improve the environmental performance of my organisation.	0.87 (0.87)

*Excluded from respecified measurement and structural models on basis of modification indices.

Pro-environmental organizational support

Pro-environmental organizational support was measured using four items adapted from Paillé and Meija-Morelos (2019) and Eisenberger et al.'s (1986) widely validated measure of perceived organizational support. The items measured the degree to which survey respondents perceive their organization values and supports employee attitudes toward environmental sustainability. Items included “The organization really cares about my attitudes to environmental sustainability” and “The organization values my contribution to environmental sustainability.”

Pro-environmental supervisor support

Pro-environmental supervisor support was measured using three items from Albrecht et al. (2023). Items included “The person I report to is supportive of environmental sustainability” and “The person I report to is helpful to me in learning about how to work in a more environmentally sustainable way.”

Pro-environmental co-worker support

Pro-environmental co-worker support was measured using three items from Albrecht et al. (2023). The items measured the extent to which employees perceived their co-workers as being supportive of environmental sustainability. Example items included “My co-workers are helpful to me in learning about how to work in a more environmentally sustainable way” and “My co-workers actively encourage me to come up with ways to work in a more environmentally sustainable way.”

Pro-environmental engagement

Pro-environmental engagement was measured using three items from a scale developed by Albrecht et al. (2021). The scale items were adapted from the Utrecht Work Engagement Scale (UWES-3), and included items such as “I am enthusiastic about environmental sustainability initiatives in this organization.”

Employee pro-environmental proactive behavior

Employee pro-environmental proactive behavior was measured with 8 items adapted from a 10 item scale developed to measure organizational citizenship for the environment (Boiral and Paillé, 2012). The items reflect employee self-reported proactive pro-environmental behavior. Example items included “I voluntarily perform environmental actions and initiatives off my own bat in my daily activities” and “In my daily activities, I initiate discussions with my colleagues about the environmental impact of our work.”

Data analytic strategy

Anderson and Gerbing's (1988) two-stage approach was used to analyze the proposed measurement and structural models. As a first step, confirmatory factor analysis (CFA) was used to assess the goodness-of-fit of the measurement model. The fit for the proposed and alternative models was determined with reference to recommended criteria (Kline, 2016): chi-square (χ^2 not significant), chi-square to degrees of freedom ratio ($\chi^2/df \leq 2$); Tucker–Lewis index (TLI) ≥ 0.95 ; comparative fit index (CFI) ≥ 0.95 ; standardized root-mean-square residual (SRMR) ≤ 0.08 ; and root-mean-square error of approximation (RMSEA) ≤ 0.05 . Less strict fit criteria have also been proposed: $\chi^2/df \leq 3$, RMSEA ≤ 0.08 (Byrne, 2016). Given that the data were self-report and taken at a single point in time, the CFA strategy also included assessing the influence of common method bias (Podsakoff et al., 2012).

The second step of the two-stage approach involved used structural equation modeling (SEM) to evaluate the fit of the proposed model (see Figure 1). The same fit indices applied to assessing the CFA were used to determine model. Relative weights analyses (RWA; Tonidandel and LeBreton, 2015) were also conducted to assess the percentage contributions of the predictor variables in explaining the variance in pro-environmental engagement and pro-environmental proactive behavior.

Results

Measurement model

The proposed measurement model indicated less than acceptable fit across most indices (see Table 2). An examination of the modification indices provided by AMOS showed that two pro-environmental proactive behavior items, and one pro-environmental organizational support item, in having overlapping content with other items, contributed most to model misspecification. Given that some respecification can be expected when conducting CFA (Anderson and Gerbing, 1988), the three items were deleted prior to running a respecified measurement model. The deletion of items did not compromise the requirement for latent constructs to have at least three items to be sufficiently defined (Jöreskog and Sörbom, 1993).

The respecified model resulted in improved fit, with all fit indices either meeting or being close to their criterion values (see Table 2). The fit statistics for the respecified model were also clearly superior to the proposed model, a one-factor model, and the null model (see

TABLE 2 Measurement model fit statistics for proposed, respecified and alternative null and one-factor models.

Model	χ^2	df	χ^2/df	TLI	CFI	RMSEA [95% CI]	SRMR
Proposed	939.419	284	3.31	0.91	0.93	0.08 [0.08, 0.09]	0.052
Respecified	458.97	194	2.37	0.96	0.96	0.06 [0.06, 0.07]	0.042
Null	9077.43	325	27.93	–	–	0.28 [0.27, 0.28]	–
Single Factor	2980.69	209	14.26	0.58	0.62	0.20 [0.19, 0.20]	0.126

χ^2 , chi square; df, degrees of freedom; TLI, Tucker–Lewis index; CFI, comparative fit index; RMSEA, root mean square of approximation; CI, confidence interval; SRMR, standardized root mean residual.

Table 2). Furthermore, as shown in Table 1, the standardized factor loadings (ranging between 0.62 and 0.95) were significant ($p < 0.001$) and exceeded the recommended criterion of 0.50 for retention in measurement models (Podsakoff et al., 2012).

The influence of common method bias (CMB) in the respecified CFA model was tested by examining the change in factor loadings after the addition of a common latent 'methods' factor to the model. The test resulted in only two items having a difference in loadings greater than 0.2 across the two comparison models (see Table 1). As such, and given some CMB would be expected given that all of the items were referenced to pro-environmental perceptions, the results suggest that CMB may not have been overly influential (Gaskin, 2012).

The descriptive statistics and intercorrelations for variables included in the respecified measurement model are shown in Table 3. All correlations were significant, but not so strong as to indicate issues with multicollinearity (Hair et al., 2010). As previously noted, the Cronbach's alphas, ranging from 0.89 to 0.97, clearly exceeded the generally accepted criterion of 0.80 (Nunnally and Bernstein, 1994).

Structural model

Having established an acceptable measurement model, the second step of Anderson and Gerbing's (1988) two-step procedure involved testing the hypothesized relationships between the latent constructs (see Figure 2) using structural equations modeling. As shown in Table 4, the structural model yielded acceptable fit, and as shown in Figure 2, all proposed structural parameters were significant.

Figure 2 shows that, as proposed, pro-environmental organizational support had significant direct effects on pro-environmental supervisor support ($p < 0.001$), pro-environmental coworker support ($p < 0.001$), and pro-environmental engagement ($p < 0.016$). Pro-environmental senior leader support had significant direct effects on pro-environmental supervisor support ($p < 0.001$), pro-environmental coworker support ($p = 0.015$) and pro-environmental engagement ($p < 0.001$). Pro-environmental supervisor support had significant direct effects on pro-environmental engagement ($p < 0.001$), and pro-environmental proactive behavior ($p = 0.004$). Pro-environmental coworker support had significant direct effects on pro-environmental engagement ($p = 0.013$), and pro-environmental proactive behavior ($p < 0.001$). Also as proposed, pro-environmental engagement had a significant direct effect on pro-environmental proactive behavior ($p = 0.041$).

To assess the proposed indirect effects within the model, bias corrected bootstrapping procedures available in Amos were conducted. Pro-environmental organizational support was found to

have significant indirect effects on both pro-environmental engagement [$\beta = 0.164$, (CI: 0.079, 0.308), $p < 0.001$], and pro-environmental proactive behavior [$\beta = 0.358$, (CI: 0.215, 0.518), $p < 0.001$]. Pro-environmental senior leader support was also found to have significant indirect effects on pro-environmental engagement [$\beta = 0.085$, (CI: 0.016, 0.180), $p = 0.015$], and pro-environmental proactive behavior [$\beta = 0.208$, (CI: 0.049, 0.352), $p = 0.014$]. However, the indirect effects of pro-environmental supervisor support [$\beta = 0.029$, (CI: -0.01, 0.094), $p = 0.060$] and pro-environmental coworker support [$\beta = 0.020$, (CI: -0.01, 0.076), $p = 0.068$] on pro-environmental proactive behavior through pro-environmental engagement were not significant. Overall, and in support of its validity, the proposed model explained 55% of the variance in pro-environmental supervisor support, 44% of the variance in pro-environmental coworker support, and a substantial 64% in pro-environmental engagement, and 43% in pro-environmental proactive behavior.

Relative weights analyses

In order to further assess the contribution of individual predictors within the model, a series of post-hoc relative weights analyses (RWA) were conducted (Tonidandel and LeBreton, 2015). Although RWA uses measured constructs as opposed to latent constructs, and can therefore generate different amounts of variance explained than CFA, RWA is a useful statistical technique for determining the relative importance of predictor variables on outcome variables (Garver and Williams, 2020). The results of three RWA analyses are shown in Table 5. With respect to the total variance in pro-environmental engagement accounted for by the four support variables ($R^2 = 56\%$), although pro-environmental senior leadership support was the strongest predictor, RWA comparisons statistics showed it did not explain significantly more variance relative to the other three supports. With respect to the relative importance of the four support variables in explaining pro-environmental proactive behavior ($R^2 = 37\%$), pro-environmental coworker support explained 44% of the total variance, significantly more than that explained by pro-environmental organizational support and pro-environmental senior leader support. With respect to explaining pro-environmental proactive behavior ($R^2 = 39\%$), after also including pro-environmental engagement as a predictor, pro-environmental coworker support explained 35% of the total variance, significantly more than that explained by pro-environmental organizational support and pro-environmental senior leader support, and pro-environmental supervisor support explained significantly more variance than pro-environmental senior leader support.

TABLE 3 Respecified measurement model - descriptive statistics, correlations and Cronbach's Alpha (on diagonal).

Variable	M	SD	1	2	3	4	5	6
1. PE-Senior Leader Support	3.78	1.76	0.97					
2. PE-Organization Support	4.18	1.46	0.73***	0.89				
3. PE-Supervisor Support	4.07	1.55	0.67***	0.68***	0.90			
4. PE-Coworker Support	4.17	1.46	0.56***	0.57***	0.70***	0.89		
5. PE-Engagement	4.26	1.54	0.69***	0.64***	0.64***	0.58***	0.90	
6. PE-Proactive Behavior	3.90	1.41	0.39***	0.46***	0.53***	0.57***	0.51***	0.91

N = 347 Cronbach's alpha italicized and bold on the diagonal. PE = Pro-environmental; *** $p < 0.001$ (i.e., 99.9% confidence intervals did not contain '0').

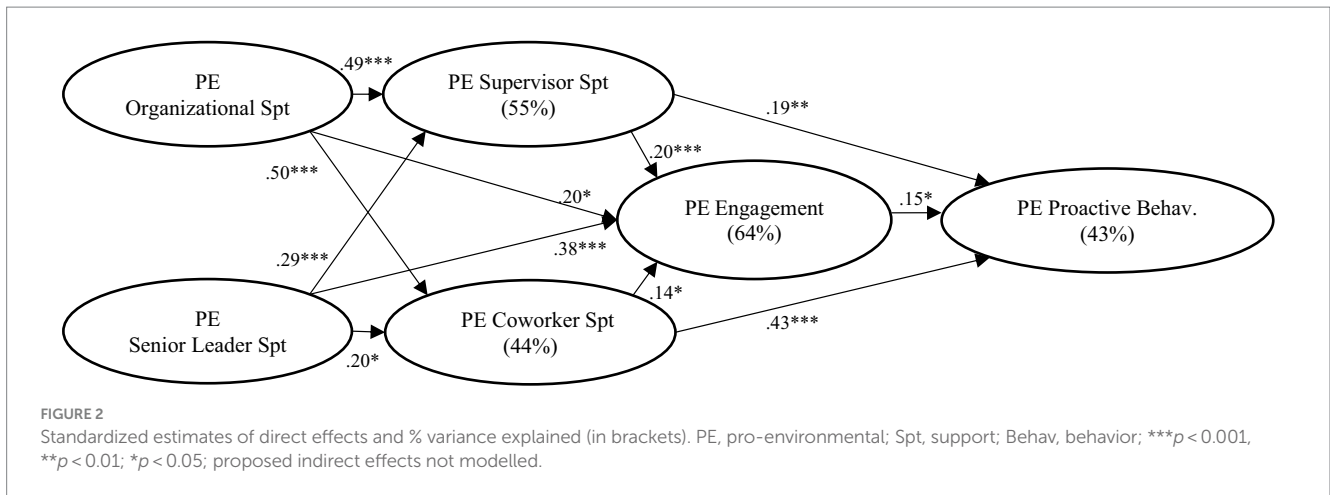


TABLE 4 Structural model fit indices.

Model	χ^2	df	χ^2/df	TLI	CFI	RMSEA [95% CI]	SRMR
Proposed	550.57	197	2.795	0.943	0.952	0.072 [0.065, 0.079]	0.063
Null	7529.77	231	32.596	–	–	0.302 [0.296, 0.308]	–

CFI, comparative fit index; TLI, Tucker-Lewis index; RMSEA, root mean square of approximation; CI, confidence interval; SRMR, standardized root mean residual.

Discussion

For organizations to successfully implement pro-environmental initiatives and achieve environmental objectives, they need to enable a range of supports that promote employee enthusiasm for pro-environmental initiatives, and importantly, enable employees to proactively engage in pro-environmental behaviors. Although, more generally, a wealth of research has confirmed the key role that different forms of support can have on individual, team, and organizational outcomes, the influence of different sources of pro-environmental support on employee pro-environmental motivation and behavior remains under-researched. The research therefore aimed to contribute to the literature by explaining how different pro-environmental supports result in employee pro-environmental motivation and behavior, and by further validating pro-environmental engagement as a potentially important construct to support organizations in achieving environmental sustainability.

Based in social support theory (Eisenberger et al., 1986) and pro-environmental engagement theory (Albrecht et al., 2022a), the study examined the direct and indirect influence of pro-environmental senior leader support, pro-environmental organizational support, pro-environmental supervisor support, and pro-environmental coworker support on pro-environmental employee engagement and pro-environmental proactive behavior. In support of the validity of the proposed model (see Figure 2), all proposed relationships were significant, with the variables accounting for sizable amounts of variance in pro-environmental engagement (64%) and proactive

behavior (43%). The findings therefore show that beyond examining the generic effects of ‘social support’ at work (Garmendia et al., 2023), there is utility in distinguishing between multiple sources of support. The analyses established the independence of the four support variables, with each source of support contributing significantly to the explanation of pro-environmental engagement and pro-environmental proactive behavior.

In support of the specific hypotheses implicit within the model, pro-environmental organizational support and pro-environmental senior leader support were each found to have significant direct effects on pro-environmental supervisor support, pro-environmental coworker support and pro-environmental engagement. The results therefore suggest that in order for employees to experience that their supervisors and coworkers are supportive of pro-environmental programs and initiatives and to be pro-environmentally engaged, senior leaders will need to actively promote environmental sustainability and actively encourage and support line-managers and supervisors to promote environmentally sustainable work practices. More broadly, organizations will need to ensure they have systems, processes, policies, and supports in place that respectfully recognize employee views on environmental sustainability, and that are genuinely and demonstrably responsive to employee complaints or suggestions about environmental sustainability.

In support of previous pro-environmental engagement theory and research (Albrecht et al., 2023), pro-environmental supervisor support and pro-environmental coworker support were both shown to be positively associated with employee pro-environmental engagement and pro-environmental proactive behavior. As such, when employees perceive that their supervisor and their coworkers support, encourage, and help them learn how to work in more environmentally sustainable ways, employees are more likely to be more energized and enthusiastic about pro-environmental initiatives and practices. Importantly, employees will also be more likely to voluntarily perform environmental actions and initiatives in their daily activities, initiate discussions with colleagues about the environmental impact of their work, volunteer for projects and events that address environmental issues, and actively encourage their colleagues to adopt more environmentally positive behaviors. The direct effects of coworker and supervisor pro-environmental support on pro-environmental engagement have not previously been established, and therefore add to previous research findings and pro-environmental engagement theory (Albrecht et al., 2022a).

TABLE 5 Relative weights analysis showing percent of total variance (R^2) explained by different sources of support ($N = 347$).

Predictor	PE-engagement ($R^2 = 56\%$)	PE-proactive behavior ($R^2 = 37\%$)	PE-proactive behavior ($R^2 = 39\%$)
PE-senior leader support	33.1	10.4	7.7
PE-organizational support	24.4	17.2	12.8
PE-supervisor support	22.8	28.2	21.8
PE-coworker support	19.6	44.2	35.43
PE-engagement	–	–	22.2

PE, pro-environmental.

The results of relative weights analyses (RWA) identified that coworker support was a significantly stronger predictor of pro-environmental engagement than the other supports included in the model. Coworker support was also a significantly stronger predictor of pro-environmental behavior than organizational level pro-environmental senior leader support and pro-environmental organizational support. These results are consistent with previous engagement research (Vera et al., 2016) and social information processing theory (Salancik and Pfeffer, 1978), and highlight the important influence of social norms in shaping employee pro-environmental attitudes and behavior. Additionally, and consistent with previous research (Albrecht et al., 2022a), the results show that if supervisors help and encourage employees to work in more environmentally sustainable ways, employees will likely be more pro-environmentally engaged and more willing to proactively support their organization's environmental sustainability. More generally, and consistent with previous research (Fay and Sonnentag, 2010; Shalley et al., 2000), the 'proximal' job-level resources of pro-environmental coworker and supervisor support were stronger predictors of the motivational and behavioral outcomes than the more 'distal' organizational-level pro-environmental resources (Albrecht et al., 2018).

Beyond the results showing positive direct effects within the proposed model, and in support of a systems approach to employee sustainability initiatives (Polman and Bhattacharya, 2016), pro-environmental organizational support and pro-environmental senior leader support were shown to be indirectly associated with pro-environmental engagement through their influence on pro-environmental supervisor support and pro-environmental coworker support. That is, in order for employees to feel energized and enthusiastic about environmental sustainability initiatives in their organization, a system of interdependent organizational and job-level supports will need to be in place. In contrast to expectations, pro-environmental supervisor support and pro-environmental coworker support had no indirect effects on proactive pro-environmental behavior through pro-environmental engagement. The strength of the direct association between coworker support and proactive pro-environmental behavior likely offset the possibility of any indirect effects.

Overall, the research extends pro-environmental engagement theory by identifying how four distinct sources of pro-environmental support influence pro-environmental employee engagement and pro-environmental proactive behavior. The support variables collectively accounted for a substantial proportion of the variance, and the research therefore contributes a deepened understanding of how organizations and researchers can understand, measure, and track employee perceptions of a range of pro-environmental supports associated with positive pro-environmental attitudes and behavior. The results clearly suggest that organizations can benefit their pro-environmental

outcomes by adopting and implementing a range of supports that have both the organization context and the job role as their focus.

Practical implications

Significant practical implications arise from the study for organizations seeking to improve employee pro-environmental attitudes and behavior. With respect to senior leaders providing pro-environmental supports, and as previously noted, senior leaders need to be seen to be actively promoting environmental sustainability and actively encouraging and supporting line-managers and supervisors to promote environmentally sustainable work practices. A wealth of leadership theory and research has highlighted the importance of senior leaders defining, championing and communicating a clear and compelling vision, and modeling espoused values (Bass, 1990). With respect to pro-environmental leadership, senior leaders need to be perceived to be authentically committed to, and fully supportive of, a clearly articulated pro-environmental vision and associated goals (Ones and Dilchert, 2012). Senior leaders will therefore need to take an active role in promoting and supporting environmental initiatives within their organization, and actively engage employees in dialog to co-create pro-environmental strategy, values, and responses (Ramus, 2001). To optimize effective senior leadership for sustainability, organizations will need criteria in place for selecting senior leaders who have pro-environmental credentials and a demonstrated commitment to environmental sustainability. Boards of Directors will need to hold CEOs and senior leaders accountable for accurate and genuine pro-environmental commitment, action, and performance outcomes (Bachmann and Spiropoulos, 2023).

With respect to pro-environmental organizational supports, the results suggest that organizations need to develop, communicate and embed organizational values that provide employees with confidence that the organization genuinely values and cares about pro-environmental sustainability. A genuine commitment to sustainability requires that resources, policies, and processes are in place to ensure that employee suggestions, inputs or complaints about environmental sustainability practices are acknowledged, actioned, and not ignored. As such, pro-environmental organizational support needs to be practically reflected in communication and 'green' human resource training and development strategies (Dumont et al., 2017) that help "employees to feel that their efforts are worthwhile and that [their organization] shares their [sustainability] values" (Greene et al., 2014; p. 451). The assignment of sustainability champions across the organization can also help ensure organizations are seen to

be genuinely committed to, and supportive of, ongoing sustainability performance (Polman and Bhattacharya, 2016).

Training, coaching and mentoring interventions have been shown to help supervisors provide informational, practical and socio-emotional support to employees (Rekalde et al., 2017). Supervisors through ongoing communication and performance development activities should be encouraged and supported to help employees learn how to work in more environmentally sustainable ways, and to support ideas and initiatives proposed by employees that can potentially have positive pro-environmental outcomes. The use of participative and inclusive supervisory styles, and the recognition and rewarding of pro-environmental initiatives and successes will likely increase employee perceptions of pro-environmental support that will likely result in their pro-environmental engagement and pro-environmental proactive behavior (Ramus, 2001).

Initiatives aimed at developing pro-environmental coworker supports could usefully draw from team cohesion and team climate research and practice (Anderson and Gerbing, 1988). Such initiatives could focus on helping coworker groups and teams to define meaningful and attainable sustainability targets, and to participatively set vision and values regarding pro-environmental targets and behaviors. Facilitated and structured development activities could be aimed at helping coworkers innovate and share learnings about how to work in a more environmentally sustainable way. Team-building activities, cross-functional collaborative projects, and team problem-solving, decision-making and reflective workshops will all likely enhance shared pro-environmental understanding and capability among coworkers (Anderson and Gerbing, 1988; Zhou and Zheng, 2023).

In terms of practical steps that can help employees feel more energized and enthusiastic about environmental sustainability initiatives in their organization, employees might usefully be supported to learn how to pro-actively extend the sustainability resources available to them in order to be able to 'craft' the way they work to be more sustainable (Albrecht et al., 2022a; Pekaar and Demerouti, 2023). Drawing from the job crafting literature, the present study suggests that employees might usefully look to senior leaders, supervisors, and coworkers for ways to seek out additional advice, challenges, and resources to enable them to work in a more environmentally sustainable way.

Overall, to successfully action sustainable pro-environmental initiatives organizations will need an integrated set of ongoing interventions aimed at the organizational level, the workgroup or team level, and the individual employee. To help develop an integrated approach, organizations might usefully sign up to pro-environmental accreditation programs such as the United Nations Global Compact (<https://unglobalcompact.org/>) or Green Corp (<https://www.greencorpllc.com/>) to hold themselves accountable to an externally validated and embedded, integrated, and system-wide set of policies and practices. The results of the present research suggest that senior leader support, organizational support, supervisor support and coworker support need to form an important part of such practices.

Limitations and future research

Despite offering theoretically grounded insights into how different sources of support impact on employee attitudes and behavior toward environmental sustainability, some study limitations need to be acknowledged. First, the cross-sectional design, despite the use of

robust confirmatory and structural modeling techniques, prohibits drawing strong causal claims about relationships among the constructs modeled (Molnár et al., 2021). Second, the use of self-report measures introduces the risk of common method bias inflating the strength of associations among the variables (Podsakoff et al., 2012). Third, the use of the heterogeneous Prolific sample may inhibit the extent to which the results can be generalized. It is noteworthy however that testing for common method bias yielded modest effects, and that it has been argued that self-report data are necessary to access employee attitudes and psychological experience (Spector, 2019). Nevertheless, to redress the limitations, researchers might in future look for opportunities to use experimental or longitudinal designs, and to use objective behavioral data, to better establish the proposed nomological net.

To extend the research on employee perceptions of pro-environmental support, researchers might usefully also examine the influence of different types of support within each of the different sources. Researchers, for example, might usefully examine the influence of informational and practical support (e.g., sharing advice and expertise) versus emotional support (e.g., listening and showing concern) for each source of support (Brough and Pears, 2004). The relative credibility and efficacy of AI generated versus human sources of support could also usefully be examined. Beyond examination of mediating effects within the proposed model, researchers could also usefully look at the moderating influence of variables such as generational differences and exchange ideology (Kim et al., 2016; Paillé and Meija-Morelos, 2019). Researchers could also look to extend the proposed model by examining the influence pro-environmental job resources (e.g., work demands) and personal resources (e.g., personal values). More broadly, and among the many important opportunities for future research in the area of employee contributions to environmental sustainability, opportunities exist to establish more objective links between pro-environmental engagement, pro-environmental behavior, and organizational sustainability metrics (e.g., reductions in carbon emissions and waste; organizational financial return). Given that prior research suggests a link between work engagement and organizational financial returns (Macey et al., 2009), establishing such links within a pro-environmental context may incentive organizations to support, promote, and prioritize employees to proactively engage in pro-environmental initiatives.

Conclusion

With recognition of the climate crisis intensifying, organizations and governments are increasingly prioritising pro-environmental initiatives. As such, it is imperative for researchers, practitioners, and policy makers to understand and identify the fundamental drivers of successful environmental programs. In a substantive extension of previous research in the area, this study contributes an understanding of the importance of multiple sources of pro-environmental support and their influence on employee pro-environmental motivation and behavior. Furthermore, the research contributes to the literature by introducing domain specific measures of senior leader support and organizational support that can assist organizations measure and track potential lead indicators of pro-environmental outcomes. Overall, the results suggest, in part, how organizations can effectively design and implement effective environmental initiatives using a well-structured framework that encompasses a system of supports.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Human Ethics Advisory Group, Faculty of Health, Deakin University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

SA: Conceptualization, Formal analysis, Writing – original draft. JD: Writing – review & editing. VK: Writing – review & editing.

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