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The impact of perceived environmental corporate social responsibility on idea generation and idea implementation

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Scholars have already made a few outcomes regarding the effect of environmental corporate social responsibility (ECSR) on employees' workplace behaviors. However, research on how perceived ECSR influences employee innovation remains largely unexplored. Drawing from the social identity theory (SIT) and stakeholder theory, this research fills this gap by examining: (a) the influence of perceived ECSR on idea generation (IG). (b) the influence of perceived ECSR on idea implementation (II). (c) the moderating effects of psychological capital (PsyCap) on these relationships. Using data on 348 employees from Chinese firms, the results demonstrate that perceived ECSR effectively fosters IG and II, yet when PsyCap is high, the positive influence of perceived ECSR is stronger. Our findings offer new insights for understanding the role of ECSR perception in the employee innovation domain by revealing that perceived ECSR can generate IG and promote II, and delimiting their boundaries from a psychological perspective. In addition, our findings make several practical implications for firms to cultivate their employees' ECSR perception and improve employees' IG and II to achieve sustainable development.

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Introduction

In recent years, improving energy efficiency and increasing waste recycling in China have become the core requirements (Zhou et al. 2022; Wu and Yu 2023). For example, the Chinese government (National Bureau of Statistics) reported that the total energy consumption reached 5410 billion kilograms of standard coal in 2022, a growth of 2.9% compared to the previous year. Moreover, firms' activities are often related to environmental degradation (Li et al. 2023). In such a context, firms are starting to achieve success by affecting employees involved in innovative behaviors while mitigating environmental damage (Latif et al. 2022a; Tuan 2023). Thus, it is critical for firms to develop employees' innovative behavior (EIB). EIB is a workplace in which employees generate new ideas and implement them during the work process (Scott and Bruce 1994), including idea generation (IG) and idea implementation (II) (Birdi et al. 2016). To date, from a non-environmental protection perspective, scholars have investigated the predictors of IG and II, such as knowledge sharing (Fatemi et al. 2022), environmental dynamism (Huang et al. 2023), personal identification (Bracht et al. 2023), however, a theoretical exploration from an environmental corporate social responsibility (ECSR) perception perspective is still not comprehensive enough, especially in the contextualization of environmental protection (Ahmad et al. 2022a; Tsameti et al. 2023). Thus, a meaningful and valuable question should be answered - does perceived ECSR foster IG and II?

Under the background of environmental protection, ECSR, as a topic of common concern, has been introduced into the environmental activities of organizations to improve employees' workplace behaviors (Orazalin and Nurlan 2020; Hsu and Chen 2023). As a subjective perception of firms' efforts to protect the environment, perceived ECSR is defined as "a sense that employees perceive the degree to which their organization's ECSR is fulfilled and evaluate their organization" (Wu et al. 2021). Some scholars have suggested that ECSR perception of employees can promote them to identify with their organization, and further generate creative ideas and conduct innovative missions in their organization (Ahmad et al. 2022a). Thus, increasing ECSR perceptions is beneficial to employees in terms of innovation performance (Hur et al. 2018). For example, when firms engage in ECSR activities, they may shape a good image and establish close relationships with their external stakeholders (Flammer, 2013) to access tangible and intangible resources (Abdi et al. 2022b). These resources facilitate effectively generating and implementing innovative ideas from employees (Forcadell et al. 2021). Hence, perceived ECSR may become a predictive role that positively influences the IG and II of employees. However, previous studies still lacked the predictors of IG and II in the contextualization of environmental protection (Bracht et al. 2023; Tsameti et al. 2023), resulting in a limited understanding of the relationship between the perceived ECSR and two dimensions of EIB. Therefore, it is worth exploring the question - how and under which circumstance does perceived ECSR impact IG and II under the context of environmental protection?

However, despite the consensus on the impact of ECSR, little research has investigated under which circumstances perceived ECSR impacts employee innovation from a psychological perspective (Ahmad et al. 2022b). SIT contends that the impacting process of employees' organizational perception involved in their workplace behavior is driven by individuals' psychological state of development (Ashforth and Mael, 1989; Raja et al. 2020). Firms need to improve employees' psychological state of development during innovation management activities (Kraus et al. 2023; Latif et al. 2023). In this case, the transformation process of perceived ECSR to generation and implementation of ideas relies on employees' psychological state from a psychological perspective.

Psychological capital (PsyCap) represents the degree to which employees can display a positive psychological state (Qin et al. 2022; Luthans et al. 2007). Some research also has indicated that employees who have a higher PsyCap, are more likely to perceive firms' activities, and their ECSR perceptions will be enhanced (Mao et al. 2021; Kraus et al. 2023), which then will elicit positive responses, such as generating creative ideas and implementing these new ideas. Hence, from a psychological perspective, the impact of PsyCap needs to be introduced into this research model to fully examine the relationships among perceived ECSR, IG, and II. According to the theoretical argumentation and gaps in the literature, this study raised the third research question: Does PsyCap as the moderating role influence the relationships between perceived ECSR and IG and II in the contextualization of environmental protection?

Accordingly, to address these gaps, drawing from the SIT, we set up to explore the psychological mechanism that perceived ECSR influences IG (either by oneself or taken from others) and II (Zhou 2003), as well as the moderating role of PsyCap in these relationships. SIT is widely used in the organizational behavior literature (Song et al. 2018) and is used to analyze how organizational factors influence individuals' identification with the organization, and then impact their behaviors (Ashforth and Mael 1989). The stakeholder theory is applied to analyze how the resources from stakeholders influence individual innovation (Gambeta et al. 2019). By analyzing data from 348 employees of Chinese firms, our research tests the relationships between perceived ECSR and IG and II. Chinese firms of the construction industry, are closely related to environmental pollution and energy consumption (Chuai et al. 2021). In such a context, China regards ECSR as a prominent concern of firms trying to reduce pollutant emissions (Li et al. 2020). In addition, by focusing on the construction industry, our study can avoid interference from other industries. In other words, to avoid the variation of the different industries, it is necessary to control the samples within the construction industry. China is now implementing the "Innovation-Driven Development Strategy", vigorously promoting firms' innovation and encouraging employees to conduct innovation activities (Chen et al. 2021). Therefore, China has a suitable environment in which to explore these relationships among IG, II, PsyCap, and perceived ECSR.

To answer the above research questions, our research makes several contributions to the literature. First, previous studies on ECSR focused on its economic effect at the macro level (Li et al. 2020), however, the influence of perceived ECSR on employee innovation has not been fully studied from a micro-level perspective. Based on SIT and stakeholder theory, we found out the predicted role of ECSR perception, thereby providing a better understanding of the impact of ECSR. Second, while prior research has suggested that there is an indirect link between perceived CSR and employee innovativeness (Forcadell et al. 2021), little research identifies the predictors of the generation and implementation of ideas from an environmental perspective (Caniëls et al. 2022). This study clearly explains how perceived ECSR affects IG and II from an environmental protection perspective, thus breaking through this research limitation. Meanwhile, this study echoes prior studies (e.g., Wu et al. 2021) to spotlight the antecedents of IG and II are rooted in employees' perceptions of their firms' ECSR activities. Third, prior research ignored employees' psychological states that affect the effectiveness of perceived ECSR, and therefore lack recognition of the circumstances under which perceived ECSR can effectively foster two dimensions of EIB. The findings contribute to the ECSR literature by determining the boundary by which perceived ECSR impacts IG and II from the PsyCap perspective.

Research background

ECSR perception. ECSR pays close attention to firm-specific activities and plays a key part in the interactive connection between firms and the natural environment (Chuang et al., 2018; Josiah and Akpuh, 2022). In our study, we defined ECSR as a series of environmentally friendly behaviors, in which a firm integrates environmental issues in interactions with stakeholders. ECSR perception is a subjective perception of an organization's environmental responsibility (Turker 2009; De Roeck and Delobbe 2012), which can elicit positive behaviors from employees. Wu et al. (2021) define perceived ECSR as "a sense that employees perceive the degree to which their organization's ECSR is fulfilled and evaluate their organization". Our research, thus, pays attention to employees' perception of ECSR and adopts Wu et al. (2021) definition of perceived ECSR.

Research on ECSR has mainly been going at two different levels. Most research has focused on the effects of ECSR from the macro level. For example, macro-level research has proposed that ECSR could impact legitimacy (Wei et al. 2017), firm value (Li et al. 2020), environmental performance (Hsu and Chen, 2023), and green intellectual capital (Li et al. 2023). Recently, other research has begun to analyze the influence of ECSR from a micro-level perspective. With this literature, some scholars have begun to explore internal stakeholders' responses to ECSR and argued a close relationship between ECSR perceptions and internal stakeholders' behaviors (Fatima and Elbanna 2023; Zhao et al. 2023). For example, they have examined that ECSR perception could develop customer loyalty (Ali et al. 2021), foster green purchase intention (Vu et al. 2022), promote pro-environment behavior (Latif et al. 2022b) and environmental citizenship behavior (Soopramanien et al. 2023), and improve organizational attractiveness (Turker et al. 2023) by matching for various stakeholders' expectations and interests. Although the ECSR literature has gradually started to study the effect of ECSR perception at the micro level, research on the antecedents of employee innovation from the ECSR perception perspective is still in its infancy.

Employees' innovative behavior. EIB as a workplace behavior is a spontaneous activity, which is generally not included in the job responsibilities expected by the roles of the organization (Boiral, 2009). Examples of this behavior include generating novel ideas and acquiring various resources to implement such novel ideas (Mascareo et al. 2021). EIB includes IG and II (Birdi et al. 2016).

Research on the antecedents of IG and II has mainly been going on two levels. Some studies have given attention to the impact of organizational-level antecedents on IG and II (Huang et al. 2023). Organizational-level research has examined the effects of the hierarchy of authority (Keum, and See 2017), social network (Perry-Smith and Mannucci 2017), social network service addiction (Khan et al. 2022), virtual communication curbs (Brucks and Levav 2022), AI-based innovation management (Füller et al. 2022), HR systems (Batistič et al. 2022), environmental dynamism (Huang et al. 2023) and contextual input (Paay et al. 2023) on generation and implementation of the idea. Additionally, previous studies also argued that different organizational-level factors can impact the implementation of ideas compared to ideas generation (Hoang et al. 2022). For example, Birdi et al. (2016) found that compared with the generation of ideas, job control has a greater impact on the implementation of ideas. Other research has focused on the impact of individual-level antecedents on IG and II (Liu et al. 2020). Some of them proposed that generation and implementation of ideas are driven by knowledge sourcing (Che et al. 2018), knowledge sharing (Fatemi et al. 2022), employees' creative self-

efficacy (Newman et al. 2018), network size (Mannucci and Perry-Smith, 2022), employees' perceptions of digital leadership (Erhan et al. 2022), personal identification (Bracht et al. 2023), and employee voice (Tsameti et al. 2023). Meanwhile, some scholars also stated that individual factors (e.g., creativity-relevant skills, Birdi et al. 2016) are significantly correlated with IG, but not with II. Additionally, we found that some scholars have investigated how environmental strategy perceptions influence innovative behavior (Paruzel et al. 2023). Afridi et al. (2020) and Paruzel et al. (2023) have indicated a direct relationship, while Wu et al. (2021) found an indirect relationship via organizational identification. This research suggests that perceived ECSR affects EIB. Hence, we intend to explore whether and when perceived ECSR influences IG and II, separately.

Psychological capital. PsyCap has received continuous attention from scholars in the positive organizational behavior (POB) domain (Newman et al. 2014; Kim et al. 2019). By adopting positive psychology and POB as the foundation and point of departure, Luthans et al. (2007) proposed the higher-order construct of PsyCap. PsyCap reflects individuals' psychological state of development including the four dimensions of self-efficacy, hope, optimism, and resilience (Luthans and Youssef-Morgan, 2017), in which individuals show perceptions and workplace behaviors (Darvishmotevali and Ali 2020). Breaking down the four dimensions, self-efficacy is defined as a personal subjective perception that individuals utilize cognitive and motivational resources to complete a task and achieve goals in a specific context (Luthans et al. 2007). This personal subjective perception stems from social perceptions, as well as is rooted in individuals' experiences. Second, hope refers to a positive motivation built up from individuals' cognition, which consists of the willingness to succeed, and the path to achieving the ability to pursue the goal (Guo et al. 2018). By adjusting the goal and the way to achieve it, hope can confer the ability to guide people to work and motivate them to find pathways to desired goals. Third, optimism represents the expectation of positive results and the positive attribution of events (Seligman et al. 1998). Hence, optimistic workers are more likely to positively face stressful situations and positively find new methods to remove obstacles and seek opportunities (Rego et al. 2012). Finally, resilience is the ability that individuals positively handle troubles, and can even capture positive changes and overwhelming revolution in serious situations or during uncertainty (Luthans et al. 2007).

Taken together, PsyCap has become a crucial role in POB research (Bouckennooghe et al. 2015). Compared with rigid personal traits, Luthans and Church (2002) pointed out that PsyCap can flexibly enable individuals to exhibit behaviors that are beneficial to the organization, thereby improving personal performance. POB researchers have indicated that PsyCap plays a key role in improving employees' behaviors and employee performance (Bouckennooghe et al. 2015), such as citizenship behaviors (Parent-Rochelleau et al. 2020), job performance (Ozturk, and Karatepe 2019; Darvishmotevali and Ali, 2020), engagement in knowledge-intensive work (Toth et al. 2022), job engagement (Kraus et al. 2023), and employee well-being (Babu et al. 2023). Recently, it has been growing evidence that PsyCap is related to innovative behavior (including employees' IG and II) that supports their organizations (Kumar et al. 2022; Ghafoor and Haar, 2022). As Kumar et al. (2022) noted, PsyCap positively impacts EIB through mastery orientation. While it increasingly appears that PsyCap has benefits in generating and implementing new ideas (Ghafoor and Haar, 2022), the moderating effects of PsyCap on the ECSR's perception-innovative behavior relationship is still infancy. As employees develop higher levels of

PsyCap, their positive psychological state is enhanced (Guo et al. 2018). High PsyCap also helps employees to better perceive firms' ECSR at work. Therefore, we further introduce PsyCap as the moderating factor of the relationships between ECSR's perception and IG, and II in the current business environment.

Social identity theory and stakeholder theory. Derived from early research in social psychology (Tajfel and Turner 1989), the SIT contends that an employee's identity is viewed as a psychological process in which employees divide themselves into different social reference groups (Ashforth and Mael 1989). SIT has been used extensively to explain the factors involved in behaviors in a specific context (Afsar et al. 2018). Furthermore, the concept of employee identity is well-built within the ECSR literature (Fatima and Elbanna 2023). According to the SIT, employees who positively perceive their organization with oneness or sameness towards the organization tend to be attracted by their organization's image, which in turn affects employees' behavior (Ahmad et al. 2022b). In other words, when employees work for a firm with a good image, employees' group affiliations will enhance their identity, thus changing their workplace behaviors (Glavas and Godwin 2013). ECSR activities reflect the extent to which firms in environmental protection and help firms establish a good organizational image that improves employees' pride and fulfills their self-enhancement needs to be related to such a reputable organization (Tian and Robertson 2019; Yasin et al. 2023). Perceived ECSR is particularly crucial in impacting how competent employees measure their firms' efforts in the environment (Turker et al. 2023). Meanwhile, IG and II are regarded as workplace behaviors related to employees' perceptions in the environmental protection context (Ahmad et al. 2022b). From a SIT perspective, perceived ECSR as a vital role may drive IG and II in the environmental protection context.

Stakeholder theory contends that the development of firms' innovation requires the exchange and transaction of resources with stakeholders (Abdi et al. 2022a). Stakeholder theory also points out that firms tend to acquire resources by meeting the expectations and interests of stakeholders (Flammer 2013; Abdi et al. 2022b). Stakeholders originally covered "shareowners, employees, customers, suppliers, lenders, and society" (Freeman 2010). As critical stakeholders, employees perceive firms' environmentally friendly behaviors and provide positive responses, which are meaningful and vital for their innovation (Gambeta et al. 2019). From this perspective, ECSR perception as a subjective assessment that pays attention to employees' evaluation and understanding of an organization's environmental responsibility (Gavin and Maynard 1975), panders to stakeholders' expectations, which helps organizations acquire the resources from stakeholders and elicit IG and II of employees. The resources include positive psychological resources of employees, knowledge, and skills mastered by stakeholders. As such, perceived ECSR is likely to affect IG and II from a stakeholder theory perspective. To better explore the underlying psychological processes that perceived ECSR enhances innovative behavior, we further empirically investigate under which circumstances perceived ECSR influences employees' IG and II by using the SIT and stakeholder theory. Additionally, from the psychological perspective, SIT suggests that psychological processes depend on individuals' psychological state (Raja et al. 2020). PsyCap, as a positive psychological state, may impact the psychological processes that perceived ECSR affects employees' IG and implementation.

Hypothesis development. Based on the SIT and stakeholder theory, we construct the conceptual model (see Fig. 1). We expect

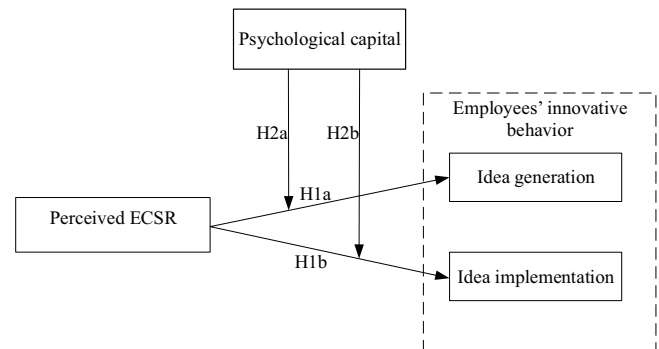


Fig. 1 Theoretical model. We divided employees' innovative behavior into idea generation and idea implementation. H1a shows that perceived ECSR is positively related to idea generation. H1b shows that perceived ECSR is positively related to idea implementation. H2a indicates that psychological capital positively moderates the influence of perceived ECSR on idea generation such that the relationship will be stronger for employees with high levels of psychological capital. H2b indicates that psychological capital positively moderates the influence of perceived ECSR on idea implementation such that the relationship will be stronger for employees with high levels of psychological capital.

that perceived ECSR positively impacts IG and II. Furthermore, we also examine how PsyCap moderates these relationships among perceived ECSR, IG, and II.

Perceived ECSR and IG and II. Drawing on Scott and Bruce (1994), we define EIB as a workplace behavior that recognizes problems generates new ideas, and is likely to carry out ideas into implementation. Consistent with the research of Zhou (2003), our study divides innovative behavior into two dimensions: IG (either by oneself or taken from others) and II. IG is conceptualized as the generation of novel ideas, including new products, new services, new manufacturing methods, and new management processes (Woodman et al., 1993), which can promote the survival, innovation, and growth of firms in market competition. Also, we define II as the transformation of creative ideas into corresponding products. IG is the conceptual basis of EIB, which is the cognitive activity of employees (Yuan and Woodman 2010). II needs secure resources to implement these new ideas generated by employees, which is a social process (Mascareo et al. 2020).

SIT states that subjective perception may influence individuals' identification, thereby impacting the behavior that supports their organization. When employees perceive that their organizations put an effort into ECSR activities for the sake of the improvement environment, they have a sense of pride (Mahmud et al. 2022; Yasin et al. 2023). In this context, increasing ECSR perception can help firms to develop employees' identification with their firms, thus encouraging employees to generate good ideas and share new ideas (Ahmad et al. 2022a). Moreover, previous studies have found that novel ideas generated by employees are regarded as a type of workplace behavior related to employees' perceptions in the environmental protection context (Alhmodi et al. 2022). Afridi et al. (2020) and Ahmad et al. (2022b) found that firms that actively participate in ECSR activities can build an atmosphere of trust where employees can generate multiple ideas in their work roles. Since the more perceptions of a psychologically safe and trustworthy environment help to come up with original ideas (Glavas and Piderit, 2009; Bracht et al. 2023), the more likelihood that new ideas will be produced (Ahmad et al. 2022b). From a SIT perspective, perceived ECSR may drive employees' IG in the environmental protection context. In addition, stakeholder theory holds that employees with higher

ECSR perception tend to make positive responses, which are important for their innovation activities (Wu et al. 2021). As such, when designing and manufacturing new products linked to the environment, employees with high ECSR perception are more willing to provide various new ideas for firms (Abdi et al. 2022b). Therefore, we hypothesize:

Hypothesis 1a. Perceived ECSR is positively related to IG.

Looking at the second stage of EIB, II is often presented as an effortful, resource-consuming process (Mascareo et al. 2020). In such a context, many obstacles may need to be overcome to encourage employees to put new ideas into practice. As the SIT proposed, higher ECSR perception can foster a sense of organizational identification among employees because employees desire to keep the firm's good social reputation (Fatima and Elbanna 2023). The above organizational identification process can be reflected in the degree of employees' support for innovation in providing a person's technical knowledge resources and skills for their organizations to develop innovative ideas and apply new ideas (Ahmad et al. 2022a). In this context, this increases the possibility of II. Wu et al. (2021) and Zhao et al. (2022) found that increasing ECSR perception is beneficial for firms to build a good reputation, thus attracting employees to invest more resources to implement new ideas and conduct creative solutions. According to Mascareo et al. (2021), higher ECSR perception can help firms enhance the recognition of their employees, thereby motivating them to complete innovative tasks and carry out their new ideas into implementation. Additionally, stakeholder theory also points out that the implementation of new ideas depends on the resources of stakeholders (Freeman, 2010; Xu et al. 2018). From this perspective, perceived ECSR as a subjective assessment of firms' environmental responsibility (Chen et al. 2022), caters to the expectations and interests of stakeholders (Wu et al. 2020). In such a context, firms help employees build close connections with other stakeholders (Flammer 2013) and acquire the resources from the network of relationships (Abdi et al. 2022b). The resources can help employees implement their new ideas and new solutions. Meanwhile, Wu et al. (2021), and Yang et al. (2019) stated that when firms engage in ECSR activities, they could establish a good organizational reputation to meet employees' expectations, and in turn obtain the knowledge and technical resources needed for employees' innovation. In light of the above theoretical arguments, we hypothesize:

Hypothesis 1b. Perceived ECSR is positively related to II.

The moderating role of psychological capital. Following Luthans et al. (2007), PsyCap is conceptualized as a positive psychological state of individuals' development. PsyCap can enhance the positive effects of employees' organizational perceptions (Abbas et al. 2014). Because perceived ECSR can be viewed as a subjective perception of organizations' ECSR activities (Rahman and Post 2012), we argue that high PsyCap employees tend to improve the influence of perceived ECSR on the generation and implementation of ideas.

SIT suggests the influence process of perceived ECSR involved in IG is a psychological process of employee identity (De Roeck and Delobbe 2012). This psychological process is impacted by individuals' psychological states (e.g., hope and optimism, Luthans et al. 2007). As a positive psychological state, PsyCap covers employees' feelings of confidence to complete challenging tasks (Fuchs et al. 2019; Kraus et al. 2023), the hoping feeling for desirable outcomes (Darvishmotevali and Ali, 2020), the optimistic sensations of individuals' ability to overcome obstacles and achieve success (Cai et al. 2019), and the sense of resilience to

the uncertain work and adversity (Hartmann et al. 2020). Thus, perceived ECSR could motivate employees to bring up more new ideas due to the positive psychological resources (i.e., PsyCap) of employees. That is, high PsyCap employees tend to generate novel ideas as a result of ECSR perceptions. Moreover, previous research has found that an employee with higher PsyCap tends to make positive attitudes and behaviors as a result of their environmental responsibility perceptions (Randolph et al. 2022; Latif et al. 2023), and as a consequence, the value of perceived ECSR to stimulate innovative ideas is magnified. As such, when employees perceive their firm as one that develops cleaner products and actively invests in environmental good (i.e., ECSR; Glavas and Godwin, 2013), high PsyCap employees are more likely to explore and develop innovative ideas without fear of outcomes (Kumar et al. 2022). Therefore, we hypothesize:

Hypothesis 2a. PsyCap moderates the influence of perceived ECSR on IG.

High PsyCap employees who can exploit resources to help firms obtain certain goals, make a variety of behavioral responses as a result of employees' organizational perceptions (Cai et al. 2019). Recently, it has been argued that high PsyCap helps employees perceive their firm's ECSR projects in a positive direction and better cope with negative emotions, thereby creatively overcoming challenges and completing various innovative tasks in their immediate work environment (Raja et al. 2020). This suggests that high PsyCap improves the influence of perceived ECSR on II. In other words, PsyCap is a moderator that encourages employees to direct their ECSR perception toward II. Ghafoor and Haar (2022) and Kumar et al. (2022) pointed out that PsyCap has an impact on the connections between employees' perception of firms' activities and their behavioral responses. Specifically, when they are more sensitive to how their firms conduct the ECSR program, high PsyCap employees have a propensity to positively exploit and integrate resources to put new ideas into implementation (Hsu and Chen 2017; Kumar et al. 2022). Thus, high PsyCap employees tend to improve the influence of perceived ECSR on II. We hypothesize:

Hypothesis 2b. PsyCap moderates the influence of perceived ECSR on II.

Methods

Sample and data collection. We surveyed employees working at different firms in the construction industry to examine the posited hypotheses. Firms in the construction industry need to get a lot of construction resources from the natural environment (e.g., wood, gravel, and soil) and are facing environmental pressure. In this context, innovation has been a core requirement for firms in this industry. Thus, the construction industry is suitable for the objectives of our study. We collected the data on ECSR perception, PsyCap, IG, and II through questionnaires. Before distributing the questionnaires, all items are confirmed to be understandable and clear for employees.

While 500 employees participated in our survey, we received 348 usable questionnaires with a response rate of 69.60%. This high response rate means that there is no non-response bias in our research. In Table 1, 87.93% of our study participants were male. 78.45% were more than 30 years old. Moreover, 75.29% have already obtained bachelor's degrees or above. Of the 348 responding participants, 19.83% held board professorate senior engineer and senior engineer, and 66.09% were engineers and assistant engineers. 27.87% of participants have been working for 11 to 20 years and 7.18% have been working for more than 20 years with their present firms.

Measures. This study measured perceived ECSR, PsyCap, IG, and II. Following the back-translation technique, items in this questionnaire are translated from English to Chinese (Brislin, 1980). Employees who we questioned provided their perceptual evaluations of all items (see Table S1) on a 5-point Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree”.

Perceived ECSR. Following Turker (2009) perceived ECSR was measured by adopting three items to describe the perception that employees perceived their organization’s activities to protect the environment (De Roeck and Delobbe 2012). A sample item is: “Our firm takes part in activities to protect and improve the natural environment”.

Psychological capital. Based on the study of Luthans et al. (2007), we adopt a measure of PsyCap following a twenty-four-item from

the PsyCap questionnaire (PCQ). A sample item is: “I am confident to find a solution by analyzing long-term problems”. Keeping with the study of Guo et al. (2018), we adapted the overall PsyCap score.

IG and II. We measured IG and II based on an eight-item scale from Scott and Bruce (1994) and Zhou and George (2001). We measured employees’ IG based on a four-item scale. A sample item is: “I can find new technologies, processes and services in the workplace”. II was measured using four items (e.g., “I can use new methods or techniques to reduce costs and improve efficiency in my work”).

Control variables. Prior studies (e.g., Newman et al. 2018; Tian and Robertson, 2019) have suggested that demographic characteristics (e.g., age and gender) influence EIB, which may affect the links between perceived ECSR and IG and II. Therefore, we include employees’ gender, age, education, position, and tenure as key control variables in this study. We coded gender as “1” for male and “2” for female. Similarly, we coded employees’ age (i.e., “1” - 18 to 30 years old, “2” - 31 to 40 years old, “3” - 41 to 50 years old, and “4” - 51 years old or above). Employees’ education is measured by their highest degree. Position was coded as “5” for professorate senior engineer, “4” for senior engineer, “3” for engineer, “2” for assistant engineer, and “1” for others. We calculated tenure as the number of years that employees have worked in the firm. Moreover, we controlled for firm size and team size because they may affect employees’ (a) IG and (b) II. The number of employees represents firm size (Wu and Yu 2022). We coded firm size as “1” - 100 employees or below, “2” - 101 to 300 employees, “3” - 301 to 500 employees, “4” - 501 to 1000 employees, and “5” - 1001 employees or above. We coded team size as “1” - 3 employees or below, “2” - 4 to 10 employees, “3” - 11 to 20 employees, “4” - 20 to 50 employees, and “5” - 51 employees or above. As Kang et al. (2021) and Zhang et al. (2022) noted, marital status could potentially influence employees’ innovative behavior. Therefore, we controlled it. Following previous literature (e.g., Niu 2014; Shahsavari et al. 2020), we coded marital status as “1” for single, “2” for living together, “3” for married without children, “4” for married with children and “5” for others. Finally, we also controlled for ownership. Ownership was coded as a dummy variable. The state-owned firm is recorded as 1, otherwise, it is recorded as 0.

Reliability and validity analysis. First, this study tested the reliability of perceived ECSR, PsyCap, IG, and II via SPSS 21. As Table 2 shows, the results indicate that Cronbach’s alpha values of all variables are more than 0.70, demonstrating adequate reliability.

Second, we conducted the principal component analysis for the scales and our results show that the cumulative variance contribution rate of all items is 69.456%, more than 60%. The total KMO value is 0.963. Meanwhile, the statistics of Bartlett’s test are significant at the level of 0.001, revealing that it is suitable

Table 1 Statistical analysis of questionnaire samples.

Variables	Items	Number of employees	Percentage
Gender	Male	306	87.93%
	Female	42	12.07%
Age	18-30	75	21.55%
	31-40	175	50.29%
	41-50	67	19.25%
	≥51	31	8.91%
Education	Higher school education or below	7	2.01%
	College degree	79	22.70%
	Bachelor degree	192	55.17%
	Master degree	56	16.09%
	PhD degree or above	14	4.02%
Firm size (number of employees)	≤100	35	10.06%
	101-300	90	25.86%
	301-500	60	17.24%
	501-1000	96	27.59%
	≥1001	67	19.25%
Team size	≤3	69	19.83%
	4-10	127	36.49%
	11-20	69	19.83%
	20-50	63	18.10%
	≥51	20	5.75%
Tenure	≤2	48	13.79%
	3-5	88	25.29%
	6-10	90	25.86%
	11-20	97	27.87%
	≥21	25	7.18%
Position	Professorate senior engineer	10	2.87%
	Senior engineer	59	16.95%
	Engineer	116	33.33%
	Assistant engineer	114	32.76%
	Others	49	14.08%

Table 2 Measurement reliability and validity.

Variables	KMO	Bartlett's test (sig.)	Cumulative variance contribution rate (%)	AVE	CR	Cronbach's alpha
1. PECSR	0.742	0.000	80.698	0.711	0.881	0.876
2. PsyCap	0.975	0.000	68.631	0.606	0.973	0.972
3. IG	0.818	0.000	71.625	0.622	0.868	0.868
4. II	0.830	0.000	73.983	0.652	0.882	0.882
Total	0.963	0.000	69.456	0.622	0.983	0.961

PECSR perceived ECSR, PsyCap psychological capital, EIB EIB, IG idea generation, II idea implementation.

Table 3 Descriptive statistics.

Variables	Mean	SD	Median	Minimum	Maximum
1. PECSR	3.518	1.106	3.667	1	5
2. PsyCap	3.857	0.824	4.000	1.417	5
3. IG	4.046	0.676	4.000	1	5
4. II	3.992	0.747	4.250	1	5
5. Gender	1.121	0.326	1	1	2
6. Age	2.155	0.862	2	1	4
7. Education	2.974	0.794	3	1	5
8. Firm size	3.201	1.293	3	1	5
9. Team size	2.534	1.165	2	1	5
10. Tenure	2.894	1.168	3	1	5
11. Position	2.618	1.016	3	1	5
12. Marital status	2.644	1.198	2	1	5
13. Ownership	1.534	0.500	2	1	2

PECSR perceived ECSR, PsyCap psychological capital, EIB EIB, IG idea generation, II idea implementation, SD standard deviation.

for factor analysis. Moreover, four factors with eigenvalues were identified, more than 1. All standardized factor loadings are more than 0.5. Hence, the four-factor structure was identified in this study.

Third, we examined the validity of four variables by adopting confirmatory factor analysis (CFA). This model is well-matched with the data ($\chi^2/df = 2.546$, RMSEA = 0.067, CFI = 0.916, TFI = 0.910, IFI = 0.916). Moreover, the AVE of each structure is in the range of 0.622 to 0.711, and the comprehensive reliability is in the range of 0.868 to 0.983, demonstrating a high convergent validity. Additionally, the discrimination validity among constructs is verified by the AVE value in our study. The square root of the AVE of each structure is between 0.789 and 0.843 in Table 5, which is greater than the off-diagonal coefficients. Therefore, these variables have good discrimination validity (Fornell and Larcker 1981).

Common method variance. To decrease the Common Method Variance (CMV), this study adopted some procedural techniques following Podsakoff et al. (2003). First, our questionnaire is anonymous. Moreover, employees' personal information and answers to the questionnaire will not be disclosed publicly. Second, this study reordered the questions listed in the questionnaire. Third, consider that there are no uniform and clear answers to the questions on this questionnaire, employees can answer all questions according to their own opinions. Statistically, following Harman's single-factor test, our results indicated that principal component analysis extracted four factors and the first factor accounted for 45.865%, well below the cutoff of 50%, demonstrating that the single-factor model is not suitable for this study (Harman 1976). In addition, this study confirmed that the four-factor model ($\chi^2/df = 2.546$, RMSEA = 0.067, CFI = 0.916, TFI = 0.910, IFI = 0.916) is superior to one factor model ($\chi^2/df = 6.417$, RMSEA = 0.125, CFI = 0.703, TFI = 0.683, IFI = 0.704) through CFA. Thus, common method bias does not deserve attention.

Empirical results

Statistical analysis. Table 3 shows the descriptive statistics of variables. The mean and standard deviation of perceived ECSR are 3.518 and 1.106, respectively. The mean and standard deviation (SD) of PsyCap are 3.857 and 0.824. The mean of IG is 4.046, which is slightly higher than II (3.992). The SD of IG is 0.676, which is slightly lower than that of product innovation (0.747). As we expected, measured dispersion for our data is not a

Table 4 One sample t-Test.

Variables	Test value = 3				
	t	df	Sig. (Two-Tailed)	Mean difference	95% confidence interval of the difference
					Lower Upper
PECSR	8.743	347	0.000	0.518	0.402 0.635
Psy	19.399	347	0.000	0.857	0.770 0.944
IG	28.847	347	0.000	1.046	0.975 1.117
II	24.765	347	0.000	0.992	0.913 1.071

PECSR perceived ECSR, PsyCap psychological capital, EIB EIB, IG idea generation, II idea implementation.

concern in this study. Moreover, the medians of perceived ECSR (3.667), PsyCap (4.000), IG (4.000), and II (4.250) are close to the maximums, suggesting that the levels of these variables are slightly high. Additionally, we used one sample T-test to compare the means in our sample with normative values. From Table 4, results from these analyses revealed that levels of perceived ECSR ($t = 8.743$, $p < 0.01$; difference in means = 0.518), PsyCap ($t = 19.399$, $p < 0.01$; difference in means = 0.857), IG ($t = 28.847$, $p < 0.01$; difference in means = 1.046), and II ($t = 24.765$, $p < 0.01$; difference in means = 0.992) are higher than in the normative sample.

Correlation matrix. The correlations of variables are depicted in Table 5. These analyses confirm that perceived ECSR correlates significantly with IG ($r = 0.512$; $p < 0.01$) and II ($r = 0.568$; $p < 0.01$). Furthermore, PsyCap is significantly associated with IG ($r = 0.318$; $p < 0.01$) and II ($r = 0.316$; $p < 0.01$). In addition, age ($r = 0.172$; $p < 0.01$), firm size ($r = 0.146$; $p < 0.01$), and tenure ($r = 0.185$; $p < 0.01$) are positively related to IG, but other control variables in our study are not. Gender ($r = 0.113$; $p < 0.05$), age ($r = 0.144$; $p < 0.01$), firm size ($r = 0.215$; $p < 0.01$), tenure ($r = 0.276$; $p < 0.01$), marital status ($r = 0.112$; $p < 0.05$) and ownership ($r = -0.155$; $p < 0.01$) are significantly correlated with II, but education, team size, and position are not significant.

Test of hypotheses. We employed the OLS analysis to test the direct effects and moderating effects (see Table 7). The variance inflation factors (VIF) for all regression models are less than 5.0 in Table 6, which reveals that there is no multicollinearity in this research.

Next, we test all of our hypotheses in Table 7. Our results revealed that perceived ECSR positively influences IG (Model 3, $\beta = 0.309$; $p < 0.01$), and the influence of perceived ECSR on II in Model 4 ($\beta = 0.371$; $p < 0.01$) is positive, and noticeable after controlling for gender, education, age, firm size, team size, tenure, position, marital status, and ownership. Thus, Hypothesis 1a and Hypothesis 1b are supported. Additionally, Model 5 shows team size ($\beta = -0.063$; $p < 0.05$) and marital status ($\beta = 0.047$; $p < 0.1$) are associated with IG, but other control variables are not significant. Model 6 shows that gender, age, education, firm size, team size, and ownership do not have any impact on II. We found only tenure ($\beta = 0.125$; $p < 0.01$), position ($\beta = 0.068$; $p < 0.05$), and marital status ($\beta = 0.071$; $p < 0.01$) to be significant in Model 6.

In Model 5, the interaction term between perceived ECSR and PsyCap on IG is represented in Table 6. This coefficient is positive and significant ($\beta = 0.106$, $p < 0.05$), thereby indicating that PsyCap moderates the positive impact of perceived ECSR on IG (Hypothesis 2a). Similarly, the interaction term between

Table 5 Correlations of variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. PECSR	0.843												
2. PsyCap	0.288**	0.798											
3. IG	0.512**	0.318**	0.807										
4. II	0.568**	0.316**	0.779**	0.789									
5. Gender	0.239**	-0.043	0.089	0.113*									
6. Age	0.235**	0.113*	0.172*	0.144**	-0.046								
7. Education	-0.058	-0.045	-0.077	-0.074	-0.121*	0.010							
8. Firm size	0.305**	0.211**	0.146**	0.215**	-0.003	0.062	-0.057						
9. Team size	0.097	0.118*	-0.032	0.029	-0.056	0.181**	-0.013	0.317**					
10. Tenure	0.218**	0.027	0.185**	0.276**	-0.155**	0.314**	0.003	0.247**	0.110*				
11. Position	-0.241**	0.039	-0.103	-0.078	-0.043	-0.242*	-0.109*	-0.007	-0.056	-0.314**			
12. Marital status	0.009	-0.058	0.078	0.112*	-0.030	-0.005	0.011	-0.086	0.001	0.090	-0.117*		
13. Ownership	-0.230**	-0.171**	-0.092	-0.155**	0.080	-0.026	0.013	-0.863**	-0.294**	-0.159**	-0.022	0.030	-

PECSR perceived ECSR, IG idea generation, II idea implementation, *p < 0.05, **p < 0.01 (two-tailed). Bold stands for the square root of AVE.

Table 6 Multicollinearity diagnostics test.

Variables	VIF
1. PECSR	1.423
2. PsyCap	1.155
3. Gender	1.188
4. Age	1.216
5. Education	1.039
6. Firm size	4.559
7. Team size	1.156
8. Tenure	1.361
9. Position	1.232
10. Marital status	1.045
11. Ownership	4.163

ECSR perceived ECSR, PsyCap psychological capital, EIB EIB, IG idea generation, II idea implementation.

perceived ECSR and PsyCap on II also was contained in Model 6. This coefficient is positive and significant ($\beta=0.085, p < 0.1$), thus indicating that PsyCap enhances the impact of perceived ECSR on II (Hypothesis 2b). Figure 2 shows that at a high level of PsyCap, the influence of perceived ECSR on IG is greater than at a low level of PsyCap. Meanwhile, Fig. 3 describes that at a higher PsyCap, the influence of perceived ECSR on II is stronger. This may be because when PsyCap is high, employees are more likely to recognize firms' ECSR efforts, thus increasing their positive behaviors toward ECSR activities. In this context, perceived ECSR will influence IG and II when PsyCap is high. Therefore, Hypothesis 2a and Hypothesis 2b are supported.

Additional analyses. To test the robustness of the results, we performed sensitivity analyses. First, we estimated a new model of psychological capital as the independent variable, perceived ECSR as the moderating variable, IG and II as the dependent variables. The results are included in Table 8. From Table 8, the R^2 values (Model 1, $R^2 = 0.184$; Model 2, $R^2 = 0.228$) also are smaller than the current model in Table 7 (Model 3, $R^2 = 0.289$; Model 4, $R^2 = 0.373$). As such, the current model is appropriate. Second, we also estimated an additional new model of the interaction between perceived ECSR and PsyCap as the independent variable, IG and II as the dependent variables. For Model 3 in Table 8, we found that the R^2 value (0.121) still is smaller than the current model in Table 7 (Model 3, $R^2 = 0.289$). Similarly, the results of the interaction term between perceived ECSR and PsyCap on II are contained in Model 4. The R^2 value (0.158) in Model 4 is smaller than the current model in Table 7 (Model 4, $R^2 = 0.373$). Therefore, our model provides a better fit. Third, we constructed a new framework, under which we examine how IG and II impact PsyCap. In Table 7, the details are as follows: the R^2 values in Table 8 (Model 5, $R^2 = 0.158$; Model 6, $R^2 = 0.157$) also are smaller than the current model in Table 7 (Model 3, $R^2 = 0.289$; Model 4, $R^2 = 0.373$), thus indicating that our model fits the data well. These results suggest that our model adequately captures the underlying relationships among the main variables in our research model.

Additionally, we also employed some other tests. Table 9 represents the results of additional robustness tests. First, we added a quadratic term of perceived ECSR in Model 1 and Model 2 to test if perceived ECSR has this curvilinear influence on the two dimensions of EIB. In Table 9, the squared term of perceived ECSR is insignificant in Model 2, suggesting that the inverted U-shaped relationship between perceived ECSR and II is not supported by our data. Second, many prior studies on EIB do not include ownership (e.g., Füller et al. 2022; Bracht et al. 2023). We removed the ownership dummies and tested Hypothesis 2a and

Table 7 Results of regression analysis.

Variables	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	IG		II		IG		II		IG		II	
	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value
Constant	3.193	6.708	0.000***	2.557	4.998	0.000***	2.645	6.199	0.000***	2.322	5.380	0.000***
Gender	0.199	1.780	0.076*	0.337	2.803	0.005***	-0.062	-0.597	0.551	-0.380	0.704	0.491
Age	0.114	2.593	0.010**	0.074	1.556	0.121	0.048	1.198	0.232	0.024	0.039	0.823
Education	-0.053	-1.183	0.238	-0.043	-0.896	0.371	-0.039	-0.980	0.328	0.026	-0.154	0.878
Firm size	0.104	1.828	0.068*	0.118	1.936	0.054*	0.031	0.613	0.540	0.031	-0.026	0.858
Team size	-0.066	-2.052	0.041**	-0.038	-1.088	0.277*	-0.058	-2.027	0.043**	0.022	0.445	0.656
Tenure	0.064	1.831	0.068	0.148	3.962	0.000***	0.039	1.248	0.213	0.045	1.487	0.138
Position	-0.020	-0.537	0.592	0.021	0.525	0.600	0.035	1.044	0.297	0.014	0.429	0.668
Marital status	0.048	1.596	0.111	0.073	2.267	0.024**	0.044	1.647	0.101	0.047	1.821	0.070
Ownership	0.077	0.542	0.588	0.045	0.291	0.771	0.081	0.642	0.521	0.097	0.783	0.434
PECSR					0.309	9.566	0.000***	0.371	11.070	0.293	8.745	0.000***
PsyCap										0.104	2.257	0.025**
PECSR x PsyCap										0.106	2.541	0.011**
R ²	0.096			0.145			0.289			0.336		0.407
Adjusted R ²	0.072			0.122			0.268			0.312		0.386
F value	3.978***			6.344***			13.690***			14.137***		19.146***

*p < 0.10, **p < 0.05, ***p < 0.01.
PECSR perceived ECSR, IG idea generation, II idea implementation.

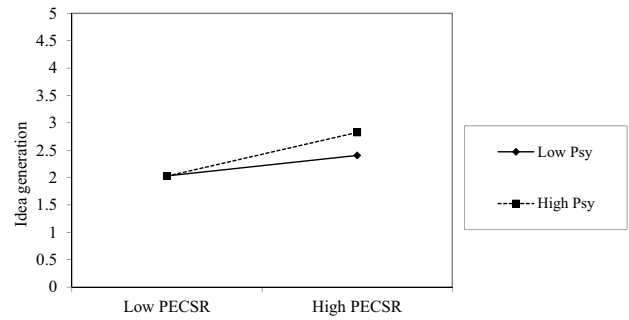


Fig. 2 Interaction effect of between perceived ECSR and PsyCap on idea generation. As Figure shows, idea generation increases more rapidly when the level of PsyCap shifts from low to high. This indicates that PsyCap enhances the positive influence of perceived ECSR on idea generation (H2a). PECSR perceived ECSR, PsyCap psychological capital.

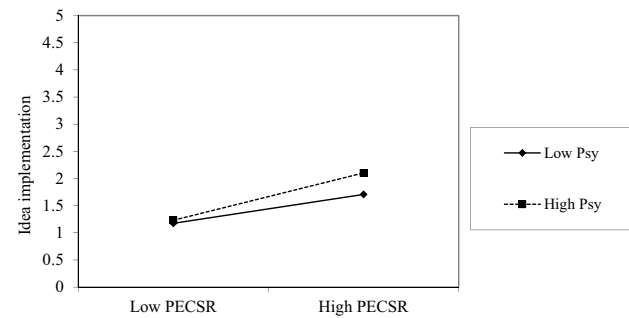


Fig. 3 Interaction effect of between perceived ECSR and PsyCap on idea implementation. As Figure shows, idea implementation increases more rapidly when the level of PsyCap shifts from low to high. This indicates that PsyCap enhances the positive influence of perceived ECSR on implementation (H2b). PECSR perceived ECSR, PsyCap psychological capital.

Hypothesis 2b. The results represent that the moderating effects of PsyCap are still positive ($\beta = 0.103, p < 0.05$; $\beta = 0.083, p < 0.1$) in Model 3 and Model 4, providing support for Hypothesis 2a and Hypothesis 2b, again. Our findings remain unaltered. Accordingly, these additional tests indicate that our findings are overall robust.

Discussion and conclusion

Under the increasing pressure of environmental protection, EIB is extremely important for firms' survival and success (Hur et al. 2018). Drawing the SIT and stakeholder theory, we construct a general model of employees' ECSR perception and innovative behavior with which to explore the influences of perceived ECSR on the two dimensions of EIB and identify the boundary, which is PsyCap. Our empirical results show that perceived ECSR as a predictive role is significantly and positively linked with IG and II, respectively. The findings enhance the understanding of the link between ECSR perceptions and employee innovation, as well as provide practical guidelines for firms in the turbulent business environment. Meanwhile, the findings also further highlight the connection between employee roles and sustainable development. Additionally, our empirical results show that the effects of perceived ECSR in improving IG and II are significantly stronger when the PsyCap of employees is high.

Theoretical contributions. Our findings offer important contributions to the innovative behavior literature. First, we

Table 8 Results of sensitivity analyses.

Variables	Independent variable= PsyCap			Independent variable= PECSR x PsyCap			Independent variable=IG			Independent variable=II									
	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6			
	IG			II			IG			II			PsyCap			PsyCap			
	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	
Constant	2.380	5.038	0.000***	1.685	3.319	0.001***	3.172	6.747	0.000***	2.539	4.997	0.000***	1.982	3.322	0.001***	2.300	3.958	0.000***	
Gender	0.231	2.172	0.031**	0.372	3.244	0.001***	0.195	1.763	0.079*	0.333	2.792	0.006**	-0.205	-1.547	0.123	-0.249	-1.866	0.063*	
Age	0.085	2.029	0.043**	0.043	0.947	0.344	0.096	2.202	0.028**	0.059	1.246	0.214	0.069	1.322	0.187	0.087	1.671	0.096*	
Education	-0.044	-1.038	0.300	-0.034	-0.737	0.462	-0.047	-1.057	0.291	-0.038	-0.795	0.427*	-0.014	-0.265	0.791	-0.019	-0.360	0.719	
Firm size	0.064	1.179	0.239	0.076	1.293	0.197	0.108	1.923	0.055*	0.122	2.004	0.046**	0.117	1.739	0.083*	0.115	1.704	0.089*	
Team size	-0.073	-2.385	0.018**	-0.045	-1.371	0.171	-0.069	-2.152	0.033**	-0.040	-1.153	0.250	0.053	1.399	0.163	0.041	1.087	0.278	
Tenure	0.074	2.233	0.026**	0.159	4.468	0.000***	0.064	1.878	0.061*	0.149	4.006	0.000***	-0.065	-1.588	0.113	-0.094	-2.240	0.026**	
Position	-0.030	-0.827	0.409	0.011	0.289	0.773	-0.037	-0.996	0.320	0.007	0.172	0.863	0.045	1.019	0.309	0.030	0.670	0.503	
Marital status	0.053	1.850	0.065*	0.078	2.553	0.011**	0.049	1.654	0.099*	0.074	2.311	0.021**	-0.038	-1.072	0.284	-0.045	-1.284	0.200	
Ownership	0.055	0.405	0.686	0.021	0.141	0.888	0.107	0.756	0.450	0.069	0.451	0.652	0.059	0.348	0.728	0.073	0.431	0.667	
PECSR	0.253	6.046	0.000***	0.271	6.026	0.000***	0.126	3.093	0.002***	0.104	2.365	0.019**	0.387	6.046	0.000***	0.359	6.026	0.000***	
PsyCap																			
PECSR x PsyCap																			
IG																			
II																			
R ²	0.184			0.228			0.121			0.158			0.158			0.157			
Adjusted R ²	0.160			0.205			0.095			0.124			0.133			0.132			
F value	7.612***			9.937***			4.628***			6.347***			6.309***			6.283***			

PECSR perceived ECSR, IG idea generation, II idea implementation. *p < 0.10, **p < 0.05, ***p < 0.01.

contribute to the literature by extending the influence of perceived ECSR into the innovation domain and clarifying the potential mechanism of how perceived ECSR influences the two dimensions of EIB. Prior studies on ECSR are mainly from its economic impact at the macro level (Li et al. 2020; Wu and Yu 2023), but the role of perceived ECSR in driving employee innovation has been underexamined. In our model, by testing the predictive role of ECSR perceptions, our study highlights how some drivers of IG and II arise from employees' perceptions of their firms' engaging their companies' participation in specific initiatives that are environmentally responsible and promote the sustainable development of the organization. Moreover, we introduce stakeholder theory and SIT to innovative behavior literature to seek the potential mechanism for triggering positive behavioral responses among employees, through which perceived ECSR positively affects the generation and implementation of ideas. Compared with a single theory, our multi-theoretical model could examine the phenomenon more comprehensively. Therefore, our finding helps to establish the theoretical connection between ECSR and employee innovation. In addition, the finding also advances ECSR literature from the perspective of stakeholders.

Second, our results further reveal that perceived ECSR positively impacts the two dimensions of EIB, including the generation and implementation of ideas. By combining the existing literature and our knowledge in hand, our finding is one of the few studies to investigate the antecedents of IG and II in the environmental protection context (Wu and Yu, 2022; Bracht et al. 2023). The finding echoes the call for an investigation of the antecedents of IG and II (Birdi et al. 2016) and implies that perceived ECSR influences the generation and implementation of ideas from the ECSR perspective. While previous research has proved that an indirect connection exists between perceived CSR and employee innovativeness (Forcadell et al. 2021), little research has demonstrated that perceived CSR directly affects IG and II in the environmental protection context (Caniels et al. 2022). Therefore, our findings also offer insightful explanations for the relationships between ECSR and employee innovation.

Third, our study contributes to innovative behavior by determining the boundary condition (i.e., PsyCap) when perceived ECSR might positively impact the workplace behaviors of employees (e.g., Tian and Robertson, 2019). Previous studies ignored individuals' psychological states that condition the effectiveness of ECSR perception (Wu et al. 2021). In this case, the understanding of under what circumstances ECSR perception improves IG and II is limited. Our findings demonstrate that PsyCap can strengthen these relationships among perceived ECSR, IG, and II in the workplace. Therefore, our research fills this gap by deepening the understanding of the important role of PsyCap in perceived ECSR - IG and II relationships from the psychological perspective. The finding also emphasizes the role of PsyCap in affecting employees' workplace behaviors.

Finally, our work contributes to the nascent literature on individual-level ECSR by extending initial research on perceived ECSR in management research (e.g., Vlachos et al. 2014). Our research explores an overlooked dimension of CSR, namely ECSR at the individual level (Turker 2009; Rahman and Post 2012). In doing so, this study has linked perceived ECSR with employees' workplace behaviors by confirming that perceived ECSR plays a key part in influencing IG and II from a micro-level perspective. Furthermore, our findings that these relationships between perceived ECSR and IG and II are moderated by PsyCap from the individual perspective. As such, the findings expand the existing studies (e.g., Graafland 2020; Wu and Yu 2023) that have begun to examine the boundary condition of the ECSR perception - employees' innovation relationship. In addition, by

Table 9 Robustness tests results.

Variables	Curvilinear model						No ownership control					
	Model 1			Model 2			Model 3			Model 4		
	IG			II			IG			II		
	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value	β	t-value	p-value
Constant	3.269	5.680	0.000***	2.316	3.840	0.000***	2.557	8.245	0.000***	1.698	5.245	0.000***
Gender	-0.043	-0.424	0.672	0.050	0.470	0.639	-0.025	-0.252	0.801	0.060	0.577	0.564
Age	0.025	0.639	0.523	-0.025	-0.621	0.535	0.025	0.656	0.512	-0.026	-0.647	0.518
Education	-0.032	-0.835	0.405	-0.021	-0.523	0.602	-0.033	-0.851	0.395	-0.020	-0.505	0.614
Firm size	0.024	0.471	0.638	0.022	0.421	0.674	-0.011	-0.400	0.690	0.001	0.019	0.985
Team size	-0.064	-2.296	0.022**	-0.034	-1.157	0.248	-0.064	-2.317	0.021**	-0.034	-1.168	0.244
Tenure	0.049	1.618	0.107	0.130	4.108	0.000***	0.048	1.604	0.110	0.126	4.060	0.000***
Position	0.004	0.126	0.900	0.057	1.644	0.101	0.014	0.421	0.674	0.068	1.980	0.049**
Marital status	0.048	1.858	0.064*	0.073	2.693	0.007***	0.045	1.754	0.080*	0.070	2.620	0.009***
Ownership	0.106	0.858	0.391	0.067	0.518	0.605						
PECSR							0.292	8.729	0.000***	0.351	10.046	0.000***
PECSR	0.003	0.111	0.911	0.030	1.205	0.229						
_Squared												
PsyCap	-0.025	-0.225	0.822	0.056	0.478	0.633	0.106	2.323	0.021**	0.115	2.405	0.017**
PECSR x							0.103	2.479	0.014**	0.083	1.918	0.056*
PsyCap												
PECSR	0.011	1.746	0.082*	0.006	0.910	0.363						
_Squared x												
PsyCap												
R ²	0.334			0.401			0.336			0.406		
Adjusted R ²	0.310			0.379			0.312			0.387		
F value	14.008***			18.685***			14.137***			20.917***		

PECSR perceived ECSR, IG idea generation, II idea implementation.
*p < 0.10, **p < 0.05, ***p < 0.01.

identifying PsyCap as a boundary condition that affects the ECSR perception - IG and II relationships, our study offers a strong theoretical interpretation of this relationship in the micro-level ECSR literature.

Practical implications. Our findings have also provided some vital practical implications for practitioners operating in the construction industry. First, perceived ECSR is a key driver of IG and II under the background of environmental protection. Therefore, we suggest that firms' practitioners (e.g., CEOs) aiming to improve the generation and implementation of employees' ideas should establish a good organizational atmosphere that fosters the employees' perceptions toward firms' ECSR activities. An organizational atmosphere can be created by regularly training and disclosing ECSR topics to employees. The more perceptions of ECSR activities help to bring up original ideas and take initiatives (Glavas and Piderit 2009), the more likelihood that employees' new ideas will be motivated. In addition, to obtain more technical knowledge resources for developing innovative ideas and implementing new ideas, we suggest that practitioners should effectively share the ECSR strategy information with employees through annual reports, quarterly reports, and awareness programs. The information on the ECSR strategy covers all efforts made by firms to fulfill their ECSR (Rahman and Post 2012). Furthermore, practitioners should regularly communicate ECSR strategies to employees through training.

Second, our findings have demonstrated that PsyCap can strengthen the direct links between perceived ECSR and the generation and implementation of ideas. Because employees' PsyCap is a positive psychological state, it can be fostered and shaped gradually over time (Caniëls et al. 2022). Therefore, we suggest that practitioners should invest more energy and time in improving PsyCap to enhance employees' ability to deal with the

ECSR-innovation relationship. Specifically, practitioners can set up a psychological counseling department for employees to help employees shape a good psychological state and process negative emotions timely. For example, when practitioners discover employees with low PsyCap, organizations can quickly address their problems by providing them with personalized services to improve employees' feelings of confidence and hope to complete innovative tasks. In addition, to increase employees' PsyCap, we suggest that practitioners should regularly hold a variety of organizational cultural activities. Moreover, practitioners should enhance employees' PsyCap in the training to increase the potential return of perceived ECSR.

Finally, we suggest that practitioners should actively invest in sustainable development activities to promote the integration of ECSR into all aspects of employees' work environment, which will improve IG and II in ECSR activities by increasing employee. In addition, our findings help regulators recognize the importance of firms investing in ECSR activities to promote employees' innovative behavior. Regulators, such as the Social Responsibility Bureau of the State-owned Assets Supervision and Administration Commission of the State Council of China, should increase the firm's ECSR investment by providing encouraging policies, such as government subsidies and preferential taxation policy for high-level ECSR firms.

Limitations and future research. Apart from its implications, our research has some limitations. First, participants are only from the construction industry in China, which means our results may not fully prove their applicability to other industries because employees in different industries have different reactions to perceived ECSR. In this context, the low R² value may derive from our empirical contexts. Future research should further pay attention to employees of other industries (e.g., non-ferrous

metals, textiles, petrochemical and chemical, manufacturing, power, coal, mining, and pharmaceutical) in different countries to confirm our findings. Second, the low R^2 value also may arise from a limitation of our research related to the cross-sectional design of the current study. That's because the cross-sectional data used in our study do not permit causal interpretations of its empirical findings. Future research could adopt experimental or longitudinal designs to improve the R^2 value and test our proposed hypotheses in the current study. Third, we only considered the moderating role of employees' PsyCap in the links between perceived ECSR and the two dimensions of EIB from the psychological perspective. These relationships are highly complex. In such a context, it may be influenced by additional moderating factors from other perspectives, which may lead to the low R^2 value in our model. Future research should make an effort to investigate other moderating factors (e.g., organizational culture and work atmosphere) within a certain environment. Finally, our research only considers IG and II affected by perceived ECSR, we encourage other scholars to test the link between organizational climates and innovative behavior rather than merely individual factors.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Author contributions

Li Yu: Conceptualization, Writing-original draft, Investigation, Methodology, Writing-review & editing, Funding acquisition. Weiwei Wu: Conceptualization, Writing - review & editing, Fundingacquisition.

Competing interests

The authors declare no competing interests.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all the participants included in this study.

Additional information

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