

Promoting or Hindering? Research on the Double-Edged Sword Effect of Responsible Leadership on Employee Green Behavior

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Abstract

Responsible leadership focuses on the balance between economic, social and environmental benefits, which is in line with the value concept of green development. However, whether responsible leadership can effectively promote employees' green behaviours and help enterprises achieve green and sustainable development still needs to be further explored. In order to explore the mechanism and boundary conditions of responsible leadership on employees' green behaviours, the article constructs a dual-path research model based on the work requirement-resource theory and resource preservation theory, with work vitality and work pressure as mediating variables and self-efficacy as moderating variable, and analyses the data collected from 342 samples. The empirical results show that: responsible leadership positively influences employees' green behaviours through the mediation of job vitality; responsible leadership negatively influences employees' green behaviours through the mediation of job stress; and compared with low self-efficacy employees, high self-efficacy employees can generate more job vitality and less job stress under responsible leadership, which promotes employees' green behaviours.

Keywords

Responsible Leadership, Employee Green Behaviour, Job Dynamics, Job Stress, Self-Efficacy

1. Introduction

At present, China's economic development has entered a new normal stage of slowing growth and serious resource and environmental constraints (Wang & Chen, 2021), and the phenomena of resource depletion and environmental pol-

lution have seriously constrained the sustainable and high-quality development of China's economy (Mu & He, 2023). The 20th Party Congress emphasised that we must stand at the height of the harmonious coexistence of man and nature to plan development, accelerate the green transformation of the development mode, develop green and low-carbon industries, and form a green and low-carbon mode of production. As the main body of the market economy (Wang et al., 2021), the relationship between enterprises and the economic, social and natural environments in which they operate is becoming increasingly close. This requires enterprises to take into account both social and environmental benefits while pursuing and obtaining economic benefits. At the same time, while pursuing the goal of profit, business leaders should also pay attention to the needs of stakeholders and take the initiative to assume corporate social responsibility. Many studies have shown that only by paying enough attention to stakeholders can a company gain a lasting competitive advantage in an increasingly competitive market and then achieve sustainable development. Leadership plays a crucial role in team building and organisational development. Unlike traditional leadership styles that focus only on leader-employee relationships, responsible leadership pays more attention to the balanced development of the economy, society and the environment, which is in line with the values embedded in green development. Employees are the most dynamic and important resources of an enterprise, and the green practice of an enterprise cannot be separated from the active participation of every employee (Yue et al., 2022). The green development of the enterprise is closely related to the employees' behaviours of energy saving and emission reduction, resource protection and resource recycling in the working environment. Employees are the core factor in transforming sustainable development strategies into measurable results, and play a fundamental role in enterprises, thus, employee green behaviours have gradually come into the attention of scholars.

Thus, it seems that both responsible leadership and employee green behaviour are positive responses to the green development of enterprises. Through combing the related literature on responsible leadership, we found that a large number of scholars have proved that responsible leadership has a significant positive impact on employees' willingness to disclose (Wen et al., 2016), subordinates' innovative behaviour (Su & Lin, 2019), employees' helping behaviour (Bu et al., 2021), employees' work commitment and family commitment (Zhou et al., 2022), etc. However, since responsible leadership is an abstract leadership style, it is not suitable for all individuals or any environment, scholars (Wen & He, 2017; Guo & Su, 2018) have suggested that the potential "dark side" of responsible leadership needs to be studied in depth. Scholars have suggested that the potential "dark side" of responsible leadership needs to be studied in depth. According to Wen Peng et al., responsible leadership can distract employees and weaken their performance goals (Pless & Maak, 2012). In the field of employees' green behaviours, some studies have confirmed that responsible leadership has a facilitating effect on employees' green behaviours (Pan & Huang, 2021; Xing et al., 2017). But does responsible leadership bring some negative impacts on employees,

teams or organisations, thus weakening the positive impacts of responsible leadership? Through what mechanism of action does responsible leadership influence employees' green behaviours? All these need further empirical tests.

Based on the work requirement-resource theory, all elements with work characteristics can be divided into two types: work resources and work requirements. On the one hand, based on the connotation of responsible leadership, a responsible leader will consider the interests of employees' demands and provide them with job resources, which plays a favourable role in achieving personal gains, provides employees with more positive emotional experiences, enhances their vitality at work, and motivates them to complete their work tasks according to the leadership vision and exhibit green behaviours. On the other hand, since employees are only one part of the stakeholders (also including shareholders, suppliers, government, the environment, etc.), responsible leaders take care of the stakeholders while placing higher demands on them, such as understanding the needs of stakeholders and coordinating conflicts or contradictions among the stakeholders. These job requirements expand the scope of employees' responsibilities, bringing work pressure and emotional exhaustion to employees, who develop more avoidance behaviours and negative feedback, thus reducing green behaviours. In addition, the introduction of individual resources is an important addition to the job requirement-resource theory (Qi & Wu, 2018). This paper further introduces self-efficacy, which is closely related to individual resources, and by giving employees energy and confidence, it can not only promote individual work vitality, but also mitigate the negative impact of responsible leadership on employees' work pressure, thus moderating the "double-edged sword" effect of responsible leadership.

To sum up, on the basis of previous research, this paper will use empirical research methods to explore the influence mechanism of responsible leadership on employees' green behaviours by taking the two sides of responsible leadership as the entry point, and starting from the two intermediary variables of work vitality and work pressure, and taking the positive and negative "double-edged sword" influences generated by responsible leadership into account, so as to enrich and improve the theory of responsible leadership and promote the green sustainable development of enterprises in China. We explore the influence mechanism of responsible leadership on employees' green behaviour, test the moderating effect of self-efficacy, and construct a research model of the influence mechanism and path of responsible leadership on employees' green behaviour, so as to enrich and improve the theory of responsible leadership and promote the green and sustainable development of Chinese enterprises.

2. Theoretical Basis and Research Hypothesis

2.1. Theoretical Foundations

2.1.1. Resource Conservation Theory

Resource Conservation Theory assumes that people have various types of re-

sources, and in order to avoid the stress caused by the loss of existing resources, they will endeavour to conserve existing resources or acquire new ones. An excess of resources will give individuals a sense of well-being and security, and a lack of resources will give individuals psychological stress, work tension, and other situations. The evaluation of the value of resources also varies from person to person, and resources cover a wide range of contents, including material resources, individual characteristic resources, conditioned resources, and energetic resources. Specifically, material resources refer to the resources that reflect the economic and social status of individuals, such as housing, cars, etc. Individual characteristic resources refer to the individual traits and skills that reflect people's ability to cope with stress, such as self-efficacy, optimism, etc. Conditional resources are the external conditions, such as rights, status, etc., that help individuals obtain valuable resources; energetic resources are the resources that help individuals obtain the first three types of resources or even more resources, such as money, time, and so forth.

The main idea of resource preservation theory states that when organisations or individuals have more abundant resources, they are more likely to acquire the quality resources they need and are less likely to experience resource loss; on the contrary, when resources are scarce, they are more likely to experience resource depletion and have a lower ability to acquire resources. Resource loss and acquisition are actually accompanied by different resource spirals, namely the resource loss spiral and the resource gain spiral. The resource loss spiral refers to the fact that resource depletion is easier to show than resource acquisition, and will cause psychological pressure and tension in individuals, therefore, individuals with resource depletion will have more difficulty in acquiring resources, and can only make up for the existing loss with limited resources, and so on, which will cause resource depletion to spiral upwards, further expanding the impact of the loss. The resource enhancement spiral refers to the fact that for individuals in an organisation, when they have more abundant resources, they do not feel pressure and tension, instead, they will invest these excess resources to obtain more resources, resulting in an upward spiral of resource enhancement. The resource loss spiral grows faster than the resource gain spiral because the rate of resource depletion is faster than the rate of resource gain. This also means that the fewer resources an individual has, the more likely they are to experience a loss spiral.

Leadership style as an organisational level resource influences individuals' perceptions of organisational resources. Individual traits conveyed by leaders have a significant impact on employees' perceptions of their work. Therefore, leadership style is an important factor that must be considered when exploring the influences on employees' green behaviours. Some scholars argue that work-related social resources include leaders' understanding and trust, and leadership support. Therefore, the resource conservation theory can effectively understand the organisational resources embedded in the individual traits of leaders, which

helps to deepen the analysis of the factors influencing employees' green behaviours. In addition, the two effects of resource enhancement spiral and loss spiral in the resource conservation theory fit the bidirectional path of the influence of responsible leadership on employees' green behaviours.

2.1.2. Job Requirements-Resource Theory

Job requirements are the factors that the content of the job creates requirements on the individual's ability, physiology, psychology, etc., and requires the individual to continuously invest a certain amount of energy and go through efforts to complete the job. It will cause a certain burden on the individual's physiology, psychology, is a negative factor, such as role pressure, work pressure, etc.. Work resources refer to the resources that satisfy physiological, psychological, organisational, social and other aspects of the work, it is a positive factor that can help to achieve the individual's work goals, reduce the physical and mental burden, and promote the growth of the individual, such as work commitment, organisational support and so on.

The Job Requirements-Resources Model explores the effects on employee attitudes and behaviours in terms of job requirements and job resources respectively. In terms of job demands, some scholars pointed out that under the influence of environmental stressors (e.g., workload, time pressure), individuals will adopt protective strategies, such as narrowing the scope of attention and redefining task requirements. In the long term, job demands can deplete an individual's resources leading to emotional exhaustion. In terms of work resources, some scholars classified resources into two categories, namely external and internal resources. External resources mainly include organisational and social resources etc. and internal resources mainly include cognitive resources and types of actions etc. However, when there is a lack of external resources, individuals often have difficulty in dealing with negative influences from environmental demands (e.g., high workloads), and they also have difficulty in achieving their personal goals. In this case, it reduces the individual's motivation to work and causes the individual to adopt a self-protective approach at work in order to avoid the risks associated with future difficulties in achieving work goals. Therefore, job requirements and job resources are important factors that have an impact on employee attitudes and behaviours. Leadership behaviours of responsible leaders can provide employees with job resource factors (e.g., positive emotions, job vitality, etc.), and also present employees with factors containing job demands (e.g., high job demands, time pressure, etc.); therefore, the influence effects of responsible leaders can be fully reflected by using the job demand-resource model.

2.2. Research Hypothesis

2.2.1. The Mediating Role of Work Dynamics

Responsible leadership is a social relationship and moral and ethical behaviour that results from the social interaction of leaders with a wider range of stake-

holders inside and outside the organisation (Pless & Maak, 2012; Maak & Pless, 2006). They are committed to building and developing a sustainable and trusting relationship in order to reach a common goal and business vision with all stakeholders inside and outside the organisation (Yao et al., 2020). Work dynamism is a positive emotional experience that occurs when employees perceive energy in the work itself or in the work environment (Spreitzer et al., 2005). Based on the Job Requirements-Resources Theory, this paper argues that on the one hand, employees, as typical internal stakeholders, and the leader-employee relationship have changed from a traditional hierarchical relationship to a trusting relationship that is sustainable for long-term cooperation. This requires responsible leaders to commit themselves to establishing a warm working environment, maintaining trusting interpersonal relationships, and creating a pleasant and fair team atmosphere in their daily working life (Wang et al., 2015); on the other hand, responsible leaders play a dominant role in constructing a fair ethical environment and delegating authority, which can make employees feel supported by their leaders, and their leaders' respect and trust can satisfy their emotional needs and bring positive emotional experience to the employees a positive emotional experience (Qi & Yang, 2016), thus bringing employees rich work resources, so this paper argues that responsible leadership can effectively enhance employees' work vitality at work. Employee green behaviour refers to the individual behaviours of employees in the workplace that are dominated by their individual wills and independently manifested in a way that is conducive to the sustainable development of the environment (Tian et al., 2021). Scholarly research has confirmed that positive emotional experiences such as work vitality have a facilitating effect on civic and organisational behaviours, and employee green behaviours are essentially behaviours that are beneficial to organisations and the environment. Work vitality can influence the interaction between individuals and the social environment, expand the horizon of individual attention, and construct personal resources (Fredrickson, 1998, 2001). Therefore, when employees feel work vitality, their thinking and behaviour will become more positive, resulting in a positive worldview and social responsibility (Carlson et al., 2013). Also, Bachrach and Jex (2000) found that individuals with higher positive affective experiences extend their work responsibilities and scope. These will motivate employees to engage in more green behaviours in their daily lives that are beneficial to the organisation (Bachrach & Jex, 2000).

Based on the above analyses, Hypothesis 1 is proposed in this paper:

H1a: There is a significant positive effect of responsible leadership on employees' work dynamics.

H1b: There is a significant positive effect of employee job dynamics on employee green behaviour.

H1c: There is a positive mediating role of job dynamics between responsible leadership and employees' green behaviours.

2.2.2. The Mediating Role of Job Stress

Job stress is the physiological response, psychological reaction and behavioural change of employees under persistent stressful stimuli (Stajkovic & Luthans, 2003), which is regarded by researchers as a “double-edged sword” and classified as challenging stress and resistance stress (Cavanaugh et al., 2000). Challenging stress is the type of stress that an individual employee can overcome on his/her own and that will enhance his/her performance and personal growth. Obstructive stress, on the contrary, is the type of stress that is difficult to be accomplished alone within the individual’s current work capacity, casts doubt on his or her own value, and creates resistance to career growth (Wang et al., 2022). Based on the job requirement-resource theory, both challenging stress and obstructive stress belong to the category of job requirement. In order to achieve the job requirements, it is inevitable that employees will consume a certain amount of resources and energy, and if these resources and energy are not replenished in a timely manner, it will lead to the depletion of employees’ energy, which will then have a negative impact on the physical and mental health of employees (Podsakoff et al., 2007). From the meaning of responsible leadership, employees are only a part of stakeholders (which may include government, suppliers, customers, society, etc.), and in the process of weighing stakeholders, responsible leadership will put higher requirements on employees’ work, including understanding the needs of other stakeholders, communicating with other stakeholders, and resolving conflicts and contradictions of other stakeholders. These demands will have a greater impact on the scope of the employee’s responsibilities, which can be a drain on the employee’s limited energy and personal resources, which can lead to increased job stress and counteract some of the positive experiences and emotional resources that responsible leaders bring to their subordinates. When employees feel pressure at work, it requires them to expend more energy and resources to seek and obtain information. When employees face a desperate situation of resource depletion, it triggers the defence mechanism of individual self-protection. In order to protect their valued resources, employees may adopt avoidance emotional attitudes and coping styles in their daily work, such as reducing work input (Wang et al., 2023) and reducing behaviours that are beneficial to the organisation and the environment (Hao & Yin, 2017).

Based on the above analyses, Hypothesis 2 is formulated in this paper:

H2a: There is a significant positive effect of responsible leadership on employee job stress.

H2b: There is a significant negative effect of employee job stress on employee green behaviour.

H2c: Job stress negatively mediates the relationship between responsible leadership and employee green behaviour.

2.2.3. The Moderating Role of Self-Efficacy

Self-efficacy is a relatively stable self-perception, which is a subjective judgement made by an individual about his or her ability to complete the tasks facing him

or her (Zhu et al., 2020). In the actual organisational work environment, employee self-efficacy moderates the relationship between job resources and job requirements (Liu et al., 2022). Employees with higher self-efficacy are able to face demanding work and individual resource situations with a more fulfilled and full state of self-confidence, and deal with stressful challenges with positive attitudes and excellent abilities, thus reducing and avoiding negative emotions; employees with lower self-efficacy will have more negative emotions when they face higher work demands, making their psychological burden more serious. In summary, responsible leadership will have an impact on employees' workload and stress to a certain extent, but self-efficacy can play a moderating role on employees' psychological emotions. Therefore, this paper argues that self-efficacy has a complementary and reinforcing effect on an individual's psychological energy, which can alleviate resource loss (reduce work stress) and enhance resource gain (increase work vigour). Individuals with high self-efficacy will see responsible leadership as an opportunity to gain resources, and will be more willing to take the initiative to face a variety of work difficulties, thus working with more energy, vigour and passion. Individuals with low self-efficacy do not believe that they can accomplish tasks outside the scope of the established requirements, and when faced with the accumulation of work requirements of responsible leadership, they become anxious because of the potential negative stimuli, which leads to an increase in work pressure, and ultimately fall into a spiral of resource depletion.

Based on the above analyses, Hypothesis 3 is formulated in this paper:

H3a: There is a positive moderating effect of self-efficacy on the relationship between responsible leadership and work dynamics, i.e., the stronger the contribution of responsible leadership to work dynamics of employees with high self-efficacy compared to employees with low self-efficacy.

H3b: There is a negative moderating effect of self-efficacy between responsible leadership and job stress, i.e., the stronger the negative effect of responsible leadership on the job stress of low self-efficacy employees compared to high self-efficacy employees.

Further, this paper proposes the moderated mediator model, that is, self-efficacy has the same moderating effect on the mediating role of work vigour and work stress. Specifically, on the one hand, when employees' self-efficacy is high, they are able to quickly integrate into the warm working environment established by responsible leaders, and convert the support they feel from their leaders in a pleasant and fair team atmosphere into personal resources, which in turn promotes their work dynamics. When employees have a high level of work vitality, they will uphold the values consistent with the organisation or the leader, which will help to practice behaviours that are beneficial to the organisation's development and create an environment for the organisation; on the other hand, a higher level of self-efficacy will weaken the consumption of cognitive resources by the responsible leadership, which is focused on the interests of multiple parties, and will reduce the work pressure and the sense of stress of employees,

which will help them to do behaviours that are conducive to organisational development.

Based on the above analyses, Hypothesis 4 is proposed in this paper:

H4a: Self-efficacy reinforces the mediating effect of job dynamics between responsible leadership and employee green behaviour.

H4b: Self-efficacy weakens the mediating effect of job stress between responsible leadership and employee green behaviour.

The research model of this paper is shown in **Figure 1**.

3. Research Design

3.1. Sample

The data collection of this research mainly adopts a combination of online and offline questionnaires. In order to ensure the reliability of the research data, the school's alumni resources were used to contact SMEs willing to participate in this research, and the HR managers of the enterprises were contacted to explain the purpose of this research and the requirements for filling out the questionnaire, stating that the research data were only used for academic research. After obtaining their consent, the HR managers were commissioned to distribute the questionnaires to their organisations. This study indicated all anonymous treatment in the notes of the questionnaire, a total of 418 questionnaires were obtained, excluding the questionnaires with all the same answers, taking too short a period of time and omissions, the remaining valid questionnaires were 342, with an effective recovery rate of 81.8 percent. Among all the valid samples, the respondents are 175 males in total, accounting for 51.17%, and 167 females, accounting for 48.83%; most of them are distributed in the age of 31 - 40; the proportion of those whose education is specialist and above is 68.42%; in terms of positions, the proportion of general employees is the largest, accounting for 52.3%. The specific situation is shown in **Table 1**.

3.2. Measurements

1) Responsible leadership. This paper adopts the 17-item Responsible Leadership Scale compiled by Cheng Xuelian, which mainly includes four dimensions, including self-cultivation, social sentiment, interactive decision-making and long-term strategy, and contains 17 test items such as "My leadership will involve

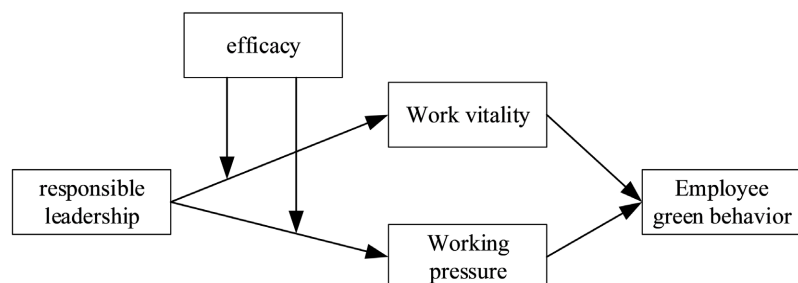


Figure 1. Research model.

Table 1. Descriptive statistical analysis of the sample

variant	Characterisation	Frequency	%
Distinguishing between the Sexes	Male	175	51.2%
	Female	167	48.8%
(A Person's) Age	25 years and under	47	13.7%
	26 - 30 years	88	25.7%
	31 - 40 years	95	27.8%
	41 - 50 years	67	19.6%
	50 and over	45	13.2%
Educational Attainment	Junior high school and below	31	9.1%
	High school/secondary school	77	22.5%
	Polytechnic	107	31.3%
	Undergraduate (adjective)	88	25.7%
	Master's degree or above	39	11.4%
Affiliated Positions	Ordinary employee	179	52.3%
	Primary Manager	76	22.2%
	Middle managers	54	15.8%
	Senior management	33	9.6%
Type of Occupation	R&D and Design	67	19.6%
	Professional and technical category	91	26.6%
	Business marketing category	105	30.7%
	Administrative/Human Resources/Finance	58	17.0%
	The rest	21	6.1%

affected stakeholders in decision-making” (Cheng et al., 2021). The Cronbach's alpha of the scale in this paper is 0.885.

2) Employee green behaviour. This paper adopts the 6-item Employee Green Behaviour Scale developed by Robertson et al., which contains 6 test items such as “I use double-sided printing as much as possible” (Robertson & Barrling, 2013). The Cronbach's α value of the scale in this paper is 0.895.

3) Work Vitality. In this paper, we used the 5-item Work Vitality Scale developed by Porath et al., which contains 5 test items such as “I feel energised at work” (Porath et al., 2012). The Cronbach's α value of this scale in this paper is 0.869.

4) Work stress. In this paper, the 11-item work stress scale developed by Cavanaugh et al. was used, which contains 11 test items such as “the number of projects/tasks that need to be completed at work” (Cavanaugh et al., 2000). The Cronbach's alpha of this scale is 0.932.

5) Self-efficacy. In this paper, the 10-item self-efficacy scale developed by

Schwarzer et al. was used, which contains 10 test items such as “If I give my best effort, I can solve the problem” (Schwarzer et al., 1997). The Cronbach’s α value of the scale in this paper is 0.936.

3.3. Method

3.3.1. Literature Research Method

Relying on the school library network book resources, this study searches the literature on responsible leadership, employees’ green behaviour, work vitality, work pressure and self-efficacy in recent years through Chinese and foreign language databases such as China Knowledge, Wipo, Wanfang, Baidu Scholar, Google Scholar, web of science, etc., reads, filters, aggregates and combs them, stands on the shoulders of the predecessors to explore the current research themes. At the same time, by comprehensively analysing the current research hotspots and research deficiencies, we constructed a conceptual model of the relationship between the variables in this study, which provides reference inspiration for the literature review, theoretical analysis and hypotheses in this study.

3.3.2. Survey Research Method

The questionnaire method is a very reliable method for obtaining data efficiently and studying problems, and it is one of the very widely used methods in management and social statistics. According to the research purpose of this paper, the questionnaire design is carried out in a step-by-step, planned, scientific and standardised way according to the principle of problem design. First, the questionnaire pre-survey, and then according to the results of the pre-survey and expert interviews, revise the questionnaire to form a formal questionnaire; through the form of sampling survey, questionnaires are issued for employees, and then the recovered questionnaires are screened, and unqualified questionnaires are excluded, and ultimately form effective data samples, which will provide data support for the subsequent empirical research.

3.3.3. Statistical Analyses

This study mainly used data analysis software including SPSS 26.0 and AMOS 26.0 to process and statistically analyzed the collected questionnaires, verify research hypotheses, and then draw research conclusions. Using descriptive statistical methods to conduct overall descriptive statistics on the sample, understand the basic information of the sample data and survey objects, and obtain the distribution characteristics of the data; Using exploratory factor analysis and confirmatory factor analysis methods to verify the reliability and validity of the questionnaire, in order to ensure its reliability and effectiveness; Using correlation analysis to explore the degree of correlation between variables such as responsible leadership, employee green behavior, work vitality, work pressure, and self-efficacy; Using the hierarchical regression method to conduct preliminary data tests on the mechanisms of interaction between variables, and using Bootstrap to further test the mediating and moderating effects to confirm the previous research hypothesis.

4. Empirical Analysis

4.1. Validity Tests

In this study, AMOS26.0 software was used to carry out the discriminant validity test for the variables involved, and after the data summary analysis, **Table 2** was obtained. Responsible leadership as a four-factor, employee's green behaviour as a single factor, job vitality as a single factor, job stress as a single factor, and self-efficacy as a single factor were jointly included in the model, in which the eight-factor model had the best fit ($\chi^2/dF = 1.230$, the TLI = 0.972, CFI = 0.974, RMSEA = 0.026). This indicates that the discriminant validity of the model is good.

4.2. Descriptive Statistical Analyses

The demographic characteristics of the effective sample are as follows: from the gender distribution, 51.2% are male and 48.8% are female; from the age distribution, 13.7% are 25 years old and below, 25.7% are 26 - 30 years old, 27.8% are 31 - 40 years old, 19.6% are 41 - 50 years old, and 13.2% are 50 years old and above; from the education distribution, 9.1% are junior high school and below, 22.5% are high school (junior college), 31.3% are specialist, 25.7% are bachelor's degree, and 11.4% are master's degree and above; from the position to which one belongs, one belongs to a generalist. 9.1%, high school (junior college) accounted for 22.5%, specialist accounted for 31.3%, bachelor's degree accounted for 25.7%, master's degree and above accounted for 11.4%; from the perspective of the position belonging to the ordinary workers accounted for 52.3%, the grass-roots level managers accounted for 22.2%, the middle managers accounted for 15.8%, the senior managers accounted for 9.6%; from the perspective of the distribution of the industry, the R & D and design category accounted for 19.2%, professional and technical category accounted for 26.6%, and 19.2%, professional and technical

Table 2. Results of validation factor analysis.

Modelling	χ^2	dF	χ^2/dF	CFI	TLI	RESEA
Eight factors (A, B, C, D, E, F, G, H)	1351.421	1099	1.230	0.974	0.972	0.026
Seven factors (A, B, C, D, E, F, G + H)	3581.983	1106	3.239	0.746	0.730	0.081
Six factors (A, B, C, D, E, F + G + H)	4479.650	1112	4.028	0.654	0.634	0.094
Five factors (A, B, C, D, E + F + G + H)	5639.685	1117	5.049	0.535	0.511	0.109
Four factors (A, B, C, D + E + F + G + H)	6487.284	1121	5.787	0.449	0.422	0.118
Three factors (A, B, C + D + E + F + G + H)	7175.533	1124	6.384	0.378	0.350	0.126
Two-factor (A, B + C + D + E + F + G + H)	7756.365	1126	6.888	0.319	0.289	0.131
Single factor (A + B + C + D + E + F + G + H)	8307.961	1127	7.372	0.262	0.230	0.137

(Note: A, B, C and D represent the four dimensions of responsible leadership: self-cultivation, social awareness, interactive decision-making and long-term strategy; E represents green employee behaviour; F represents work dynamics; G represents work stress; and H represents self-efficacy).

category accounted for 26.2%. In terms of industry distribution, R&D and design accounted for 19.2%, professional and technical accounted for 26.6%, business and marketing accounted for 30.7%, administration/human resources/finance accounted for 17.0%, and others accounted for 6.1%. See **Table 3** for details.

4.3. Correlation Analysis

The results of the correlation analysis are shown in **Table 4**: responsible leadership and work vitality ($r = 0.193, p < 0.01$); work vitality and employees' green behaviour ($r = 0.244, p < 0.01$); responsible leadership and work pressure ($r = 0.216, p < 0.01$); work pressure and employees' green line ($r = -0.129, p < 0.05$). According to the above results, it can be seen that: the results of correlation analysis basically coincide with the research hypothesis of this paper, which provides preliminary data support for the hypothesis testing of this study.

Table 3. Results of descriptive statistical analysis.

Variant	Characterisation	Frequency	%
Distinguishing between the Sexes	Male	175	51.2%
	Female	167	48.8%
(A Person's) Age	25 years and under	47	13.7%
	26 - 30 years	88	25.7%
	31 - 40 years	95	27.8%
	41 - 50 years	67	19.6%
	50 and over	45	13.2%
Educational Attainment	Junior high school and below	31	9.1%
	High school/secondary school	77	22.5%
	Polytechnic	107	31.3%
	Undergraduate (adjective)	88	25.7%
	Master's degree or above	39	11.4%
Affiliated Positions	Ordinary employee	179	52.3%
	Primary Manager	76	22.2%
	Middle managers	54	15.8%
	Senior management	33	9.6%
Type of occupation	R&D and Design	67	19.6%
	Professional and technical category	91	26.6%
	Business marketing category	105	30.7%
	Administrative/Human Resources/Finance	58	17.0%
	The rest	21	6.1%

4.4. Hypothesis Testing

4.4.1. Mediating Effects Test

This study conducted hypothesis testing through hierarchical regression analysis. The results of the mediation effect test are shown in **Table 5**: from Model 5, it can be seen that responsible leadership and job vitality present a significant positive correlation ($b = 0.295$, $p < 0.001$), and H1a is verified; from Model 1, it can be seen that there is a significant positive correlation between job vitality and employee's green behaviour ($b = 0.243$, $p < 0.001$), and H1b is verified; from model 2, when both responsible leadership and job vitality are put into the regression analysis, the direct effect of responsible leadership on employees' green behaviours is weakened ($b = 0.4$, $p < 0.001$), but there is still a significant effect, which indicates that job vitality partially mediates between responsible leadership

Table 4. Results of correlation analysis.

variant	1	2	3	4	5
Responsible leadership	1				
Employee Green Behaviour	0.332**	1			
Vitality of work	0.193**	0.244**	1		
Work pressure	0.216**	-0.129*	0.141**	1	
Self-efficacy	0.162**	0.111*	0.443**	-0.060	1
Average value	3.167	2.857	2.852	2.933	2.991
(Statistics) standard deviation	0.701	0.929	0.926	0.909	0.944

Note: **Indicates $p < 0.01$, and *Indicates $p < 0.05$.

Table 5. Results of the mediation effect test.

Variant	Employee Green Behaviour				Vitality of work	work pressure
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Distinguishing between the sexes	0.014	0.0634	0.031	0.1327	0.007	0.2923**
(A person's) age	-0.044	-0.038	-0.048	-0.034	-0.040	0.046
Educational attainment	-0.015	-0.014	-0.012	-0.020	0.037	-0.055
Affiliated Positions	-0.026	-0.027	-0.019	-0.020	0.007	0.026
Affiliated Industries	0.007	-0.008	-0.043	-0.049	-0.088*	-0.104*
Responsible leadership		0.400**		0.516**	0.257**	0.295**
Vitality of work	0.243**	0.1842**				
Work pressure			-0.136*	-0.233**		
R-square	0.063	0.150	0.023	0.165	0.054	0.091
F	3.735	8.387	1.293	9.417	3.205	5.613

Note: **Indicates $p < 0.01$, and *Indicates $p < 0.05$.

and employees' green behaviours, and H1c is verified.

From model 6, it can be seen that responsible leadership has a significant positive effect on work pressure ($b = 0.257, p < 0.001$), and H2a is verified; from model 3, it can be seen that work pressure significantly and negatively affects employees' green behaviours ($b = -0.136, p < 0.005$), and H2b is verified; from model 4, it can be seen that when both responsible leadership and work pressure into the regression analysis, the direct effect of responsible leadership on employee green behaviour is enhanced ($b = 0.516, p < 0.001$), but the mediating effect is still significant, i.e., work pressure plays a partially mediating role between responsible leadership and employee green behaviour, H2c is verified.

In this paper, Bootstrap method was used to further test the mediating utility (Table 6 and Table 7). The results of Table 6 show that the indirect effect of influencing employees' green behaviours through job dynamics is 0.0473, with a 95% confidence interval of [0.0147, 0.0873], excluding 0. The direct effect is 0.3996, with a 95% confidence interval of [0.2737, 0.5282], also excluding 0. This suggests that responsible leader job dynamics plays a partial mediating role in the relationship between responsible leadership and employees' green behaviours. Table 7 results show that the indirect effect of influencing employees' green behaviours through work stress is -0.0688 , with a 95% confidence interval of $[-0.1162, -0.0293]$, excluding 0; the direct effect is 0.5156, with a 95% confidence interval of [0.3794, 0.6492], also excluding 0. This suggests that responsible leader work stress plays a role in the relationship between responsible leadership and employees' green behaviours, partially mediating role between responsible leadership and employees' green behaviour. In summary H1c and H2c were further validated.

4.4.2. Moderating Effects Test

In order to verify the moderating effect of self-efficacy, this paper refers to the practice of Wen Zhonglin and other scholars, and includes the independent variable (responsible leadership), moderating variable (self-efficacy), and the

Table 6. Bootstrap test results for the mediating effect of job vitality.

	Effect	BootSE	BootLLCI	BootULCI
intermediary effect	0.0473	0.0188	0.0147	0.0873
direct effect	0.3996	0.0651	0.2737	0.5282
aggregate effect	0.4468	0.067	0.307	0.576

Table 7. Bootstrap test results for the mediating effect of work stress.

	Effect	BootSE	BootLLCI	BootULCI
intermediary effect	-0.0688	0.0222	-0.1162	-0.0293
direct effect	0.5156	0.0683	0.3794	0.6492
aggregate effect	0.4468	0.067	0.307	0.576

interaction term (responsible leadership*self-efficacy) in the regression model of job vitality and job stress in **Table 8**. From Model 8 and Model 10, the moderating effect of job vitality ($b = 0.172$, $p < 0.05$) was significant and H3a was validated; the moderating effect of job stress ($b = -0.204$, $p < 0.01$) was significant and H3b was validated.

4.4.3. Moderated Mediation Test

Table 9 shows that when employees' self-efficacy is at a low level, the effect value of the path "responsible leadership - job vitality - green behaviour of employees" is -0.0042 , with a 95% confidence interval of $[-0.0439, 0.0324]$, and the interval contains 0. When employees' self-efficacy is at a high level, the effect value of the path "responsible leadership - job vitality - green behaviour of employees" is 0.0556 , with a 95% confidence interval of $[0.0184, 0.1046]$. When employees' self-efficacy is at a high level, the effect value of the path "responsible leadership - work vitality - employee green behaviour" is 0.0556 , with a 95% confidence interval of $[0.0184, 0.1046]$, and the interval does not contain 0, which indicates that high self-efficacy has a significant positive mediating effect, and the assumption of H4a is verified. **Table 9** also shows that when employees' self-efficacy is at a low level, the effect value of the path "responsible leadership-work pressure-employees' green behaviours" is -0.126 , with a 95% confidence interval of $[-0.2175, -0.0556]$, and the interval does not contain 0. When employees' self-efficacy is at a high level, the effect value of the path "responsible leadership-work pressure-employees' green behaviours" is -0.126 , and the 95% confidence interval is $[-0.2175, -0.0556]$, with no 0 inside the interval. When employees' self-efficacy is

Table 8. Moderating effect test results.

Variant	Vitality of work Model 7	Vitality of work Model 8	work pressure Model 9	work pressure Model 10
distinguishing between the sexes	0.045	0.088	0.153**	0.273
(a person's) age	-0.04	-0.027	0.06	0.041
educational attainment	0.035	0.022	-0.066	-0.046
Affiliated Positions	0.008	0.014	0.029	0.018
Affiliated Industries	-0.098	-0.075	-0.135*	-0.110**
Independent variable: responsible leadership	0.129**	0.1395*	0.241**	0.348**
Regulation: self-efficacy	0.422**	0.407**	-0.085	-0.073
interaction term Responsible leadership*self-efficacy		0.172*		-0.204**
R^2	0.225	0.239	0.098	0.118
F	13.881	13.090	5.199	5.593

Note: **Indicates $p < 0.01$, and *Indicates $p < 0.05$.

at a high level, the effect value of the path “responsible leadership - work pressure - employees’ green behaviour” is -0.0363 , with a 95% confidence interval of $[-0.0822, 0.0081]$, and the interval contains 0, which indicates that the positive mediating effect of high self-efficacy is not significant, and the hypothesis H4b has been verified.

4.5. Summary of Hypothesis Testing Results

In this study, the proposed hypotheses were tested by statistically analysing the recovered valid sample data using SPSS 26.0 and PROCESS plug-in, following the scientific methods and processes of data analysis, and the specific results are summarised in **Table 10**.

Table 9. Moderated mediation effect test results.

trails	moderator variable	efficiency value	standard error	BootLLCI	BootULCI
Responsible Leadership - Work Dynamics - Green Employee Behaviour	lower level	-0.0042	0.0186	-0.0439	0.0324
	average value	0.0257	0.0138	0.0019	0.0564
	high level	0.0556	0.022	0.0184	0.1046
Responsible Leadership - Job Stress - Employee Green Behaviour	lower level	-0.126	0.0408	-0.2175	-0.0556
	average value	-0.0811	0.0248	-0.1346	-0.0374
	high level	-0.0363	0.0228	-0.0822	0.0081

Table 10. Summary of hypothesis testing results.

Suppose that...	Hypothetical content	Test results
H1a	Responsible leadership has a significant positive effect on employees’ sense of job vitality	adjuvant
H1b	There is a significant positive effect of employee work dynamics on employee green behaviour	adjuvant
H1c	Responsible leadership has a significant positive effect on employee green behaviour through the mediating role of employee work dynamics	adjuvant
H2a	Responsible leadership has a significant positive effect on employees’ sense of job stress	adjuvant
H2b	There is a significant negative effect of employee job stress on employee green behaviour	adjuvant
H2c	Responsible leadership has a significant negative effect on employee green behaviour through the mediating effect of employee job stress	adjuvant
H3a	Self-efficacy positively moderates the relationship between responsible leadership and work dynamics, i.e., the more responsible leadership promotes work dynamics in high self-efficacy employees compared to low self-efficacy employees	adjuvant
H3b	Self-efficacy negatively moderates the relationship between responsible leadership and job stress, i.e., the stronger the negative effect of responsible leadership on job stress for low self-efficacy employees compared to high self-efficacy employees.	adjuvant
H4a	Self-efficacy reinforces the mediating effect of job dynamics between responsible leadership and employee green behaviour	adjuvant
H4b	Self-efficacy weakens the mediating effect of job stress between responsible leadership and employee green behaviour	adjuvant

5. Conclusions and Discussion of the Study

5.1. Conclusions of the Study

This paper constructs the double-edged sword path of responsible leadership affecting employees' green behaviour based on the work requirement-resource theory and resource preservation theory, etc., and obtains the following conclusions: firstly, responsible leadership's concern for stakeholders' (ecological environment) corporate social responsibility shown in the work, and employees' internalization of the leadership's environmental goals and enhancement of the autonomous motivation can have a positive impact on employees' green behaviour; secondly. Second, responsible leadership's maintenance of subordinates' interests will enhance employees' work vitality, which will increase employees' green behaviours, and at the same time, responsible leadership's maintenance of other interests will increase employees' work pressure, which will reduce employees' green behaviours; Third, self-efficacy has a positive moderating effect in the relationship between responsible leadership and work vitality, and also has a positive moderating effect on the mediating effect on work vitality, i.e. the higher employees' self-efficacy is, the higher employees' self-efficacy is, the higher employees' self-efficacy is. Third, self-efficacy has a positive moderating effect on the relationship between responsible leadership and job vitality, and it also has a positive moderating effect on the mediating effect of job vitality, i.e., the higher the self-efficacy of employees, the more significant is the effect of responsible leadership on employees' green behaviours through job vitality. Self-efficacy has a negative moderating effect on the relationship between responsible leadership and work stress, and also has a negative moderating effect on the mediating effect of work stress, i.e., the higher the employees' self-efficacy, the more significant is the influence of responsible leadership on employees' green behaviours through work stress.

5.2. Theoretical Contributions

Currently, there is a lack of research on the complete path of responsible leadership's influence on employees' green behaviours, and relevant studies have paid little attention to the role of job dynamics and job stress in the path of responsible leadership's influence on employees' green behaviours from the perspective of self-efficacy. Therefore, the theoretical contribution of this paper is:

First, the double-edged sword effect of responsible leadership is discussed. Based on the work requirement-resource theory and resource preservation theory, this paper takes responsible leadership as the entry point, and constructs a dual-path integration model of responsible leadership influencing employees' green behaviour from the two paths of "resource gain" and "resource loss". In the existing literature, studies on the influence mechanism of responsible leadership have, to varying degrees, ignored the possible negative effects and focused only on the positive effects on subordinates and organisations. However, in recent studies some scholars have noted the existence of negative effects of

responsible leadership in organisational management and development. This study reveals that responsible leadership can produce both positive effects (increased employee motivation) and negative effects (increased employee stress), expands the study of the consequences of responsible leadership, and provides a new theoretical basis for why responsible leadership can produce a “dark side”.

Second, this study further explored the boundary effect of employee self-efficacy. Continuing within the framework of Job Requirements-Resources Theory and Resource Conservation Theory, this study proposes that employee self-efficacy has a moderating effect between accountable leadership and work dynamics and work stress. Specifically, employees with higher self-efficacy were able to generate more job dynamics and lower job stress under accountable leadership compared to those with lower self-efficacy, which in turn resulted in more green behaviours conducive to organisational development. This result suggests that self-efficacy enhances the advantages and reduces the potential costs of accountable leadership, thus supporting the complementary role of employee self-efficacy as a resource.

5.3. Management Insights

Although research has shown that responsible leadership also has its negative aspects, this does not mean that the role of responsible leadership can be ignored. On the contrary, in the process of constructing responsible leadership, organisations should make leaders fully aware of the negative impacts that their own behaviours may have, and then control the scale of their leadership behaviours to maximise the positive impacts of responsible leadership on their subordinates, and at the same time minimise the negative impacts that it may have.

Therefore, first of all, managers should pay attention to the prevention and intervention of responsible leadership in order to prevent negative psychological problems such as work stress among the employees under their leadership. This study found that although responsible leadership can increase employees’ work dynamics and thus promote green behaviours, it can also lead to greater work pressure and negative costs. Consequently, the application of responsible leadership should be emphasised in the management practices of enterprises in order to avoid the possible negative effects of responsible leadership.

Secondly, leaders should stimulate the work vitality and enthusiasm of employees in their daily work so that they can play a role in their daily work. Leaders can use caring, praise and encouragement to improve the positive emotions of employees, so as to establish a correct psychological orientation, this way can also reduce the negative impact of responsible leadership on employees to a certain extent, and then more effectively enhance the green behaviour of employees.

Finally, the leader should fully consider the individual differences of each employee, and give appropriate attention to the individual. Specifically, when the leader of the implementation of responsible management, the need to compre-

hensively assess the subordinates' own competence and effectiveness of the current work, that is, to pay attention to the subordinates' self-efficacy on the effect of the role of responsible leadership. In addition, enterprises in the recruitment process, you can conduct the appropriate psychological testing of candidates, and give preference to employees with a high degree of motivation and self-efficacy.

5.4. Research Shortcomings and Prospects

Firstly, although the data collection through the distribution of questionnaires in this paper fits the research method of some scholars, this research method does not satisfy the principle of random sampling in statistics well, and the data collection should be carried out by a combination of online and offline in the future research, so as to ensure the reliability and validity of the data source to the greatest extent; secondly, this study only examines the responsible leadership and its influencing mechanism from the perspective of the individual level, such as the team level or organisational level; thirdly, this study mainly examines the relationship between responsible leadership and employees' green behaviour from the individual level. Second, this study only examined responsible leadership and its influence mechanism from the perspective of employee self-efficacy as a human resource, on the basis of which other boundary effects, such as team-level or organisational-level factors, can be further explored in the future; and third, this study mainly discussed the mechanism of responsible leadership and employees' green behaviours at the individual level, and there was no cross-level study. Regarding the process of responsible leadership's influence on individual employees is a complex process, future research can further explore multilevel studies to discuss the effect of responsible leadership from a cross-level perspective.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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