



Navigating Artificial Intelligence and Project Success: Insights from Information Technology Sector in Pakistan

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Received: 02 April 2024 Revised: 07 August 2024 Accepted: 09 October 2024 Published: 03 December 2024

Keywords

Project Success,
Work Environment,
Organizational Citizenship
Behavior,
Employee Empowerment,
Information Technology

Abstract

The basic objective of this research is to empirically examine the moderating effect of work environment on the relationship between organizational citizenship behavior, employee empowerment and project success of IT projects in the public and private organizations of Rawalpindi-Islamabad, Pakistan. The research was cross-sectional with a deductive approach; and data collection was done through survey. The research has been based on the target population related to information technology (IT) projects in public and private sector from the twin cities of Rawalpindi and Islamabad, Pakistan. PLS-SEM was employed to examine the data. This study suggests that employees' OCB and employees' empowerment (EE) would impact positively on project success given a conducive and healthy environment at workplace. However, the work environment (WE) negatively moderates both the relationships. The behavior of employees plays a vital role in the outcome of any project. This study stipulates that chances of project success (PS) get amplified when employees possess organizational citizenship behavior (OCB) and are appropriately empowered under a set of favorable work environment (WE). While contributory factors of project success related to leadership, management and technical facets have been elaborately studied previously, the relationship of employees' behavior and their empowerment with project success has scarcely been tested. The findings of this research have theoretical and practical significance and are likely to assist the IT project managers in motivating and empowering their employees and managing the work environment befittingly.

Introduction

Project management (PM) is an emerging field that has drawn significant interest (Ika & Pinto, 2022). Now-a-days, projects are critical part of many outfits (Pinto et al., 2022) and experts have rightly declared that "PM is the wave of the future" (Circic Lalic et al., 2022). The project management has now transformed into a well-structured area of knowledge and expertise (Ika & Pinto, 2022). Despite the application of PM practices, a large number of projects fail (Ika & Pinto, 2023; Kumar, Pandey, & Singh, 2023). Therefore, project success has remained an issue of central importance, and lot of research has already been done on this subject (Beshah, Jekale Mengesha, & Demiss, 2024; Kiani Mavi et al., 2024; Kumar et al., 2023). Circic Lalic et al. (2022) suggest that success of a project entails completing the task within allocated budget, specified timeframe, adhering to required standard of quality and also fulfilling the project objectives. (Hughes, Rana, & Dwivedi, 2020) asserts that the concept of PS is still ambiguous, therefore needs further study. Huang et al. (2021) advocate that PS is multidimensional construct as it has a wider scope.

The Pulse of Profession report shows that failed IT projects

around the globe caused loss of approximately \$101 million per \$1 billion investment; and their overall failure rate was about 14 percent (Tucmeanu et al., 2022). Some scholars suggest that success ratio of IT projects is less than 50 percent (Westenberger, Schuler, & Schlegel, 2022). However, due to different nature of IT projects, success of such projects can be ascertained after putting them in the operational stage for some time (Tucmeanu et al., 2022).

Due to globalization, competition among the business entities has enhanced; and organizations are looking for in-house improvement of productivity. Accordingly, the OCB has been a favored topic of investigation (Iqbal, Qamari, & Surwanti, 2024); that refers as the work performed by an employee over and above the formally defined role (Thamrin et al., 2024). Katz (1964) maintains that three attributes are a requirement for workforce of a proficient outfit: feel part of outfit; consistently performance; and dedication past the duty requirement (OCB). Similarly, the employee engagement (EE) implies that employees be actively forthcoming to help the outfit meeting its goals (Thamrin et al., 2024). Putri et al. (2024) suggest that an outfit's vision should stress on backing the employees' role and

decisions. The work environment (WE), however, chiefly contributes in the quality and productivity of employees' work. One of the significant factors contributing to workers' committed engagement is the culture surrounding a workplace (Pinto et al., 2022). WE may be described as the premises where people work together for realizing organization objectives; including structures, procedures, and other things that interact with employees and affect their performance (Saripudin & Perkasa, 2024). WE may also include physical conditions like lighting, ventilation and functional comfort (Dullah, Limgiani, & Suwardi, 2023). A meta-data analysis research conducted from 1990 to 2013 indicates that a WE attributes of heavy workload, employment uncertainty and low incentive may cause emotional exhaustion; whereas appropriate support and justice at workplace may save the workforce from burnouts (Aronsson et al., 2017).

Naeem Mian, Malik and Hussain (2024) suggest that the contribution by developing countries for research on PS has been minimal; and that human factors of PS like OCB have not been researched adequately. Venczel, Berényi and Hriczó (2021) also observe that investigation of human side in the PM in context of developing countries is embryonic. Putri et al. (2024) also suggest that the relationship between OCB and PS needs to be explored. Moreover, there is a dearth of investigation about psychosocial side of project oriented outfits and its relationship with PS - necessitating additional focus on behavioral aspects of PS. Accordingly empirical investigation is needed on psychological empowerment (Khattak et al., 2024). This study examines the relationship of individual OCB (OCB-I) and psychological empowerment of employees with PS in the overall context of the WE in a developing country like Pakistan. It is intended to contribute to the ongoing crystallization of the concept of PS while exploring its relationships with OCB, EE and WE of IT projects.

Literature Review and Theory

Project Success (PS)

We often come across different projects in life. The projects are temporary in nature (Ika & Pinto, 2022). The criteria for PS become different according to the differing nature of projects (Khattak, Rizvi, & Khan, 2022). The PS concept was conceived 1960s and initially implemented in PM performance domain (Kiani Mavi et al., 2024). PS is typically gauged on the basis of triple constraint of iron triangle - time, cost and desired specifications (Hughes et al., 2020; Pinto et al., 2022; Tucmeanu et al., 2022). However, Kiani Mavi et al. (2024) argue that precise definition of PS is yet vague. They conclude that there might be certain projects finishing within time, budget and scope, but not making headway into market; conversely, some project that over-run cost and time but turn out to be huge success in profitability and user acceptance.

The notion of PS comprises of two distinct components; PM success and product success. Analogy by (Hughes et al.,

2020) identifies the commonality and overlap between PS and PM success that implies the PM is the subset of PS. While, the most frequently mentioned pre-condition for PS is adhering to schedule and cost, client satisfaction and client also part of PS (Hughes et al., 2020). PS is thus a multi-dimensional construct that includes project effectiveness (meeting the constraints like time and cost), impact on customer, success on account of business and lastly, preparing for the future (Putri et al., 2024).

From IT projects' perspective, Tucmeanu et al. (2022) stresses that a vital landmark of IT related PM over the last couple of decades has been the Agile PM within the scrum framework and IT project managers must take due care of users' expectations and ideas regarding success, failure and quality. The research on IT projects shows that opinions of stakeholders on PS are divergent. Clients attribute project failure to issues related to clients' involvement, communication, planning and definition of objectives; however, the project managers indicate problems with leadership, planning and definition of objectives.

Organizational Citizenship Behaviour (OCB)

The term OCB was coined by (Iqbal et al., 2024) that indicates employees' behavior that is not part of formal charter of duties but that is useful to organization. Apart from the usual technical work, OCB also embraces the social aspect of the WE (Aronsson et al., 2017). Commonly there are two types of OCB; OCB-I (individual) and OCB-O (organizational). OCB-I is helpful for co-workers whereas OCB-O adds value to the firm. Naeem Mian et al. (2024) assert both types of OCB have separate connotations. However, other experts take OCB as single construct and described OCB as an optional attitude of a worker not related to recognized reward scheme that contributes to firm's effectiveness. Yen, Li and Niehoff (2008) suggest that OCB indirectly relates with success of information (IT) system. They further suggest that in future relationship between OCB and information system success may be investigated. The OCB has lately been a key subject of investigation (and is critical to survival of business outfits because of the extremely competitive milieu (Iqbal et al., 2024).

Employee Empowerment (EE)

Empowerment is a high level of inherent motivation for a job that is part of work attitude including meaning, competence, self-determination and impact (Khattak et al., 2024). It is a process that allows the employees in objectives setting, decision-making and problem solving in a work setting. There are mainly two notions of empowerment; situational and psychological. The former encompasses the managerial practices that delegate the right of decision-making. The latter, however, underpins feelings of workforce, including the sense of competence, having a say in their work setting, choice of work modalities, and a feeling of importance at work (Surya et al., 2023). The psychologically empowered

employees have a sense of independence, meaning and competence (Khan et al., 2020). There is a linkage between psychological empowerment and intrinsic motivation and it is a valuable tool of employees for the PS (Ali et al., 2020).

Work Environment (WE)

The significance of WE and its effect on PS have not been largely understood (Aronsson et al., 2017). WE may be termed as the physical locality where a particular job is executed (Saripudin & Perkasa, 2024). A healthy environment reduces dullness thus enhancing the work effectiveness, organizational growth, job satisfaction and employees' welfare. Ali et al. (2020) have proposed three dimensions of environment; munificence, complexity and dynamism marked by dependence, ambiguity and uncertainty. Ika and Pinto (2023) conclude that effective workplace environment promotes a more satisfied worker, thus improves the output.

Organizational Citizenship Behaviour (OCB) and Project success (PS)

There is ample evidence from the previous researches that overall attitude of employees positively influences the performance of an organization (Naeem Mian et al., 2024). The employees with shared values are more inclined towards cooperation and collaboration, and thus contribute to PS. Putri et al. (2024) have concluded that OCB predicts followers' performance and thus contributes towards PS. Saffariantoosi and Khaleghi (2024) suggest that OCB is strongly associated with task performance. (Thamrin et al., 2024) assert that loyalty and commitment bolster the individual output which in turn contributes to PS. In context of IT projects, Shafi et al. (2021) are of the view that voluntary behavior like OCB can positively affect PS by promoting environment of cooperation and facilitating the management. Based on the above discussion, it is hypothesized that:

Hypothesis 1: *Organizational citizenship behavior impacts the project success.*

Employee Empowerment (EE) and Project Success (PS)

The advocates of EE suggest that the empowering workplace environment contribute to increased output (Khattak et al., 2022). EE may also develop skillfulness in the workforce that keeps them motivated, helps adapt to work surroundings and minimize hiccups (Khan et al., 2020). (Surya et al., 2023) proposes that the psychological empowerment can exhibit itself in four dimensions: meaning, competence, self-determination and impact; which would manifest into active attitude of employees. EE has a key role in enhancing a firm's success prospects as it is an employee's approach to work that has a significant impact on PS (Khattak et al., 2022; Malik, Sarwar, & Orr, 2021). Therefore, the employees' psychological empowerment (EE) contributes to PS. Basing on the above discussion, it is hypothesized that:

Hypothesis 2: *Employees' empowerment impacts project success.*

Work Environment (WE) and Project Success (PS)

There is a positive relationship between working conditions and job satisfaction (Dullah et al., 2023); and all factors related to WE significantly impact the project performance. Aripin, Matriadi and Ermeila (2024) assert that good engagement of employees with their WE, will positively impact the employees' performance. Therefore, (Dullah et al., 2023) suggests improvement in the physical WE for employees' motivation and better performance. Aripin et al. (2024) conclude that a positively developed WE has a favorable effect upon the employees' output level in the banking and insurance sector. On the other hand, there is an inverse relationship between workplace bullying environment and PS. Hessari et al. (2024) argue that employees' productivity enhances up to a specific threshold; however, performance reduces when workload increases beyond threshold. Dullah et al. (2023) have tested WE as moderator, and concluded that pro-activeness has a strongly positive link with the performance, whereas competitive aggressiveness has a negative relationship with a firm's performance. Basing on the above discussion, it is hypothesized that:

Hypothesis 3: *Work environment moderates' relationship between organizational citizenship behaviour and project success.*

Hypothesis 4: *Work environment moderates' relationship between employees' empowerment and project success.*

Based on the discussion above and hypothesis derivation, following is the research framework of the current study:

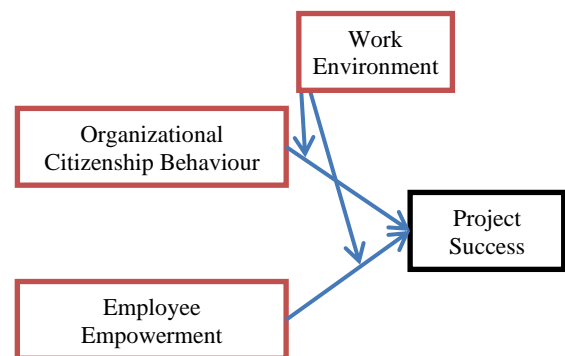


Figure 1: Research Framework.

Methodology

The aim of this study was to examine the impact of OCB and EE on the PS with moderating role of WE. Within the overall concept of OCB, the construct of *OCB (individual)* was focused; and the connotation of EE was the *psychological empowerment* whereas the WE encompassed all the three facets; technical, human and organizational. Figure 1 below illustrates the research model. The research was primary and cross-sectional in nature within the framework of descriptive research design. The data was collected through survey method from the employees related to IT projects from assortment of public and private organizations in the twin

cities of Rawalpindi-Islamabad, Pakistan. For better generalizability, the employees working on IT projects at all tiers from top management to workers were targeted taking into account different levels of education and work experience. A self-reported version of questionnaire was administered physically and online. The participants were contacted in their workplace setting.

Moreover, all the employees working in IT based outfits in Rawalpindi and Islamabad were the population of this research. Total 262 responses were finalized through convenience sampling and voluntary participation. About 350 questionnaires were physically distributed in hardcopy and about 150 respondents were contacted on email. Out of 350 distributed questionnaires, 289 hardcopy responses were received with a response rate of about 82.5 percent; however out of the received questionnaires, 262 were usable. The online response rate was about 13 percent.

Measurement of the Variables

All variables were adapted from the previous studies to ensure the content validity (Hessari et al., 2024). PS was measured using a 14-itmes multi-dimensional scale developed by (Aga, Noorderhaven, & Vallejo, 2016) from which 3 items were selected. The OCB-I was measured through 3-items from the 8 item scale developed by (Lee & Allen, 2002). Psychological empowerment was measured by a scale constructed by (Spreitzer, Kizilos, & Nason, 1997), and modified by (Fulford & Enz, 1995) comprising of 11 items and 3 items selected from this scale. WE was measured using a 3 items from 15-items scale developed by (Ouko, 2011). All the study variables were measured on a 5-point Likert scale.

Data Analysis Procedure and Tools

The software Smart PLS 4.0 was utilized for data analysis

that included reliability and validity of the constructs, correlation analysis using outer loading, regression analysis as well path coefficient has been utilized to test formulated hypothesis.

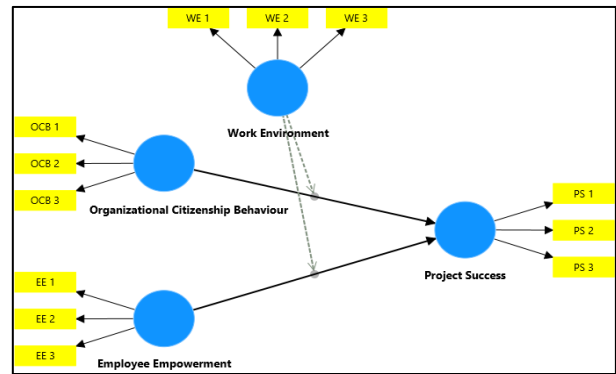


Figure 2: PLS-SEM Path Model.

The above Figure 2 shows the reflective constructs having organization citizenship behaviour and employee’s empowerment as an independent variable while work environment as moderator and project success as dependent variable comprising three items each.

Reliability and Validity Analysis

The value of Cronbach Alpha of all constructs utilized in this study have more than 0.70 value that shows in Table 1 that the internal consistency reliability of constructs has been established (Hair & Alamer, 2022). Moreover, convergent validity of all constructs has been established as average variance extracted value of all constructs shown in Table 1 are greater than 0.50 value (Hair & Alamer, 2022).

Table 1: Constructs Reliability and Convergent Validity.

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Employee Empowerment	0.902	0.938	0.938	0.835
Organizational Citizenship Behaviour	0.757	0.776	0.859	0.67
Project Success	0.82	0.84	0.892	0.735
Work Environment	0.751	0.819	0.852	0.658

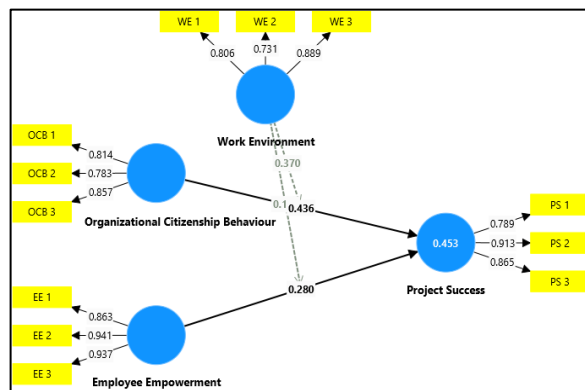


Figure 3: Measurement Model.

Table 2: Outer loadings (Indicator Reliability).

	Employee Empowerment	Organizational Citizenship Behaviour	Project Success	Work Environment
EE 1	0.863			
EE 2	0.941			
EE 3	0.937			
OCB 1		0.814		
OCB 2		0.783		
OCB 3		0.857		
PS 1			0.789	
PS 2			0.913	
PS 3			0.865	
WE 1				0.806
WE 2				0.731
WE 3				0.889

The outer loading of all the constructs utilized in this study shows greater than 0.708 as seen in Figure 3 that shows that indicator reliability (item reliability) have been established (Hair Jr, Page, & Brunsveld, 2019). Moreover, Table 2 shows

that the square root of the individual indicator loadings of all items gives a measure of the proportion of variance common with the other elements of the indicator variable and the other variables tested.

Table 3: Discriminant Validity (Heterotrait and MonoTrait Ratio).

	EE	OCB	PS	WE
Employee Empowerment				
Organizational Citizenship Behaviour	0.130			
Project Success	0.084	0.417		
Work Environment	0.423	0.223	0.553	
Work Environment x Organizational Citizenship Behaviour	0.439	0.065	0.458	0.577
Work Environment x Employee Empowerment	0.212	0.393	0.05	0.124

The Heterotrait and Monotrait Ratio criterion have been utilized in the study to establish discriminant validity of the constructs (Henseler, Ringle, & Sarstedt, 2015). The above Table 3 shows that the construct values are lower than 0.85 that indicated that discriminant validity of all the constructs have been established (Hair Jr et al., 2019).

Table 4: R-Square.

	R-square	R-square Adjusted
Project Success	0.453	0.444

Hair et al. (2013) noted in academic research that R² values between 0.25, 0.50 and 0.75 can be qualified as weak, moderate and substantial. Table 4 shows that 45.3% variance of Project Success explained by independent variables.

Table 5: Path Coefficient.

	β	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P values
EE -> PS	0.280	0.255	0.082	3.405	0.001
OCB-> PS	0.436	0.433	0.052	8.381	0.001
WE x OCB -> PS	0.370	0.352	0.077	4.796	0.001
WE x EE -> PS	0.140	0.136	0.061	2.328	0.023

The above Table 5 shows significant and positive relationship between employee empowerment and project success as p value is 0.001 < 0.05. Moreover, the organizational citizenship behavior relationship with project success is also positive and highly significant as p value is 0.000 < 0.05. The working environment also shows positive and highly significant moderating impact between employee empowerment and project success as p value is 0.000 < 0.005 (see Figure 4).

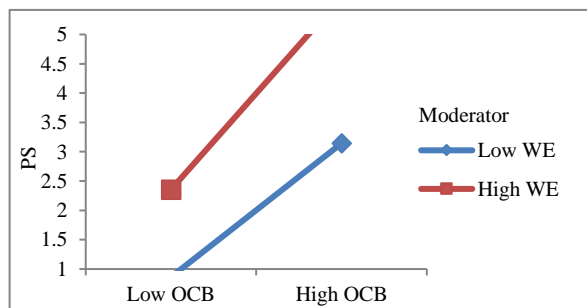


Figure 4: Moderation of Work Environment.

This illustrated that better working environment strengthens the relationship between employee empowerment and project success. Lastly, working environment positively and significantly moderates the relationship between organizational citizenship behavior and project success as p value is 0.02 < 0.05. This illustrated that better working environment strengthens the relationship between organizational citizenship behavior and project success (see Figure 5).

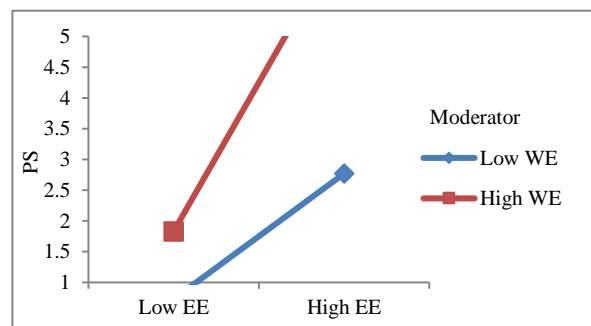


Figure 5: Moderation of Work Environment.

Discussion

The results of our research provide empirical evidence in support of the hypothesized positive relationship between OCB and PS. (Putri et al., 2024) have also argued that overall attitude of employees positively influences the performance of an organization. (Iqbal et al., 2024) suggests that OCB is strongly related to task performance. In the context of IT projects, (Saffariantoosi & Khaleghi, 2024) are of the view that the voluntary behavior such as OCB can positively effect the information system success. It is believed that empowerment causes development of the required ability in the workforce that keeps them motivated (Ali et al., 2020). The results of regression analysis provide support in favor of a notably positive relationship between EE and PS. The study also concludes that WE moderate the relationship between OCB and PS; and EE and PS. Hessari et al. (2024) have examined the linkage between racial diversity and performance with the moderating role of environment; and concluded that in the munificent environment, relationship between diversity and performance strengthens whereas in resource-scarce environment, the there is no impact on the relationship. The

results of present study also imply that overall; the WE have relatively weaker moderating effect, meaning that WE do not significantly matter in the environment of Pakistan, specifically in the IT sector. This fact may have something to do with the culture and socio-economic conditions of developing countries like Pakistan. One explanation could be that IT project teams are so resilient that they do not depend on the material aspects of workplace environment like office gadgetry, light and noise conditions and terms of service.

In the backdrop of IT projects, the effect of WE is even minimized because most of IT workforce perform remotely in the virtual WE, especially in the post-pandemic situation. In such a scenario, the impact of conducive or supportive workplace environment or the absence of it should make no worthwhile difference. Wherever the IT projects are being performed collectively, the WE are generally crowded; but the work force is still motivated and determined (Aripin et al., 2024).

Theoretical Implication

This research project contributes significantly to the literature on project management and project success, adding several new insights. It is one of the successful studies that examine the success of critical projects in Pakistan's Information Technology (IT) organizations, whether in public or private sector organizations. Furthermore, this research is among the few that explore the moderating effect of the work environment on organizational citizenship behavior and project success in the context of Pakistan's IT sector. Similarly, it is one of the few studies that investigate the moderating effect of the work environment on the relationship between employee empowerment and project success within the same context.

Practical Implication

The practical implications of this research are highly relevant for managers and practitioners operating in Pakistan's IT sector, both in public and private organizations. The findings suggest that both organizational citizenship behavior and employee empowerment play crucial roles in the success of any project. When these two variables coexist within a project, the likelihood of its success increases significantly. Moreover, the current research work also emphasizes that for a project to succeed, managers must ensure that the work environment is highly positive and motivating. The work environment should encourage employees, recognize their work, and empower them to make decisions freely and easily. By fostering such an environment, project success can be ensured.

Limitations of the Study and Future Direction

This study was conducted with numerous limitations. First is the time and resource constraint. The sample population from only the twin city Rawalpindi-Islamabad, Pakistan working on IT projects was targeted. The future research may

focus on the same variables covering all types of projects instead of IT field only. The moderating role of WE has revealed interesting results. In future, study on the moderating role of WE may also be carried out for further clarity.

Acknowledgement

We extend our sincere thanks to all participants and contributors who supported this research.

CRedit Authorship Contribution Statement

Muhammad Hussain: Conceptualization, Data curation, Formal analysis, Funding acquisition. Usman Ahmad: Investigation, Methodology, Project administration, Resources, Software. Muhammad Hussain: Supervision, Validation, Visualization. Writing – original draft. Muhammad Hussain, Usman Ahmad: Writing – review & editing.

Declaration of Competing Interest

The authors declare no relevant financial or non-financial interests to disclose.

Fundings

The authors confirm that this research received no funding from external sources.

Ethical Statement

This study adhered to ethical standards, and ethical approval was unnecessary as no human tissue or biological samples were used.

Data Availability Statement

The datasets generated and analyzed during this study can be obtained from the corresponding author on reasonable request.

Artificial Intelligence/ Language Module Statement

The authors confirm that no artificial intelligence or large language models (LLMs) were employed in the writing, analysis, or editing of this research, and they collectively assume full responsibility for its content.

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