

# Self-leadership and innovative work behaviors: Testing a parallel mediation model with goal striving and goal generation

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## Abstract

relationship between self-leadership and innovative work behavior, but there is insufficient evidence to confirm goal striving as a mediator behind this relationship. The study contributes to our understanding of the fundamental mechanisms behind the relationship between self-leadership and innovative work behavior. It also provides practical implications for organizations seeking to enhance innovative work behavior.

## Evaluations

SERVICE	SUMMARY	VERSION	DATE	EVALUATED
 ResearchHub	avg. 3/5	1	06/16/20 25	
	SciScore =5	1	06/16/20 25	
 DataSeer	N/A	1	06/16/20 25	
 paper.wizard.	N/A	1	06/16/20 25	

## Registration

Registration can be found in the link below

<https://osf.io/gt6uq>

## Materials

Data and materials can be found in the link below

[https://osf.io/hzar5/files/osfstorage?view\\_only=.](https://osf.io/hzar5/files/osfstorage?view_only=)

## **Data**

Data and materials can be found in the link below

*[https://osf.io/hzar5/files/osfstorage?view\\_only=.](https://osf.io/hzar5/files/osfstorage?view_only=)*

## **Code**

Not applicable. We did not used R package for this analyses.

## Paper

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### Study highlights

- Self-leadership plays a significant role in enhancing innovative work behavior.
- There is insufficient evidence to confirm that goal-striving mediates the relationship between self-leadership and innovative work behavior.
- The mediating effect of self-goal generation on the relationship between self-leadership and innovative work behavior was found to be significant.
- The study extends previous research by proposing and testing a model integrating goal-striving and goal-generation as parallel mediators in the relationship between self-leadership and innovative work behavior.
- The findings contribute to understanding the fundamental mechanisms behind the relationship between self-leadership and innovative work behavior and provide practical implications for organizations seeking to enhance innovative work behavior.

## INTRODUCTION

Since the seminal work of Scott and Bruce (1994), the construct of innovative work behavior has garnered considerable attention from Industrial-Organizational Psychologists. Several theoretical and empirical studies show that attention is accorded to innovative work behavior. Innovative work behavior is essential in today's highly dynamic and competitive business environment as it is crucial in achieving organizational effectiveness and sustainable performance (Barney, 1991; Huang et al., 2019; Pieterse et al., 2010). Given the importance of innovation, extant research has linked leadership style to innovation outcomes (Le Blanc et al., 2021; Pieterse et al., 2010). Researchers have identified various potential antecedents of innovative work behavior, including leadership practices (Akram et al., 2016; Bednall et al., 2018; Le Blanc et al., 2021).

Self-leadership is an aspect of leadership that is crucial for understanding innovative work behavior. Self-leadership has been consistently documented in several studies as a significant determinant of innovative work behavior (Arista & Parahyanti, 2019; Atitumpong & Badir, 2018; H. J. Kang et al., 2014; Khan et al., 2022; Su & Hahn, 2022). Despite these encouraging works, little is

known about how and why self-leadership influences innovative work behaviors. However, notable exceptions include those reported by (Khan et al., 2022). This study establishes that the link between self-leadership and innovative work is mediated by creative self-efficacy. Moreover, the mediating effect was moderated by knowledge sharing, such that a higher level of knowledge sharing deepened the relationship between self-leadership and innovative work behavior. Thus, we extended prior studies by testing a model that integrates goal-striving and goal-generation as parallel mediators in the relationship between self-leadership and innovative work behavior. We particularly sought to address three critical research questions: (i) To what extent does self-leadership positively influence innovative work behaviors? (ii) Does goal striving mediate the positive influence of self-leadership on innovative work behaviors? (iii) How does goal generation mediate the positive influence of self-leadership on innovative work behaviors?

## **THEORY AND HYPOTHESIS DEVELOPMENT**

### **Self-leadership and innovative work behavior**

Self-leadership refers to leadership styles that naturally influence and motivate oneself to perform better than anticipated in one's roles and responsibilities (Krampitz et al., 2021; Manz, 1986). On the other hand, innovative work behavior is defined as "the intentional creation, introduction, and application of new ideas within a work role, group, or organization, in order to benefit role performance, the group, or the organization" (Janssen, 2000). Similar to self-leadership, innovative work behavior is a motivational issue that helps an individual perform better in the workplace.

Extant research has consistently documented that self-leadership relates positively to innovative work behavior (Arista & Parahyanti, 2019; Atitumpong & Badir, 2018; H. Kang et al., 2022). As noted at the outset, despite accumulating evidence suggesting that self-leadership plays a crucial role in encouraging workplace innovation, little research has considered the fundamental reasons why self-leadership relates to innovative work behaviors. To address this lacuna, we propose the following hypothesis:

***Hypothesis 1: Self-leadership will have a positive influence on innovative work behaviors.***

### **Goal striving and goal generation as potential mediators**

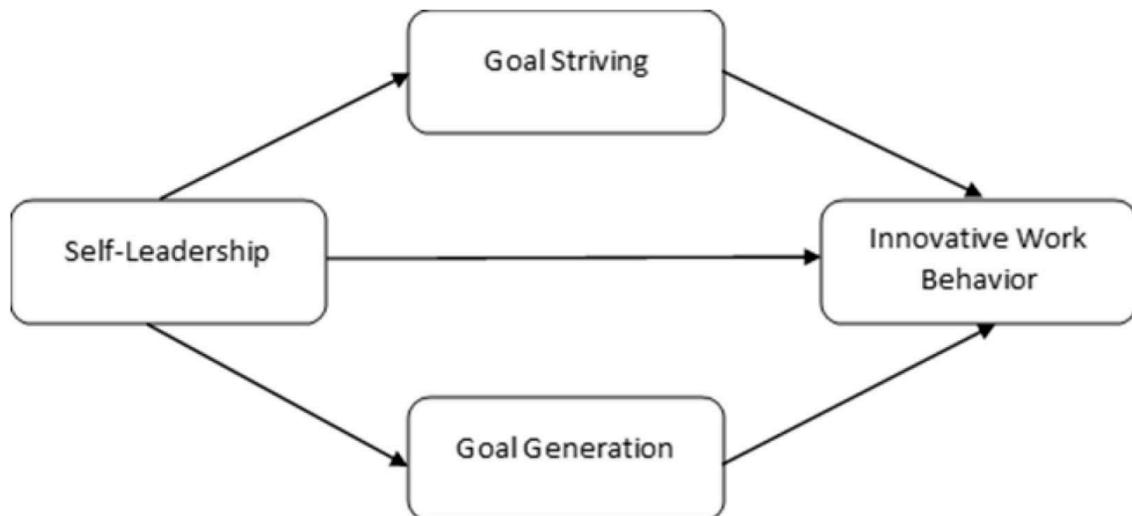
Goal striving is an individual's tendency to set goals with distinct characteristics, including realistic, challenging, acceptable, specific, or unclear characteristics, and then try to achieve them. On the other hand, goal generation is defined as individuals' cognitive efforts to anticipate the desired outcome and develop effective strategies to reach it (Wang et al., 2022). We drew on (Bandura, 1991) social cognitive theory of self-regulation to underpin the mediating role of goal-striving and goal generation. Consistent with this theory, we contend that goal-related processes are

fundamental mechanisms through which self-leaders' efforts facilitate innovative work behaviors for the following reasons.

First, goal-striving and goal generation help individuals initiate goals and consistently achieve them without external influence, contributing to success in their roles and responsibilities (H. Kang et al., 2022). Second, goals are central to motivating individuals to determine how much effort they should exert to persistently perform a given task and the strategies they might employ to facilitate goal achievement (Battistelli & Montani, 2014). Third, given that leadership behavior is typically characterized as goal-oriented and that goals are the path through which leaders realize their visions, it is logical to argue that goals are fundamental mechanisms that underlie the relationship between self-leadership and innovative behavior in the workplace (Cai et al., 2023). Finally, extant literature suggests that when people set significant objectives for themselves, they are more likely to be motivated and dedicated to achieving them because they see a strong connection between their aspirations and fundamental beliefs (Montani et al., 2017). These beliefs help employees become more innovative in the workplace by generating new ways of performing their jobs. Based on the above reasoning and theoretical prepositions, we hypothesized the following:

**Hypothesis 2: Goal striving will mediate the positive influence of self-leadership on innovative work behaviors.**

**Hypothesis 3: Goal generation will mediate the positive influence of self-leadership on innovative work behaviors.**



**Figure 1: Conceptual model**

## METHODS

### Transparency and Openness

We pre-registered our study before collecting the data through an Open Science Framework (<https://osf.io/gt6uq>). In particular, SmartPLS4 software and Microsoft Excel (Microsoft Corporation, 2021) were utilized to perform analysis (Microsoft Corporation, 2021; Ringle et al., 2022). All data and analysis results are available at [https://osf.io/hzar5/files/osfstorage?view\\_only](https://osf.io/hzar5/files/osfstorage?view_only) = .

### Participants and procedure

The relationships between self-leadership, goal-striving, goal generation, and innovative work behavior were investigated in a cross-sectional study conducted among public sector employees from four districts in Brunei Darussalam. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Before the commencement of the study, ethical clearance was obtained from the Research Committee of the Universiti Teknologi Brunei. The data were collected between October 1, 2022, and October 29, 2022, using a web-based survey created in a Google Form. The survey was translated into Bahasa Melayu using the (Brislin, 1970) back translation and emailed to the participants. The survey was administered with the help of a hired Research Assistant who facilitated the data collection procedure. The Research Assistant was provided with a draft email invitation asking the participants to click the web link to complete the web-based survey. Participants were informed that the survey would take approximately 15–20 minutes to complete. They were also informed that participation was voluntary and that all their information would be used only for research purposes. In total, 312 participants completed the survey. More than half of the participants were female (n = 150, 53.2%). The mean age of participants was 35.94 years, with a standard deviation of 9.32 years.

### Measures

*Innovative work behavior:* Innovative work behavior was measured in this study based on the scale developed by (Scott & Bruce, 1994). The scale consists of six statements rated on a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” An example of an innovative work behavior item is “searches out new technologies, processes, techniques, and/or product ideas.”

*Self-leadership:* We used a 20-item Brief Self-Leadership scale from (Steinhardt et al., 2003). Rating on this scale was based on a five-point Likert scale with the following response options: 1 = never/almost never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always/almost always on items such as “I feel a sense of inner peace.”

*Goal-striving:* We used an 8-item questionnaire by (Ehrlich, 2020) to measure goal-striving. A sample item is "I am having fun working on this goal," rated on a seven-point scale ranging from 1 = *not true at all* to 7 = *very true*.

*Goal generation:* The goal generation was measured using a six-item scale adopted from (Bindl et al., 2012). A sample item is "I always think about ways to improve services in my workplace," rated on a five-point Likert scale ranging from "*strongly disagree*" to "*strongly agree*."

*Covariates.:* To ensure that our findings are credible and free from estimation bias of the causal effects, we also incorporated control variables into our research model, including gender (categorical variable) as well as age, goal commitment, and trait of resilience as continuous variables. Specifically, we measured goal commitment using six items from the study by (Hollenbeck et al., 1989). The participants indicated the extent to which they agreed or disagreed with six statements about their commitment to the goal (1 = "*strongly disagree*," to 7 = "*strongly agree*." A sample item is "I am strongly committed to achieving any goal I set for myself." We measured resilience using six items from the brief resilience scale developed by (Smith et al., 2008). A sample item is "I tend to bounce back quickly after hard times," rated on a five-point Likert scale ranging from "*strongly disagree*" to "*strongly agree*."

## **Analysis**

To test our hypotheses, we employed partial least squares structural equation modeling (Chin, 1998; Wold, 1974). PLS-SEM was selected for three main reasons. First, PLS-SEM allows the analysis of complex interrelationships between observed and latent variables in a regression-based model (Gotz et al., 2010). Second, Given that our focus was to predict the underlying determinants of innovative work behavior, PLS-SEM is much more suitable in the current study than other alternative approaches, such as co-variance-based structural equation modeling. Finally, we opted for PLS-SEM, the most widely used technique in human resource management and related disciplines (Alshebami, 2021; Reinartz et al., 2009; Tabiu et al., 2020). As (Henseler et al., 2009) suggest, we evaluated our measurement model regarding reliability and validity before testing the hypotheses from the output generated by the structural model. We followed the most recommended approach for testing our mediation model, based on 5,000 bootstrap samples (Hayes, 2009; Preacher & Hayes, 2004, 2008). The statistical estimates obtained from PLS-SEM are described in the subsequent section.

### Assessment of common method variance

Before conducting the primary analyses, we assessed common method variance (CMV) to rule out the possibility of CMV. We specifically utilized a Random Dependent Variable in the SmartPLS because it becomes the most preferred approach for testing CMV among researchers. This method involves updating our dataset to include a Random Dependent Variable. The Dummy Random Dependent Variable was created using the RAND function in Microsoft Excel (Microsoft Corporation, 2021). After updating our dataset with the Random Dependent Variable, we duplicated our SmartPLS model by renaming the new model with the Test of CMV. We removed all the arrows pointing to innovative work behavior and added the new Random Dependent Variable. All our initial variables, including innovative work behavior, are treated as independent variables in the duplicated SmartPLS model, with arrows from these variables pointing at the Random Dependent Variable. Next, we ran the PLS algorithm, looked at the report, and checked the inner model under collinearity statistics. (Kock, 2015) suggests that a value of more than 3.3 indicates CMV. In this study, none of these values exceeded 3.3, which implies no indication of CMV (Table 1).

	VIF
Goal commitment -> Rand variable	2.05
Goal generation -> Rand variable	3.05
Goal striving -> Rand variable	1.77
Innovative work behavior -> Rand variable	2.54
Self-leadership -> Rand variable	2.43
Trait resilience -> Rand variable	1.63

## RESULTS

Table 2 presents the results obtained from the measurement model calculation using the PLS-SEM algorithm. According to (José et al., 2012), having outer loadings exceeding 0.70 suggests that individual item reliability is adequate. Furthermore, obtaining Cronbach's alpha and Composite reliability greater than 0.70 confirms the reliability of the constructs in the measurement model (José et al., 2012). As shown in Table 2, all these requirements have been fully fulfilled; hence, our measurement model appears reliable. As indicated in Table 1, this study's convergent validity has also been established since the average variance extracted (AVE) for each construct exceeds 0.50 (Hair et al., 2012). Finally, two criteria were employed to confirm the discriminant validity of the measurement model, namely, the Heterotrait-monotrait ratio and Fronell-Larcker. Using the former approach, the Heterotrait-monotrait ratio of correlations should not exceed 0.85 to achieve discriminant validity (Henseler et al., 2015). On the other hand, the Fronell-Larcker approach

suggests that discriminant validity is achieved when the square root of each AVE exceeds the correlation coefficient among constructs. As shown in Table 2 and Table 3, discriminant validity is confirmed.

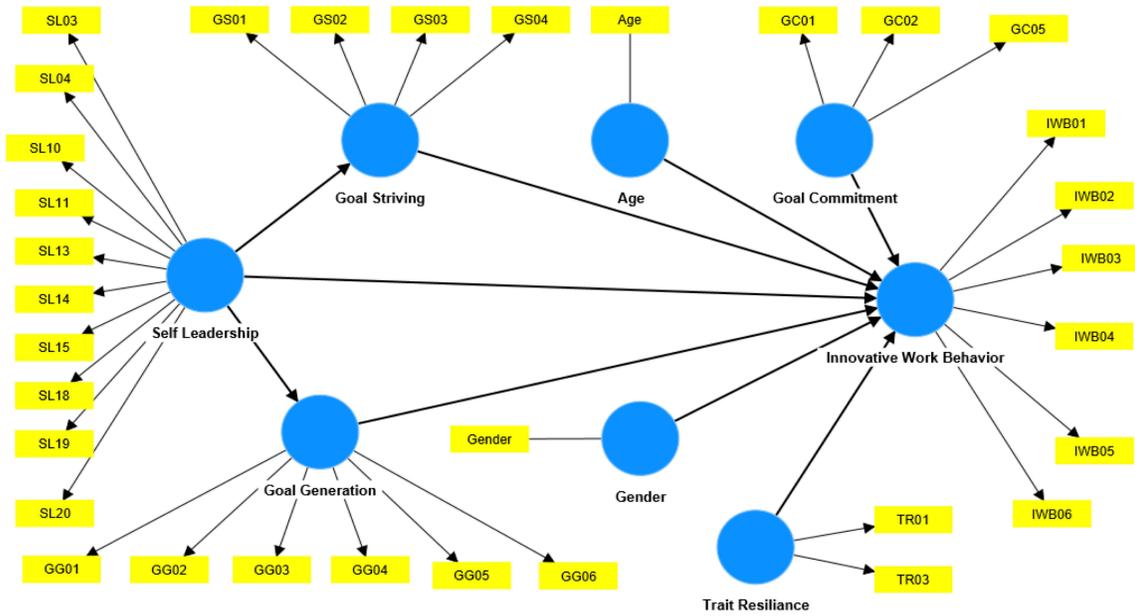


Figure 2. Graphical representation of the measurement model

Table 1. Results of the measurement model				
Constructs	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted
Innovative work behavior		0.94	0.94	0.78
IWB01	0.89			
IWB02	0.84			
IWB03	0.91			
IWB04	0.88			
IWB05	0.92			
IWB06	0.85			
Self-leadership		0.93	0.93	0.62
SL03	0.74			
SL04	0.78			
SL10	0.80			
SL11	0.74			
SL13	0.73			

SL15	0.83			
SL18	0.75			
SL19	0.81			
SL20	0.83			
Goal commitment		0.77	0.81	0.68
GC01	0.78			
GC02	0.90			
GC05	0.79			
Goal generation		0.91	0.92	0.70
GG01	0.87			
GG02	0.84			
GG03	0.71			
GG04	0.89			
GG05	0.83			
GG06	0.89			
Goal striving		0.80	0.80	0.62
GS01	0.82			
GS02	0.82			
GS03	0.71			
GS04	0.80			
Trait resilience		0.71	0.73	0.78
TR01	0.90			
TR03	0.86			

Constructs	Heterotrait-monotrait ratio					
	1	2	3	4	5	6
1. Innovative work behavior						
2. Self-leadership	0.66					
3. Goal generation	0.79	0.70				
4. Goal						

striving	0.43	0.67	0.55			
5. Trait resilience	0.66	0.66	0.71	0.40		
6. Goal commitment	0.65	0.71	0.76	0.69	0.58	

Table 4. Discriminant validity using the Fornell-Larcker benchmark

Constructs	Fornell-Larcker criterion					
	1	2	3	4	5	6
1. Innovative work behavior	0.88					
2. Self-leadership	0.62	0.79				
3. Goal generation	0.74	0.65	0.84			
4. Goal striving	0.37	0.58	0.47	0.79		
5. Trait resilience	0.55	0.53	0.58	0.30	0.88	
6. Goal commitment	0.57	0.60	0.64	0.53	0.44	0.82

Table 5 presents the results of the structural model. Consistent with Hypothesis 1, we found a significant direct influence of self-leadership on innovative work behavior ( $c'$  effect = 0.27;  $p < 0.001$ ), even after controlling for age, gender, goal commitment, and trait resilience. Surprisingly, regardless of age, gender, goal commitment, and trait resilience, Hypothesis 2, which postulates the mediating role of goal-striving in the relationship between self-leadership and innovative work behavior, was not found to be significant ( $a_1b_1$  coefficient = -0.06; 95% CI = [-0.14; 0.01]). However, an indirect effect of self-leadership on innovative work behavior through goal generation was established ( $a_2b_2$  coefficient = 0.31; 95% CI = [0.22; 0.39]).

Table 5. Structural model

Direct effects Relationships	Beta	SE	t-statistics	p-values	Confidence intervals	
					Lower	Upper
Age -> Innovative						

Work Behavior	0.18	0.04	4.24	0.00	0.11	0.26
Gender -> Innovative Work Behavior	0.22	0.08	2.71	0.00	0.08	0.35
Self-Leadership -> Innovative Work Behavior	0.27	0.06	4.78	0.00	0.18	0.37
Goal Commitment -> Innovative Work Behavior	0.23	0.05	4.81	0.00	0.15	0.31
Trait Resilience -> Innovative Work Behavior	0.24	0.05	4.84	0.00	0.16	0.32
Specific indirect effects Relationships	Beta	SE	t-statistics	p-values	Confidence intervals	
					Lower	Upper
Self-Leadership -> Goal Generation -> Innovative Work Behavior	0.31	0.04	7.10	0.00	0.22	0.39
Self-Leadership -> Goal Striving -> Innovative Work Behavior	-0.06	0.04	1.52	0.13	-0.14	0.01
Total effects Relationships	Beta	SE	t-statistics	p-values	Confidence intervals	
					Lower	Upper

Age -> Innovative work behavior	0.15	0.04	3.53	0.00	0.07	0.23
Gender -> Innovative work behavior	0.07	0.08	0.95	0.34	-0.08	0.22
Self-leadership -> Goal generation	0.65	0.04	17.20	0.00	0.57	0.72
Self-leadership -> Goal striving	0.58	0.05	11.91	0.00	0.48	0.67
Self-leadership -> Innovative work behavior	0.44	0.06	7.44	0.00	0.32	0.55
Goal commitment -> Innovative work behavior	0.11	0.05	2.02	0.04	0.01	0.22
Goal generation -> Innovative work behavior	0.47	0.06	8.15	0.00	0.35	0.58
Goal striving -> Innovative work behavior	-0.10	0.06	1.62	0.11	-0.23	0.01
Trait resilience -> Innovative work behavior	0.11	0.05	2.35	0.02	0.02	0.21

**Note: GC = Goal commitment; GG = Goal generation; GS = Goal striving; IWB = Innovative work behavior; SL = Self-leadership; TR = Trait resilience; SE = Standard Error**

We ascertained whether our model has predictive validity. We performed PLS predict analysis, which generated the root mean square error (RMSE). It has been recommended that these values exceed the RMSE values of the linear regression model (Shmueli et al., 2019). As presented in Table 6, this condition has been met. Hence, our mode has sufficient predictive validity. We then adopted (Cohen, 1988) criteria for assessing effect sizes, which categorized the strength of the effects as follows: small = 0.02, medium = 0.15, and large = 0.35. As presented in Table 6, none of the  $f^2$  values fall below 0.02, which indicates desirable results. Finally, even though establishing an acceptable R-squared value depends upon the study context, the assessment of the coefficient of determination in this study was based on (Falk & Miller, 1992) threshold of a minimum of 10%. As shown in Table 6, the structural model evaluation has yielded the following R-squared values: Innovative work behavior = 62%; Goal generation = 42%; Goal striving = 33%. All these values suggest that acceptable R-squared values have been achieved.

	Q <sup>2</sup> predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE		$f^2$ -square
GG01	0.35	1.03	0.82	0.95	0.74	Age -> IWB	0.04
GG02	0.25	1.15	0.94	1.05	0.86	Gender -> IWB	0.00
GG03	0.23	0.71	0.56	0.67	0.52	GC -> IWB	0.02
GG04	0.35	0.89	0.70	0.80	0.63	GG -> IWB	0.23
GG05	0.22	1.07	0.87	0.99	0.78	GS -> IWB	0.02
GG06	0.34	0.87	0.69	0.79	0.63	SL -> GG	0.72
GS01	0.23	1.20	0.91	1.14	0.82	SL -> GS	0.49
GS02	0.23	1.19	0.90	1.12	0.81	SL -> IWB	0.04
GS03	0.14	1.46	1.16	1.51	1.16	TR -> IWB	0.02
GS04	0.20	1.23	0.94	1.23	0.91		
IWB01	0.38	1.03	0.81	1.01	0.79		
IWB02	0.42	0.82	0.64	0.81	0.63		
IWB03	0.46	0.90	0.71	0.87	0.67	R-square	

IWB04	0.28	1.14	0.93	1.08	0.87		IWB	62%
IWB05	0.39	1.05	0.84	0.98	0.77		GG	42%
IWB06	0.29	0.93	0.75	0.90	0.72		GS	33%

**Note: GC = Goal commitment; GG = Goal generation; GS = Goal striving; IWB = Innovative work behavior; SL = Self-leadership; TR = Trait resilience**

## DISCUSSION

The primary objective of the present study was to examine the mediating role of goal-striving and goal-generation in the relationship between self-leadership and innovative work behavior. The direct effect model results indicate a significant positive relationship between self-leadership and innovative work behavior. This finding is consistent with prior studies and extant theory (Blau, 1964), suggesting that self-leadership is the cornerstone for enhancing innovative behavior in the workplace (Arista & Parahyanti, 2019; Atitumpong & Badir, 2018; H. Kang et al., 2022). The results show that goal generation mediates the relationship between self-leadership and innovative work, providing sufficient evidence that although self-leadership matters in enhancing innovative work behavior, goal generation matters most because goal generation helps individuals initiate goals and make consistent efforts to achieve them (H. Kang et al., 2022). In contrast, we did not find sufficient evidence to establish the significance of goal-striving as a mediator in the relationship between self-leadership and innovative work behavior. This finding was not consistent with the anticipated results of the study, as it was believed that self-leadership fosters innovation primarily by actively working towards goals.

### Theoretical contributions

The present study has significant implications for the literature on leadership and innovative work behavior. Firstly, we identify novel fundamental mechanisms (i.e., goal-striving and goal-generation) that underlie the relationship between self-leadership and innovative work behavior. Although previous empirical research has consistently demonstrated that self-leadership fosters innovative work behavior, the underlying mechanism has remained largely unknown (Arista & Parahyanti, 2019; Atitumpong & Badir, 2018; H. Kang et al., 2022). By integrating a social cognitive perspective to examine the mediating role of goal-striving and goal generation in the relationship between self-leadership and innovative work behavior, our study offers new insights into the fundamental mechanisms that explain why self-leadership promotes innovative work behavior. Our findings are consistent with previous research that links self-leadership to innovative work behavior (Lu & Li, 2021). Moreover, by focusing on goal-striving and goal generation as mediators, we build on prior studies that emphasize the importance of goal-setting mechanisms in understanding the impact of leadership on innovative work behavior. Thus, this study contributes

to the existing literature by deepening our understanding of the role of self-leadership in promoting innovative work behavior through goal striving and goal generation.

### **Implications for practice**

Our research offers valuable insights for leaders, policymakers, and organizations seeking to enhance innovative work behavior. For example, organizations can effectively encourage innovative work behavior by emphasizing self-leadership and goal-setting. Organizations should implement comprehensive training and development programs focusing on developing self-leadership skills such as motivation, emotional intelligence, and resilience to achieve this. Additionally, workshops on goal-setting techniques should be conducted, emphasizing the importance of aligning individual goals with organizational objectives. Creating a supportive culture with rewards and recognition of innovative behavior and encouraging calculated risks is crucial. Leadership development initiatives are essential, including training managers and leaders in self-leadership principles and setting an example through their own behaviors. Clear communication of expectations regarding innovation and alignment of organizational policies with innovation goals promotes self-leadership. Providing resources, such as time and budget, and establishing mentorship programs further support employees in pursuing innovative projects. Regular feedback mechanisms and integrating self-leadership and innovation competencies into performance appraisals ensure ongoing evaluation and recognition of contributions to innovation. By incorporating these strategies into organizational policies, policymakers can create an environment that values and actively promotes self-leadership and goal-setting, fostering a culture of continuous innovation within the workforce.

### **Limitations and future directions**

Although this study makes some valuable contributions, it also has a few limitations worth mentioning. It is crucial to acknowledge these limitations because they have significant implications. Notably, goal-striving and goal generation may not be the primary mechanism by which self-leadership influences innovation. Additional research is needed to gain a deeper understanding of the role of goal setting in this context. Furthermore, owing to the cross-sectional nature of our data, we were limited in establishing causal relationships in the present study. This is an inherent limitation of cross-sectional research design. Longitudinal designs can be employed in future research to understand better the mechanisms through which self-leadership fosters innovative work behavior. It is also crucial to consider the potential for common method bias when using self-report measures, which could have influenced the results. Therefore, this aspect must not be overlooked. Despite these limitations, this study has made notable contributions.

## **Conclusion**

In conclusion, the present study contributes to understanding the complex relationship between self-leadership, goal setting, goal generation, and innovative work behavior. As a result, these research findings further our knowledge of this area. From the managerial perspective, this research provides important insights to organizations seeking to foster a culture of innovation among their employees. Specifically, this study expounds on the role of self-goal striving and goal generation as mediators in the relationship between the two. Additional research should be conducted to validate and expand our findings across various organizational contexts.

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## **Competing Interests**

The authors have declared that no competing interests exist.

## **CRedit Author Contribution Statement**

*Kabiru Maitama Kura*: Conceptualization, Funding Acquisition, Methodology, Writing—Original Draft, Supervision, Project Administration. *Hartini Mashod*: Conceptualization, Writing—Review & Editing. *Faridahwati Mohd. Shamsudin*: Investigation, Formal Analysis, Visualization. *Shahratul Karmila Rosland*: Data collection, Statistical Analysis, Writing—Review & Editing. *Ramatu Abdulkareem Abubakar*: Literature Review, Data Curation, Resources, Validation. *Fadziliwati Muhiddin*: Software, Data Management, Writing—Review & Editing. *Noor Maya Salleh*: Methodology, Statistical Analysis, Writing—Review & Editing.

## **Declaration on the Use of Generative Artificial Intelligence**

ChatGPT by OpenAI and Grammarly were used to support the writing process, particularly in refining language, improving clarity, and formatting academic content. The authors confirm that all intellectual contributions, including the conceptualization, data analysis, interpretation of findings, and final decisions on content, were made by the human authors. AI tools were not used for data extraction, statistical analysis, or generating original scientific content. The authors take full responsibility for the integrity and accuracy of the work.

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## **Declarations**

### **Ethics**

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Before the commencement of the study, ethical clearance was obtained from the Research Committee of the Universiti Teknologi Brunei. Approval number: UTB/GSR/2/2022 (18).

### **Competing Interests**

The authors have declared that no competing interests exist.

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### **Author Contributions**

Kabiru Maitama Kura: Conceptualization, Funding Acquisition, Methodology, Writing – Original Draft, Supervision, Project Administration. Hartini Mashod: Conceptualization, Writing – Review & Editing. Faridahwati Mohd. Shamsudin: Investigation, Formal Analysis, Visualization. Shahratul Karmila Rosland: Data collection, Statistical Analysis, Writing – Review & Editing. Ramatu Abdulkareem Abubakar: Literature Review, Data Curation, Resources, Validation. Fadziliwati Muhiddin: Software, Data Management, Writing – Review & Editing. Noor Maya Salleh: Methodology, Statistical Analysis, Writing – Review & Editing.