

Artificial Intelligence and Leadership: The Contribution of Sense of Belonging and Psychological Need Fulfilment

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Abstract: This paper examines the relationships among artificial intelligence, leadership, sense of belonging, and psychological need fulfilment among employees working in hybrid mode. It draws on self-determination theory to examine psychological need fulfilment and sense of belonging in relation to leadership perceptions, with artificial intelligence examined as a mediating variable. The study is limited to IT employees working in hybrid mode in Bengaluru, India. Using purposive sampling, 500 questionnaires were distributed, 410 responses were received, and 400 completed and valid responses were used for analysis. The proposed research model was analyzed using SPSS and AMOS software programs with structural equation modelling and mediation testing based on 5000 bootstrap resamples and bias-corrected 95% bootstrap confidence intervals. The findings show that sense of belonging ($\beta = .381, p < .001$), psychological need fulfilment ($\beta = .318, p < .001$), and artificial intelligence ($\beta = .113, p = .013$) are significantly and positively related to leadership. Psychological need fulfilment is positively associated with AI ($\beta = .551, p < .001$), whereas sense of belonging is significantly negatively associated with AI ($\beta = -.097, p = .036$). Artificial intelligence significantly mediates the relationship between psychological need fulfilment and leadership through a positive indirect effect ($\beta = .062, 95\% \text{ BC CI } [.011, .120], p = .018$). Artificial intelligence also mediates the relationship between sense of belonging and leadership ($\beta = -.011, 95\% \text{ BC CI } [-.031, -.001], p = .034$). The study concludes that artificial intelligence mediates the relationships of psychological need fulfilment and sense of belonging with leadership among employees working in hybrid mode. It highlights the importance of maintaining meaningful human interaction alongside the use of artificial intelligence. The findings also contribute to applying self-determination theory to understanding leadership perceptions among employees working in hybrid mode.

Keywords: Artificial intelligence, hybrid work, leadership, psychological need fulfilment, sense of belonging.

1 INTRODUCTION

The advent of artificial intelligence has greatly affected how organizations function, especially those where employees work both online and offline, that is, in hybrid mode. Work requirements have changed considerably, especially with the rise of artificial intelligence. Leadership is associated with employees' performance and motivation. Employee engagement and job crafting are associated with job satisfaction [1]. Leadership shapes how a job is performed and influences perceptions of the job. Leadership can support employee empowerment in organizations [2]. Digital leadership is developing with the growth of artificial intelligence and hybrid work environments; leaders need to develop adaptive structures that use digital tools and improve employees' digital skills. Leadership is a channel through which changes can be introduced into organizational processes [3].

Emotional leadership is important for the current generation of employees. As digital tools and online and offline work become more common, employees need leaders who help develop a sense of belonging and meet their needs. Employees still regard interpersonal relationships as of primary importance [4]. A strong sense of belonging acts as an important motivator for staying in the organization; employees' experiences in an organization are influenced by the relationships they build over time. This has changed as employees working in hybrid mode may have fewer opportunities to build these interactions daily. Leaders need to address this challenge and communicate clearly to engage employees more effectively. They must foster better conversations and support employees' psychological needs within the organization [5].

Organizations provide structure and systems that encourage and develop an employee's sense of belonging; employees need to feel that their work is valued and needed [6]. A sense of belonging is associated with lower mental stress and can foster communication among employees [7]. Employees with a higher sense of belonging had higher job satisfaction and morale [8]. Employees' need for autonomy, a basic psychological need, is especially important in a hybrid work model; good leaders create space for employees to plan their work and manage their day [9]. Social media and artificial intelligence can help meet employees' psychological needs [10]. In self-determination theory, autonomy is a basic psychological need at work; artificial intelligence may help employees meet this need.

AI training and learning models should consider psychological needs to support employee effectiveness and satisfaction. When introducing artificial intelligence into the organization, consider improving competence and capability; organizations should plan before implementing AI by providing training programs, offering certification, and considering employees' relatedness needs [11]. Artificial intelligence has also been associated with concerns about employees' sense of self and increased stress. Meaningful relationships may decrease in organizations with greater automation; therefore, automation should support employees' sense of worth through a support-centred approach [12]. Low-skilled workers may struggle to adapt to the digital tools and techniques organizations require. Work structures need to adapt to these changes, especially in terms of leadership [13]. Organizations should approach AI adoption at several levels—team, department, and especially leadership. To mitigate risk, organizations should first assess their systems before introducing AI into their processes.

AI can create opportunities for career development and promotion; organizations should clearly explain these opportunities to employees to support motivation [14]. Leadership in the hybrid work environment has changed significantly. The implementation of artificial intelligence in organizations has changed how management operates. This paper examines two factors relevant to employees working in the hybrid work model: sense of belonging and psychological need fulfilment. This paper examines artificial intelligence as a mediating variable in the relationship between these factors and employees' perceptions of leadership in hybrid work settings.

2 REVIEW OF LITERATURE

This paper examines artificial intelligence as a mediating variable in the relationships between sense of belonging, psychological need fulfilment, and leadership. A literature review was conducted to identify the research gap.

2.1. Leadership

Supervisory leadership has long been associated with positive outcomes in human resource practices and self-efficacy. Supervisors are seen as moral leaders; employees look to their leaders for approval and attention. Employees want to maintain their social standing and avoid loss of reputation; they therefore aim to maintain good relations with their leaders [15]. Leaders faced communication challenges in remote and hybrid work, particularly because of the lack of face-to-face interaction and difficulties in networking. During COVID-19, managers consulted each other on ways to address these challenges and improve their management and adaptation to digital tools [16]. Digital meetings improved employees' knowledge. Spontaneous communication was associated with reduced social interaction and was identified as a difficulty in hybrid mode. Inclusive leadership was associated with psychological safety and improved employee voice among those working in hybrid mode. Encouraging anonymous feedback through digital means has improved communication in organizations. Employers' communication should be more inclusive and understanding of the situation of employees working in hybrid mode [17].

Managers have found various digital solutions useful, as some employees interact better in online meetings than in offline meetings. Digital communication has enhanced learning in organizations and improved employees' competence in certain tasks. Leadership and learning have changed significantly in the hybrid work environment. Training can be more personal and individually tailored, and digital platforms can improve knowledge sharing [18]. Leaders who were flexible, adaptable, and understanding were perceived more positively in the hybrid work mode. Transformational and knowledge-oriented leadership were found to suit a hybrid work environment. Team well-being, performance, and resilience were higher in organizations where leaders were more innovative and adaptable to digital tools and communication [19].

2.2. Sense of Belonging

Organizations need to improve their digital adaptability and competence and design hybrid work around employees' needs to foster a sense of belonging. An agile workforce requires accountability, and organizations must create space for employees to collaborate and work together [20]. Older employees had greater difficulty adapting to hybrid work and were more likely to report a lower sense of belonging than others. Workspace does not directly determine employees' sense of belonging; organizational culture and climate also influence it. Organizations should create a supportive sense of community among employees [21].

In a hybrid work environment, organizations need to maintain a balance that encourages employee relationships. Hybrid work includes both synchronous and asynchronous social settings; employees may prioritise task completion over socialising. They find it difficult to keep track of others' workloads and make time to meet. Work loneliness is an important factor affecting those working in the hybrid work environment, while meaningful work was also associated with good relationships in the study. Informal connections, in which employees interact about aspects of each other's private lives, are important for better work relationships [22]. Managerial support, as well as peer support, is essential for a sense of belonging. Peer support groups were essential for dealing with complex problems, and employees felt that the company did not prioritise productivity alone but also supported their relationships and sense of community.

Peer support is seen as an important factor in fostering a sense of belonging among employees [23]. It was found that developing an agile system in the hybrid work model was important for fostering a sense of belonging among employees. At both the group and individual levels, employees felt disconnected while working remotely because they could not interact directly with co-workers. Interestingly, employees reported the strongest sense of belonging when working as part of a team; they found that employees rarely met for outside social activities or sports events, much less than pre-COVID levels of interaction. Managers need to make continuous, dedicated efforts to improve interaction when employees work in hybrid mode [24]. Meaningful work is associated with three major psychological needs: autonomy, competence, and relatedness. A study of over 300 respondents found that these three factors are important for meaningful work in organizations, including in hybrid work mode; autonomy is the foundation that meets employees' psychological needs. Organizations should therefore nurture supportive relationships with employees, and managers need communication training to meet employees' needs better [25].

2.3. Psychological Need Fulfilment

Social needs were identified as a major component of need fulfilment; relatedness to the job and peers was considered essential for employees to feel satisfied at work, and effective feedback improved competence and was therefore an important component of need fulfilment [26]. Autonomy-supportive environments positively affect employees' need fulfilment [26]. The physical environment also affects psychological need fulfilment. Employees may prefer a private setting to support competence and autonomy, while autonomy, competence, and relatedness at work can be associated with an uncluttered and well-arranged environment [27], [28]. Human-centred artificial intelligence may help meet employees' psychological needs. An adjustable, creative platform can support autonomy when used appropriately, and an adaptive feedback loop can also help address employees' psychological needs [29]. AI can support the use of big data in areas such as compensation and workforce effectiveness; HR managers should receive appropriate training on how to use AI and when human intervention is necessary [30].

2.4. Artificial Intelligence

Organizations that use AI can gain greater opportunities for innovation. HR managers should ensure transparency in the processes. To meet the psychological needs of autonomy, relatedness, and competence, AI should be introduced and managed in a way that helps improve the digital competency of employees. Organizations should develop adaptable, supportive environments that facilitate sustainable technology adoption [31]. AI plays a significant role in HR applications and can support productivity and decision-making. Effective management and training are important for appropriate AI use; AI can make decision-making more efficient when applied appropriately [32]. AI has been associated with employee engagement in relation to leadership; managers need to tailor their approaches to employees to improve productivity while ensuring that AI does not replace necessary human tasks [33]. AI can improve HR practices and decision-making. When applied to HR practices, AI can positively affect organizational effectiveness. It can also improve employee relations, strengthen skill management, and improve decision-making [34].

Artificial intelligence is a tool that, when used efficiently, can support employees' needs for autonomy and relatedness. Employees with higher adaptability may be more willing to use available resources. Similarly, artificial intelligence-enabled communication media may also influence a sense of belonging. Employees with a strong sense of belonging within the organisation may be less likely to use AI for knowledge sharing and workflow improvement, as they may prefer direct or personal communication through their social networks in hybrid work mode.

2.5. Research Gap

Existing literature on the hybrid work model focuses more on employee outcomes, such as collaboration and employee engagement; artificial intelligence is generally studied as an enabler or one factor rather than a direct influence. Extensive literature examines leadership changes, communication differences, adaptation to digital technologies, AI's influence, sense of belonging, and psychological need fulfilment. However, limited research has examined the role of artificial intelligence in employees' work experiences through sense of belonging and psychological need fulfilment in relation to leadership. The changing nature of hybrid work has altered how employees interact through artificial intelligence and other digital media; this affects decision-making and, importantly, perceptions of organisational communication. The research examines the gap in how leadership can respond to the changing needs of those working in the hybrid model, especially regarding sense of belonging and psychological need fulfilment. Artificial intelligence has been studied as an outcome rather than as a mediating variable in the changing work environment. It has been associated with employee autonomy and sense of belonging. Taking these factors into account, this paper addresses the research gap by examining the relationships between sense of belonging, psychological need fulfilment, and leadership, and by investigating artificial intelligence's mediating role in these relationships among employees working in hybrid mode. Towards this end, the following research questions are framed.

1. What is the relationship between sense of belonging and leadership in a hybrid work setting?
2. What is the relationship between psychological need fulfilment and leadership in a hybrid work setting?
3. What is the relationship between artificial intelligence and leadership in a hybrid work setting?
4. Does artificial intelligence mediate the relationships between sense of belonging, psychological need fulfilment, and leadership among employees working in hybrid mode?

These research questions focus on the relationships among sense of belonging, psychological need fulfilment, artificial intelligence, and leadership in the hybrid work context. Based on these questions, the following research objectives were formulated.

1. To examine the relationship between sense of belonging and leadership among employees working in hybrid mode.
2. To assess the relationship between psychological need fulfilment and leadership among employees working in hybrid mode.
3. To examine the relationship between artificial intelligence and leadership among employees working in hybrid mode.
4. To determine the mediating effect of artificial intelligence on the relationships of sense of belonging and psychological need fulfilment with leadership.

3 RESEARCH METHODOLOGY

3.1. Scales used in the Questionnaire

The study used the following pre-validated scales, as presented in Table 1. The scales were adapted from the cited sources for use in the present study. The questionnaire comprised 34 items covering the four constructs examined in the study: sense of belonging, leadership, psychological need fulfilment, and artificial intelligence. The selected scales were adapted from the cited validated instruments to suit the context of employees working in hybrid mode. The items measured the respective constructs and were subsequently assessed for reliability and validity before testing the proposed relationships.

Table 1. Pre-validated scales.

Scale	Items	Citation
Sense of Belonging	12	Workplace belongingness scale [35]
Leadership	6	Digital Leadership Skills and Associations with Psychological Well-Being scale [36]
Psychological Need Fulfilment	12	Need satisfaction, motivation, and well-being in the work organizations [37]
Artificial Intelligence	4	Attitude towards AI [38]

A conceptual model was made based on the reviewed literature as shown in Fig. 1. The conceptual model illustrates the proposed relationships among sense of belonging, psychological need fulfilment, artificial intelligence, and leadership. It shows the direct relationships between the variables and the proposed mediating role of artificial intelligence in the relationships between the psychological factors and leadership.

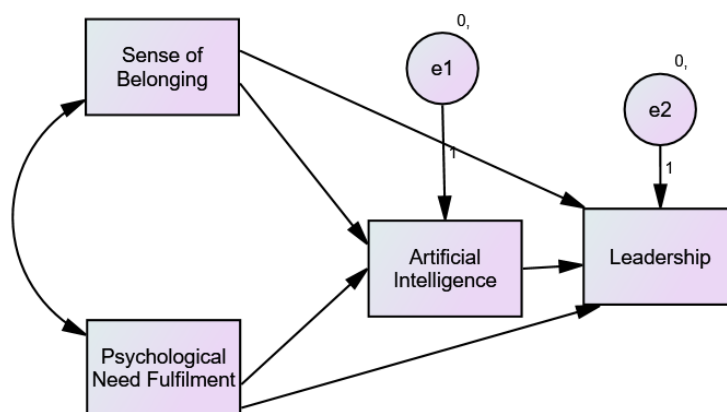


Fig. 1. Conceptual model.

3.2. Hypotheses

The hypotheses were formulated based on the relationships identified in the literature review and represented in the conceptual model. The first set of hypotheses examines the direct relationships of sense of belonging, psychological need fulfilment, and artificial intelligence with leadership. The second set examines the relationships between sense of belonging, psychological need fulfilment, and artificial intelligence. The final set examines the mediating role of artificial intelligence in the relationships between the two psychological factors and leadership.

- H1a: Sense of belonging is positively associated with leadership.
- H1b: Psychological need fulfilment is positively associated with leadership.
- H1c: Artificial intelligence is positively associated with leadership.
- H2a: Sense of belonging is positively associated with artificial intelligence.
- H2b: Psychological need fulfilment is positively associated with artificial intelligence.
- H3a: Artificial intelligence acts as a mediator between sense of belonging and leadership.
- H3b: Artificial intelligence acts as a mediator between psychological need fulfilment and leadership.

3.3. Sampling and Data Collection

The study involved employees from different companies in Bengaluru, India, who were working in hybrid mode. The study distributed 500 questionnaires using purposive sampling. The respondents were required to be employees working in hybrid mode in Bengaluru, India. Given the large population, Cochran's formula was used as a reference for sample-size planning, assuming a population proportion of 0.5, a 95% confidence level, and a 5% margin of error. The resulting reference sample size was 384. A total of 410 responses were received, of which 400 completed and valid responses were used for analysis.

4 EMPIRICAL RESULTS OF MEASUREMENTS AND STRUCTURAL MODEL ASSESSMENT

4.1. Assessment of Sampling Adequacy

The adequacy of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy [39]. The KMO measure assesses the adequacy of correlations among the variables for factor analysis. KMO values above 0.80 are generally considered good for factor analysis; therefore, 0.937 indicates excellent sampling adequacy [40]. In this study, Bartlett's test of sphericity was significant ($\chi^2 = 6933.402$, $p < 0.001$, $df = 435$), indicating that the correlation matrix was suitable for factor analysis. [41].

Table 2. KMO and Bartlett's test.

Test	Statistic	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	KMO	0.937
Bartlett's test of Sphericity	Approx. Chi-Square	6933.402
	Df	435
	Sig	<0.001

The KMO value of 0.937 is well above the commonly used threshold of 0.70, indicating excellent sampling adequacy for factor analysis and sufficient covariance among variables to meet the prerequisites for factor analysis.

4.2. The Common Method Bias Test

To minimize the potential impact of common method bias, the study used both procedural and statistical controls. Procedurally, the study used anonymous surveys and explicitly assured participants that their data would be kept strictly confidential to reduce concerns and enhance the authenticity of their responses. Additionally, the questionnaire design prioritized simplicity and readability, ensuring that the questions were clear and easy to understand. To control for common method bias, this study used Harman's single-factor test. The results showed that the first factor explained 30.16% of the variance, below the 50% threshold. The Harman single-factor test did not indicate that a single factor accounted for the majority of the variance; however, common method bias cannot be completely ruled out.

4.3. Confirmatory Factor Analysis

AMOS version 24 was used to perform confirmatory factor analysis. The model assessed reliability, convergent validity, and discriminant validity. Fig. 2 presents the final CFA model, and Table 4 presents the corresponding measurement results. The model fit was evaluated using the Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), and Adjusted Goodness-of-Fit Index (AGFI) [42]. During the CFA, items with inadequate factor loadings were removed before estimating the final measurement model. Table 3 presents the final retained items and their standardized factor loadings.

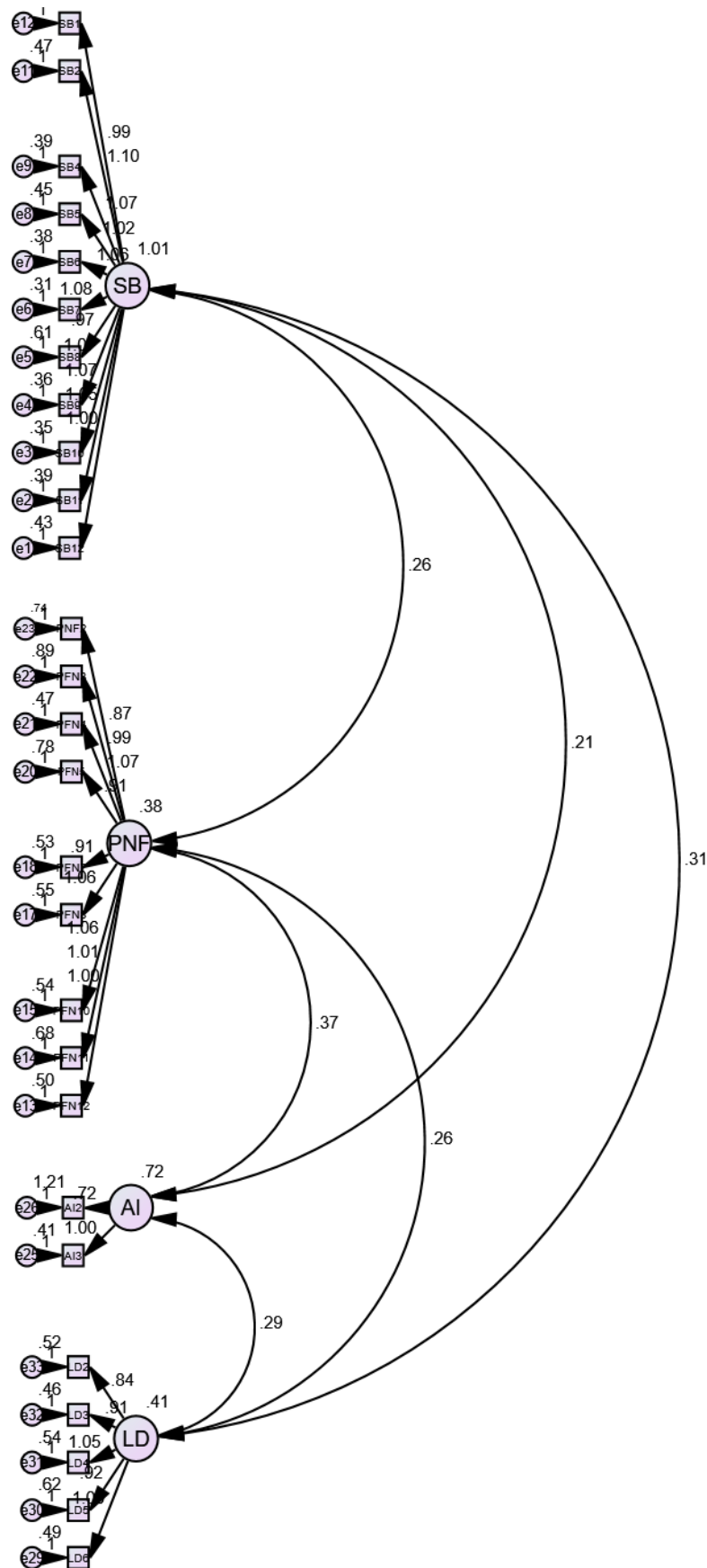


Fig. 2. Final confirmatory factor analysis.

Table 3. Reliability and convergent validity test.

Variables/ Constructs	Items	Standardized Factor Loadings	Cronbach Alpha	Composite Reliability	Average Variance Extracted	Maximum Shared Variance
Sense of Belonging-SB	SB1	0.781	0.865	0.867	0.717	0.268
	SB2	0.85				
	SB4	0.866				
	SB5	0.836				
	SB6	0.863				
	SB7	0.89				
	SB8	0.778				
	SB9	0.872				
	SB10	0.875				
	SB11	0.86				
	SB12	0.836				
Psychological Need Fulfilment-PNF	PNF2	0.525	0.830	0.837	0.548	0.422
	PNF3	0.546				
	PNF4	0.695				
	PNF5	0.539				
	PNF7	0.614				
	PNF8	0.665				
	PNF10	0.665				
	PNF11	0.602				
Artificial Intelligence- AI	AI2	0.656	0.719	0.724	0.588	0.172
	AI3	0.706				
Leadership-LD	LD2	0.6	0.729	0.716	0.536	0.422
	LD3	0.656				
	LD4	0.669				
	LD5	0.602				
	LD6	0.663				

4.4. Goodness of Fit

The CFA results indicate an acceptable overall model fit. Table 4 presents the model fit indices for the CFA model. Goodness-of-fit indices must meet certain criteria to be considered valid, according to [43]. The RMSEA was 0.058, below the stated threshold of 0.060, indicating acceptable model fit. The normed chi-square CMIN/DF was 2.349, below the 3.0 threshold, indicating acceptable model fit. The GFI was 0.876, exceeding the stated threshold of 0.85. The AGFI was 0.852, exceeding the stated threshold of 0.80. The NFI was 0.892, slightly below the stated threshold of 0.90. However, the remaining fit indices indicate acceptable overall model fit [41]. Root mean square residual (RMR) is reported as 0.054.

Table 4. Model fit indices.

Model Fit Indices	Threshold Limit	Estimated Values	Interpretation
CMIN/DF	<3.0	2.349	Good
CFI	>0.90	0.915	Good
GFI	>0.85	0.876	Good
AGFI	>0.80	0.852	Good
PGFI	>0.50	0.737	Good
IFI	>0.90	0.935	Good
TLI	>0.90	0.917	Good
NFI	>0.90	0.892	Acceptable
RMSEA	<0.06	0.058	Good
RMR	<0.08	0.054	Good

4.5. Reliability and Convergent Validity Test

Reliability and validity were assessed as part of the confirmatory factor analysis. Convergent validity was assessed using Average Variance Extracted (AVE) and Composite Reliability (CR), with the reported values exceeding the stated thresholds of 0.50 for AVE and 0.60 for CR, as shown in Table 3. Some standardized factor loadings for PNF are relatively low but were retained in the final measurement model.

4.6. Discriminant Validity

To establish discriminant validity, the heterotrait–monotrait (HTMT) ratio was examined based on the criterion proposed by [44]. All HTMT values reported in Table 5 are below the recommended threshold, indicating adequate discriminant validity among the constructs.

Table 5. Discriminant validity (HTMT test).

	SOB	PNF	AI	LD
SOB	-			
PNF	0.411	-		
AI	0.092	0.472	-	
LD	0.595	0.656	0.315	-

4.7. Hypothesis Testing

The data were analysed using structural equation modelling (SEM) with AMOS 24.0, as shown in Fig. 3. The instruments used in this study were adapted from previous studies. The SEM results provide evidence regarding the hypothesized relationships among sense of belonging, psychological need fulfilment, artificial intelligence, and leadership, as shown in Table 6.

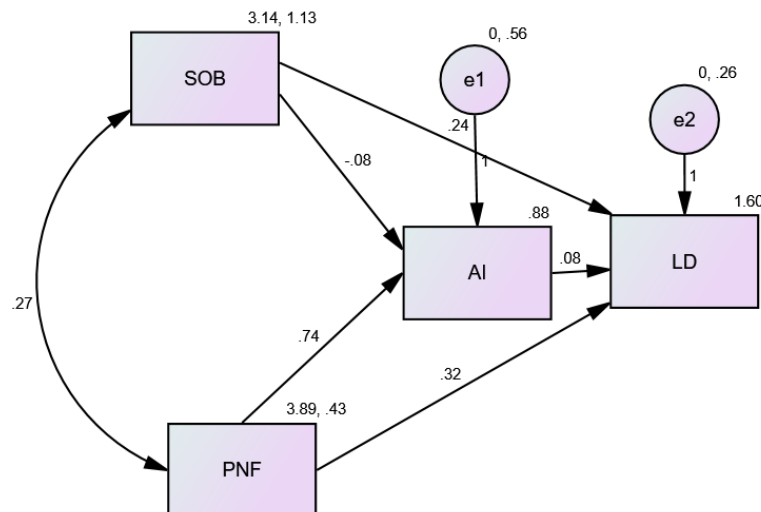


Fig. 3. Final SEM after hypothesis testing.

Fig. 3 displays the model estimates generated in AMOS, while Table 6 reports the corresponding standardized regression weights used to interpret the hypothesized relationships.

Table 6. Standardized regression weights.

H.No.	Paths	Standardized Estimates	SE	CR	P	Remarks
H1a	SB>LD	0.381	0.026	8.990	***	Accepted
H1b	PNF>LD	0.318	0.049	6.498	***	Accepted
H1c	AI>LD	0.113	0.034	2.486	0.013	Accepted
H2a	SB>AI	-0.097	0.038	-2.096	0.036	Rejected
H2b	PNF>AI	0.551	0.062	11.848	***	Accepted

Fig. 3 shows the structural equation model and the estimated relationships among sense of belonging, psychological need fulfilment, artificial intelligence, and leadership. Table 6 shows significant direct relationships between the study variables and leadership. The results indicate that sense of belonging has a significant positive relationship with leadership ($\beta = .381$, $p < .001$). A sense of belonging and positive workplace relationships are associated with more positive perceptions of leadership among employees, and H1a can be accepted. Psychological need fulfilment is also significantly and positively related to leadership ($\beta = .318$, $p < .001$). The fulfilment of relatedness, autonomy, and competence needs is positively associated with perceptions of leadership among employees; H1b is accepted.

Artificial intelligence is also significantly and positively related to leadership ($\beta = .113$, $p = .013$). The finding indicates a significant positive relationship between artificial intelligence and leadership perceptions among employees; therefore, H1c is accepted. Finally, the results indicate a significant relationship between sense of belonging and artificial intelligence. Sense of belonging is negatively associated with artificial intelligence ($\beta = -0.097$, $p = .036$), and H2a is rejected because the observed relationship is opposite to the hypothesized positive direction. Psychological need fulfilment is significantly and positively associated with artificial intelligence ($\beta = 0.551$, $p < .001$), and H2b is accepted.

4.8. Mediation Testing

The mediation analysis treated Sense of Belonging (SB) and Psychological Need Fulfilment (PNF) as independent variables, Leadership (LD) as the dependent variable, and Artificial Intelligence as the mediator. Mediation analysis was conducted using direct and indirect effects based on bootstrap procedures with 5000 resamples and a bias-corrected 95% bootstrap confidence interval [45]. An indirect effect was considered statistically significant when the corresponding 95% bootstrap confidence interval did not include zero. The results show that artificial intelligence significantly mediates the relationship between psychological need fulfilment and leadership ($\beta = 0.062$, 95% BC CI [0.011, 0.120], $p = .018$). Psychological need fulfilment therefore has a significant indirect relationship with leadership through artificial intelligence. Artificial intelligence also significantly mediates the relationship between sense of belonging and leadership ($\beta = -0.011$, 95% BC CI [-0.031, -0.001], $p = .034$). The direct effect of sense of belonging on leadership is positive ($\beta = .381$), whereas the indirect effect through AI is negative ($\beta = -.011$), indicating inconsistent mediation, as shown in Table 7.

Table 7. Mediation analysis.

H.No	Path	Direct Effects	Indirect Effects	Total Effects	95% BC CI	Remarks
H3a	SB>AI>LD	.381	-.011	.370	[-.031, -.001]	Supported
H3b	PNF>AI>LD	.318	.062	.380	[.011, .120]	Supported

5 DISCUSSION

The present study examined the relationships between sense of belonging, psychological need fulfilment, artificial intelligence, and leadership. Using structural equation modelling, the study found that sense of belonging, psychological need fulfilment, and artificial intelligence all have significant direct relationships with leadership. At the same time, sense of belonging and psychological need fulfilment also have significant relationships with artificial intelligence. Mediation was tested using the bootstrap method; the analysis shows that artificial intelligence significantly mediates the relationships between psychological need fulfilment, sense of belonging, and leadership. The study assessed the measurement model's reliability and validity through confirmatory factor analysis. This study provides further insights into leadership and the influence of artificial intelligence in the hybrid work environment.

Sense of belonging, psychological need fulfilment, and artificial intelligence all show significant positive direct relationships with leadership. Employees who feel valued, accepted, and connected to their colleagues may perceive leadership more positively in an environment characterised by trust and collaboration. Employees perceive leaders who create an inclusive and supportive environment positively [5]. Employees whose psychological needs are fulfilled may be more confident and motivated and may perceive leadership more positively [9]. Sense of belonging is significantly and positively related to leadership, consistent with previous studies highlighting leadership's role in shaping positive social experiences for employees [46]. Leadership and workplace social relationships are also relevant to employees' sense of belonging. Relational experiences are important in the workplace and are associated with employees' sense of belonging [47].

The present study extends this discussion to the hybrid work environment. In such settings, employees may have fewer opportunities for face-to-face interaction, making connectivity and inclusion important considerations for leadership. Leadership needs to make deliberate efforts to improve connectivity and create a more inclusive environment. The positive relationship between sense of belonging and leadership suggests that employees who feel seen, accepted, and valued may also perceive leadership more positively. This is significant for leaders in hybrid work environments, as they need to make a deliberate effort to strengthen these connections. Psychological need fulfilment shows a significant positive relationship with leadership, consistent with self-determination theory, which holds that employees' relatedness and autonomy at work are positively associated with work-related outcomes [48]. The present study provides further evidence for this relationship in the hybrid work environment. In the hybrid work environment, employees may need greater autonomy and competence as they manage aspects of their work independently. Leadership that supports autonomy and provides opportunities to develop competence may therefore be perceived more positively in the hybrid work environment.

Artificial intelligence demonstrates a significant positive relationship with leadership, indicating that more positive perceptions of AI are associated with more positive perceptions of leadership among employees working in the hybrid work environment. These findings align with recent studies linking artificial intelligence adoption with leadership. A recent study found that usage of AI tools was positively associated with leadership and employee engagement [49]. Similarly, another study reported that AI was associated with positive outcomes in HR practices and leadership, emphasising the relationship between technological capabilities and perceptions of leadership [50].

Sense of belonging has a significant negative relationship with artificial intelligence ($\beta = -.097$, $p = .036$); therefore, H2a is rejected because the observed relationship is opposite to the hypothesized positive direction. This finding suggests that employees with a strong sense of workplace belonging may not necessarily view the adoption of artificial intelligence positively. This result contributes to the broader study of artificial intelligence adoption, especially in a hybrid work environment. AI may be viewed more positively when employees see it as supporting their work rather than replacing human involvement, particularly when leadership positions it as supporting work and relationships [51]. The present findings can therefore be interpreted as indicating the importance employees place on relationships, interactions, and connections in organisations. This finding is relevant to the hybrid work environment, where employees may have fewer opportunities for social interaction and interpersonal exchange. This interpretation should be treated with caution, as the research design is cross-sectional and causal conclusions cannot be drawn.

Employees reporting greater psychological need fulfilment also reported more positive perceptions of artificial intelligence adoption. This is broadly consistent with self-determination theory, particularly for autonomy and competence in technology-enabled work. Recent studies have emphasised that AI-oriented leadership perceived as enabling employee autonomy and competence is more likely to be viewed as supportive rather than controlling [51]. The findings suggest that employees reporting greater psychological need fulfilment may also have more positive perceptions of AI, particularly where autonomy and competence are relevant to technology-enabled work. However, the SEM analysis shows an association between psychological need fulfilment and artificial intelligence in the observed sample; it does not establish causality.

Mediation analysis was conducted using 5000 bootstrap resamples with a bias-corrected 95% confidence interval. Artificial intelligence significantly mediates the relationship between psychological need fulfilment and leadership. This finding is consistent with previous research on artificial intelligence-enabled leadership and research linking AI adoption with meaningful work [51]. The finding is relevant to research on hybrid work environments because psychological need fulfilment is positively associated with perceptions of AI in the present study. Employees may perceive leadership associated with technology that supports these needs more positively [51].

Artificial intelligence also mediates the relationship between sense of belonging and leadership. The direct effect of sense of belonging on leadership is positive ($\beta = .381$), whereas the indirect effect through artificial intelligence is negative ($\beta = -.011$), indicating inconsistent mediation. This finding indicates that the positive direct relationship between sense of belonging and leadership is accompanied by a negative indirect pathway through artificial intelligence [8]. One possible interpretation is that employees may value interpersonal connections more in a hybrid work environment where technology-mediated interaction is more common. This supports recent studies on artificial intelligence and the importance of leadership in positioning it as a tool that supports employee relationships.

The study contributes to the literature on how leadership perceptions in the hybrid work environment are associated with psychological need fulfilment, sense of belonging, and artificial intelligence. The study supports previous theories on leadership and belongingness as a relational process. It also extends research on AI-enabled leadership. The research contributes to the emerging literature on artificial intelligence, leadership, and hybrid work environments. The findings provide further insight into AI's role as a mediator in the relationship between psychological need fulfilment and leadership. This highlights technology's role in leadership outcomes in organisations where employees work both offline and online. Lastly, this study adds to research on hybrid work environments by examining the relationship between artificial intelligence and leadership. The findings highlight the relevance of digital technologies to leadership perceptions among employees working in hybrid mode. The findings also offer practical insights into using artificial intelligence in organisations operating in a hybrid work environment, particularly regarding psychological need fulfilment and leadership. Organisations can create appropriate channels for feedback, support, and opportunities alongside AI adoption.

6 LIMITATIONS OF THE STUDY

The study has several limitations to consider when interpreting the findings. Common method bias cannot be completely ruled out despite the Harman test, as it only examined whether a single factor accounted for most of the variance. The cross-sectional design limits causal conclusions, and future studies could use longitudinal designs to examine changes over time. The rapid evolution of AI technologies may affect the findings' continued relevance as organisations introduce and adopt new tools and applications.

Data were collected through self-reported questionnaires, which may be subject to response bias because participants' responses may reflect their perceptions of particular situations. The study was limited to employees working in hybrid mode in the IT industry in Bengaluru, India, which may limit the generalisability of the findings to other industries, locations, and work arrangements. Future research could examine employees in other job roles and industries, fully remote work arrangements, longitudinal designs, experimental AI interventions, cross-country comparisons, and AI literacy.

7 CONCLUSION

In conclusion, this study provides further evidence of the relationships between sense of belonging, psychological need fulfilment, and leadership among employees working in hybrid mode. The findings also provide further insight into the relationship between artificial intelligence and leadership in the hybrid work environment. The findings suggest that leadership in hybrid work environments needs to account for employees' experiences of belonging, psychological need fulfilment, and AI use. The study also provides insight into the mediating role of artificial intelligence in the relationships between sense of belonging, psychological need fulfilment, and leadership. Understanding these relationships may help organisations consider how AI is used alongside employees' psychological and social needs in hybrid work environments. Further research could examine the role of artificial intelligence in other areas of organisational management.

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ETHICS STATEMENT

The study strictly maintained ethical principles of confidentiality, anonymity, and voluntary participation. Informed consent was obtained from all participants before they completed the questionnaire.

STATEMENT OF CONFLICT OF INTERESTS

The second author, who is the corresponding author of this manuscript, is a member of the Editorial Board of the International Journal of Emerging Research in Engineering, Science, and Management (IJERESM). He was not involved in the editorial handling, peer-review process, or decision-making for this manuscript. The manuscript was processed independently through the journal's standard editorial procedures, and the author had no access to confidential editorial information or any additional information regarding the editorial process. The authors declare no other conflicts of interest related to this study.

LICENSING

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