AI Awareness and Psychological Withdrawal in Hotels: The Mediating Role of Ego Depletion and the Moderating Role of Ambiguity Tolerance

Ahmed S. Abdelaziz [1], Shimaa Abo Elsoad Mohamed Soliman [2], and Mahmoud Ahmed Mohmed Saleh [3]

[1]*Hotel Management Department, Faculty of Tourism and Hotel Management, Capital University, Egypt;* [2]*Hospitality Management Department, High Institute of Tourism, Hotels & Computer Science, Seyouf, Alexandria, Egypt;* [3]*Hospitality Department, Higher Institute for Tourism and Hotels EGOTH, Luxor, Egypt.*

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Abstract

Grounded in Conservation of Resources (COR) theory, this study examines the impact of artificial intelligence (AI) awareness on hotel employees' psychological withdrawal behavior, highlighting the mediating mechanism of ego depletion and the moderating role of ambiguity tolerance. Data were collected from 410 full-time employees working in five-star hotels in Egypt and analyzed using PLS-SEM. The findings reveal that AI awareness significantly increases employees' psychological withdrawal and ego depletion. Results further indicate that ego depletion positively predicts psychological withdrawal and mediates the relationship between AI awareness and withdrawal behavior. Moreover, ambiguity tolerance moderates the relationship between AI awareness and ego depletion, suggesting that employees with higher tolerance for ambiguity experience lower resource depletion in response to AI-related changes. This study contributes to the literature by integrating resource-based theory with emerging digital transformation research into hospitality, providing empirical evidence on the psychological consequences of AI awareness and identifying a protective personal resource that mitigates its adverse effects.

Keywords: Artificial intelligence awareness; Psychological withdrawal; Ego depletion; Ambiguity tolerance; Conservation of resources theory; Hospitality industry.

*Corresponding author: Shimaa Abo Elsoad Mohamed Soliman, *solimanshimaa247@gmail.com*

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1. Introduction

Artificial intelligence (AI) is rapidly transforming service industries, particularly the hospitality sector, where technology integration is reshaping service delivery, employee roles, and organizational processes. Recent research highlights that AI awareness among employees produces both positive and negative psychological and behavioral consequences (Li et al., 2019; Kong et al., 2021; Wang et al., 2022; Bai et al., 2024). While AI adoption enhances efficiency and competitiveness, it also generates job insecurity, role ambiguity, and work stress that influence employee attitudes and withdrawal behaviors (Koo et al., 2021; Raina, 2023; Martínez-Roget et al., 2025). Emerging evidence demonstrates that AI awareness can trigger counterproductive work behaviors, silence behavior, burnout, and turnover intentions through stress-related mechanisms (Cheng et al., 2025; El-Majeed et al., 2025; Salama et al., 2025; Song et al., 2025).

From a theoretical perspective, Conservation of Resources (COR) theory (Hobfoll, 1989, 2011; Hobfoll et al., 2016, 2018) provides a strong framework to explain these effects. COR theory posits that individuals strive to acquire, retain, and protect valuable resources, and that perceived threats to resources—such as technological disruption or AI-driven transformation—lead to psychological strain and defensive behaviors. In hospitality contexts, increasing AI integration may deplete employees' cognitive and emotional resources, resulting in ego depletion and withdrawal tendencies (Xia et al., 2020; Jin, 2023; Shi et al., 2021). Recent studies confirm that AI awareness is associated with job stress, burnout, emotional exhaustion, and psychological withdrawal through resource loss mechanisms (Hou & Fan, 2024; Teng et al., 2024; Wei et al., 2026; Nguyen & Nguyen, 2025).

A growing body of literature emphasizes the "double-edged sword" nature of AI awareness, where it simultaneously enhances performance potential and increases psychological strain (Liu & Cheng, 2025; Zhang et al., 2025a; Zhang et al., 2025b; Qin et al., 2025). Employees who perceive AI as a threat to autonomy or job security are more likely to experience stress-induced resource depletion, leading to disengagement and withdrawal behaviors (He et al., 2025; Xu & Lau, 2025; Pericleous et al., 2025).

However, individual differences may buffer these negative consequences. Ambiguity tolerance—defined as the ability to function effectively under uncertain and unclear conditions (Furnham & Ribchester, 1995; Furnham & Marks, 2013; McLain et al., 2015)—has been identified as an important personal resource that mitigates stress responses and strengthens adaptive capability (Sung et al., 2017; Xu & Tracey, 2014; García-Vidal et al., 2023; Yılmaz et al., 2025).

Despite increasing attention to AI-related outcomes in hospitality research, limited studies have simultaneously examined ego depletion as a mediating mechanism and ambiguity tolerance as a boundary condition linking AI awareness to psychological withdrawal. Existing research primarily focuses on burnout, turnover intention, or performance outcomes (Bakir et al., 2025a; Bakir et al., 2025b; Hassan et al., 2024; Wang et al., 2024), leaving the underlying resource-depletion processes underexplored.

Accordingly, grounded in COR theory, this study investigates how AI awareness influences psychological withdrawal behavior through ego depletion and examines whether ambiguity tolerance moderates the relationship between AI awareness and ego depletion. The study targets full-time employees in five-star hotels in Egypt, an environment characterized by rapid digital transformation

and increasing AI integration. By integrating technological awareness, psychological resource depletion, and individual resilience factors, this research contributes to a deeper understanding of employee responses to AI-driven change in hospitality settings.

2. Literature review and hypotheses development

2.1. Underpinning Theory: Conservation of Resources Theory

This study is grounded in Conservation of Resources (COR) theory, which provides a comprehensive framework for explaining how individuals respond to perceived threats and resource loss in organizational contexts (Hobfoll, 1989, 2011; Hobfoll et al., 2016, 2018). COR theory posits that individuals strive to acquire, maintain, and protect valuable resources, including psychological energy, time, status, and personal capabilities. Stress occurs when these resources are threatened, lost, or insufficiently replenished. Under such conditions, individuals engage in defensive mechanisms to minimize further resource depletion.

In technology-intensive environments such as hotels undergoing digital transformation, artificial intelligence awareness may represent a potential resource threat. Employees who recognize the expansion of AI systems may perceive uncertainty regarding job stability, role clarity, and future career development. Such perceptions trigger cognitive appraisal processes that consume psychological resources and generate stress responses. From a COR perspective, this resource loss process may manifest as ego depletion, which reflects diminished self-regulatory capacity resulting from sustained cognitive and emotional strain (Shi et al., 2021; Xia et al., 2020).

When employees experience resource depletion, they are more likely to adopt withdrawal-oriented coping strategies to conserve remaining resources. Psychological withdrawal behavior can therefore be understood as a protective response aimed at reducing further resource consumption in stressful work environments (Lehman & Simpson, 1992; Zimmerman et al., 2016). Accordingly, AI awareness indirectly contributes to withdrawal behavior through its impact on ego depletion.

Furthermore, COR theory emphasizes the role of personal resources in buffering resource loss spirals. Individual characteristics such as ambiguity tolerance function as psychological resources that enable employees to better cope with uncertainty and technological change (Furnham & Ribchester, 1995; McLain et al., 2015). Employees with high ambiguity tolerance are less likely to interpret AI-related transformation as a direct threat, thereby reducing the extent to which AI awareness translates into resource depletion.

2.2. Artificial Intelligence Awareness and Employee Psychological Outcomes

Artificial intelligence (AI) is increasingly embedded in hospitality operations, reshaping service delivery, decision-making processes, and employee tasks. AI awareness refers to employees' perception and understanding of AI technologies implemented within their organizational environment and how such technologies influence job design and performance requirements (Li et al., 2019; Wang et al., 2022). Although AI adoption enhances operational efficiency and service quality, it simultaneously generates psychological reactions among employees, including job insecurity, role ambiguity, and perceived threats to professional identity (Koo et al., 2021; Raina, 2023).

Recent empirical research highlights that AI awareness is associated with both positive and negative behavioral consequences. For instance, AI awareness has been linked to turnover intention, burnout, work stress, silence behavior, and withdrawal-related outcomes (Cheng et al., 2025; Salama et al., 2025; Song et al., 2025; Teng et al., 2024). From a resource perspective, increased awareness of AI-driven transformation may signal potential resource loss, reduced autonomy, or performance pressure. Such perceptions activate stress responses that contribute to disengagement and psychological withdrawal behaviors (Aggarwal et al., 2020; Yasami et al., 2024).

Psychological withdrawal reflects employees' behavioral and cognitive disengagement from work as a coping mechanism in response to stressors or unfavorable work conditions (Lehman & Simpson, 1992; Zimmerman et al., 2016). In technology-intensive environments, employees who perceive AI as a threat may reduce involvement, limit effort, or mentally detach from work tasks. Therefore, grounded in resource loss logic and prior empirical evidence, AI awareness is expected to increase psychological withdrawal. Thus, the following hypothesis is formulated:

H1: AI awareness positively influences employees' psychological withdrawal behavior.

2.3. AI Awareness and Ego Depletion

Ego depletion refers to the reduction of self-regulatory resources following prolonged exposure to cognitive demands, stressors, or emotional strain (Shi et al., 2021; Xia et al., 2020). In organizational contexts, stressful job conditions or perceived threats to job stability consume employees' psychological energy, reducing their capacity for self-control and adaptive functioning.

Within hospitality settings, AI awareness may act as a psychological stressor. Employees who recognize automation expansion or AI integration may experience uncertainty regarding job security, skill relevance, and future career prospects (He et al., 2025; Xu & Lau, 2025). Such uncertainty increases cognitive load and continuous monitoring of environmental threats, which drains emotional and mental resources.

Empirical studies suggest that technology-related stressors, job insecurity perceptions, and workplace uncertainty contribute to resource depletion and emotional exhaustion (Jin, 2023; Hou & Fan, 2024; Wei et al., 2026). Therefore, consistent with Conservation of Resources (COR) theory, AI awareness is expected to consume employees' regulatory resources and increase ego depletion. Thus, the following hypothesis is formulated:

H2: AI awareness positively influences employees' ego depletion.

2.4. The Moderating Role of Ambiguity Tolerance

Ambiguity tolerance refers to individuals' capacity to function effectively in situations characterized by uncertainty, unpredictability, and incomplete information (Furnham & Ribchester, 1995; McLain et al., 2015). Employees with high ambiguity tolerance are more comfortable dealing with change and technological uncertainty, whereas those with low tolerance perceive ambiguity as threatening and stressful.

In technology-driven environments, AI integration often introduces unclear role boundaries and evolving performance expectations. Research indicates that ambiguity tolerance plays a protective role in mitigating stress reactions and enhancing adaptive coping (Sung et al., 2017; Xu & Tracey, 2014; García-Vidal et al., 2023). Employees who tolerate ambiguity are less likely to interpret AI-related transformation as a direct threat to their resource stability.

Applying COR theory, ambiguity tolerance functions as a personal resource that buffers the resource-draining effect of AI awareness. When employees possess higher tolerance for uncertainty, the psychological impact of AI awareness on ego depletion weakens because they perceive technological change as manageable rather than threatening. Conversely, low ambiguity tolerance intensifies resource depletion under AI-driven uncertainty. Thus, the following hypothesis is formulated:

H3: Ambiguity tolerance moderates the relationship between AI awareness and ego depletion, such that the positive relationship is weaker for employees with higher ambiguity tolerance.

2.5. Ego Depletion and Psychological Withdrawal

Ego depletion reduces employees' ability to regulate behavior, maintain engagement, and sustain effort in demanding contexts (Shi et al., 2021; Xia et al., 2020). When employees experience depleted self-control resources, they are more likely to adopt avoidance-oriented coping strategies, including withdrawal from tasks, reduced participation, or emotional detachment.

Empirical evidence supports the link between ego depletion and negative work behaviors such as silence, deviance, and disengagement (Jin, 2023; Nie & Wang, 2025; Zimmerman et al., 2016). In hospitality settings, employees facing high cognitive and emotional exhaustion may withdraw psychologically as a defense mechanism to conserve remaining resources.

Thus, based on resource conservation logic, depleted employees are expected to demonstrate higher levels of psychological withdrawal behavior. Therefore, the following hypothesis is formulated:

H4: Ego depletion positively influences employees' psychological withdrawal behavior.

2.6. Mediating Role of Ego Depletion

Integrating the preceding arguments, AI awareness may not directly influence psychological withdrawal alone but operates through internal psychological processes. Specifically, AI awareness increases cognitive stress and perceived threat, which depletes employees' self-regulatory resources. This depletion reduces adaptive capacity and increases withdrawal tendencies.

Prior studies have demonstrated that ego depletion functions as a key mediating mechanism linking stressors to behavioral outcomes (Xia et al., 2020; Shi et al., 2021). Recent research further supports mediated relationships between AI-related stressors and employee outcomes via burnout or resource loss processes (Teng et al., 2024; Nguyen & Nguyen, 2025).

Accordingly, ego depletion is expected to transmit the effect of AI awareness to psychological withdrawal. Thus, the following hypothesis is formulated:

H5: Ego depletion mediates the relationship between AI awareness and employees' psychological withdrawal behavior.

The theoretical framework of the study is illustrated below in Figure (1).

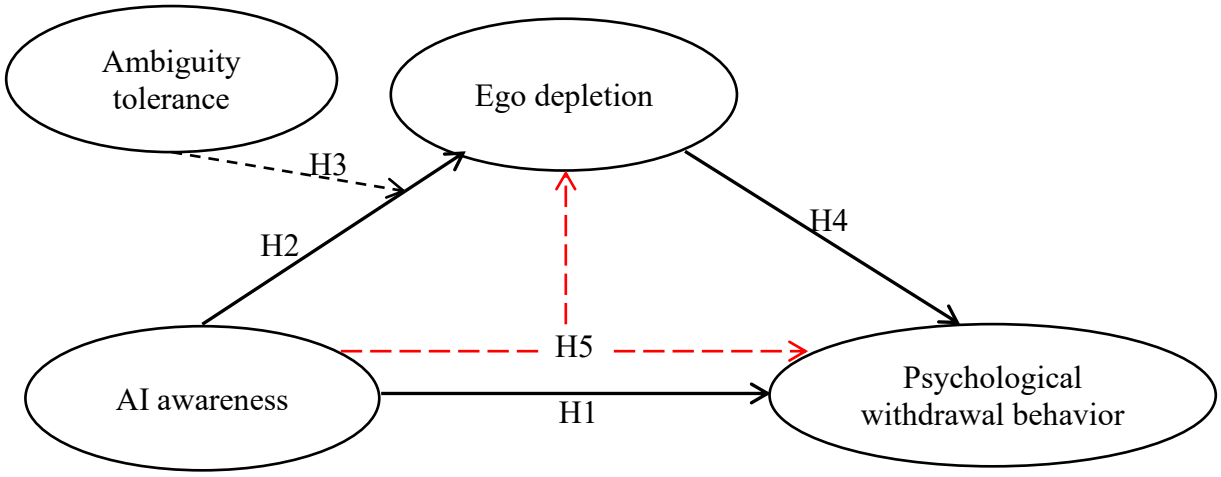

Figure (1): the theoretical framework of the study.

3. Methodology

3.1. Measures and Instrument Development

The research instrument consisted of two sections. The first section measured the focal latent constructs, while the second captured respondents' demographic characteristics, including gender, age, and educational level. In total, 21 measurement items were included (see Appendix A), all adapted from previously validated and widely used scales to ensure content validity and measurement reliability.

Artificial intelligence awareness (AIA) was assessed using a four-item scale adapted from Li et al. (2019). Psychological withdrawal behavior (PW) was measured using an eight-item scale originally developed by Lehman and Simpson (1992). Ego depletion was captured through a four-item scale adopted from Shi et al. (2021), while ambiguity tolerance was measured using a four-item instrument developed by Furnham and Ribchester (1995) and later applied by Sung et al. (2017). All items were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

To ensure linguistic and conceptual equivalence, the questionnaire was translated into Arabic following Brislin's (1980) back-translation procedure. The initial translation was conducted by two bilingual experts, followed by an independent back-translation into English to verify accuracy and consistency. Academic specialists and hospitality practitioners further reviewed the instrument to confirm clarity, relevance, and contextual appropriateness.

3.2. Sampling Strategy and Study Context

Given the geographic dispersion of five-star hotels and practical constraints in accessing the entire population, convenience sampling was adopted as the most feasible approach. This technique is commonly used in organizational and hospitality research when probability sampling is difficult to implement due to logistical limitations.

The study targeted full-time employees working in five-star hotels located in the Greater Cairo Region of Egypt. This context is particularly appropriate for examining the proposed relationships because five-star hotels operate in technology-intensive environments characterized by increasing adoption of artificial intelligence systems. Employees in such settings experience continuous interaction with digital technologies, evolving job requirements, and organizational transformation, which may trigger cognitive strain and withdrawal behaviors. At the same time, rapid digital transformation and competitive pressure create role ambiguity, highlighting the relevance of ambiguity tolerance as a moderating variable. Accordingly, this context provides meaningful variation to test the proposed theoretical model within an emerging market hospitality environment.

The Greater Cairo region includes 30 five-star hotels (The Egyptian Ministry of Tourism and Antiquities, 2022). Verbal approval was obtained first from hotel management and HR departments. Surveys were distributed onsite in 25 hotels that agreed to participate. Respondents were informed that participation was voluntary and that their responses would remain anonymous and confidential, with results reported in aggregate form only.

A total of 410 valid responses were collected. Following the guideline proposed by Hair et al. (2010), which recommends a minimum ratio of 1:10 between measurement items and sample size, the required minimum sample for 21 items was 210 respondents. The final sample of 410 thus exceeds the recommended threshold and is adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis.

3.3. Data Analysis Procedures

Data were analyzed using PLS-SEM, as it is suitable for testing complex models, handling non-normal data distributions, and accommodating moderate sample sizes (Hair et al., 2017). WarpPLS 8.0 was employed to estimate both the measurement and structural models and to evaluate reliability, validity, and hypothesized relationships.

To assess common method bias (CMB), several diagnostic tests were conducted. Harman's single-factor test indicated that "no single factor accounted for more than 50% of the total variance". Additionally, all variance inflation factor (VIF) values were below the recommended threshold of 3.3, suggesting the absence of severe multicollinearity or common method variance concerns. Together, these results indicate that common method bias does not significantly threaten the robustness of the findings. Procedural remedies were also implemented to reduce potential common method bias. These included ensuring respondent anonymity and confidentiality, clearly explaining that participation was voluntary, and separating the measurement of key variables within the questionnaire to reduce response consistency effects. Such design strategies further strengthen the methodological rigor of the study.

4. Results

4.1. Respondents' Profile

Table 1 presents the demographic characteristics of the 410 participating hotel employees. The sample is predominantly male (64.63%), while females represent 35.37% of respondents. In terms of age distribution, nearly half of the participants fall within the 30–45 years category (47.80%), followed by those aged 18–29 years (26.34%) and those above 45 years (25.85%), indicating a workforce largely concentrated in the mid-career stage. Regarding educational attainment, the majority hold an undergraduate degree (61.95%), whereas 30.24% have a high school qualification or below, and only 7.80% possess postgraduate credentials.

Furthermore, to enhance the reliability of the data, only employees with a minimum of one year of professional experience were surveyed, based on evidence suggesting that employees generally adapt to organizational norms and culture within a relatively short timeframe (Morrison, 1993).

Table 1. Respondent's profile (N=410 hotel employees)

Demographics	Category	Frequency	Percent
Gender	Male	265	64.63
	Female	145	35.37
Age Group	18-29 years	108	26.34
	30-45 years	196	47.80
	Above 45 years	106	25.85
Educational level	High school or below	124	30.24
	Bachelor's degree	254	61.95
	Postgraduate degree or higher	32	7.80

Note: Only employees with a minimum of one year of professional experience were included in the sample.

Source: Authors' elaboration.

4.2. Measurement Model

Table 2 summarizes the measurement model assessment and demonstrates satisfactory psychometric properties across all constructs. Indicator loadings for artificial intelligence awareness (AIA), psychological withdrawal (PW), ego depletion (ED), and ambiguity tolerance (AT) are all above the "recommended threshold of 0.60, with most exceeding 0.70", indicating strong item reliability.

Composite reliability (CR) values range from 0.820 to 0.934, and Cronbach's alpha (CA) values range from 0.707 to 0.919, both surpassing the commonly accepted benchmark of 0.70. These results confirm adequate internal consistency for all constructs. Convergent validity is also supported, as the average variance extracted (AVE) values fall between 0.532 and 0.641, exceeding the minimum criterion of 0.50. Furthermore, variance inflation factor (VIF) values are low (ranging from 1.036 to 1.599), suggesting the absence of multicollinearity concerns.

Overall, the findings indicate that the measurement scales exhibit acceptable reliability, convergent validity, and collinearity diagnostics, supporting the adequacy of the measurement model for subsequent structural analysis.

Table 2. Results of psychometric properties

Construct	Indicators	Loading	CR	CA	AVE	VIF
Artificial intelligence awareness (AIA)	AIA_1	0.748	0.866	0.793	0.620	1.488
	AIA_2	0.837				
	AIA_3	0.858				
	AIA_4	0.697				
Psychological withdrawal (PW)	PW_1	0.836	0.934	0.919	0.641	1.599
	PW_2	0.742				
	PW_3	0.816				
	PW_4	0.741				
	PW_5	0.842				
	PW_6	0.799				
	PW_7	0.839				
	PW_8	0.780				
Ego depletion (ED)	ED_1	0.824	0.895	0.852	0.631	1.433
	ED_2	0.817				
	ED_3	0.831				
	ED_4	0.809				
	ED_5	0.682				
Ambiguity tolerance (AT)	AT_1	0.751	0.820	0.707	0.532	1.036
	AT_2	0.717				
	AT_3	0.735				
	AT_4	0.714				

Source: Authors' elaboration.

Table 3 reports the correlations among the study constructs, with the square roots of the AVE displayed on the diagonal in accordance with the Fornell–Larcker criterion. The diagonal values—AIA (0.788), ED (0.794), PW (0.800), and AT (0.729)—all exceed the respective inter-construct correlations. This indicates that each construct demonstrates stronger associations with its own indicators than with other constructs in the model. Therefore, the Fornell–Larcker criterion is met, providing evidence of satisfactory discriminant validity for the measurement model.

Table 3. Fornell–Larcker Criterion: Inter-Construct Correlations with AVEs

Construct	AIA	ED	PW	AT
Artificial Intelligence Awareness (AIA)	0.788			
Ego depletion (ED)	0.435	0.794		
Psychological Withdrawal (PW)	0.524	0.509	0.800	
Ambiguity Tolerance (AT)	-0.123	-0.092	-0.034	0.729

Source: Authors' elaboration.

Table 4 reports the heterotrait–monotrait (HTMT) ratios used to further assess discriminant validity. All HTMT values fall well "below the recommended threshold of 0.90, and even below the more conservative criterion of 0.85", indicating strong discriminant validity among the constructs. Specifically, the highest HTMT value is observed between artificial intelligence awareness (AIA) and psychological withdrawal (PW) at 0.614, followed by the association between ego depletion (ED) and psychological withdrawal (0.573), and between artificial intelligence awareness and ego depletion (0.524). The HTMT values involving ambiguity tolerance (AT) are notably low, ranging from 0.109 to

0.194, further confirming its distinctiveness from the other variables. Overall, these results provide additional evidence that the constructs are empirically distinct and that the measurement model demonstrates satisfactory discriminant validity.

Table 4. Discriminant Validity Assessment Using the Heterotrait–Monotrait Ratio (HTMT)

Construct	AIA	ED	PW	AT
Artificial Intelligence Awareness (AIA)				
Ego depletion (ED)	0.524			
Psychological Withdrawal (PW)	0.614	0.573		
Ambiguity Tolerance (AT)	0.194	0.122	0.109	

Source: Authors' elaboration.

4.3. Model Fit

Appendix B reports the model fit and quality indices following the criteria proposed by Kock (2021). The results indicate that the structural model demonstrates satisfactory overall fit and robustness. The average path coefficient (APC = 0.351, $p < 0.001$), average R-squared (ARS = 0.380, $p < 0.001$), and average adjusted R-squared (AARS = 0.377, $p < 0.001$) are all statistically significant and meet the recommended threshold ($p < 0.05$), supporting the model's explanatory power. Collinearity diagnostics are well within acceptable limits, as reflected by low values of average block VIF (1.300) and average full collinearity VIF (1.317), both below the conservative cut-off of 3.3.

Moreover, the Tenenhaus goodness-of-fit (GoF = 0.510) exceeds the benchmark for a large effect size (≥ 0.36), indicating strong overall model performance. Additional quality indicators—including the Sympson's paradox ratio (0.750), R-squared contribution ratio (0.981), statistical suppression ratio (1.000), and nonlinear bivariate causality direction ratio (1.000)—all surpass their respective minimum criteria. Collectively, these findings confirm that the model is statistically sound, free from major collinearity concerns, and exhibits strong predictive and explanatory adequacy.

4.4. Structural Model and Hypotheses Testing

Table 5 and Figure 2 summarize the findings of the structural model analysis, reporting the estimated direct relationships as well as the moderating effects examined in the study. The findings indicate that artificial intelligence awareness (AIA) has a significant positive effect on psychological withdrawal (PW) ($\beta=0.48$, $p<0.01$, $f^2=0.314$), supporting H1 and demonstrating a substantial effect size. Similarly, AIA significantly predicts ego depletion (ED) ($\beta=0.53$, $p<0.01$, $f^2=0.289$), confirming H2 with a moderate-to-strong effect.

The moderating hypothesis (H3) is also supported, as the interaction term between AIA and ambiguity tolerance (AIA×AT) negatively influences ED ($\beta=-0.10$, $p=0.02$, $f^2=0.015$). Although the effect size is small, the negative coefficient suggests that ambiguity tolerance buffers the positive relationship between AI awareness and ego depletion. Furthermore, ego depletion significantly increases psychological withdrawal ($\beta=0.29$, $p<0.01$, $f^2=0.171$), supporting H4 with a moderate effect size.

In terms of explanatory power, the model accounts for 27% of the variance in ego depletion (R^2=0.27) and 48% of the variance in psychological withdrawal (R^2=0.48), indicating moderate predictive capability, particularly for psychological withdrawal. Overall, all hypothesized relationships are empirically supported.

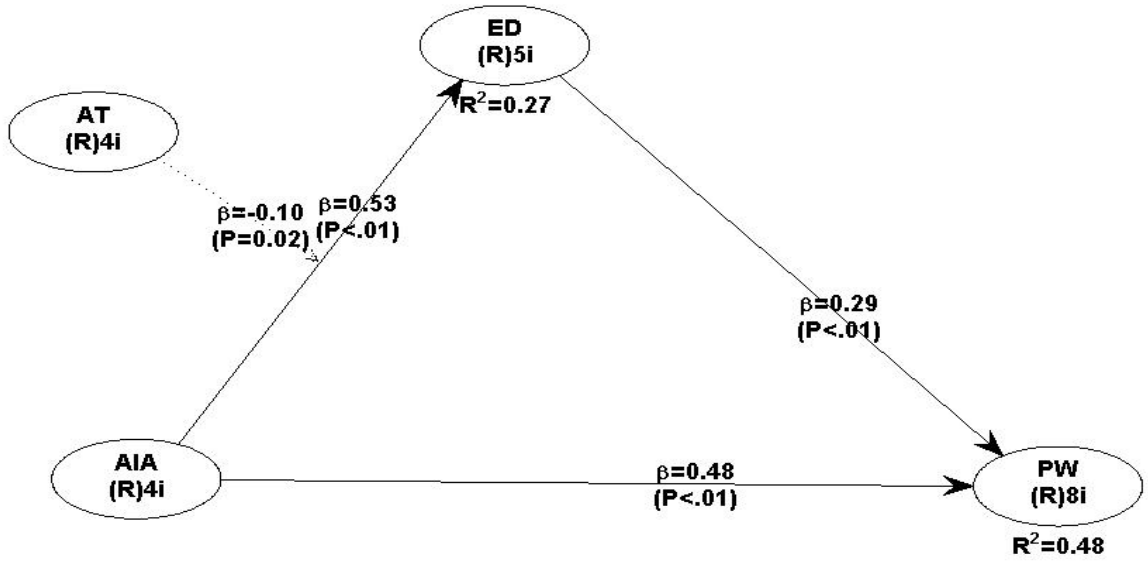

Figure 2. Final results of the study

Table 5. Direct and moderating effects

H	Structural Paths	Path Coefficient (β)	*P*-values	Effect Size (f2)	Result
H1	AIA →PW	0.48	<0.01	0.314	Supported
H2	AIA →ED	0.53	<0.01	0.289	Supported
H3	AIA*AT →ED	-0.10	=0.02	0.015	Supported
H4	ED →PW	0.29	<0.01	0.171	Supported
ED R2: = 0.27, PW R2: = 0.48					

Source: Authors' elaboration.

Table 6 reports the mediation analysis examining the indirect effect of artificial intelligence awareness (AIA) on psychological withdrawal (PW) through ego depletion (ED) using the bootstrapping approach proposed by Preacher and Hayes (2008). The results indicate that both the indirect (path a × path b) and direct effects are statistically significant, supporting a partial mediation model.

Specifically, the indirect effect (0.154) is significant, as confirmed by the bootstrapped confidence interval that does not include zero (95% CI: 0.087–0.220), with a t-value of 4.521. The variance accounted for (VAF=24.3%) indicates that ego depletion partially mediates the relationship between artificial intelligence awareness and psychological withdrawal. Although the direct and total effects remain significant, the mediation effect suggests that part of the influence of AI awareness on

withdrawal behavior operates through employees' ego depletion. Overall, the findings confirm partial mediation in the proposed model.

Table 6. Mediation analysis

H		Path a	Path b	Indirect Effect	SE	t-value	Bootstrapped confidence interval 95% LL	95% UL	Direct Effect	Total Effect	VAF (%)	Mediation
H5	AIA→ ED→ PW	0.530	0.290	0.154	0.034	4.521	0.087	0.220	0.48	0.6337	24.3	Partial

Source: Authors' elaboration.

5. Discussion

Grounded in Conservation of Resources (COR) theory, this study examined how artificial intelligence (AI) awareness influences hotel employees' psychological withdrawal through ego depletion and how ambiguity tolerance moderates the relationship between AI awareness and ego depletion. The findings provide strong empirical support for the proposed model and align with emerging research on AI-related psychological consequences in hospitality settings.

First, the results reveal that AI awareness significantly increases employees' psychological withdrawal behavior. This finding is consistent with prior research demonstrating that AI awareness can generate negative behavioral outcomes such as turnover intentions, work withdrawal, silence behavior, and counterproductive work behaviors (Li et al., 2019; Cheng et al., 2025; Salama et al., 2025; Zhang et al., 2025b). Studies suggest that when employees perceive AI as a potential threat to job security or professional identity, they may disengage psychologically as a coping strategy (Koo et al., 2021; Raina, 2023; Pericleous et al., 2025). Our results extend this stream of research by confirming that withdrawal behavior is one of the key responses to AI-driven transformation in hotel contexts.

Second, the findings show that AI awareness increases ego depletion. This result supports previous research emphasizing that technology-related stressors and workplace uncertainty consume employees' cognitive and emotional resources (Hou & Fan, 2024; Wei et al., 2026). From a resource perspective, awareness of AI integration may trigger continuous self-monitoring, performance pressure, and concerns about technological displacement, leading to resource loss. Similar arguments have been advanced in studies linking AI awareness to burnout, emotional exhaustion, and stress-related outcomes (El-Majeed et al., 2025; Wang & Zhou, 2025). The present study contributes by identifying ego depletion as a critical psychological mechanism underlying these relationships.

Third, ambiguity tolerance was found to moderate the relationship between AI awareness and ego depletion, weakening the positive association. This finding aligns with research demonstrating that ambiguity tolerance functions as a personal resource that enhances adaptive capacity under uncertainty (Furnham & Ribchester, 1995; Sung et al., 2017; García-Vidal et al., 2023; Yılmaz et al., 2025). Employees

with higher tolerance for uncertainty are less likely to interpret AI-related transformation as threatening, thereby reducing resource depletion. These results reinforce prior evidence showing that individual differences shape employees' reactions to technological change (Xu & Tracey, 2014).

Fourth, ego depletion significantly increases psychological withdrawal behavior, supporting resource loss logic within COR theory. When employees experience depleted self-regulatory resources, they tend to adopt avoidance-oriented coping strategies to conserve remaining energy (Shi et al., 2021; Xia et al., 2020; Jin, 2023). Previous studies similarly demonstrate that ego depletion is associated with withdrawal-related outcomes, unethical behaviors, and disengagement (Nie & Wang, 2025; Zimmerman et al., 2016; Yasami et al., 2024). Our findings extend this literature to the context of AI awareness in hospitality settings.

Finally, the mediation results confirm that ego depletion partially transmits the effect of AI awareness on psychological withdrawal. This finding highlights the psychological mechanism through which technological awareness translates into behavioral consequences. It supports prior studies that emphasize indirect pathways linking AI awareness to employee outcomes through stress-related variables such as burnout, job stress, or psychological contract breach (Teng et al., 2024; Nguyen & Nguyen, 2025; Wang et al., 2024). By identifying ego depletion as an explanatory mechanism, this study advances understanding of how resource loss processes operate in digitally transforming hotels.

Overall, the results reinforce the double-edged nature of AI awareness in hospitality organizations (Liu & Cheng, 2025; Zhang et al., 2025a). While AI technologies enhance operational efficiency, they simultaneously generate psychological strain that may trigger withdrawal behaviors unless buffered by personal resources such as ambiguity tolerance.

6. Conclusions and Implications

6.1. Main Conclusions

This study examined how AI awareness influences hotel employees' psychological withdrawal behavior through the mediating mechanism of ego depletion and the moderating role of ambiguity tolerance. The findings indicate that AI awareness significantly increases both ego depletion and psychological withdrawal among hotel employees. Ego depletion was found to partially mediate the relationship between AI awareness and withdrawal behavior, highlighting the psychological resource-loss process underlying employees' reactions to technological change. In addition, ambiguity tolerance moderates the relationship between AI awareness and ego depletion, suggesting that employees with higher tolerance for uncertainty are better able to cope with AI-related changes in the workplace. Overall, the study provides empirical evidence that employees' psychological resources and individual differences play a crucial role in shaping behavioral responses to AI-driven transformation in hospitality organizations.

6.2. Theoretical Implications

This study contributes to the growing literature on artificial intelligence (AI) awareness and employee outcomes by extending theoretical understanding of its psychological mechanisms within hospitality

settings. First, by grounding the model in Conservation of Resources (COR) theory, the findings reinforce the argument that AI awareness represents a potential resource threat that triggers resource depletion and withdrawal behaviors. The confirmation that AI awareness increases ego depletion and psychological withdrawal strengthens resource-based explanations of technology-induced stress in service industries.

Second, the study advances AI-related research by identifying ego depletion as a key mediating mechanism linking AI awareness to psychological withdrawal. While prior studies have linked AI awareness to burnout, turnover intention, and stress (Li et al., 2019; Cheng et al., 2025; Salama et al., 2025), limited research has examined the internal psychological process that translates awareness into behavioral disengagement. By demonstrating mediation, this study clarifies the underlying resource loss pathway and enriches existing AI-employee behavior models (Teng et al., 2024; Nguyen & Nguyen, 2025).

Third, the moderating role of ambiguity tolerance contributes to the literature on personal resources in digital transformation contexts. Previous studies highlight ambiguity tolerance as a protective factor in uncertain environments (Furnham & Ribchester, 1995; Sung et al., 2017; Yılmaz et al., 2025). This study empirically confirms its buffering role within AI-driven workplace change, expanding understanding of individual differences in technological adaptation.

Overall, the findings integrate AI awareness research with psychological resource theory and provide a more comprehensive explanation of employee responses to digital transformation.

6.3. Practical Implications

The findings offer important managerial insights for hotel executives, HR managers, and policymakers in technology-intensive hospitality environments.

First, hotel managers should recognize that AI implementation is not only a technical transformation but also a psychological transition. Transparent communication regarding the purpose of AI systems, their complementary role to employees, and their long-term impact on job stability can reduce uncertainty and mitigate resource depletion. Managers should organize structured information sessions and training workshops to familiarize employees with AI tools and reduce fear-driven interpretations.

Second, since AI awareness increases ego depletion, hotel organizations should introduce resource-recovery strategies in daily operations. For example, managers can implement structured breaks, flexible scheduling, and micro-recovery interventions to reduce cognitive overload. Encouraging teamwork and peer support during technology integration phases can also replenish emotional resources.

Third, because ambiguity tolerance buffers the negative impact of AI awareness, hotels should incorporate psychological resilience and adaptability training into human resource development programs. Practical strategies include simulation-based training, scenario planning exercises, and change-management workshops that expose employees to control uncertainty environments. Such interventions strengthen employees' ability to cope with digital transformation.

Fourth, HR departments should integrate psychological assessment tools during recruitment and internal development to identify employees with higher adaptability and tolerance for change, particularly for positions exposed to advanced digital systems.

Overall, hotel organizations should adopt a human-centered AI implementation strategy that balances technological efficiency with employee well-being.

6.4. Limitations and Future Research Directions

Despite its contributions, this study has certain limitations that open avenues for future research.

First, the cross-sectional design limits causal inferences. Although the results support the proposed relationships, longitudinal or experimental designs would provide stronger evidence for the temporal ordering between AI awareness, ego depletion, and psychological withdrawal. Future research could adopt multi-wave data collection to examine dynamic resource loss processes over time.

Second, the study relies on self-reported data from full-time employees in five-star hotels in Egypt. Although procedural remedies and statistical tests were applied to reduce common method bias, future studies should collect multi-source data (e.g., supervisor-rated withdrawal or objective performance indicators) to strengthen methodological robustness. Comparative studies across different hotel categories or geographic regions would also improve generalizability.

Third, while ambiguity tolerance was examined as a moderator, other personal resources such as psychological capital, resilience, or digital self-efficacy may also buffer AI-related stress. Future research could test more complex moderated mediation models incorporating multiple personal and organizational resources.

Fourth, the study focuses on five-star hotels in an emerging market context. Future studies may examine whether the findings differ across cultural contexts, organizational sizes, or technology maturity levels.

Finally, additional organizational factors such as leadership style, perceived organizational support, or AI transparency practices may shape employees' responses to AI awareness and should be explored in future research.

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Appendix (A): measurement scale items
Artificial intelligence awareness (AIA) 1. I am worried that my work will be replaced by artificial intelligence machine 2. I am worried that what I do now in my job may be replaced by machines with AI and robotics 3. I am very pessimistic about the future of the hotel where I work, because employees may be replaced by AI systems 4. I am pessimistic about the future of the hotel industry as a whole, because employees may be replaced by AI systems
Psychological withdrawal (PW) 1. I have thoughts of missing work 2. I talk to my colleagues about non-work-related topics 3. I leave the workplace for unnecessary reasons 4. I think about my dreams and desires while working 5. I waste work time on personal matters 6. I put in less effort at work than required 7. I'm having thoughts about leaving my current job 8. I let my colleagues do my work
Ego depletion (ED) 1. At this moment, my mental energy is running low 2. Right now, it would take a lot of effort for me to concentrate on something 3. My mind feels unfocused right now 4. I feel drained right now 5. If I were given a difficult task right now, I would give up easily
Ambiguity tolerance (AT) 1. I really dislike instances when a person does not give straight answers about himself or herself 2. I am bothered when I do not know how strangers react to me 3. I get very anxious if I am uncertain about the responsibilities of a job 4. I feel very uncomfortable in a decision-making situation in which there is not enough information to solve the problem (all items were reverse coded).

Appendix (B): Model fit and quality indices (Kock, 2021)			
	Assessment	Criterion	Mark
Average path coefficient (APC)	0.351, P<0.001	P<0.05	√
Average R-squared (ARS)	0.380, P<0.001	P<0.05	√
Average adjusted R-squared (AARS)	0.377, P<0.001	P<0.05	√
Average block VIF (AVIF)	1.300	acceptable if ≤ 5, ideally ≤ 3.3	√
Average full collinearity VIF (AFVIF)	1.317	acceptable if ≤ 5, ideally ≤ 3.3	√
Tenenhaus GoF (GoF)	0.510	small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36	√
Sympson's paradox ratio (SPR)	0.750	acceptable if ≥ 0.7, ideally = 1	√
R-squared contribution ratio (RSCR)	0.981	acceptable if ≥ 0.9, ideally = 1	√
Statistical suppression ratio (SSR)	1.000	acceptable if ≥ 0.7	√
Nonlinear bivariate causality direction ratio (NLBCDR)	1.000	acceptable if ≥ 0.7	√