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Research Paper

Intolerance of Uncertainty and Artificial Intelligence Dependency: The Mediating Role of Metacognitive Confidence among Remote and In-Office IT Startup Employees

Dinushya S[1]*, Manoj R[2], Asilaa Abbas[3]

ABSTRACT

This study examined the mediating role of metacognitive confidence in the relationship between intolerance of uncertainty and AI dependency among IT startup employees. This is particularly relevant given that approximately 72% of employees report daily AI usage, with remote workers showing heightened cognitive reliance on AI tools. Data were collected from 372 Indian IT startup employees (remote n = 192, in-office n = 180) using the IUS-12, MCQ-30 Cognitive Confidence subscale, and DAI-5. Data were analyzed using descriptive statistics, Pearson correlations, independent samples t-tests, and mediation analysis via PROCESS Model 4 in JAMOVI. Results indicated that intolerance of uncertainty significantly reduced metacognitive confidence ($b = -0.117$, $p < .001$), which in turn increased AI dependency (indirect effect $b = 0.0163$, $p = .003$, 95% CI [0.0066, 0.0275]), alongside a significant direct effect ($b = 0.201$, $p < .001$). Remote workers had lower confidence ($t=-2.274$, $p=.024$) and higher dependency ($t=3.459$, $p=.001$) compared to in-office employees; females showed higher metacognitive confidence ($t=2.163$, $p=.031$). These findings explain how uncertainty erodes cognitive self-trust and increases AI dependence among IT startup employees, highlighting the importance of maintaining cognitive autonomy in hybrid technology environments.

Keywords: *Intolerance of Uncertainty, Metacognitive Confidence, AI Dependency, Workplace Technology Use, Cognitive Processes*

AI tools have become an integral part of the IT process, with an estimation of 72% of developers utilizing AI on a daily basis (Sonar, 2026). Despite the high dependence on AI, trust in AI-generated results is low, with 96% of developers not fully trusting AI-generated code, and fewer than half of them checking the results before using them (Sonar, 2026). The high dependence on AI despite the low trust in AI-generated results indicates that the dependence of professionals on AI may not necessarily be due to trust in AI, but may instead be an attempt to compensate for psychological vulnerabilities that make

[1]MSc Clinical Psychology, Department of Psychology, Dr. M.G.R. Educational and Research Institute – Chennai, Tamilnadu, India
[2]Head of the Department, Department of Psychology, Dr. M.G.R. Educational and Research Institute – Chennai, Tamilnadu, India
[3]Assistant Professor, Department of Psychology, Dr. M.G.R. Educational and Research Institute – Chennai, Tamilnadu, India
*Corresponding Author

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external cognitive validation appealing. The need to understand what makes people dependent on AI certainty is an important research question, especially as AI integration in professional environments continues to accelerate.

In today's software development settings, AI tools like code generation systems, debugging aids, and automated documentation platforms are now part of daily workflows. These tools were originally made to improve productivity and lessen repetitive mental effort. However, as they become more advanced, there is a gradual change in how people share cognitive responsibility between their own thinking and these external systems. Researchers in cognitive science refer to this as the extended mind thesis, where outside tools effectively become part of human thought (Clark & Chalmers, 1998).

Intolerance of Uncertainty is the key vulnerability in this psychological pathway. This research follows Carleton (2016), who describes it as a trait marked by an enduring inability to manage the distress that comes from not having clear or sufficient information. Likewise, Freeston et al. (1994) described it as "a cognitive style that is characterized by the person reacting negatively when confronted with unknown situations." Ladouceur et al. (1999) further describe intolerance of uncertainty as "the fundamental fear that generates and maintains worry across anxiety disorders." Research suggests that this persistent discomfort with uncertainty may erode individuals' confidence in their own cognitive processes, increasing their reliance on external sources of validation.

Metacognitive confidence serves as the central mediating variable in the proposed theoretical framework, linking intolerance of uncertainty to behavioral reliance on artificial intelligence. Foundational researchers offer complementary definitions that collectively underscore its role in cognitive self-regulation. Wells and Matthews (1996) describe this construct as the internal trust an individual has in the accuracy and effectiveness of their own thinking, effectively acting as a high-level monitoring system for mental performance. Flavell (1979) conceptualized it as "knowledge and beliefs about one's cognitive capabilities and the regulation thereof," establishing the field's foundational framework. Cartwright-Hatton et al. (2004) refined the construct clinically as "degree of self-trust in memory, attention, and judgment processes," linking low confidence directly to maladaptive reassurance-seeking behaviors.

AI dependency represents the behavioral outcome of the proposed theoretical framework, occurring when cognitive offloading shifts from adaptive tool use to preferential reliance on artificial intelligence systems. Key researchers provide converging definitions that distinguish pathological dependency from normal technology integration. According to Morales-García et al. (2024), AI dependency occurs when a user prioritizes AI tools for standard mental tasks and experiences psychological discomfort if the technology becomes inaccessible, thereby emphasizing the affective component of dependency. Risko and Gilbert (2016) describe how cognitive offloading becomes maladaptive when individuals consistently prefer external computational resources over their own adequate internal processing capacity. Sparrow et al. (2011) documented a related phenomenon, the Google Effect, demonstrating that external tools can become primary cognitive reference points, gradually reducing individuals' reliance on internal memory and judgment. Work environments may further amplify this pathway, as remote settings reduce access to the immediate human feedback that typically supports cognitive confidence.

The work environment in which the developers are situated may also affect this psychological process. Organizational environments differ considerably in the level of social interaction, peer support, and collaborative feedback mechanisms available to employees. In traditional office settings, software developers are generally able to access their colleagues, who can offer them feedback or engage in collaborative problem-solving activities with them. These interactions can be viewed as human cognitive validation, thereby increasing individuals' self-confidence in their cognitive processes.

In contrast, in remote work settings, software developers may not be able to access spontaneous interaction with their colleagues, even though technology has enabled them to engage in structured interaction using digital communication tools. In situations where software developers are uncertain, consulting AI systems may be the most accessible form of immediate feedback, thereby making AI systems assume this psychological role.

Despite the rapid integration of Generative AI into the IT sector, research remains siloed, leaving a critical gap in understanding the psychological mechanisms of professional AI dependency. While existing research has established that Intolerance of Uncertainty (IU) acts as a transdiagnostic trigger for anxiety-related technology use (Carleton, 2016) and that individuals engage in cognitive offloading to minimize mental effort (Risko & Gilbert, 2016), empirical evidence directly linking these constructs through a mediational pathway remains limited, Specifically, the role of metacognitive confidence, the internal trust in one's own cognitive operations, remains largely unexamined as the primary transmission mechanism that converts fear of the unknown into pathological reliance on AI validation. Furthermore, most studies on AI reliance have focused on general or student populations, failing to account for the high-stakes, high-velocity environment of IT startups where the "cost of error" is extreme. Crucially, there is no research that compares how this psychological mediation operates across different professional settings; it remains unknown whether the Remote work environment, characterized by social isolation and a lack of desk-side human validation, creates a different dependency profile compared to the In-Office environment where peer feedback is immediate. The present study addresses these gaps by examining the mediating role of metacognitive confidence in the relationship between intolerance of uncertainty and AI dependency, and by comparing this psychological pathway across remote and in-office IT startup employees.

Hypotheses

- **H1:** Intolerance of uncertainty will positively predict AI dependency.
- **H2:** Metacognitive confidence will mediate the relationship between intolerance of uncertainty and AI dependency.
- **H3:** Work modality (remote vs. in-office) will be associated with differences in AI dependency and metacognitive confidence.

METHOD

Research Design

The quantitative research design was utilized in the present study to investigate the interrelation of intolerance of uncertainty, metacognitive confidence, and AI dependency of IT startup employees. The independent variable of the research was intolerance of uncertainty, the dependent variable was AI dependency, while the mediating variable was metacognitive confidence. The difference in work modality was also explored in the research.

Participants

The study included 372 employees working in IT startup organizations in India, of whom 192 were working remotely and 180 were working in office settings. Participants were actively engaged in technology-driven work environments where artificial intelligence tools were regularly used as part of professional tasks.

Sampling Technique

Purposive sampling was used to recruit participants who met the study's occupational criteria. This approach ensured that respondents were actively employed in IT startup environments and regularly engaged with artificial intelligence tools as part of their professional tasks.

Inclusion Criteria

Participants were required to:

- Be currently employed full-time in an IT startup
- Work either remotely or in an in-office setting
- Have a minimum of five months of professional experience

Exclusion Criteria

Participants were excluded if they:

- Were interns or temporary trainees
- Were on long-term medical or psychological leave
- Were currently undergoing psychiatric treatment

Instruments

- **Intolerance of Uncertainty:** Intolerance to Uncertainty Scale-Short Form (IUS-12; Carleton et al., 2007) was used to measure intolerance to uncertainty. This scale consists of 12 items that evaluate cognitive, emotional, and behavioral responses to uncertain situations. Items are rated on a 5-point Likert scale ranging from 1 (Not at all characteristics of me) to 5 (Entirely characteristic of me). Higher scores indicate greater intolerance of uncertainty. Previous studies report strong internal consistency ($\alpha = .85–.91$).
- **Metacognitive Confidence:** Metacognitive confidence was assessed using the Cognitive Confidence subscale of the Metacognitions Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004). The subscale consists of six items evaluating individuals' trust in their memory and cognitive abilities. Responses are rated on a 4-point Likert scale ranging from 1 (Do not agree) to 4 (Agree very much). Higher scores indicate lower cognitive confidence. The subscale demonstrates good reliability ($\alpha \approx .84$).
- **AI Dependency:** AI dependency was measured using the Dependence on Artificial Intelligence Scale (DAI-5; Morales-García et al., 2024). The scale contains five items assessing psychological reliance on artificial intelligence systems for decision making and task completion. Items are rated on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Higher scores indicate greater dependence on artificial intelligence tools.

Procedure

Permission to conduct the study was obtained through professional networks and startup incubator contacts. Participants were invited to complete an online questionnaire after

providing informed consent. The survey consisted of a demographic information form followed by the IUS-12, the MCQ-30 cognitive confidence subscale, and the AI dependency scale. The questionnaire required approximately 10-15 minutes to complete. Responses were collected anonymously and coded for statistical analysis.

Statistical Analysis

Data were analyzed using IBM SPSS for descriptive statistics, Pearson correlation analyses, and independent samples t-tests. Mediation analysis was conducted using PROCESS Model 4 in JAMOVI to examine whether metacognitive confidence mediated the relationship between intolerance of uncertainty and AI dependency.

RESULTS

Descriptive Statistics

Descriptive statistics for the study variables are presented in Table 1. Participants reported moderate levels of intolerance of uncertainty (M = 34.22, SD = 9.30), average levels of metacognitive confidence (M = 17.66, SD = 5.01), and moderate levels of AI dependency (M = 14.46, SD = 4.18). Skewness and kurtosis values indicate that the variables were approximately normally distributed.

Table 1. Descriptive Statistics of Study Variables

Variable	N	Mean	SD	Skewness	Kurtosis
Intolerance of Uncertainty	372	34.22	9.30	0.016	-0.493
Metacognitive Confidence	372	17.66	5.01	-0.065	-0.446
AI Dependency	372	14.46	4.18	0.203	-0.281

Note. N = 372. M = mean; SD = Standard Deviation

Correlation Analysis

Pearson correlation analyses were conducted to examine relationships among intolerance of uncertainty, metacognitive confidence, and AI dependency. Intolerance of uncertainty was positively associated with AI dependency ($r = .483$, $p < .01$) and negatively associated with metacognitive confidence ($r = -.217$, $p < .01$). Metacognitive confidence was negatively associated with AI dependency ($r = -.265$, $p < .01$). These results indicate that higher intolerance of uncertainty is related to greater reliance on artificial intelligence and lower confidence in one's cognitive abilities.

Table 2. Pearson Correlations Among Study Variables

Variable	1	2	3
(1) Intolerance of Uncertainty	1		
(2) Metacognitive Confidence	-0.217**	1	
(3) AI Dependency	0.483**	-0.265**	1

Note. N = 372. p < .01 (two-tailed).

Work Modality Differences

Independent samples t-tests were conducted to examine differences between remote and in-office employees on intolerance of uncertainty, metacognitive confidence, and AI dependency. Remote employees reported significantly lower metacognitive confidence ($t = -2.274$, $p = .024$) and significantly higher AI dependency ($t = 3.459$, $p = .001$) compared to in-office employees. No significant difference was observed for intolerance of uncertainty ($t = 1.438$, $p = .151$).

Table 3. Independent Samples t-Test Comparing Remote and In-Office Employees on Study Variables

Variable	t	df	p
Intolerance of Uncertainty	1.438	370	0.151
Metacognitive Confidence	-2.274	360.814	0.024*
AI Dependency	3.459	362.182	0.001**

Note. N = 372. *p < .05. **p < .01.

Gender Differences

Independent samples t-tests were conducted to examine gender differences in intolerance of uncertainty, metacognitive confidence, and AI dependency. Female participants reported significantly higher metacognitive confidence than male participants (t = 2.163, p = .031). No significant gender differences were observed for intolerance of uncertainty (t = −1.047, p = .296) or AI dependency (t = 0.183, p = .855).

Table 4*. Independent Samples t-Test Examining Gender Differences in Study Variables*

Variable	t	df	p
Intolerance of Uncertainty	-1.047	370	0.296
Metacognitive Confidence	2.163	370	0.031*
AI Dependency	0.183	370	0.855

Note. N = 372. *p < .05.

Mediation Analysis

A mediation analysis was conducted to examine whether metacognitive confidence mediated the relationship between intolerance of uncertainty and AI dependency. Intolerance of uncertainty significantly predicted lower metacognitive confidence (b = −0.117, p < .001). Metacognitive confidence significantly predicted AI dependency (b = −0.139, p < .001). Intolerance of uncertainty also had a significant direct effect on AI dependency (b = 0.201, p < .001).

Table 5. Path Estimates for the Mediation Model

Path	b	SE	Lower CI	Upper CI	p
Intolerance of Uncertainty → Metacognitive Confidence	-0.117	0.0276	-0.171	-0.0625	<0.001
Metacognitive Confidence → AI Dependency	-0.139	0.0393	-0.218	-0.0626	<0.001
Intolerance of Uncertainty → AI Dependency	0.201	0.0184	0.165	0.2365	<0.001

Note. N = 372. b = unstandardized regression coefficient. CI = confidence interval.

Mediation Effects

The indirect effect of intolerance of uncertainty on AI dependency through metacognitive confidence was significant (b = 0.0163, p = .003, 95% CI [0.0066, 0.0275]). The direct effect of intolerance of uncertainty on AI dependency remained significant (b = 0.2007, p < .001), indicating partial mediation.

Table 6. Mediation Effects of Metacognitive Confidence

Effect	b	SE	Lower CI	Upper CI	p
Indirect Effect (IUS → MC → AID)	0.0163	0.00544	0.00656	0.0275	0.003
Direct Effect (IUS → AID)	0.2007	0.01814	0.16584	0.2360	<0.001
Total Effect (IUS → AID)	0.2170	0.01823	0.18006	0.2513	<0.001

Note. N = 372. Bootstrap confidence intervals were based on 5,000 resamples.

DISCUSSION

The present study investigated the psychological mechanisms underlying AI dependency among IT startup employees, with a specific focus on whether metacognitive confidence mediates the relationship between intolerance of uncertainty and reliance on artificial intelligence tools. The results largely support the theoretical model proposed, shedding light on how uncertainty shapes cognitive self-trust and technology reliance in professional settings.

Consistent with the first hypothesis, intolerance of uncertainty emerged as a significant positive predictor of AI dependency. Employees who reported greater discomfort when confronted with ambiguous or uncertain situations showed a stronger tendency to defer to AI tools during decision making and problem solving. This pattern is consistent with prior theoretical accounts suggesting that individuals with high intolerance of uncertainty actively seek external sources of structure and reassurance when their internal sense of certainty is threatened (Carleton, 2016). Within technology-driven workplaces, AI tools appear to serve as an immediate substitute for the cognitive reassurance that uncertain employees might otherwise seek from peers or supervisors, offering a consistent and accessible alternative to the unpredictability of human judgment.

The second hypothesis was also supported. Metacognitive confidence partially mediated the relationship between intolerance of uncertainty and AI dependency, indicating that the pathway from uncertainty intolerance to AI reliance operates, at least in part, through a reduction in individuals' trust in their own cognitive functioning. Employees who experienced greater intolerance of uncertainty tended to report lower confidence in their memory, attention, and judgment, and this diminished self-trust predicted greater reliance on AI systems. This finding aligns with metacognitive theory, which holds that beliefs about the reliability of one's own thinking directly shape cognitive strategies and behavioural responses (Wells & Matthews, 1996). When confidence in internal processing erodes, individuals appear more inclined to offload cognitive responsibility onto external systems perceived as more precise or dependable. In this way, artificial intelligence functions not only as a productivity tool but as a mechanism for managing the distress associated with cognitive self-doubt.

It is worth noting that the direct effect of intolerance of uncertainty on AI dependency remained significant after accounting for metacognitive confidence, confirming partial rather than full mediation. This suggests that additional psychological mechanisms beyond metacognitive confidence alone may contribute to the relationship between uncertainty intolerance and AI reliance. Future research may benefit from examining other potential mediators, such as decision-making anxiety or technology trust, to develop a more comprehensive account of this pathway.

The third hypothesis was supported by the work modality comparisons. Remote employees reported significantly lower metacognitive confidence and higher levels of AI dependency than their in-office counterparts, despite showing comparable levels of intolerance of uncertainty. This dissociation is theoretically meaningful. It suggests that the work environment does not necessarily alter the degree to which individuals experience uncertainty, but it does appear to shape how that uncertainty is managed. In office settings, the availability of colleagues for spontaneous consultation and collaborative problem solving may provide a form of social cognitive scaffolding that sustains individual confidence. Remote workers, by contrast, operate with reduced access to this informal validation, making AI systems a more prominent and readily available source of immediate feedback. These findings underscore the importance of social context in shaping technology dependence and suggest that the psychological costs of remote work may extend beyond well-documented factors such as isolation and communication strain.

Gender differences were also observed, with female employees reporting modestly higher metacognitive confidence than male employees. This finding was not hypothesised and should be interpreted cautiously, as gender was not a primary focus of the study. Nevertheless, it raises the possibility that cognitive self-evaluation processes differ across demographic groups in ways that may interact with technology use patterns. This dedicated investigation in future research.

The identification of metacognitive confidence as a mediating mechanism offers a concrete psychological explanation for individual differences in AI reliance that prior research had not examined. While existing literature has addressed cognitive offloading and general technology dependence, the specific role of metacognitive beliefs in professional AI use contexts had remained largely unexplored. By situating these processes within the high-demand environment of IT startups, the present study adds contextual specificity to the broader literature on human-AI interaction.

From a practical standpoint, these findings suggest that interventions aimed at reducing excessive AI dependency may need to address metacognitive confidence directly. Technical AI literacy training alone may be insufficient if employees lack trust in their own judgment. Organisations would do well to invest in initiatives that build metacognitive awareness among employees encouraging critical engagement with AI outputs rather than uncritical dependence on them and that ensure remote workers in particular have adequate access to human feedback and collaborative support structures.

CONCLUSION

The present study provides empirical evidence for a psychological pathway through which intolerance of uncertainty leads to AI dependency via reduced metacognitive confidence. These findings extend existing literature on cognitive offloading and human-AI interaction by identifying metacognitive confidence as a key mechanism that explains why uncertainty-intolerant individuals increasingly defer to artificial intelligence systems in professional decision making.

The comparative analysis of remote and in-office employees adds an important contextual dimension, demonstrating that the psychological pathway toward AI dependency is not uniform across work settings. The relative absence of immediate peer feedback in remote environments appears to heighten both the erosion of metacognitive confidence and the

compensatory reliance on AI tools, underscoring the role of social context in shaping technology dependence.

As artificial intelligence becomes more deeply embedded in professional workflows, these findings carry meaningful implications for how organizations support cognitive autonomy among their employees. Fostering metacognitive awareness and confidence in individual judgment may be as important as providing technical AI literacy, ensuring that intelligent systems serve as tools that augment human thinking rather than substitute for it.

Limitations

This study has several limitations. First, the cross-sectional design limits causal conclusions about the relationships among intolerance of uncertainty, metacognitive confidence, and AI dependency. Second, the use of self-report measures may introduce response biases, although validated scales were employed. Third, the sample consisted only of IT startup employees in India, which may limit the generalizability of the findings to other industries or cultural contexts.

Implications

The findings contribute to the literature on human-AI interaction by identifying metacognitive confidence as a psychological mechanism linking intolerance of uncertainty to AI dependency. Practically, organizations adopting AI technologies may benefit from encouraging critical thinking and strengthening employees' confidence in their own decision-making abilities to prevent excessive reliance on AI systems.

Future Implications

Future research should examine these relationships in different industries and cultural contexts to enhance generalizability. Longitudinal studies could also investigate how AI dependency develops over time with continued technology use. Additionally, future studies may explore other psychological factors, such as technology trust, cognitive workload, or decision-making anxiety, that may influence reliance on AI systems.

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Conflict of Interest

The author(s) declared no conflict of interest.

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APPENDIX

Table A1 Correlation Matrix with Means and Standard Deviations for Study Variables

Variable	M	SD	1	2	3
1. Intolerance of Uncertainty	34.22	9.3	-		
2. Metacognitive Confidence	17.66	5.01	-.217	-	
3. AI Dependency	14.46	4.18	.483	-.265	-

Note. Note. N = 372. p < .01 (two-tailed).