



(RESEARCH ARTICLE)



## Understanding sleep procrastination through intolerance of uncertainty: The mediating role of fear of missing out among Generation Z

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### Abstract

Sleep procrastination, defined as the voluntary delay of sleep without external constraints, has emerged as a growing concern among Generation Z, particularly in digitally saturated environments. This study investigates the relationship between intolerance of uncertainty (IU) and sleep procrastination and examines whether fear of missing out (FoMO) mediates this relationship among Indian Gen Z adults. Grounded in self-regulation theory, the research explores how cognitive discomfort and emotional reactivity contribute to bedtime delay. A sample of 400 participants, predominantly students and single young adults, completed validated measures of IU, FoMO, and sleep procrastination. Correlational analysis revealed significant positive associations between IU and sleep procrastination ( $\rho = .235, p < .001$ ), and between FoMO and both IU ( $r = .570, p < .001$ ) and sleep procrastination ( $r = .168, p < .001$ ). However, mediation analysis indicated that FoMO did not significantly mediate the relationship between IU and sleep procrastination. Additionally, no significant gender differences were found in sleep procrastination. These findings suggest that IU and FoMO independently contribute to bedtime delay, with IU exerting a more direct cognitive influence. The study highlights the need for culturally sensitive interventions targeting cognitive discomfort and digital emotional reactivity in Indian youth. By situating sleep procrastination within a psychological and cultural framework, the research contributes to a deeper understanding of youth mental health and self-regulatory behaviour in emerging digital contexts.

**Keywords:** Sleep procrastination; Intolerance of uncertainty; Fear of missing out; Generation Z; Self-regulation theory; Youth mental health; India

### 1. Introduction

Sleep represents an essential physiological and psychological process responsible for mental sharpness, emotional control, cognitive functioning, and overall health and wellness. Sleep is important for memory consolidation, immune response, and adaptation in everyday life. In younger people, especially college students, sleep serves as a regulating system during transition stages marked by increasing academic pressures, social changes, and growing exposure to electronic media. Although sleeping is necessary, sleep problems have become increasingly common in today's world due to both clinically diagnosed sleep disorders and voluntary behaviors, such as postponing sleep without any external motivation. This behavior, termed sleep procrastination, has been identified as a significant problem associated with self-control failure in modern living. According to Kroese et al. (2014), sleep procrastination involves deliberately postponing sleep in the absence of valid reasons for staying awake. Insomnia, on the other hand, represents the inability to fall asleep despite efforts to do so. Unlike individuals suffering from insomnia, sleep procrastinators choose to delay going to bed and tend to partake in non-urgent activities such as social networking sites, video streaming, or chatting online. This deliberate delay reflects a breakdown of self-control, where short-term gratification outweighs the long-term need for rest and recovery.

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This issue is particularly pronounced among Generation Z, the cohort born between the mid-1990s and early 2010s, who have grown up in a world defined by technology, social media, and online interconnectedness. As digital natives, Gen Z individuals demonstrate exceptional technological fluency and adaptability but also face unique psychological risks due to their constant digital immersion. For this generation, the smartphone has evolved into both a social lifeline and a source of distraction, often serving as an avenue for self-expression, validation, and connection.

Two psychological constructs that may play a significant role in regulating self-regulatory processes leading to sleep procrastination include Intolerance of Uncertainty (IU) and Fear of Missing Out (FoMO). Intolerance of uncertainty refers to the inability of individuals to accept that their future experiences would be uncertain or ambiguous (Carleton, 2016). High-IU individuals are likely to feel anxious, worry frequently, and have enhanced cognitive involvement when encountering uncertainty. Similar to IU, the Fear of Missing Out (FoMO) is an emotional and motivating factor of bedtime procrastination behavior. FoMO refers to a constant fear that people around may be having enjoyable experiences without them and a need to stay always connected to what others are doing (Przybylski et al., 2013). The concept has been strongly associated with problems related to social media addiction and overall poor well-being of users. The relationship between IU and FoMO could be especially important for understanding the Indian population due to cultural, educational, and familial contexts in which individuals experience uncertainty and sense of belonging. Specifically, Indian youth, especially the ones belonging to Generation Z, face great academic pressure and strive to succeed. At the same time, India's collectivistic cultural framework emphasizes social connectedness, interdependence, and approval from family and peers, which can intensify the experience of FoMO. Despite growing awareness of these psychological factors, the interrelationship between IU, FoMO, and sleep procrastination remains underexplored, particularly in non-Western populations.

Therefore, this study aims to investigate the relationship between intolerance of uncertainty and sleep procrastination and to examine whether fear of missing out mediates this relationship among Indian Generation Z adults.

### **1.1. Intolerance of Uncertainty and Sleep Procrastination**

A growing body of empirical literature highlights the intricate relationship between intolerance of uncertainty (IU) and sleep procrastination, revealing that individuals' difficulty in tolerating ambiguity manifests as a form of cognitive-emotional dysregulation that undermines bedtime behavior. Kroese et al. (2014) demonstrated that BP is a distinctive behavioral construct shaped by self-regulatory capacity, confirming that the tendency to delay bedtime was negatively related to self-control and positively to general procrastination. Lauriola et al. (2019) provided direct empirical support, showing that IU indirectly worsened sleep through increased anxiety sensitivity. Lin et al. (2017) reported that IU predicted poor sleep among Chinese adolescents, mediated by worry a cognitive process central to IU's conceptual structure.

### **1.2. Intolerance of Uncertainty and Fear of Missing Out**

Recent scholarship situates IU as a fundamental psychological antecedent of Fear of Missing Out (FoMO), a pervasive emotional state reflecting anxiety about missed rewarding experiences, particularly in digital contexts. Alfasi (2021) empirically validated this link, finding that IU partially mediated the relationship between attachment anxiety and FoMO. Sun et al. (2022) demonstrated that IU contributes to problematic social media use via maladaptive coping and FoMO among Chinese adults. Collectively, these findings establish IU as a central cognitive vulnerability that fuels FoMO by intensifying discomfort with social ambiguity and unpredictability.

### **1.3. Fear of Missing Out and Sleep Procrastination**

An extensive body of recent evidence links FoMO with sleep procrastination, primarily through pathways involving emotional distress, digital overuse, and cognitive arousal. Flores et al. (2023) demonstrated that FoMO indirectly reduced sleep quality through heightened rumination and BP. Huang et al. (2023) found that BP and FoMO jointly mediated the relationship between mobile phone dependency and poor sleep quality among 862 Chinese college students. Synthesizing across studies, FoMO contributes to BP through three interrelated mechanisms: cognitive arousal that prevents disengagement, emotional dysregulation characterized by anxiety and rumination, and behavioral reinforcement through habitual smartphone use.

### **1.4. Fear of Missing Out as a Mediator**

Emerging research increasingly identifies FoMO as a key mediator translating the effects of IU into sleep procrastination. Yao et al. (2025) provided compelling evidence for this pathway, demonstrating that FoMO fully mediated the relationship between IU and problematic smartphone use among U.S. undergraduates. Despite the theoretical plausibility of this mediation pathway, research has not uniformly confirmed FoMO's mediating role,

particularly in non-Western collectivistic cultures. The present study addresses this gap by examining whether FoMO mediates the relationship between IU and sleep procrastination in a culturally distinctive Indian sample.

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## **2. Method**

### **2.1. Statement of the Problem**

Sleep procrastination has emerged as a significant behavioural concern among Generation Z, particularly in digitally saturated environments. Despite growing awareness of its psychological underpinnings, the interrelationship between intolerance of uncertainty (IU), fear of missing out (FoMO), and sleep procrastination remains underexplored in the Indian context. Existing research has predominantly been conducted in Western settings, leaving a critical gap in understanding how these constructs interact within collectivistic, culturally distinct populations such as Indian Gen Z adults.

### **2.2. Research Question**

Does fear of missing out (FoMO) mediate the relationship between intolerance of uncertainty (IU) and sleep procrastination among Indian Generation Z adults?

### **2.3. Objective**

- To investigate the relationship between intolerance of uncertainty (IU) and sleep procrastination among Generation Z Indian adults.
- To examine whether fear of missing out (FoMO) mediates the relationship between IU and sleep procrastination.
- To assess whether gender differences exist in sleep procrastination among the sample.

### **2.4. Hypothesis**

- H1: There is a significant positive relationship between intolerance of uncertainty (IU) and sleep procrastination.
- H2: Fear of missing out (FoMO) mediates the relationship between IU and sleep procrastination.
- H3: There is no significant gender difference in sleep procrastination.

### **2.5. Research Design**

This study employs a quantitative, cross-sectional, correlational design with a mediation model. The cross-sectional approach enables data collection at a single point in time, suitable for naturally occurring variables like FoMO and sleep procrastination, and is cost-effective for online surveys targeting geographically dispersed Indian Gen Z adults. The correlational design examines associations among IU, FoMO, and sleep procrastination without manipulating variables, allowing assessment of the strength and direction of relationships. Mediation analysis explores whether FoMO explains the indirect effect of IU on sleep procrastination (Hayes, 2017). While cross-sectional designs cannot establish causality, mediation with bootstrapping provides initial insights into potential mechanisms for future research.

### **2.6. Sampling Technique**

A purposive sampling method was employed. Purposive sampling ensured that only participants meeting the inclusion criteria age, Indian residency, and English proficiency, were selected. The target population was Generation Z adults in India, aged 18–28 years, with a total sample size of 400 participants (180 male, 220 female). The chosen sample size of 400 was sufficient to provide adequate statistical power for mediation analysis, allowing for the detection of small to medium effect sizes.

#### *2.6.1. Inclusion Criteria*

- Indian residents aged 18–28 years (Generation Z cohort)
- Proficiency in English to complete the survey
- Access to internet and willingness to participate voluntarily

#### *2.6.2. Exclusion Criteria*

- Participants diagnosed with psychiatric or sleep disorders

- Those undergoing treatment affecting sleep or mental health
- Those working night shifts

### 2.7. Tools for the Study

Intolerance of Uncertainty Scale–12 (IUS–12): Developed by Carleton et al. (2007), this 12-item scale measures dispositional IU on a 5-point Likert scale (1 = Not at all characteristic, 5 = Entirely characteristic). Reliability is high (Cronbach's  $\alpha = .91$ ).

Fear of Missing Out Scale (FoMO Scale): Developed by Przybylski et al. (2013), this 10-item scale measures FoMO on a 5-point Likert scale (1 = Not at all true, 5 = Extremely true), with strong internal consistency ( $\alpha = .88$ ).

Bedtime Procrastination Scale (BPS): Developed by Kroese et al. (2014), this 9-item scale assesses voluntary bedtime delay on a 5-point Likert scale (1 = Almost never, 5 = Almost always), demonstrating excellent reliability ( $\alpha = .92$ ).

### 2.8. Data Analysis

Data were analyzed using Jamovi (Version 2.5.6). The Shapiro–Wilk test indicated non-normal distribution; accordingly, Spearman's rank-order correlation was selected for examining relationships between IU, FoMO, and sleep procrastination. A regression-based mediation model was conducted using the MedMod module in Jamovi to determine whether FoMO mediated the relationship between IU and sleep procrastination. An independent-samples t-test was performed to examine gender differences in sleep procrastination.

### 2.9. Ethical Consideration

All participants were fully informed about the study's objectives, potential risks, and their right to withdraw without consequence. Confidentiality was ensured through data anonymization and secure password-protected storage. Recruitment was conducted through online platforms, and participants provided informed consent before completing the survey. There is no conflict of interest to be disclosed.

## 3. Results

**Table 1** Descriptive Statistics of the Study Variables

Variable	N	M	Median	Mode	SD
Intolerance of Uncertainty	400	32.8	32	27	9.21
FOMO	400	24.8	23.5	20.0	8.93
Sleep Procrastination	400	29.1	29	27	6.38

Note. N is number of participants; M is mean; SD is standard deviation.

Table 1 summarises scores for three psychological constructs across a sample of 400 participants. Intolerance of uncertainty shows a mean of 32.8 with relatively high variability (SD = 9.21), suggesting diverse responses. FoMO has a slightly lower mean of 24.8 and similar dispersion (SD = 8.93). Sleep procrastination scores average 29.1 with the least variability (SD = 6.38), indicating more consistency in participant responses.

**Table 2** Correlation Analysis Between Intolerance of Uncertainty, FOMO, and Sleep Procrastination

Variables	Intolerance of Uncertainty	Sleep Procrastination	FOMO
Intolerance of Uncertainty	1		
Sleep Procrastination	0.230***	1	
FOMO	0.570***	0.168***	1

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2 presents the Spearman's rank-order correlation results. Intolerance of uncertainty and sleep procrastination showed a positive and statistically significant association ( $\rho = .230$ ,  $p < .001$ ), indicating that higher levels of intolerance toward uncertainty are associated with greater tendencies to procrastinate sleep. IU also demonstrated a strong

positive correlation with FoMO ( $r = .570, p < .001$ ). Additionally, FoMO was positively correlated with sleep procrastination ( $r = .168, p < .001$ ), supporting a direct link between social-emotional anxiety and bedtime delay.

**Table 3** Mediating Role of Fear of Missing Out (FoMO) in the Relationship Between Intolerance of Uncertainty and Sleep Procrastination

Relationship	Total Effect	Direct Effect	Indirect Effect	CI Lower	CI Upper	z-Statistic	Conclusion
IU→FoMO→Sleep Procrastination	<.001	<.001	0.666	-0.0365	0.0571	0.432	No mediation

Note. CI = Confidence Interval.

Table 3 presents the results of the mediation analysis. The total effect of IU on sleep procrastination was significant ( $p < .001$ ), as was the direct effect ( $p < .001$ ). The indirect effect through FoMO was 0.666, with a 95% confidence interval ranging from  $-0.0365$  to  $0.0571$  and a z-statistic of 0.432. Since the confidence interval crosses zero and the z-statistic is non-significant, FoMO did not significantly mediate the relationship between IU and sleep procrastination. This leads to the rejection of Hypothesis 2.

**Table 4** Independent-Samples t-Test Comparing Sleep Procrastination Between Male and Female Participants

	Statistic	df	p
Sleep Procrastination	-0.151	398	0.88

Note.  $H_a: \mu_1 \neq \mu_2$

Table 4 presents the results of the independent-samples t-test. The analysis yielded a t-statistic of  $-0.151$  with 398 degrees of freedom and a corresponding p-value of 0.88, indicating no significant difference in sleep procrastination between male and female participants. Hypothesis 3 was therefore accepted, confirming the absence of significant gender-based differences in sleep procrastination.

#### 4. Discussion

The findings of the present study provide valuable insights into how intolerance of uncertainty (IU) and fear of missing out (FoMO) contribute to sleep procrastination among Generation Z adults in India. The demographic profile indicated that most participants were students and working individuals, a population deeply integrated with digital media and characterized by fluctuating schedules and prolonged screen exposure.

The correlational results revealed a significant positive association between intolerance of uncertainty and sleep procrastination ( $\rho = .230, p < .001$ ). This statistical finding supports the theoretical assumption that individuals who struggle to tolerate ambiguity and unpredictability may engage in avoidant behaviors, including delaying sleep, as a temporary means to escape anxiety-provoking thoughts. Within the framework of self-regulation theory (Baumeister & Heatherton, 1996), procrastination is often conceptualized as a failure of self-control, where immediate emotional relief is prioritized over long-term goals such as obtaining sufficient sleep.

The data further indicated a robust positive correlation between IU and FoMO ( $\rho = .570, p < .001$ ), suggesting that individuals with higher intolerance of uncertainty are more likely to experience heightened concern about missing rewarding social interactions. Additionally, the study found a significant positive association between FoMO and sleep procrastination ( $r = .168, p < .001$ ), reinforcing previous research indicating that individuals experiencing higher levels of FoMO tend to sacrifice sleep in favor of continued online engagement.

However, mediation analysis revealed that FoMO did not significantly mediate the relationship between intolerance of uncertainty and sleep procrastination ( $z = 0.432, p > .05, 95\% \text{ CI } [-0.0365, 0.0571]$ ). One possible explanation is that the relationship between IU and sleep procrastination may be driven more by intrapersonal emotional regulation deficits rather than by socially oriented anxieties. The non-significant mediation also implies that FoMO might function as a parallel rather than a sequential process. Furthermore, the independent-samples t-test showed no significant gender difference in sleep procrastination ( $t = -0.151, p = .88$ ). This result suggests that the experience of bedtime procrastination is relatively uniform across genders within the sample, reflecting the universality of the phenomenon in digitally connected youth populations.

In the Indian context, where social interaction and familial expectations are strong determinants of self-concept, the interplay between uncertainty, FoMO, and sleep behaviors acquires unique relevance. Indian Gen Z adults often navigate rapid transitions, academic stress, career ambiguity, and socio-technological change, factors that naturally heighten uncertainty tolerance thresholds. This contextual nuance enriches the understanding of how Western-derived constructs such as IU and FoMO operate within collectivistic cultures.

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## 5. Conclusion

The present study examined the relationship between intolerance of uncertainty (IU) and sleep procrastination among Indian Generation Z adults, with fear of missing out (FoMO) considered as a potential mediator. Results indicated a significant positive association between IU and sleep procrastination, supporting the notion that difficulty coping with ambiguity contributes to bedtime procrastination as a coping response to cognitive discomfort. IU was also strongly associated with FoMO, indicating that those uncomfortable with uncertainty tend to experience greater anxiety about missing social or digital experiences. FoMO was positively related to sleep procrastination, highlighting the role of emotional dependence on online engagement in delaying sleep routines. However, mediation analysis revealed that FoMO did not significantly mediate the IU–sleep procrastination relationship, implying that IU exerts a more direct cognitive influence on bedtime delay while FoMO functions independently as a social-emotional factor. No significant gender differences were found, indicating that bedtime procrastination is not substantially shaped by gender.

### *Implications*

From a theoretical perspective, the results reinforce self-regulation theory (Baumeister & Heatherton, 1996) by demonstrating that bedtime delay reflects deeper cognitive and emotional processes rather than mere behavioral lapse. Practically, the study informs interventions targeting both cognitive and emotional contributors to sleep procrastination. Cognitive-behavioral strategies that enhance tolerance for uncertainty, reduce worry, and foster emotional regulation may effectively support individuals struggling with bedtime delay. Culturally sensitive adaptations are essential to accommodate the unique academic pressures, familial expectations, and collectivist norms influencing Indian Gen Z. At an institutional level, universities and workplaces can integrate sleep hygiene education and mental health support into wellness programs.

### *Limitations and Future Directions*

While this study provides important insights, several limitations should be acknowledged. First, the cross-sectional design limits the ability to infer causal relationships. Future research using longitudinal or experimental designs could help establish directionality. Second, the study relied entirely on self-report measures, which may have introduced social desirability bias. Third, the sample mainly consisted of urban students and young professionals, which limits generalization to the wider Generation Z population. Fourth, the mediation model focused only on FoMO as a linking factor; other constructs such as rumination, emotional fatigue, or digital dependency may also explain the IU–sleep procrastination relationship. Finally, incorporating contextual influences such as academic workload, stress, and family environment would provide a more comprehensive picture.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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