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Print ISSN: [3006-2497](#) Online ISSN: [3006-2500](#)Platform & Workflow by: [Open Journal Systems](#)<https://doi.org/10.5281/zenodo.23040162>**The Role of Overthinking Between Digital Media Use and Insomnia among Adults****Nabila Hashim**

Department of Applied Psychology, University of Sahiwal, Pakistan.

Dr. Wajiha Tahir

Department of Applied Psychology, University of Sahiwal, Pakistan.

Dr. Muhammad Waseem Tufail (Corresponding Author)

Department of Applied Psychology, University of Sahiwal, Pakistan.

waseemtufail@uosahiwal.edu.pk**Abstract**

Objective: This study aimed to determine if examining the tendency to overthink may help understand the relationship between use of digital media and severity of insomnia among young adults of Pakistan. **Methodology:** This research employed a correlational design. A total of 300 participants between the ages of 18 and 52 years (mean age = 26.44 years; SD = 7.19 years) were included in the study, including 180 females and 120 males. A set of three tools were used to collect data for the study. The tools included: Social Media Use Integration Scale (SMUS); Perseverative Thinking Questionnaire (PTQ) and Insomnia Severity Index (ISI). After collection of data, correlations and regression analysis, independent samples 't' tests and mediation analysis were performed using the PROCESS Macro (Model 4) in SPSS. **Results:** Positive correlations were found between the use of digital media, overthinking, and the severity of insomnia. Use of digital media was related to overthinking ($r = .52, p < .01$) and insomnia ($r = .66, p < .01$) in the expected directions. Overthinking was also associated with insomnia ($r = .62, p < .01$). Results of a simple linear regression indicated digital media use was related to insomnia in the predicted direction ($R^2 = .438, B = .373, t = 15.236, p < .001$). Partial mediation was found for overthinking between the use of social media and insomnia (Indirect Effect = .0654, SE = .0153, 95% Bootstrap CI = [.0355, .0957]). From a series of independent sample t-tests, it was found that, in general, women endorsed more use of digital media, overthinking, and insomnia when compared to men. **Conclusion:** These results show how negative digital media use can lead to bedtime negative cognitions that contribute to the inability to fall or stay asleep, and how negative digital media use can lead to an inability to control negative cognitions. The results demonstrate a lack of gender-specific digital wellness programs that include elements of cognitive restructuring and integration of mindfulness and digital detox practices.

Keywords: Digital media use, Overthinking, Insomnia, Young adults**1. Introduction & Literature Review**

The rate of global interaction and communication has increased with advances in technology. The COVID-19 pandemic changed the way people communicated, especially with the increase in use of digital media. The pandemic also changed education and the way information is shared. The internet is a tool that can promote interaction and connect people across the world. The challenges it presents to psychological and physical well-being of people cannot be overstated. The ubiquitous nature of the internet to provide information and entertainment makes it hard to take a break from social interaction. (Dudar et al., 2025).

Sleep disruption from different sources, and clinically diagnosable insomnia, in particular, are rapidly growing mental health issues. Of the different forms of insomnia, approximately one third of all young adults have experienced some form of difficulty in falling or staying asleep due to their excessive use of digital media. While several research studies have examined the biological pathways of this phenomenon (i.e. the effects of exposure to blue-light on the production of the hormone melatonin), there has been scant research focused on the psychological pathways. This research aims to fill this knowledge gap. The focus will be on understanding whether the use of digital media by young adults of Pakistan creates a state of insomnia, and if so, what the nature of this relationship is. This research further aims to advance theories surrounding this phenomenon by the development of a hypothetical conceptual model (Mahmood et al., 2026; Spiegelhalder et al., 2026).

1.1 Digital Media Use and the Sleep Health Crisis

Many studies show that too much engagement with digital media leads to worse quality sleep. It has been shown that many young adults and adolescents use a digital device within an hour of when they want to go to sleep (Dudar et al., 2025; Spiegelhalder et al., 2026). Use of digital devices within close proximity to when an individual wants to go to sleep results in a decrease in the amount of time it takes for an individual to fall asleep and increases the chances of an individual waking up during the night. Young Adults are more susceptible to the effects above because many of their everyday activities and social interactions are fulfilled and represented through digital means and media (Baldi et al., 2025).

Interaction with digital media and the equipment that is used to engage with such media is designed to be interactive, engaging, and stimulating. The negative consequences of using such media can be described as an addiction and can be as debilitating as other substance related addictions. Heavy use of such digital media displaces and fulfills other activities during the day and as described by the theory of bedtime procrastination, fulfills and engages the mind in such a way that helps delays the onset of a desired and restful state. Such use has been correlated and associated with anxiety, depression, and other psychosocial and physiological conditions (Ahmed et al., 2025; Baldi et al., 2025; Rahman et al., 2025).

1.2 Overthinking as a Transdiagnostic Cognitive Culprit

Overthinking, also known as over-rumination or over-worry, is persistent and repetitive mental activity centered around the negative aspects of one's experiences and conditions. The focus is usually on the past (e.g. rumination), or future (e.g. worry) negative events. While normal rumination is adaptive, e.g. generating alternative solutions to a problem, in over-rumination, individuals get stuck in repetitive negative thought loops, and become less able to regulate negative emotions associated with the thinking (Montell, 2026).

Based on the limited available data, psychologically integrative approaches to mental health cross-cuttingly consider negative perseverative thinking and intensive digital media use. Humans are prone to mentally replay, and engage in negative social comparisons. In an attempt to maintain social acceptance, individuals compare themselves to their peer groups, e.g. negative social comparisons to idealized-reality social media profiles can lead to low self-esteem, cyberbullying can lead to replaying and ruminating about past social interactions, and exposure to polarizing/distressing content can lead to anxiety, all of which can increase cognitive arousal and prevent sleep (Ahmed et al., 2025; Mahmood et al., 2026).

1.3 Theoretical Frameworks: The Cognitive Model of Insomnia & Spielman's 3P Model

The relationships between the use of digital media, overthinking, and disruption of sleep, as described in this report, are substantiated by the cognitive behavior's theories of sleep. The Cognitive Model of Insomnia, developed by Harvey (2002), suggests that continuous and chronic

suspicions about sleep are explained by pre-sleep cognitive activities. According to Harvey, people with insomnia have pre-sleep cognitive activities that include worry, rumination and apprehension that are anxiety provoking and mold cognitive and physiological arousal. The cognitive and psychological arousal, as described by Harvey, prevents and delays the onset of sleep by suppressing sleep-promoting cognitive activities. This results in a vicious cycle that disrupts sleep and increases cognitive activities, including worrying and overthinking. Other cognitive activities that increase arousal and interrupt the onset of sleep include fear, distress, and anxiety (Wang et al., 2026).

The 3P Model of Insomnia (Spielman et al., 1987), suggests that insomnia is as a result of the combination of neurotic and anxious predispositions, including negative and repetitive pre-sleep cognitions. Repetitive bedtime digital media use is considered a negative predisposing factor. Repetitive negative pre-sleep cognitions are perpetuating factors of insomnia. Cognitive activities, including worry and overthinking, remain insomnia and disrupt the onset of sleep (Janjic et al., 2026).

1.4 The Present Study and Hypotheses

Although we know that high screen time and poor-quality sleep have a direct connection, the pathway that connects digital activities to clinical insomnia is unclear. Previous studies have mostly described “screen time” in vague terms. Describing digital phenomena this way does not capture the transdiagnostic mechanisms that underlie the relationship. Additionally, most studies have focused on developed and/or westernized countries. Pakistan, on the other hand, is an example of a rapidly digitizing, under-developed and culturally-conservative country. This study aims to fill the aforementioned research gaps by using data collected from young adults in Pakistan to test a mediation model where the relationship between digital media and insomnia is presumed to be mediated by thinking about technology. It is hypothesized that:

H1: Digital media use is related to significantly positive severity of insomnia in adults.

H2: Digital media use is related to positively significant occurrence of perseverative negative thinking.

H3: The overthinking is related to significantly positive severity of insomnia.

H4: Overthinking mediates the relationship between digital media use and insomnia.

H5: There will be significant differences by gender, with women endorsing greater levels of digital media use, perseverative negative thinking, and insomnia, when compared to men.

2. Methodology

The study used a correlational, cross-sectional design to examine these hypotheses. Using this design, the research team was able to document the relationships between participants’ natural, self-reported digital media habits, rhythmic thinking, and their sleep. Data was collected in the Punjab province of Pakistan.

2.1 Participants and Sampling

The study group consisted of 300 adult participants (both graduate and undergraduate students) from different cities of Punjab (i.e. Sahiwal, Lahore, Arifwala, Pakpattan and Okara). Of these 300 participants, 120 were male and 180 were female. The male participants comprised of 40% of the total sample and about 30% of the total potential participant group as reported in the records. The female participants comprised of 60% of the total sample and about 45% of the total potential participant group reported in the records. The age of the participants ranged from 18 to 52 years, and the mean age of the participants was 26.44 years (standard deviation = 7.19). The sample was further selected purposely, based on their eligibility, to participate in the research. Eligibility was determined by the following criteria: (a) being 18 years of age or older, (b) being enrolled in a degree level program and (c) being a user of social media or other online

platforms. The participants were not allowed to have a school or college level education, be less than 18 years of age and/or not use social or other online platforms. A power analysis was performed using G*Power to determine the minimum sample size required to reduce error in multiple regression analysis. Based on the analysis and an effect size of 0.15, the required sample size was 88. Since the sample size of the study was 300, the authors believed that sampling error was significantly reduced.

2.2 Psychometric Measures

The survey packet contained a demographic sheet along with 3 self-report scales. Each of these self-report scales was culturally validated and psychometrically sound and standardized.

1. Social Media Use Scale (SMUS): The SMUS (Lin, Wang, & Chen, 2016) assesses frequency, duration and intensity of interactions via social and digital media. It consists of 17 items. Adapted versions of the scale range from 10 to 17 items. It assesses the duration people spend online, the types of online platforms people use, and the psychological and emotional consequences of online behavior. Items are rated on a Likert scale from 1 (never) to 5 (always). Respondents who endorsed the items on the scale more frequently are assumed to use digital media more extensively, intensively and with greater emotional involvement. In this study, the SMUS demonstrated excellent reliability ($\alpha = .95$).

2. Perseverative Thinking Questionnaire (PTQ): The PTQ is a self-report measure of two categories of repetitive negative thinking: rumination and worry. It consists of 15 items and was created to assess the three elements of perseverative thinking: the level of repetitiveness of the thoughts (frequency), the level of sedateness (intensity) and the level of difficulty to discontinue thinking (uncontrollability). It was designed in a way that respondents evaluate to what extent they endorse the elements of perseverative thinking described in the items using a 4-point Likert scale, ranging from 0 (never) to 4 (almost always). In the present study, the PTQ demonstrated an excellent level of reliability ($\alpha = .94$).

3. Insomnia Severity Index (ISI): Developed by Morin (1993), and later refined by Morin et al. (2001, 2011), the Insomnia Severity Index (ISI) is a brief measure of the general severity and impact of insomnia over the last 14 days. The ISI contains 7 items assessing: i) the presence and/or frequency of various insomnia symptoms (e.g., falling or staying asleep, waking too early, and overall satisfaction with sleep); ii) how significantly the insomnia symptoms interfere with and/or impact day to day activities; iii) how noticeable the symptom is to others; and (iv) how distressing the insomnia symptom is. Total score of the ISI can range from 0 to 28, with 0 to 7 indicating no clinically significant insomnia, 8 to 14 sub-threshold insomnia, 15 to 21 moderate insomnia and 22 to 28 severe insomnias. For this study, the ISI demonstrated excellent internal consistency ($\alpha = .92$).

2.3 Research Procedure and Ethical Compliance

The authors of the SMUS, PTQ, and ISI scales gave permission to collect the data. The Department of Applied Psychology at the University of Sahiwal issued a letter of confirmation of the researcher's academic status and endorsed the research study. The staff member at each university assisted the researcher with the collection of the data by distributing the survey packets to the students in a convenient and comfortable way. The convenience sampling method was used. Student participants were given an information sheet which explained their rights as participants and the survey procedures. Each participant was given an opportunity to read the information sheet. Completing the survey was voluntary and participants had the right to withdraw at any point. The researcher upheld participants' right to privacy and confidentiality. Maintaining academic ethics, participants completed the surveys at their convenience and choose their own time limits, if any.

2.4 Data Analysis Strategy

Data were analyzed in SPSS (version 23) in a number of steps. First, to assess the levels of internal consistency for the various scales, Cronbach's Alpha was calculated, following Nunnally & Bernstein's (1994) guidelines. Second, descriptive statistics, i.e. frequency, percentage, mean, standard deviation, and skewness and kurtosis scores, were generated for each of the variables. Third, in order to assess the nature and strength of the relation among digital media use, overthinking, and insomnia, Pearson correlation was performed. Fourth, to assess the predictors of insomnia, a series of bivariate regressions was performed. Fifth, to assess the differences among men and women on the various study variables, a series of independent samples t-tests were performed. Last, to assess the mediating effect of overthinking between social media use and insomnia, Hayes' PROCESS macro (Model 4) was performed.

3. Results

The results below include several analyses including, but not limited to, scale reliability, sample demographics, descriptives, bivariate correlations, regression analyses, gender comparisons, and a mediation model, and are presented in that order.

Table 3.1 Psychometric Reliability and Scale Internal Consistency

Measurement Scales	Number of Items	Cronbach's (α)
Insomnia Severity Index (ISI)	7	.92
Social Media Use Scale (SMUS)	17	.95
Perseverative Thinking Questionnaire (PTQ)	15	.94
Frustration Discomfort Scale (FDS)	28	.96

Table 1. Internal Consistency and Reliability of the Study Scales (N = 300).

Internal consistency was assessed using Cronbach's alpha on the three main scales. As shown in Table 1, the scales exhibited high reliability, with Cronbach's alpha between 0.92 to 0.95. Thus, the scales are considered suitable to be used with the adult population.

Table 3.2: Demographic Characteristics of the Sample (N=300)

Demographic Variable	Frequency (f)	Percentage (%) / Mean (SD)
Gender		
Male	120	30.0%
Female	180	45.0%
Education Level		
BA / BS	99	24.8%
MA / MSc	34	8.5%
MS / MPhil	65	16.3%
PhD	12	3.0%
Others	90	22.5%
Primary Digital Media Platform		
Facebook	6	1.5%
Instagram	15	3.8%
WhatsApp	18	4.5%
TikTok	12	3.0%
Age Range	18 - 52 years	26.44 (SD = 7.19)

The sample (Table 3.2) was about 45% female and 30% male, a pattern consistent with other samples collected from urban centers in Pakistan. The largest group by education level was the undergraduate students (24.8%), followed by the alternative 'Others' group diplomas (22.5%),

and the masters (MS/MPhil) level students (16.3%). With respect to the types of social media used, the sample reported using WhatsApp (4.5%), Instagram (3.8%), and TikTok (3.0%). The average age of the sample was 26.44 years ($SD=7.19$), which is in line with the definition of young adults.

Table 3.3: Descriptive Statistics of all Scales (N=300)

Variables	No. of Items	Mean (M)	SD	Skewness (SE)	Kurtosis (SE)	Range
Insomnia Severity (ISI)	7	2.86	1.10	0.09 (0.141)	-1.19 (0.281)	0 - 28
Digital Media Use (SMUS)	17	3.68	1.94	0.81 (0.141)	-0.05 (0.281)	17 - 85
Overthinking (PTQ)	15	2.95	0.76	-0.79 (0.141)	-0.11 (0.281)	0 - 60
Table 3.3: Descriptive Statistics of all Scales (N=300)						

As shown in Table 3.3, the average level of overthinking was $M = 2.95$ ($SD = 0.76$), which was below the midpoint. On the other hand, use of digital media was high, $M = 3.68$ ($SD = 1.94$), and showed extreme variability. Although a few outliers were present, the data were normalized. Therefore, it was assumed that parametric statistics could be used.

Table 3.4: Pearson Product-Moment Correlation Matrix for Study Variables

Variable	Digital Media Use	Overthinking	Insomnia
Digital Media Use	-	.52**	.66**
Overthinking	-	-	.62**
Insomnia	-	-	-

Pearson correlation was performed to assess the linear relationship of the study variables. From the results presented in Table 4, the variables had a positive relationship. Furthermore, digital media use was positively related to insomnia ($r = .66$, $p < .01$), thereby, confirming hypothesis 1. Digital media use was related to the tendency to overthink ($r = .52$, $p < .01$), and therefore hypothesis 2, was also confirmed. Lastly, overthinking was related to insomnia ($r = .62$, $p < .01$), hence hypothesis 3 was also confirmed. Based on the results, it can be argued that repetitive and uncontrollable thoughts are related to insomnia and therefore, higher levels of sleep disturbance.

Table 3.5: Multi Linear Regression Analysis for the predictor of Social Media Use

Variables	B	SE	t	p	95% CI
Constant	1.486	0.102	14.62	.000	[1.286, 1.686]
Digital Media	0.373	0.024	15.236	.000	[0.324, 0.421]

Results showed that the use of digital media was related to the severity of insomnia. The regression coefficient for this relationship was 0.373, and this was a significant result, $p < 0.001$. The model was a good fit with a confidence interval of 0.324 and 0.421. Thus, the more digital media is used, the worse insomnia becomes and the more symptoms of insomnia are expressed.

Table 3.7: Gender-Based Differences across Study Variables (N=300)

Variables	Male (n=120)		Female (n=180)		t(298)	p	95% CI	
	M	SD	M	SD			LL	UL
Insomnia (ISI)	2.55	1.03	3.05	1.09	-3.99	.000	-0.74	-0.25
Digital Media (SMUS)	3.33	1.08	3.90	1.98	-2.55	.011	-1.02	-0.13
Overthinking (PTQ)	2.67	0.80	3.12	0.66	-5.32	.000	-0.62	-0.28

As shown in Table 3.7, women had greater symptoms of insomnia, spent more time on digital media, and engaged in more episodes of 'overthinking' than men in the sample. Men's and women's mean scores on insomnia symptoms differed, with women endorsing higher means than men, $t(62) = -3.99$, $p < .001$. The same was true for means on digital media, $t(62) = -2.55$, $p = .011$, and 'overthinking' $t(62) = -5.32$, $p < .001$, respectively. Support therefore, exists for Hypothesis 3 which stated that women are at greater risk of digital over-use and its associated cognitive and emotional distress compared to men.

Table 3.8: Mediation Analysis: Indirect Effects of Social Media Use on Insomnia Severity via Overthinking

Mediation Path	Effect Size (B)	Boot SE	t	p	LLCI	ULCI
Total Effect (SMUS ISI)	0.3726	0.0245	15.24	.000	0.3245	0.4207
Direct Effect (SMUS ISI)	0.2024	0.0285	7.1	.000	0.1462	0.2585
Indirect Effect via PTQ (Overthinking)	0.0654	0.0153			0.0355	0.0957
Indirect Effect via FDS (Frustration)	0.1048	0.0251			0.0578	0.1571
Total Indirect Effect	0.1702	0.0247			0.1245	0.2221

Note: Indirect effects are based on 5000 bootstrap samples. CI = Confidence Interval; LLCI = Lower-Level Confidence Interval; ULCI = Upper-Level Confidence Interval.

Mediation analysis using PROCESS Macro (Model 4) showed that the relationship between social media use and insomnia severity was partial mediated by overthinking. The total effect of social media use on insomnia was positive and significant ($B = .3726$, $p < .001$). The direct effect of social media use on insomnia was reduced, but still significant, after the mediator was included ($B = .2024$, $p < .001$). The effect of social media use on insomnia was partially mediated by overthinking. The effect of social media use on insomnia was mediated by overthinking to the tune of $B = .0654$, and the total effect of social media use on insomnia was mediated by $B = .1702$. The total effect of digital media use on insomnia was largely due to the effects modeled by this analysis, supporting Hypothesis 2.

4. Discussion

This study assessed the connection of young adults' use of digital media and their level of overthinking (repetitive thought containing negative content) with their insomnia. To achieve this, it tested both the direct and the indirect relationships of the variables in consideration with their theories and frameworks. The results showed and supported the hypotheses, reflecting that there is an association between digital media and insomnia through cognitive hyperarousal. Herein, I discuss the results, and according to the literature, integrate the results with cognitive-behavioral therapies and sleep. Finally, I describe the results in the context of clinical psychology and define the constraints of the research.

4.1 Direct Effects: Digital Media Use and Insomnia Severity

Consistent with H1, the positive relationship between digital media use and insomnia severity was significant ($r = .66$, $p < .01$). Based upon simple linear regression, the use of digital media was a significant predictor of insomnia ($B = .373$, $p < .001$), and explained about 43.8% of the variation in the disruption of the participant's sleep ($R^2 = .438$). The international research focus on the negative impact of technology and the consequences on a person's ability to sleep are plentiful. In Norway, the research study by Vesalainen and Sivertsen (2025) documented that the use of electronic media and screens while in bed increased the risk of developing insomnia and decreased the total amount of sleep by about 24 minutes. Further, cave et al. (2024) documented the negative impact and relationship between the use of social media by college students in the U.S. and development of insomnia and other sleep disorders.

The biopsychosocial model offers explanations for the relationship between digital media use and disruption of sleep. Biologically and psychologically, the use of digital media and the disruption of the body's natural sleep cycle are attributed to the use of electronic media and the type of light (blue light) that is emitted by the digital media (Chang et al., 2015). In Pakistan, research documented the use of social media by students, and the relationship between the use of social media and development of insomnia (Aslam et al., 2024). The research documented 61% of the participants experienced extreme sleep disturbance because of the use of social media. Further, the research documented that social media use by the participants led to the development of insomnia and other emotional disorders.

4.2 The Explanatory Cognitive Mechanism: Overthinking as a Mediator

The psychological effects of exposure to blue light are investigated in the study. The main result of the study is the acceptance of H4, which states that thinking about digital media in a circular manner (i.e. overthinking) mediates the relationship between the use of digital media and the symptomatology of insomnia (Indirect Effect = 0.0654, 95% CI = [0.0355, 0.0957]). Thus, it is explained that the use of digital media may lead to symptoms of insomnia both directly and indirectly through circular thinking.

This result complements the Cognitive Model of Insomnia and Perseverative Thinking (Harvey's, 2002). According to these models, racing thoughts and other cognitive activities before going to bed may lead to the inability to fall asleep. As stated earlier in this paper, the use of social media may lead users to become involved with stimulating and emotionally charge contents which may lead to repetitive and involuntary thoughts about previous social interactions, as well as to thoughts about possible future social interactions and messages, and to negative social comparisons (Twenge & Campbell, 2018; Woods & Scott, 2016). Circular thinking regarding digital media may lead to an inability to fall asleep and to the worsening of insomnia.

Recent studies show that emotional attachment to social media creates a cognitive pathway to negative social comparisons. This further leads to pre-sleep cognitive activation, which, in turn, increases the severity of insomnia. For example, Lin et al. (2024) reported the above-mentioned findings in their sample of 830 participants, aged 16 to 30 years. Other researchers (Liu et al. 2024) have also identified psychological processes associated with the use of social media, and the disruption of individuals' sleep. Likewise, Murtaza, Khan and Shah (2024), in their sample of adolescents in Lahore, Pakistan, documented the negative impact of excessive use of the internet and social media on adolescents' sleep because of preoccupation with social media and negative social comparisons. In addition, excessive use of social media and the internet, negative social comparisons, and preoccupation with social media promote rumination, which increases insomnia among adolescents.

4.3 Cultural Context and Gender Vulnerabilities

One of the important findings here is the consistent difference between the genders for each of the core constructs. It was found that women, as compared to men, were more in the following cases; greater use of digital media ($M = 3.90$ and $M = 3.33$), over thinking ($M = 3.12$ and $M = 2.67$) and more severe cases of insomnia ($M = 3.05$ and $M = 2.55$).

Coming from a collectivist culture like Pakistan, and with different social and behavioral expectations like men, may explain some of the psychological stresses young women are faced with. Moreover, in Pakistani culture, many behavioral expectations for women are tightly restricted, and a woman's infraction may cause a loss of honor for the family and increase stress for the woman. Because of restrictions to express emotion, women may develop psychological stresses of worry and rumination. This stress may contribute to women's tendency to be online media insomniacs. Participants reported that social media provided a means of expressing emotions and built self-identity. Unfortunately, social media also may promote images and lifestyles that are beyond the means of most, and may negatively affect participants' psychological well-being. This stress, in conjunction with the women's restricted expression of emotions, may contribute to participants' insomnia, anxiety, and other psychological distresses.

4.4 Clinical and Practical Implications

The results presented here are important for clinical psychology and public health.

Developing CBT-I Interventions: In its present form, Cognitive Behavioral Therapy for Insomnia (CBT-I) helps patients to adjust their sleep environment in order to establish and stick to a regular bedtime. Based on the results reported herein, other CBT-I strategies need to be developed to help patients deal with negative automatic thoughts and pre-sleep worries related to digital media.

Use of Gender Responsive Strategies: Because women report more negative automatic thoughts and symptoms of insomnia than men, strategies need to be developed to help women deal with negative emotions and insomnia. Further, mental health interventions can be designed to incorporate other strategies to help women deal with the emotional and psychological stresses related to family and society in general.

Digital Health and Hygiene: Digital media can promote negative thoughts, anxiety and insomnia. Media literacy and health education need to teach the importance of digital mindfulness and responsible use of digital media in the hours preceding sleep.

Application Development: There is potential to use these findings to develop health and digital media related products and services to help consumers develop healthy digital habits and to monitor and control their digital media use.

4.5 Limitations and Recommendations for Future Research

Few limitations of the study should be addressed. First, because the study used self-report measures, participants may have reported overly positive behavior (i.e. "social desirability") or may have been subject to memory distortion. Therefore, the authors suggest that in addition to self-report measures, future studies use objective measures of sleep (i.e. actigraphy) and/or other behavioral measures. Second, because the study used a cross-sectional design, the authors were limited to making inferences (i.e. descriptive statistics) about sleep and digital media, and reverse causation. Third, the authors suggest that the sample was deficient in terms of generalizability. The sample consisted of 300 young adult students from the Punjab province. Future studies should aim to include other age groups, rural populations and other clinical populations.

5. Conclusion

The results of the studies in this paper suggest that negative repetitive thinking (also known as rumination) plays a role in linking the use of digital media and insomnia for young adults. The

use of digital media contributes to rumination and other cognitive activities that make it difficult to fall or stay asleep. Women from Pakistan in this study showed more symptoms of digital media-related stress, as well as more severe symptoms of insomnia. Methods focused on improving sleep, like those based on traditional approaches to sleep hygiene, do not take into consideration the emotional and cognitive effects of the always-connected, digital world. The incorporation of these elements into traditional cognitive behavioral therapy, digital health literacy, and counseling could be beneficial for young adults, especially women.

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