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Fear of missing out and sleep: cognitive behavioural factors in adolescents' nighttime social media use

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Abstract

Introduction

Social media use has been linked to poor adolescent sleep outcomes, but the mechanisms behind this association are not yet well understood. This study examines links between adolescents' social media habits, fear of missing out and sleep outcomes, using path analysis to evaluate a model of proposed underlying mechanisms.

Methods

Adolescents aged 12-18 years (N=101) completed questionnaire measures.

Results

Nighttime social media use was associated with later bedtimes, increased pre-sleep cognitive arousal, longer sleep onset latency and shorter sleep duration. Path analysis supported a model whereby fear of missing out predicted shorter sleep duration via two distinct mechanisms: (1) at a behavioural level, by driving late night social media use, which delays bedtimes; (2) at a cognitive level, by increasing pre-sleep cognitive arousal, thus further delaying sleep onset.

Conclusions

Efforts to develop and evaluate intervention strategies should therefore consider not only social media behaviours but also underlying cognitive factors, such as fear of missing out.

Keywords

A full report is available from the authors upon request.

Social media now plays a central role in adolescents' lives, with recent research highlighting both positive and negative outcomes of this shift towards online social interaction (Deters & Mehl, 2013; Lenhart, 2015; Vorderer, Kromer, & Schneider, 2016; Woods & Scott, 2016). One aspect of concern for parents, teachers and health professionals is the potential negative impact on sleep – since sufficient, good quality sleep is crucial for adolescent health, wellbeing and academic performance (Owens, 2014).

Adolescents who use social media more (particularly around bedtime) tend to have poorer sleep (Woods & Scott, 2016). However, research directly examining potential drivers and mechanisms behind this link is still lacking. The current study begins to address this gap by exploring an important possible driver for this nighttime social media use: Fear of Missing Out (FOMO). FOMO is a general state of anxiety at missing out on rewarding experiences, often driving social media engagement (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Young people in particular report feelings of disconnectedness and missing out without access to online communication, preferring to keep their phones within reach at night (Vorderer et al., 2016). This desire to be constantly connected and concern about missing out when offline may make it difficult for highly invested adolescent users to disengage from social media at bedtime (Woods & Scott, 2016).

The current study evaluates a model whereby FOMO predicts nighttime social media use, which is in turn linked to shorter sleep duration via two paths, based on mechanisms identified in Cain and Gradisar's (2010) theoretical framework of electronic media use and sleep in children and adolescents. Firstly, at a behavioural level, we propose that nighttime social media use will predict later bedtimes, in line with similar findings in young adults (Orzech, Grandner, Roane, & Carskadon, 2016). Secondly, at a cognitive level, we propose that nighttime social media use will predict increased pre-sleep cognitive arousal and longer sleep onset latency (time taken to fall asleep). This is in line with previous findings that adolescents who used social media more around bedtime tended to take longer to fall asleep, and this was mediated by how alert they felt in bed (Harbard, Allen, Trinder & Bei, 2016). By delaying sleep onset, both these possible mechanisms are particularly relevant for the sleep duration of adolescents, whose school timetables prevent later rise times to compensate (Owens, 2014; Tavernier & Willoughby, 2014). Figure 1 presents the proposed model, whereby FOMO predicts nighttime social media use, which is in turn linked to shorter sleep duration via behavioural and cognitive paths.

[FIGURE 1 AROUND HERE. "Fig 1 - Proposed model"]

Methods

Participants and procedure

This research took place at a UK secondary school, as part of an ongoing research partnership. The study was advertised through school assemblies and in classes, with pupils invited to complete an online survey hosted via qualtrics.com. 101 participants (66% female) completed the self-report online questionnaires measures. Participants were aged 12-18 years, with a mean age of 14 years and an age breakdown as follows: 46% were 12-13 years; 32% were 14-15 years; 22% were 16-18 years. All participants (plus parents of under 16s) provided consent. Institutional ethical approval was granted, plus permission from the relevant Local Education Authority and school.

Measures

Fear of missing out

The Fear of Missing Out scale (FoMOs; Przybylski et al., 2013) consists of 10 items (e.g. "I get anxious when I don't know what my friends are up to") rated on a 5-point scale from "not at all true of me" to "extremely true of me". Item scores are averaged to give an overall score of 1-5. The scale has good reliability, with Cronbach's alpha of .89 in both Pzybylski et al.'s (2013) adult sample and in the current sample.

Nighttime social media use

Nighttime-specific social media use was measured using a self-report questionnaire (Woods & Scott, 2016). Seven items – including "How often during the last month have you used social media in bed?" – provide a total score of 0-31. The measure had Cronbach's alpha of .82 in the current sample.

Pre-sleep cognitive arousal

The cognitive subscale of the Pre-Sleep Arousal Scale (PSAS; Nicassio, Mendlowitz, Fussell, & Petras, 1985) requires participants to rate how intensely they experience eight symptoms (e.g. "Being mentally alert, active") as they attempt to fall asleep, from "not at all" to "extremely" . Item scores are summed to give a score of 8-40. It has good reliability (Cronbach's alpha = .87; Yeh, Wung & Lin, 2015). Cronbach's alpha was .86 for the current sample.

Sleep habits

Participants reported the time they usually went to bed, how long it usually took them to fall asleep (in minutes) and how many hours of actual sleep they got a night, during the past month.

Data analysis

Predicted associations were tested with Spearman's Rho correlation coefficients. Path analysis tested the proposed model (Fig. 1) using the lavaan package for R (R Core Team, 2016; Rosseel, 2012). Sleep onset latencies, FOMO and Pre-Sleep Cognitive Arousal scores were transformed by taking log10(value), to meet normality assumptions. Bedtimes were excluded for four participants who reported short-term atypical sleep schedules due to religious fasting. Acceptable model fit was assessed using goodness-of-fit indices with the following criteria: non-significant Chi-square value (Kline, 2005); comparative fit index (CFI) and Tucker-Lewis index (TLI) > .90 (Hu & Bentler, 1999); root-mean-square error of approximation (RMSEA) < .08 (Browne & Cudeck, 1992). Collinearity statistics indicated an absence of multicollinearity (Kennedy, 1992).

Results

Means, standard deviations and ranges for each measure are presented in Table 1. Only 5% of participants reported never using social media at night.

[TABLE 1 AROUND HERE. "Table 1: Means, standard deviations and ranges for study variables"]

Correlations between study variables were consistent with expected associations based on the proposed model. Nighttime social media use was significantly associated with shorter sleep duration (r_s = -.26, p < .01), later bedtimes (r_s = .41, p < .001), increased pre-sleep cognitive arousal (r_s = .36, p < .001) and increased sleep onset latency (r_s = .20, p < .05). FOMO was significantly associated with increased levels of nighttime-specific social media use (r_s = .36, p < .001). Pre-sleep cognitive arousal was significantly associated with longer sleep onset latency (r_s = .32, p < .001) and shorter sleep duration (r_s = -.21, p < .05).

Path analysis

All paths in the proposed model (see Fig. 1) were significant (p < .05), but the overall model provided a poor fit (X^2[9] = 24.3, p < .01, CFI = .79, TLI = .66, RMSEA = .14). Therefore model

adjustments were made, guided by the modification indices and consideration of the model's theoretical underpinnings. A path from FOMO to pre-sleep cognitive arousal was added, which was significant ($p < .001$) and improved the model fit. Following this, the path from nighttime social media use to pre-sleep cognitive arousal was no longer significant ($p = .45$) and was removed. The adjusted model (Fig 2) provided an acceptable fit ($X^2[9] = 13.5$, $p = .14$, CFI = .94, TLI = .90, RMSEA = .077) and explained 58% of the variance in sleep duration.

[FIGURE 2 AROUND HERE. "Fig 2 – Modified model"]

Discussion

Adolescents with higher levels of FOMO tended to use social media more at night, in line with existing evidence that FOMO can be a driver for social media engagement (Przybylski et al., 2013). Adolescents who used social media more heavily at night tended to go to bed later, feel more alert in bed, take longer to fall asleep, and sleep less, in line with findings in young adults (Orzech et al., 2016). Model testing indicated improved fit when FOMO predicted pre-sleep cognitive arousal directly, as opposed to indirectly via increased nighttime social media use as we had predicted (Harbard et al., 2016).

Contrary to our hypothesised model, the current results highlight two parallel pathways that predict shorter sleep duration, stemming from a shared underlying driver: FOMO. We saw separate behavioural and cognitive components, with fear of missing out driving adolescents to actively engage more in social media behaviours at night (the behavioural component) and also feel more alert in bed (the cognitive component). Given that 95% of the current sample did report using social media at night at least sometimes, this suggests that increased pre-sleep cognitive arousal reported by nighttime users (as previously noted by Harbard et al., 2016) may arise, not from social media use behaviour itself, but from underlying concerns about possibly missing out.

Therefore, fear of missing out is a highly relevant current issue in adolescent sleep, which should be considered at both behavioural and cognitive levels. Behaviourally, FOMO may drive nighttime social media use, which delays bedtimes and restricts sleep opportunity for school-aged adolescents with fixed rise times (Owens, 2014; Tavernier & Willoughby, 2014). Cognitively, this underlying concern around missing out may also contribute to increased cognitive arousal before sleep

(independent of how much an individual actually uses social media in bed), which further impacts on sleep onset and duration.

To address this current issue in adolescent sleep, efforts to develop, pilot and evaluate targeted elements of interventions might consider this cognitive-behavioural model. Crucially, the current results would suggest that simply removing the behavioural component (e.g. by limiting nighttime access to social media) would not address the parallel cognitive component of increased arousal, which may arise directly from underlying concerns about missing out (as opposed to the social media behaviour itself). Cognitive-behavioural approaches are already well-supported in other areas of adolescent wellbeing (e.g. depression and anxiety; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Targeting the cognitive-behavioural factors identified in the current model, future research could evaluate the effectiveness of staggered reductions in nighttime social media use over time, combined with techniques shown to reduce pre-sleep cognitive arousal, such as mindfulness (Cincotta, Gehrman, Gooneratne, & Baime, 2011).

Conclusions from these analyses should be considered within the limitations of this exploratory study. The small sample size precluded more complex model testing, and future research can address this limitation by testing models that include age and gender, plus other potentially relevant factors, such as anxiety (Woods & Scott, 2016). Further examination of individual differences is an important area moving forward, as there are likely to be other relevant factors beyond the scope of this initial study. Although we did observe some such differences (e.g. for gender, with girls reporting higher FOMO and nighttime social media use), given the demographic skew and relatively small numbers in the current sample, we recommend further exploration before generalising conclusions. Furthermore, the study used self-report measures (which can be subject to biases in recall and reporting; Althubaiti, 2016) and did not ask participants about weekday and weekend habits separately: both of which are common issues in existing literature on adolescent social media use and sleep, and should be considered moving forward.

Despite these caveats, the results of this exploratory study can contribute to informing future research, including the development and evaluation of possible targeted intervention strategies. The current findings support a cognitive-behavioural perspective on FOMO and sleep during adolescence.

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Table 1 – Means, standard deviations and ranges for study variables

Variable	Mean (SD)	Min	Max
Nighttime-specific social media use	14.3 (7.6)	0	28
Fear of missing out (FoMO)	2.0 (0.8)	1	4.5
Pre-sleep cognitive arousal	17.2 (7.0)	5	36
Sleep duration (hours)	7.7 (1.5)	4	11
Bedtime (hh:mm)	22:55 (01:05)	20:45	04:00
Sleep onset latency (mins)	27.3 (25.8)	1	180

Figure 1 – Proposed model
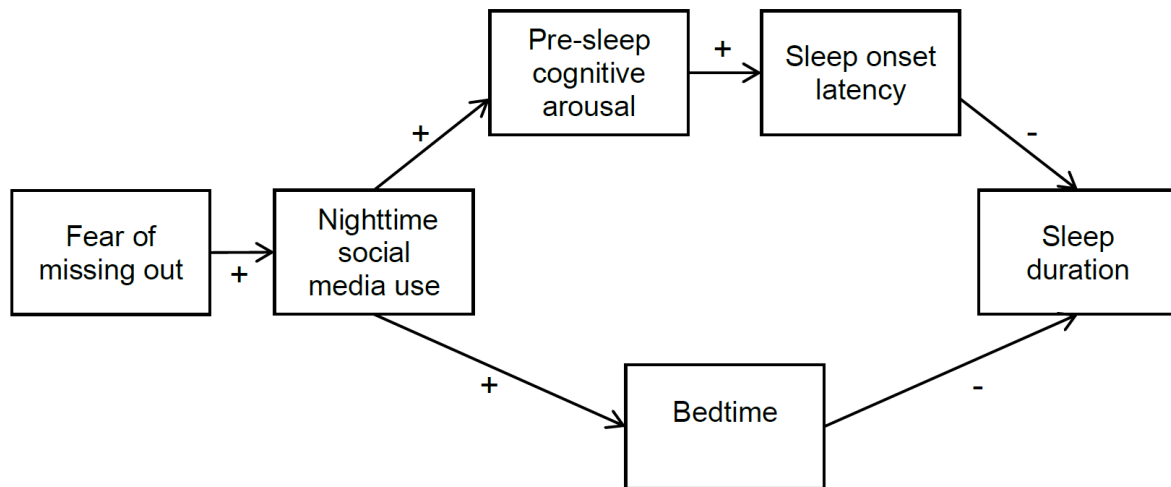
Our proposed path model, whereby fear of missing out predicts nighttime social media use, which in turn is linked to shorter sleep duration at both a behavioural level (via later bedtimes) and a cognitive level (via increased pre-sleep cognitive arousal and longer sleep onset latency).

Figure 2 – Modified model
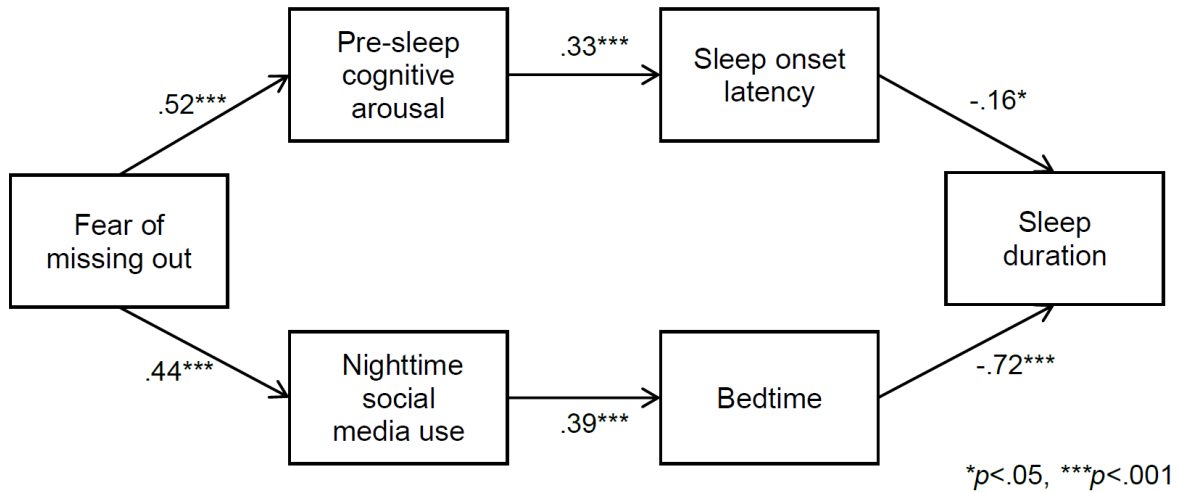
Final path model, in which fear of missing out predicts nighttime social media use, which is linked to shorter sleep duration via later bedtimes, as predicted. Pre-sleep arousal predicts shorter sleep duration via longer sleep onset latency, as expected; however arousal is predicted directly by fear of missing out, not indirectly via nighttime social media use.