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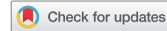
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## All night long: problematic media use is differentially associated with sleep quality and depression by medium

Allison Eden, Morgan E. Ellithorpe\*, Dar Meshi, Ezgi Ulusoy, and Sara M. Grady

### ABSTRACT

Media use appears to adversely affect sleep quality. Yet, findings remain inconsistent based on medium, duration, and manner of use. Given the recent, widespread rise in consumption of video-on-demand services and social media platforms, problematic use of these media has become of interest to media and sleep researchers. Although research has looked at the correlation between problematic media use and sleep, to date no studies have compared different media platforms to better understand the processes. To address this, we conducted a survey examining the relationships between both sleep quality and depression with problematic broadcast television, video-on-demand, and social media use. Results demonstrate problematic Internet-based media consumption, i.e., video-on-demand and social media use, is related to adverse sleep outcomes while broadcast television use, even when problematic, was not related to adverse sleep outcomes in our study. Similar results were found for depression. Implications for research and clinical practice are discussed.

### KEYWORDS

Television; social media; addiction; sleep quality; depression

Widespread penetration of both personal computers (laptops, tablets, mobile phones, etc.) and Internet access has allowed for the introduction of social media and video-on-demand (VOD) streaming worldwide and at all times of the day. This “always on” media use has led to some small section of the population experiencing maladaptive media use, which interferes with everyday functioning (i.e., *problematic use*; Orosz, Bóthe, & Tóth-Király, 2016).

Problematic media use occurs with both television (Orosz et al., 2016) and social media (Griffiths, Kuss, & Demetrovics, 2014). It has been linked to self-reported, adverse psychological outcomes, such as lower self-esteem and increased depression (Andreassen, Pallesen, & Griffiths, 2017; Bányai et al., 2017; Elhai, Dvorak, Levine, & Hall, 2017). However, the relationship between problematic media use – especially television – and sleep quality is relatively unknown (but see Amez, Vujić, Soffers, & Baert, 2020; Wolniczak et al., 2013), specifically whether streaming media shows associations between problematic use, sleep, and depression more or less strongly than traditional, appointment-based broadcast media use.

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Investigation of these relationships is needed, as the media landscape continues to drastically change. Although some research has examined the role of pre-bed binge-watching (e.g. Exelmans & Van den Bulck, 2017) social media use (e.g. Levenson, Shensa, Sidani, Colditz, & Primack, 2017) and smartphone use (Amez et al., 2020) on sleep disturbances, to date research has not differentiated between streaming media content, broadcast media content, and social media content in the context of sleep outcomes.

Inadequate duration of sleep, sleep disturbances, and delayed onset of bedtime are prevalent among today's youth and young adults (Hale & Guan, 2015), and these sleep problems can have profound adverse health impacts, particularly for depression and mental health (Steptoe, Peacey, & Wardle, 2006). Over 90% of published studies show a significant association with screen media use and adverse sleep outcomes (see Table 2 in Hale & Guan, 2015; Lam, 2014, for a detailed overview), particularly for women (Amez et al., 2020). Published studies examined the duration, location, extent, or frequency of media use as predictors of adverse sleep outcomes (Hale & Guan, 2015; Levenson et al., 2017). Although overall findings suggest strong relationships between media use and adverse sleep outcomes (duration, onset, and quality), results have been inconsistent for different media, i.e., television use was less strongly related to adverse sleep outcomes than social media (Hale & Guan, 2015). Therefore, RQ1 is: What is the relationship between problematic broadcast, streaming, and social media use, sleep disruption, and depression in a college-age population?, and RQ2 is: "Do these relationships differ by modality?"

## Method

### *Participants and Procedure*

One hundred and eighteen students were recruited from an online research pool at a large Midwestern public university. After excluding nine people who stopped taking the survey halfway through, all of the final sample ( $n = 109$ ; 52.29% females;  $M_{age} = 20.80$ ,  $SD_{age} = 1.41$ , 65.1% Caucasian) provided written consent, and then completed a survey to assess behavioral and psychological scales as part of a larger study. All procedures were approved by the university Institutional Review Board. Detailed descriptions of participants, and measurement can be found here ([https://osf.io/y4wt9/?view\\_only=3c5c8c5bb38347fc86e67882fbe20d52](https://osf.io/y4wt9/?view_only=3c5c8c5bb38347fc86e67882fbe20d52)).

### *Measures*

#### *Problematic VOD and TV viewing*

Orosz, Bóthe and Tóth-Király's Problematic Series Viewing Scale (2016) assessed problematic series viewing. Two distinct scales were formed by

averaging responses for each type of viewing (Problematic Broadcast TV,  $\alpha = .85$ ,  $M = 1.96$ ,  $SD = 0.75$ ; Problematic VOD,  $\alpha = .85$ ,  $M = 2.01$ ,  $SD = 0.76$ ).

### ***Problematic social media use***

Problematic social media use was measured with the 6-item Bergen Social Media Addiction Scale (Andreassen et al., 2017). Items were summed to form a composite scale (following Andreassen et al., 2017; Bányai et al., 2017),  $\alpha = .88$ ,  $M = 14.73$ ,  $SD = 5.81$ .

### ***Sleep quality***

Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was used to measure sleep quality. Higher scores indicate poorer sleep quality ( $\alpha = .75$ ,  $M = 8.21$ ,  $SD = 3.60$ ).

### ***Depression***

The 4-item PROMIS depression scale was used (Clover et al., 2018). Items were summed to form a composite scale,  $\alpha = .88$ ,  $M = 7.30$ ,  $SD = 3.43$ .

### ***Control variables***

Control variables included grade point average out of a 4-point scale ( $M = 3.25$ ,  $SD = 0.35$ ), age, sex, and BMI ( $M = 23.95$ ,  $SD = 4.49$ ).

## **Results**

In order to answer the research question, we ran two OLS regressions with the problematic use scales as the predictors along with the control variables (Table 1; see [https://osf.io/y4wt9/?view\\_only=3c5c8c5bb38347fc86e67882fbe20d52](https://osf.io/y4wt9/?view_only=3c5c8c5bb38347fc86e67882fbe20d52) for correlations).

Problematic viewing of VOD television and problematic social media use were both associated with a greater incidence of sleep disruption while problematic viewing of broadcast television was not. Similarly, for depression; problematic social media use was significantly associated with higher reporting of depression symptoms, while problematic viewing of broadcast and VOD television were not, although VOD was marginally significant. Sleep disruption and depression were positively correlated. Holding the problematic usages constant, only gender among our control variables positively predicted sleep disruption. Specifically, women were more likely to report sleep disruption.

## **Discussion**

The results illustrate the relationship between problematic media use and sleep is more nuanced than previous research may have accounted for. Overall, the

**Table 1.** Regression results.

	Sleep Quality			Depression		
	<i>B</i>	<i>Beta</i>	Std. Err.	<i>B</i>	<i>Beta</i>	Std. Err.
Constant	-4.71		6.99	3.95		6.35
Problematic VOD	1.46**	.31	0.54	0.93 <sup>+</sup>	.20	0.49
Problematic non-VOD	-0.67	-.14	0.55	0.75	.16	0.50
Problematic social media	0.15*	.24	0.06	0.15*	.25	0.06
Age	0.32	.12	0.24	-0.20	-.08	0.22
Sex (male = 0)	1.48*	.21	0.67	0.64	.09	0.61
BMI	0.03	.04	0.08	0.03	.04	0.07
GPA	0.28	.03	0.98	0.32	.03	0.89
<i>R</i> <sup>2</sup> (Adj. <i>R</i> <sup>2</sup> )		.20 (.14)			.27 (.22)	
<i>F</i> (7, 101)		3.59**			5.37***	

*N* = 109. <sup>+</sup> < .1 \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

finding suggests the similar structural factors of VOD and social media use may contribute to adverse health outcomes for users, beyond the same problematic use tied to broadcast TV watching.

This could be due to the structural differences between digital media interfaces and broadcast television (Schweidel & Moe, 2016). Broadcast television has clear structural breakpoints (i.e., organized schedules). These structures may provide scripted decision-points where audiences choose to keep watching, change the channel, or turn the TV off. Most VOD services, however, auto-play the next episode, and social media channels have adopted infinite scroll, considered a hallmark of “addictive” software design (Schweidel & Moe, 2016). These interfaces may encourage problematic watching in a way that negatively impacts sleep onset.

Exploring problematic media use – particularly via the Internet and streaming services – in combination with individual affective responses and use patterns may be particularly informative in future sleep latency and displacement research. The need to investigate moderating variables such as affective response and time of use is especially important given that some prior research has demonstrated contradictory findings to ours (e.g., Wolniczak et al., 2013).

In terms of limitations to the current study relies on cross-sectional self-report data, so causal inference is limited. That said, problematic media use is well suited to self-report, given that the relative and personal interpretation of behaviors may be more informative than demarcating absolutes; what is problematic and disruptive for one media user may not be for others. It is also worth noting that our items differentiated viewing behaviors in terms of platform differences (broadcast television vs. VOD) but not hardware differences (television set vs. mobile device vs. laptop). As VOD services can be accessed both through mobile devices and television sets, the structural interface may be an essential factor to consider in future studies. Finally, we replicated findings regarding the role of gender in media use and sleep disturbance (Amez et al., 2020), yet an explanatory mechanism for why women are more strongly affected is lacking. Future studies must examine

other intra-personal and content-based variables to differentiate the effects of problematic use on health outcomes for different users.”

To conclude, the main contribution of this study illustrates that the media effects on sleep and mental health outcomes, such as depression, vary based on media platform. Research should continue to disentangle what people watch (and how) to understand the various roles of structural, environmental, and content features in media and their differential effects on sleep quality and other outcomes. Such understanding can lead future researchers to be able to build a theory around the differential effects of media platforms on sleep quality and mental health. A better-differentiated understanding of problematic media use, particularly relationships to sleep and other health outcomes, could also inform future tools for applied scholars and health practitioners in diagnostic contexts.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

## Notes on contributors

*Allison Eden* (Ph.D., 2011, Michigan State University) is an associate professor in the Department of Communication at Michigan State University. Her work centers on understanding media enjoyment, particularly the role enjoyment plays in attention to and selection of media content, and more broadly the effects of entertainment on user behavior and well-being.

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*Sara Grady* is a PhD student in the Department of Communication at Michigan State University. Her research explores media and entertainment consumption from a functional perspective, particularly examining functional motives for narrative exposure and affective and

social outcomes of use. Her work is informed by her degrees in both engineering (University of Michigan) and fan & media studies (University of Edinburgh).

## Author contribution

AE, ME, DM proposed and designed study. EU, SG collected data. All authors contributed to data analysis and writing.

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