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On this week's episode of the podcast, I interview Victoria "Tori" Burghart, 4th year medical student about social media and its impact on mental health.

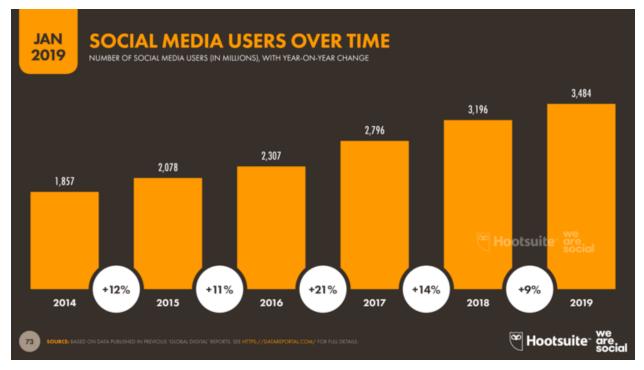
Since its introduction in the early 2000's, social media has become an integral part of our daily lives. It influences culture, current affairs, and connects us to the world like never before. As people spend more and more of their lives online, it's important for us to consider how this new online world *is changing us*. Social media represents a significant portion of the time many spend "plugged-in", especially the children of the internet age - adolescents. How many people does social media actually affect? Does it truly make us more social? Or does "new" mode of human interaction provide poor substitute for the original? After all, healthy social connection is one of the key factors in good mental health and well-being. It's time to check in and find out: how does social media affect mental health?

How many people are on social media?

Before diving into the effects of social media, let's nail down the scope of its impact. How many people use social media? Marketing research companies estimate that the total number of global social media users is around 3.4 billion in 2019, with an estimated increase of 1.6 billion users over the last five years (Kemp 2019).

Victoria Burghart, Jaime Rudyk, David Puder, M.D.





Source: Kemp (2019)

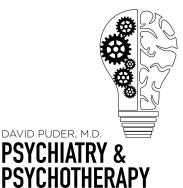
When compared to estimates of total global population (7.7 billion people), approximately 45% of the global population uses social media and just under half of those using joined within the last year. Here's the breakdown from some selected social media platforms:

- Facebook: 1.59 billion daily users, 2.41 billion monthly users (<u>Facebook</u> <u>NewsRoom Statistics</u>)
- Instagram: 500 million users per day, 800 million users total (<u>2018 Instagram</u> Engagement Report)
- TikTok: 800 million app store downloads, estimated user numbers similar to Instagram (<u>Kemp 2019</u>)

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Victoria Burghart, Jaime Rudyk, David Puder, M.D.

 YouTube: 2 billion users monthly, over 1 billion hours of video watched collectively per day (<u>Youtube Press</u>)



 Netflix: 165.93 million paid memberships globally, just over 60 million in the U.S., 140 million hours of content collectively watched per day, or over 1 billion hours per week (<u>Netflix Q3 2019 Investor Report</u>, <u>Dwyer</u>, <u>E. 2017</u>)

For context, this means that approximately 30% of the global population uses Facebook at least once per month, the number of users on Instagram and TikTok are equal to about 3x the total population of the U.S. (about 160 million), 25% of the global population uses YouTube at least once per month, and just under 1 in 4 Americans pay for a Netflix account.

A significant portion of the global population uses social media, but how much time do they spend using it? Again the answer comes from marketing research companies: the average global user spends 2 hours and 16 minutes per day on social media, in the U.S. the average user spends 2 hours and 4 minutes (Kemp 2019). If we round the average use time per day to 2 hours, that would mean that the average U.S. social media user spends 730 hours per year on social media; that is equivalent to :

- 18 40-hour work weeks
- The flight time required to obtain a commercial pilot's license almost 3 times
- The amount of required class time required to complete over 4 12-credit semesters of college
- About 15% of the supervision hours the average medical student receives during training (The average medical student has 5,000 hours of clinical experience by the time they graduate)

Social media has a huge global impact; because of both the number of people who use and they time they spend using it. But how does it impact all of these individuals? Does social media really connect people?

Victoria Burghart, Jaime Rudyk, David Puder, M.D.

Is Social Media Social?

There are a few recent studies that address social media

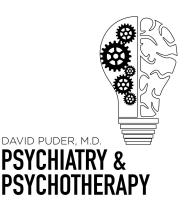
and perception of connectedness. A 2018 study from the University of Kansas found that after using social media for 5-10 minutes, 75% of study participants reported that they did not believe they socially interacted during that time, and 50% reported that they typically interact on social media (Hall, J. 2018). That same study also found that while chatting/messaging was the best predictor of feeling relatedness and perceiving social interaction, only 4% of the participant's time was spent chatting (Hall, J. 2018). Another 2018 study conducted by two university researchers took a different approach: they asked participants to rate images based on the desirability of their content. Those who rated social media icons more desirable were more likely to (1) have a higher daily social media usage rate, (2) rate images of solitary activities more highly, and (3) hold stronger beliefs that social media had an impact on their in-person relationships when compared to those who did not rate social media icons highly (Hill and Zheng 2018). According to the authors, these findings suggest that "the immediate desire for is potentially linked to one's desire for social isolation" (Hill and Zheng 2018). Interestingly, echoes of these sentiments can also be found in a 2019 article from globalwebindex, a digital surveying and data collection company, analyzing the rise of TikTok, a relatively new video creation and sharing platform:

"TikTok's rise in popularity is no coincidence – it's been ushered in by trends we have commented on before. In recent years, our data has shown using social media to share personal updates and to connect with friends has become less important to internet users. Using it to find entertainment is now more of a priority. We see the evidence for that in the responses TikTok users give for why they enjoy using the service.

This trend is often called "passive browsing", whereby social media users trawl through their feeds to consume content without sharing anything themselves."

- Chris Beer, Senior Trends Analyst

A 2019 analysis of data from the Monitoring the Future Database, collected nationally by the University of Michigan's Institute for Social Research from U.S. teenagers since



Victoria Burghart, Jaime Rudyk, David Puder, M.D.

DAVID PUDER, M.D. PSYCHIATRY & PSYCHIATRY & PSYCHIATRY PSYCHIATRY

1975, also provides insight into loneliness and social media use. The study found that 50% more 12th graders in 2017 "agreed" or "mostly agreed" with the statement "a lot of the time, I feel lonely" compared to those in 2012

(Twenge, Spitzberg, & Campbell 2019). They also found that adolescents that scored low in in-person social interaction and high in social media use reported significantly higher levels of loneliness when compared to those who were low in in-person interaction and low in social media use (Twenge, Spitzberg, & Campbell 2019).

These studies suggest that "social" media is a misrepresentation of how the average user interacts with these platforms. Social media isn't that social after all.

Social Media and Mental Health: Two Sides of the Story

The effect of social media on mental health has been a source of debate between researchers, users, and companies for years. Opinions are greatly divided, so we'll examine the two core positions. A quick review of a few evidence based medicine concepts can be found here.

Position 1: "Social media is a Nothingburger". If anything, it has a positive effect on mental health.

Surprisingly, it was more difficult to find studies detailing the positive effects of social media use. If you search for "social media" and "good" on google scholar the vast majority of the results are studies about how amazing social media is for business and advertising. Facebook, arguably the most widely used social media platform, issued a press release in December 2017 titled *Hard Questions: Is Spending Time on Social Media Bad for Us?* Facebook mainly used two articles to support "the good" of social media: a 2013 conducted out of Cornell & Georgia Universities and (2) a 2016 study conducted out of The Human-Computer Interaction Institute at Carnegie-Mellon.

In the first of the two studies, researchers learned that participants found viewing their own Facebook profile to be self-affirming compared to viewing a stranger's profile

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



(Toma & Hancock 2013). The same study also found that Facebook users were more likely to choose to visit Facebook compared to four "non-affirming" websites after receiving negative feedback (Toma & Hancock 2013). The

study does not appear to have any formal measures of depression or anxiety, but focuses on online behavior in the context of Self-Affirmation Theory, which is based on the idea that people have "a fundamental need to see themselves as valuable, worthy, and good" and seek out environments that confirm that belief (Toma & Hancock 2013); with adequate self-affirmation, people should not respond to "ego threats" - situations or evidence that contradicts that fundamental need to be worthy. In the context of this study, Facebook profiles were used as a measure of self-affirmation, as found in previous literature. The authors state that to be self-affirming, [Facebook] profiles must "represent the domain of self on which self-worth is contingent, offer a positive and desirable self-presentation, and be accurate" (Toma & Hancock 2013).

With this background information the design and results of the study are much clearer: after receiving negative feedback, which was in no way associated with the quality of the participant's performance, participants were more likely to visit Facebook over non-affirming options. In other words, Facebook users use their profiles as a tool to self-soothe after their concept of self-worth has been threatened, but does not clarify the impact this behavior has on mental-health. Notability, Toma & Hancock's study does not address the validity of the negative feedback (if the feedback was congruent with performance), nor the participants' ability to discard negative feedback they assessed as undeserved. The inability to reject invalid feedback, positive or negative, is a huge behavioral red flag that leads to some concerning questions: first, if the negative feedback was invalid, did participants reject it appropriately? Second, did Facebook use make participants more accepting of invalid negative feedback without critical appraisal of its value?

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



<u>A Note on Association Strength</u>: Association strength, or "the power of a study", is represented by β . B ranges from 1 to 0, where 1 is an absolute, strong association and 0 is no association.

The second study cited in the Facebook press release comes from two authors. The first, Robert Kraut PhD. (in Social Psychology) who is on the faculty of Carnegie Mellon's Human-Computer Interaction Institute. The second author is Moira Burke PhD. (in Philosophy of Human-Computer Interaction), a research scientist employed by Facebook. She received her PhD. at Carnegie Mellon under the supervision of Robert Kraut; this study is built on some of the data from her thesis paper. Of note, Burke is also one of the two authors of the Facebook press release on social media and mental health (Ginsberg and Burke 2017). They collected data from 1,910 English-speaking Facebook users recruited world-wide by opt-in survey marketed through Facebook ads from June - August of 2011. The survey consisted of scales for measuring aspects of well-being and questions relating to eight Facebook friends chosen by the participant, they then compared the activity of the participant and friends to Facebook server activity log (Burke and Kraut 2016). They found that receiving composed, targeted communication from strong ties (close friends as determined by participant) had a minuscule, but statistically significant association with increased well-being (β =0.02, p=0.04), which the same actions from weak ties showed no impact (β =0.01, p=0.70).

There are other studies on social media and mental health outside of those cited in Facebook's press release. A study published in 2015 found that overall, people experience more positive emotions than negative emotions while browsing on Facebook (Lin, 2015). They found that participants were happier when a post came from a strong tie [relationship], but experience more benign envy when posts are from a strong tie (Lin, 2015). Another study from 2012 of 190 18-29 year-olds found no associated between time spent on social networking sites and level of depression (Jelenchick et al. 2012). One critique of this study is the use of a screening tool called the PHQ-9 to measure transient, "in the moment" changes in mood. The authors send out 43 surveys to each participant over a 7 day period of time The PHQ-9 is designed to evaluate

Victoria Burghart, Jaime Rudyk, David Puder, M.D.

clinical depression symptoms within the last two weeks and is not an appropriate measure of small mood changes like the $\underline{OQ-45.2}$.

Overall, the evidence supporting the idea that social media

use has either a positive effect or no effect on mental health is quite poor. The studies had critical design flaws, questionably associated results, authors with conflicts of interest, or little data on long-term mental health measures. Now that we've examined the evidence for Position 1, let's explore the support for Position 2.

Position 2: "Social media has a damaging effect on mental health"

The idea that social media is bad for mental health is not new. The trend in increasing screen time has had parents trying to detach their children and teens from devices for several years. But what is the evidence behind the idea that social media has a negative impact? According to a review published in *Nature Communications,* current evidence in neuroscience research suggests that adolescents are "highly sensitive to acceptance and rejection through social media" (Crone & Konijn 2018). The authors also state that "the emerging trajectory of acceptance sensitivity, peer 'obedience', and emotion precedence may make adolescents specifically susceptible to sensationalist and fake news, unrealistic self-expectations, or regulation emotions through adverse use of media"(Crone & Konijn 2018). While this study addresses the potential for negative impact on emotional and cognitive processing, it doesn't provide data about mental illness and its relationship to social media; neuroscience has left that to social psychologists.

Social psychologists have been interested in the relationship between social media and mental health for a while. Here are summaries of several relevant studies:

 In 2013, the University of Michigan conducted a study on perceived well-being and life satisfaction. Over the course of two weeks 82 participants were texted surveys at five random times during the day, each evaluating their mood, self-esteem, and perceived life satisfaction at that time as well as Facebook use in the period of time since their last survey. They found that the higher the



Victoria Burghart, Jaime Rudyk, David Puder, M.D.

DAVID PUDER, M.D. PSYCHIATRY & PSYCHOTHERAPY

participants' Facebook use, the greater the decline in their subjective well-being and life-satisfaction (Kross, 2013).

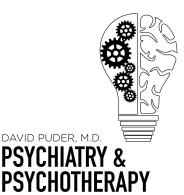
- A 2015 study of Canadian middle & high-school children found that adolescents that used social media more than 2 hours per day where more likely to rate their mental health poorly; they were also more likely to experience high-levels of psychological distress and suicidal ideation (Sampasa-Kanyinga 2015).
- A 2016 study conducted by researchers at the University of Pittsburgh found that, out of 1,787 young adults (age 19-32), those who spend more than 120 minutes on social media per day were almost twice as likely to report high levels of depression that participants who spent <30 minutes per day (OR=1.66, 95% CI[1.14,2.42], mean time per day: 61 min) (Lin et al. 2016); they also found that when stratified by number of social media site visits per week, the highest 25% was more than twice as likely to report greater depression symptoms (OR = 2.74, 95% CI[1.86,4.04], mean site visits: 30 per week).
- A 2017 follow up study from the same research team reported that those who used 0-2 social media platforms, those that used 7-11 social media platforms had 3x the odds of increased levels of depression and 3.2x the odds of increased anxiety symptoms (Primack et al. 2017).

In contrast to the aforementioned studies, a 2017 meta-analysis of studies concerning social media and psychological well-being from the National Changhua University of Education in Taiwan found that:

"correlation between time spent on social networking sites and positive indications (self-esteem and life satisfaction) were close to 0, whereas those between time spent on social networking sites and negative indications (depression and loneliness) were weak" (Huang 2017)

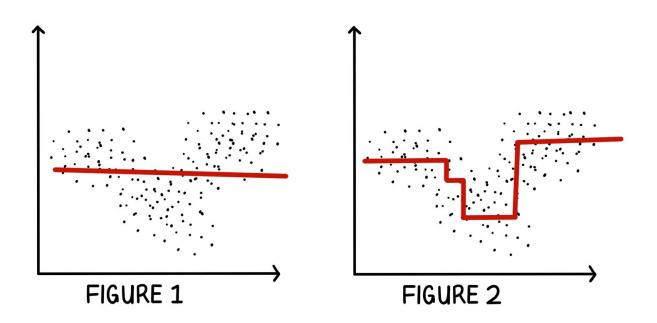
There are a few issues with this study. First, the variables measured by the individual studies in the meta-analysis were quite diverse and the data had to be heavily manipulated in order to be analyzed together. Another potential flaw in the analysis of the data is strict adherence to a linear association between the two variables without allowing for potential nonlinear relationships. For example, let's imagine we have a data set represented by the black dots on Figures 1 & 2. If we were to model a purely linear

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



relationship with this data, the result might look somewhat like Figure 1; the line is flat, showing no trend or relationship between the two variables. If we use model specificity, which does not assume the relationship

between two variables fits a straight line, we might get results that look like figure 2, which shows a clear relationship between the two variables.



The weak association between negative indicators of well-being may or may not be more significant, but the data was only used in a rigid analytic model that is limited to direct linear relationships. Keeping those issues with data analysis in mind, we'll take those results with a grain of salt and explore some of the newer studies on media and mental health.

Victoria Burghart, Jaime Rudyk, David Puder, M.D.

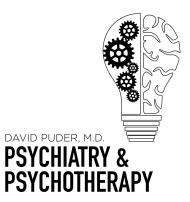
Effect size? Effect size (d) is a description of effect magnitude calculated from data analyzed with Cohen's d test [it's complicated]. + indicates a positive correlation, and - indicates a negative correlation	Effect size	đ
	Very small	0.01
	Small	0.20
	Medium	0.50
	Large	0.80
	Very Large	1.20
	Huge	2.0



References: Cohen 1988, Sawilowsky 2009

Some of the most recent studies on social media and mental health were published by Twenge et al. from the University of San Diego with collaboration from Campbell at the University of Georgia. The study included approximately 6,000 participants over time and researchers found that the prevalence of Major Depressive Disorder in adolescents age 12-17 increased from 9.1% of teens in 2010 to 14.8% in 2017, or a 63% increase in the number of teens with depression (Twenge et al. 2019). Another finding from the same study concerns young adults (aged 18-25): in 2017, 71% more young adults experienced serious psychological distress within the last month compared to the same age group in 2008 (13.1% vs. 7.7% respectively). Within this age group, those aged 20-21 had the largest increase in measures of psychological distress within the last month, 78% more compared to the same cohort in 2008 (Twenge et al. 2019). In a separate 2019 publication, Twenge and Campbell examined the association between digital media use, depression, and suicidal ideation in adolescents using data from two large surveys in the US and one the UK (221,096 total responses). They found that light users of digital media (< 1 per day) reported higher psychological well-being than heavy users (5+ hours per day) with a mean effect size of d=0.31, or small to moderate effect (Twenge & Campbell 2019).

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



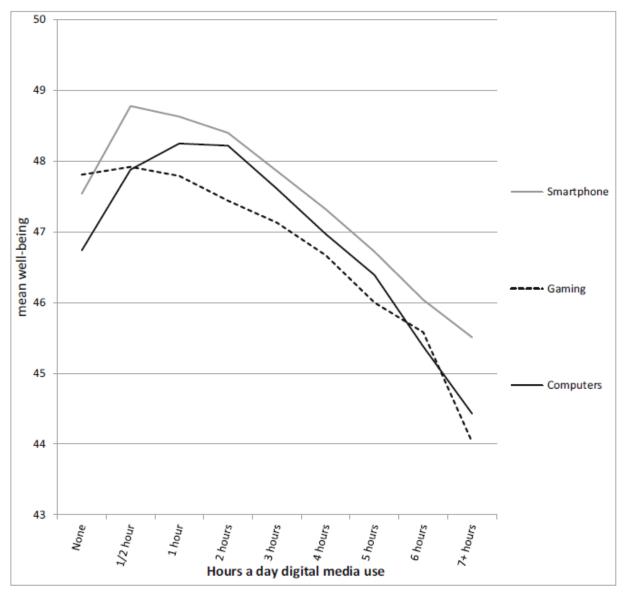


Fig. 2 Mean well-being by hours a day of gaming, smartphone, and computer use, UK sample of 15-year-olds, with controls

Image source: Twenge & Campbell 2019

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Victoria Burghart, Jaime Rudyk, David Puder, M.D.

Heavy users of social media were more likely to be unhappy, be low in well-being, or to have suicide risk factors such as depression, suicidal ideation, past suicide attempts [see Figure 6] (Twenge & Campbell 2019); more



specifically, heavy users were twice as likely to report having attempted suicide. The largest drop in well-being occurred between moderate and heavy use as shown in Figure 2.

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



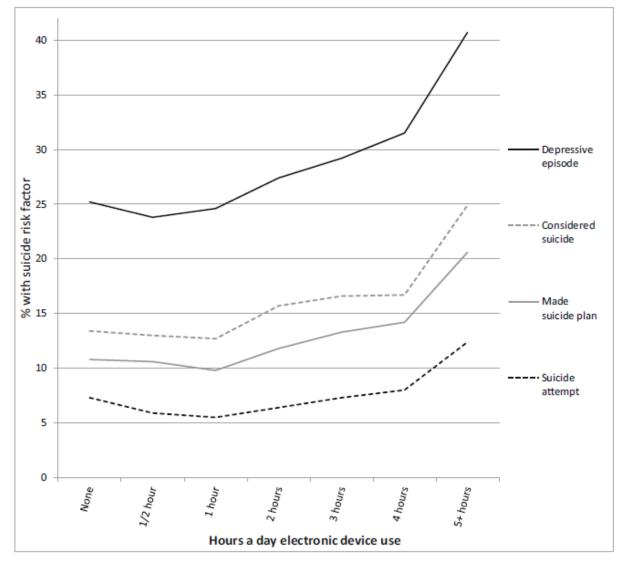


Fig. 6 Percentage of adolescents with suicide risk factors by hours a day of electronic device use, 9th-12th graders, YRBSS, with controls

Image Source: Twenge & Campbell 2019

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Victoria Burghart, Jaime Rudyk, David Puder, M.D.



Interestingly, light digital media users were highest in well-being, even over moderate users (2-5 hrs per day) and non-users . Light digital media users were highest in

well-being, even over moderate users (2-5 hrs per day) and non-users; according to the authors, the cause of this increased well-being will require further study (<u>Twenge &</u> <u>Campbell 2019</u>).

The evidence that social media use is detrimental to mental health is quite extensive compared to the studies that find positive or inconsequential relationships. The effect of use on those who spend greater than 2 hours per day on social media appears to have a greater impact than on those who use less, especially in adolescent users. Now that we've examined the relationship between social media and symptoms of anxiety and depression, let's take a look at the effect of screen time on sleep. Sleep is an essential component of mental health, so much so that changes in sleep are part of diagnostic criteria for depressive disorders, anxiety disorders, and many other psychiatric disorders (American Psychiatric Association); there is an entire subsection of diagnostic criteria specifically for Sleep-Wake Disorders. Is sleep a part of the problem with social media and screen use?

Electronic Use & Sleep

There are many studies on the effects of screens on sleep. One of the older studies comes from the *Journal of Youth Adolescence* in 2015. In a survey of 362 adolescents, Swiss researchers found that the use of digital devices before sleep was associated with shorter sleep duration (β = -.29, *t* = -6.00, *p*<0.001) and with increased sleep difficulties (β = .21, *t* = 3.91, *p*<0.001); those with sleep difficulties were more likely to report depression symptoms (β = .26, *t* = 4.84, *p*<0.001) (Lemola et al, 2015). The study also found that teens who owned smartphones reported more electronic media use before sleep and later bedtimes. A 2016 study of 467 teens conducted by the University of Glasgow found that poorer sleep quality was associated with higher overall social media use (*r* = .24, *p* < 0.001), higher nighttime use (*r* = .34, *p* < 0.001), and higher emotional investment in social media (*r* = .28, *p* < 0.001) (Woods et al. 2016). The study also compared anxiety and depression levels which were independently

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



associated with higher overall social media use, higher nighttime social media use, and increased emotional investment in social media (r = 0.11 - 0.32, p < 0.001 - 0.01) (Woods et al. 2016).

Two of the most recent studies on the relationship between sleep and screen time come from (1) University of Ohio/University of Wyoming and (2) from a collaboration between 9 Universities in the UK and Switzerland. The first study tracked 114 college students during their first semester; they were given sleep quality surveys and had both their waist circumference and BMI measures before and after the study period. Unsurprisingly, only a third of participants reported meeting sleep recommendations, those who slept < 8 hours 25% percent slept 6.5 hours or less each night, and 92% kept their phone in the room while they slept (Whipps et al. 2019). They found that those who reported using their devices to play games were more likely to have higher pre and post-trial: weight, waist circumference, and BMI (p < 0.006 - 0.037) (Whipps et al. 2019). The second study uses data from a survey of 6,616 adolescents in the UK that measured screen use and several sleep variables such as bedtime and how long it took to fall asleep. According to the survey, over $\frac{2}{3}$ of reported using one screen-based mobile device at night, and about $\frac{1}{3}$ reported using phones at night in a dark room (Mireku et al. 2019). They also found that:

- Night-time phone and TV use was associated with a higher likelihood of insufficient sleep (less than 8 hours) on both weekdays and weekends (OR = 1.32 & 95%CI[1.10,1.60];OR = 1.40 & 95%CI[1.23,1.60] respectively)
- Teens using mobile phones in a lighted room had a higher chance of getting insufficient sleep (OR = 1.32 & 95%CI[1.37,1.95]) and sleep later OR= 1.64 & 95%CI[1.37,1.95]) on weekends compared to non users
- Those who used mobile phones in a dark room on weeknights were over 2x more likely to get insufficient sleep (OR=2.13 & 95%Cl[1.79,2.54]) and over 3x more likely to go to sleep later (OR=3.38 & 95%Cl[3.25, 4.62]) compared to non-users.
- Using mobile phones at night was associated with lower quality of sleep compared to non use (β=-1.18 & 95%CI[-1.85,-0.52])

Victoria Burghart, Jaime Rudyk, David Puder, M.D.



Clearly using mobile devices at night before sleeping leads to less sleep and lower quality sleep. Sleep issues often have a negative effect on mental health that would be independent of any effects from media exposure or online interaction.

Closing Thoughts

<u>There are papers on both sides of the line.</u> When researching Social media, like other controversial topics, you will be able to find a publication that supports any given side of the debate. Remember to evaluate your sources critically, make sure that research studies are being summarized correctly, and watch out for bias - especially your own. Look for peer- reviewed academic journals whenever possible, try to avoid getting your information from secondary sources like news media without verifying it, and look for multiple sources with similar findings.

<u>Too much screen time has a negative impact.</u> There are long term effects negative effects of more than 2 hours of non work/school screen time per day, especially for adolescents. There is a benefit to limiting screen time to less than 2 hours/day. Some signs of unhealthy attachment to mobile devices are:

- Nomophobia: the anxiety one feels when unable to access their cell phone
- Telepressure: anxiety created by feeling/belief that messages, emails, etc. must be answered immediately

<u>Sleep is King.</u> Treasure your sleep! It's important for your mental health. Phones and other screens will interfere with good sleep. If you wake up at night, don't check your phone. Try not to use screens within an hour of going to sleep for 3-4 weeks and see if you sleep better.

<u>There are a lot of things we're not doing because we're on our phones.</u> In a 2019 study that restricted social media use participants were found to spend more time browsing the internet, working, caring for children, cooking, and cleaning (<u>Hall, Johnson, & Ross</u> 2019). Things you could be doing include:

Victoria Burghart, Jaime Rudyk, David Puder, M.D.

- Talking to people in-person
- Exercising
- Going outside
- Developing health spirituality
- Learning a new skill



<u>Screens are often seen as a way to meet desires. especially for connection, but keep in</u> <u>mind that true connections are getting harder to come by on social media</u>. Social media presence, like appearance, is curated for public consumption. People pick and choose what to post and how - whether it's only posting good things or using media editing tools, be aware that what you see may not be the whole story. Comparing yourself to a social media facade isn't realistic or fair.

<u>Professionals can definitely use social media.</u> but you have to learn how to use it effectively and not allow it to take over your life. We personally use social media because of our mission to educate the next generation of mental health professionals. People have their attention online; if you have a message you want to share, having a social media presence can be important.

Finally, if you find this blog and podcast helpful please share it on social media! (A bit of humor to end it!)