Problematic Smartphone Usage in the TikTok Era

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Abstract

As smartphone ownership has steadily increased there has been a rise in individuals that display Problematic Smartphone Use (PSU). Through a comprehensive literature review of PSU it quickly became evident that research into PSU intervention strategies such as Cognitive Behavior Therapy (CBT) and Digital Detox are focused on "collectivist cultures". However, "collectivist cultures", such as India and China, account for only 45% of the world's population, and omit North America, almost all of Europe, Africa and Australasia. Further, our literature review identified that PSU intervention strategies almost all focus on issues surrounding social media use and gaming. Beyond this over-focus on collectivist cultures, we also find that the advent of TikTok has fundamentally changed things. TikTok has a strategy of using AI to feed users short form video (SFV) content that they find interesting. This is a very different form of smartphone usage than before TikTok, and almost certainly leads to a different form of PSU. As such, it is not clear that CBT and Digital Detox strategies developed based on "collectivist cultures" and based on pre-TikTok consumption of social media and gaming is relevant or effective This paper is the first to identify the issue of a tilt in the PSU literature and the accompanying CBT and Digital Detox strategies to "collectivist cultures", as well as the first to recognize the impact on these PSU treatments as a result of the "TikTok Era" and the resulting transition to SFV. The outcome is that a rethink and new research into PSU and accompanying treatments is needed.

Keywords: problematic smartphone use, cognitive behavioral therapy, digital detox, short form video, TikTok

1. INTRODUCTION

With the steady increase of smartphone ownership and accessibility, Problematic Smartphone Use (PSU) is becoming more apparent within society (Auxier & Anderson 2021). PSU can be defined as compulsive smartphone use that can lead to negative consequences during daily functioning in terms of productivity, social relationships, physical health, or emotional well-being (Horwood & Anglim, 2018). Interventions can be made in several ways to help remedy PSU, including the use of apps designed for the purpose, not using the

smartphone at all (Digital Detox), as well as techniques such as cognitive behavioral therapy (CBT), which is an individual therapy that is designed to identify and make changes to an individual's negative behaviors, and has been found to be promising in helping the habits that PSU may cause (Kim, 2013).

This paper begins with a basic review of the current state of research on PSU, and ways in which individuals might cope with PSU. From this initial review phase, we discovered two trends which are the core thesis of this paper: that current research on PSU and how it can be treated with CBT and Digital Detox may be missing important issues of culture that make such research less relevant across areas of the world beyond those most intensely covered in the literature; that current research on PSU and how it can be treated with CBT and Digital Detox is focused almost exclusively on social media and gaming, which ignores the rapid and intensive shift to short form video (SFV) being the predominate way smartphone users spend their time online, exemplified by the rise of TikTok. As a result, the research on PSU and how to treat it is likely not that useful anymore.

2. RESEARCH BACKGROUND

Problematic Smartphone Usage

Problematic Smartphone Usage (PSU) is a term that can group certain individuals into a specific category correlated to the way they use their smartphone and can manifest in different ways depending on the user. PSU can be described as compulsive smartphone use that can lead to negative consequences during daily functioning in terms of productivity, social relationships, physical health, or emotional well-being (Anglim & Horwood, 2018). PSU can be seen in behaviors such as using the device while driving which has been correlated to increase in traffic collisions and has been investigated as early as 1992 through data on mobile phone distractions related to collisions while driving (Billieux et al., 2019; Sun & Jia, 2016; Violanti, 1998).

Dependency problems can impact smartphone users that rely on the device to achieve their desired goals (Li, 2016) and may influence certain social, behavioral, and affective (mood) problems and can be linked to addictive behavior amongst individuals (Csibi et al., 2017; Choliz, 2010). Although PSU is linked to addictive behavior there has yet to be a standard cut off point to distinguish if an individual user is addicted or has reached a problematic level of use (Harris et al., 2020). Even though there is no standard cutoff to diagnose PSU, someone who may be exhibiting PSU can be identified as displaying the 6 core components of addictive behavior. These include salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse (Csibi et al., 2017). Table 1 below describes each of these terms in more detail in relation to problematic and addictive behavior towards smartphones.

Term	Definition
Salience	Overwhelming dominance and total preoccupation of smartphone use.
Mood Modification	Mood changes experienced directly using smartphones.
Tolerance	The increase over time of daily hours spent using smartphones.
Withdrawal Symptoms	Negative feelings when unable to engage in smartphone use.
Conflict	Intrapersonal and interpersonal problems arising from smartphone use.
Relapse	The reversion to addictive smartphone behavior after a period of abstinence.

Table 1: Definition Table, Source, Csibi et al., (2017)

The most significant predictors of PSU are time spent using the device, conscientiousness (wanting to fulfill your own duties), emotional stability, openness, and age (Griffiths et al., 2017). Specific app use by an individual, which means the individual is focused on a particular app, for example Facebook or TikTok, may be another indicator to PSU or smartphone addiction (Noë et al., 2019).

Even though there is limited research that addresses general prevalence of PSU within individuals as a whole or who is likely to be affected by problematic use, preschool children and young adults are at highest risk for smartphone related addicted behavior when using the core components of addictive behavior model (Csibi et al., 2019). The most vulnerable age group for excessive smartphone use are adolescents between the ages of 14 to 18 years old (Lemola et al., 2014; Csibi et al., 2019). A data analyzation of problematic use within populations of children and young people shows that one in four of the individuals included in the study exhibited PSU, and with these behaviors they also have greater odds of being in poorer mental health than someone that does not suffer from PSU (Sohn, et al., 2019). Another survey

found that about a third of UK adults surveyed said that they find it difficult to disconnect (Ofcom, 2016). Pew Research center also found that almost half of U.S. adults reported that they "could not live" without their smartphone (Smith, 2015; Elhai, et al., 2016).

Early studies on PSU show the potential correlations to anxiety disorders, personality disorders, depressive disorders, and excessive stress when problematic use is present in an individual (Griffiths, et al., 2017; Sohn, et al., 2019), and more time spent on smartphones can lead to increase in anxiety (Griffiths, et al., 2017).

Results from research on anxiety and computers found anxiety was most related to PSU and that when one's smartphone usage increases their depression decreases and vice versa (Elhai, et al., 2016). The inverse relationship of depression with smartphone use was a pattern found in many studies displaying the dependency of an individual when PSU is present and it can be further described as an individual's perceived depression increasing when they are unable to use their smartphone (Elhai, et al. 2016). Younger individuals are at the highest risk of problems developing from PSU with many of the symptoms in these populations consisting of depression, anxiety, high levels of perceived stress, and poor sleep (Sohn, et al., 2019). Social interactions are also impacted by the prevalence of PSU, envy was a risk factor mediated from fear of missing out that is created through PSU use in adolescent individuals. Envy in this circumstance is when the individual is jealous of what they see other people experiencing through their device (Wang, et al., 2019).

Although there is limited research on which smartphone apps are causing problematic use or are the most addictive, social media apps like Snapchat show their correlation to PSU (Noë et al., 2019). Based on an indicator called Smartphone Application Based Addiction Scale (SABAS), which uses the 6 core components of addiction as discussed earlier as measurement, excessive users of social media apps and gaming are more likely to develop addiction symptoms than individuals that use their smartphones for productive tasks such as school or work purposes (Csibi et al., 2019).

Coping With Problematic Smartphone Use (PSU)

With PSU impacting certain individuals in the digital era, how to cope with it is an important topic. Research on coping with PSU is extensive, and within it we found two mechanisms that are more prevalent: 1) remedies such as Cognitive Behavioral Therapy (CBT), which is an individual therapy that is designed to identify and make changes to an individual's negative behaviors and may be an effective way of coping with PSU (Kim, 2013), and 2) apps designed specifically to intervene during long periods of smartphone use, which we call here Digital Detox.

CBT "is a common type of talk therapy (psychotherapy). You work with a mental health counselor (psychotherapist or therapist) in a structured way, attending a limited number of sessions. CBT helps you become aware of inaccurate or negative thinking so you can view challenging situations more clearly and respond to them in a more effective way" (Mayo Clinic, 2019). CBT may be effective in dealing with PSU use as it has been found to help a multitude of habits. For instance, it can assist a person with an internet addiction to recognize the thoughts and feelings that are leading to their addictive behavior (Kim, 2013, Orzack & Orzack, 1999). In another study analyzing the impact of mind-body exercise (defined in this setting as gentle movement, anatomic alignment, mental focus, deep breathing, and staying in a meditative present state) and CBT, it was found that both to be useful in combating PSU as well as promoting good overall mental health (Thomas, et, al. 2020). In a controlled study completed on a group of individuals ages 12-19 that used an adapted form of CBT to target excessive smartphone use, the individuals showed a reduction in their excessive smartphone use after the therapy as well as an improvement in their psychological well-being (Khalily, et, al. 2021). This improvement in psychological well-being included a significant decrease in symptoms of depression, anxiety, stress, hyperactivity, and emotional difficulties immediately following the trial and this decrease maintained during the 3-month follow-up. In this case, excessive smartphone use follows a similar meaning to PSU as defined earlier correlating with the same impacts for each including increased risk of depression and anxiety, higher perceived stress, and poorer sleep in these individuals with these excessive or problematic behaviors (Khalily, al. 2021; Horwood & Anglim , 2018; Sohn, et al., 2019). CBT has been found to be effective in treating individuals that exhibit these psychological issues and could be a gateway into helping change the habits of problematic smartphone users (Kim, 2013).

With the large potential effect on the youth since younger individuals are more likely to become problematic smartphone users', other

intervention techniques are worth discussing (Sohn, et al., 2019). Digital interventions, which are smartphone apps that are created to help reduce smartphone usage, could be promising if they become popular enough (Velthoven, et al., 2018). One study focused on the impact of an app that was created to show an individual their usage statistics and ways to limit their usage behaviors with a goal of self-regulation of smartphone use shows the efficacy of such an app. The results show that individuals using this app had a significant decrease in usage as well as their ability to manage interruptions was greatly improved (Ko, et al., 2015). However, there is a lack of empirical evidence that proves the safety and effectiveness of digital interventions through smartphone apps (Veltohoven, et al., 2018). Due to individual subjective differences to their use (varying experiences produced by different users) the effectiveness of an application is difficult to find because of the inability to tailor the application to each person's specific psychological needs (Veltohoven, et al., 2018).

Another approach that is being examined to help with addictive behaviors that are caused by smartphone use and other internet technology is a Digital Detox, which can be defined as a periodic disconnection from social or online media, or strategies to reduce digital media involvement (Enli & Trine, 2019). The apps described earlier for digital interventions can be viewed in a similar way to digital detox because of their goal to reduce digital media in a user (Enli & Trine, 2019; Ko et al., 2015; Velthoven et al., 2018). A study completed on digital detox, which in this case was four sessions of 24-hour smartphone abstinence, shows that there is a slight improvement in mood during periods of abstinence, but the overall results displays that there was not much change in behavior in heavy smartphone users (Wilcockson, et al., 2019). Another study showed digital detox can lead to a decrease in smartphone usage and a decrease in depression symptoms after completing the intervention (Radtke, et al., 2021). Though more studies are starting to be done on impacts of digital detox on PSU it is still rather a grey area and results appear to display a lack of effectiveness on the behaviors of the problematic users that are subjected through a digital detox intervention (Wilcockson, et al. 2019; Radtke, et al., 2021).

Studies on Coping with PSU are predominately focused on a small cross-section of global populations

In our review of studies on coping with PSU we noticed that the majority of the research was focused on a small cross-section of global populations. This is not a criticism of the research in and of itself. We are confident that the published research is thorough, informative, useful and interesting. Our point here is that there are known differences between the ways populations use and process cultural values and practices, and there is support in the literature for the fact that this has an impact on the efficacy of remedies such as Cognitive Behavioral Therapy (CBT). Although we conducted a thorough search, we were not able to locate studies about cross-cultural or cross-country similarities or differences for apps designed specifically to intervene during long periods of smartphone use (Digital Detox).

We are first going to introduce two theories for looking at the ways different cultures might interact differently with CBT and Digital Detox: Hofstede's Cultural Dimensions Theory and the Theory of Cognitive Styles.

Hofstede's *Cultural Dimensions Theory* (Hofstede,1984) is a framework for cross-cultural communication that shows the effects of a society's culture on the values of its members, and how these values relate to behavior. As CBT and Digital Detox are behavioral interventions, we believe that it is likely that the use of these as an intervention for PSU is likely going to vary across countries and cultures.

Witkin's *Theory of Cognitive Styles* (Witkin et al., 1977) "is a person's preferred way of gathering, processing, and evaluating information. It influences how people scan their environment for information, how they organize and interpret this information, and how they integrate their interpretations into the mental model and subjective theories that guide their actions" (Hayes & Allison, 1998). As with Hofstede's Cultural Dimensions Theory, we believe that since CBT and Digital Detox are behavioral interventions, different cognitive styles across cultures and countries may impact the efficacy of these interventions.

In order to validate our contention that the majority of research on PSU with interventions of CBT and Digital Detox is focused on a small cross-section of global populations, we use a recent narrative review on combatting digital addiction and the countermeasures proposed (Cemiloglu, et al. 2022) which reviews papers on this topic over the period 2012 to 2022. In addition, the Cemiloglu, et al. (2022) review finds that six scales have been used to screen research participants for mobile phone or smartphone addiction (see Appendix A for the six scales).

The Cemiloglu, et al. (2022) review cites 17 papers that use CBT as a PSU countermeasure approach. These papers are included in Table 2, along with the location of the study covered by the research, and whether or not one of the six screening for mobile or smartphone addiction scales was used.

Excluding the one paper that is a review paper of the literature, CBT as a countermeasure approach to digital addiction was studied 4 times in China (25%), 3 times in South Korea (18.75%), 3 times in Germany (18.75%), and once each in Spain, Pakistan, Iran, Austria and the USA (6.25%) (note, one study covered Germany and Austria, so the total adds up to more than 100%). When the list is narrowed to those studies where the research participants were selected based on mobile or smartphone addiction surveys, there are 4 in total, with 2 from South Korea, 1 from China and 1 from Pakistan.

The Cemiloglu, et al. (2022) review cites nine papers that use Digital Detox in the form of limit setting as a countermeasure approach. These papers are included in Table 3, along with the location of the study cover by the research, and whether or not one of the six screening for mobile or smartphone addiction scales was used.

Excluding the one paper that used downloads from the Google Play store for data (and therefore did not report country of the participant), Digital Detox from limit setting as a form of digital addiction countermeasure was the location of the study four times (50%) in South Korea, and one time in each of Japan, India and the USA (33%), with one study being across the world though predominately from Asia.

We next map the locations where the research was conducted with CBT or Digital Detox countermeasures onto the Hofstede's Cultural Dimensions (Hofstede,1984) framework. We have combined countries, such as Austria - Germany, and China – South Korea – Japan, where the three Hofstede dimensions of Individualism – Collectivism, Power Distance and Uncertainty Avoidance are the same. The intent here is to show whether or not there are concentrations of research around specific types of cultural dimensions.

In Table 4, we summarize three dimensions of Hofstede's Cultural Dimensions Theory (Hofstede,1984) showing the effects of a society's culture on the values of its members, and how these values relate to behavior. The dimensions are Individualism-Collectivism, Power Distance, Uncertainty Avoidance. We map these to the relevant research on CBT or Digital Detox countermeasures.

In the US, there is a high level of individualism, leading to a focus on Personal achievement, Independence, and Self-expression. This can manifest itself as regards to CBT as being something that is acceptable, and indeed easy to talk about, as therapy is about Independence, and Self-expression. In contrast, countries such as China, South Korea and Japan have a much more collectivist approach to culture with a focus on the values of its members, and how these values relate to behavior, leading to a focus on group consensus, social harmony and interdependence. This suggests that CBT and Digital Detox might be more problematic as a choice of intervention in higher collectivism societies than higher individualistic societies.

We note that there is support in the literature for this contention. For instance, "there are persistent questions about the generalizability of CBTs to culturally diverse populations and whether culturally sensitive approaches are warranted" (Huey, et al. 2023). This very recent research also notes that there is "a dearth of relevant trials" of the impact of cultural sensitivity within the context of CBT.

ISSN: 2473-4901
v10 n6116

Reference number in Cemiloglu, et al. (2022)	Citation	Location of study	Participants screened based on mobile or smartphone addiction surveys?
[13]	Hou, Y., Xiong, D., Jiang, T., Song, L., & Wang, Q. (2019).	Social psychology course at Peking University, **China**	No
[28]	Alavi, S. S., Ghanizadeh, M., Mohammadi, M. R., Jannatifard, F., Esmaili Alamuti, S., & Farahani, M. (2021).	All students at Tehran, **Iran** universities in the academic year of 2018-19	No
[42]	Li, T., Cui, L., Ma, S., Zhang, S., Zheng, J., Xiao, J., & Zhang, Q. (2018).	Forty-two **Chinese** college students	Yes
[60]	Wölfling, K., Müller, K. W., Dreier, M., Ruckes, C., Deuster, O., Batra, A., & Beutel, M. E. (2019).	4 outpatient clinics in **Germany** and **Austria**	No
[61]	Seo, H. S., Jeong, E. K., Choi, S., Kwon, Y., Park, H. J., & Kim, I. (2020).	**Korea** University Ansan hospital between the ages of 10 and 24 year	Yes
[72]	Ke, G. N., & Wong, S. F. (2018).	**Malaysia**	No
[73]	Han, J., Seo, Y., Hwang, H., Kim, S. M., & Han, D. H. (2020).	**South Korea**	No
[74]	Wölfling, K., Beutel, M. E., Dreier, M., & Müller, K. W. (2014).	42 patients in **Germany**	No
[75]	González-Bueso, V., Santamaría, J. J., Fernández, D., Merino, L., Montero, E., Jiménez-Murcia, S., & Ribas, J. (2018).	Barcelona, **Spain**	No
[84]	Zhang, J. T., Ma, S. S., Li, C. S. R., Liu, L., Xia, C. C., Lan, J., & Fang, X. Y. (2018).	Beijing Normal University, **China**	No
[86]	Young, K. S. (2013). Treatment outcomes using CBT-IA with Internet-addicted patients. *Journal of behavioral addictions*, *2*(4), 209-215.	**USA**	No
[105]	Du, Y. S., Jiang, W., & Vance, A. (2010).	**China**	No
[106]	Lee, H., Seo, M. J., & Choi, T. Y. (2016).	**South Korea**	Yes
[107]	Kim, S., & Noh, D. (2019).	5 in **China** 3 in **Korea** 2 in **USA** 1 in **Germany** Survey of prior research	No
[108]	Khalily, M. T., Bhatti, M. M., Ahmad, I., Saleem, T., Hallahan, B., Ali, S. A. E. Z., & Hussain, B. (2021).	**Pakistan**	Yes
[109]	Szász-Janocha, C., Vonderlin, E., & Lindenberg, K. (2021).	**Germany**	No

Table 2: 17 papers extracted from Cemiloglu, et al. (2022) review that use CBT as a PSU countermeasure approach.

ISSN: 2473-4901
v10 n6116

Reference number in Cemiloglu, et al. (2022)	Citation	Location of study	Participants screened based on mobile or smartphone addiction surveys?
[117]	Ko, M., Yang, S., Lee, J., Heizmann, C., Jeong, J., Lee, U., & Chung, K. M. (2015)	Google Play – smartphone intervention apps	N/A
[118]	Ko, M., Choi, S., Yatani, K., & Lee, U. (2016)	**South Korea**	No
[119]	Kim, I., Jung, G., Jung, H., Ko, M., & Lee, U. (2017)	**South Korea**	No
[120]	Löchtefeld, M., Böhmer, M., & Ganev, L. (2013)	**Asia** (53.5%), **North America** (16.5%) and **Europe** (14.5%)	No
[121]	Kim, J., Cho, C., & Lee, U. (2017).	**South Korea**	No
[122]	Yasudomi, K., Hamamura, T., Honjo, M., Yoneyama, A., & Uchida, M. (2021).	**Japan**	No
[123]	Hiniker, A., Hong, S., Kohno, T., & Kientz, J. A. (2016).	**USA**	No
[124]	Okeke, F., Sobolev, M., Dell, N., & Estrin, D. (2018)	**India**	No
[129]	Ko, M., Choi, S., Yang, S., Lee, J., & Lee, U. (2015).	**South Korea**	No

Table 3: 9 papers extracted from Cemiloglu, et al. (2022) review that use Digital Detox in the form of limit setting as a countermeasure approach.

ISSN: 2473-4901
v10 n6116

Location	Papers identified in Table 1 & 2	Hofstede's Cultural Dimension of Individualism / Collectivism	Hofstede's Cultural Dimension of Power Distance	Hofstede's Cultural Dimension of Uncertainty Avoidance
USA	1 CBT 1 Digital Detox	**Highly Individualistic** Prioritize: Personal achievement Independence Self-expression	**Low** Great emphasis on: Equality Independence Challenging authority	**Low** Greater emphasis on: Innovation, flexibility and adaptability
Austria Germany	1 CBT 3 CBT	**Moderately individualistic** Prioritize: Personal achievement Independence Self-expression	**Low** Great emphasis on: Equality Independence Challenging authority	**Moderate to High** Strong emphasis on: Tradition Rules Avoiding risk
Spain	1 CBT	**Moderately collectivistic** culture, with a strong emphasis on family, community, and social harmony	**Relatively high** power distance culture, with a strong respect for authority and hierarchy	**Relatively high** uncertainty avoidance culture, with a strong desire for structure and rules
Malaysia	1 CBT	**More collectivistic** Prioritize: Social Harmony Interdependence, Group consensus	**High** Strong emphasis on: Respecting authority Social Status Hierarchy	**Moderate to High** Strong emphasis on: Tradition Rules Avoiding risk
India Pakistan	1 Digital Detox 1 CBT	**More collectivistic** Prioritize: Social Harmony Interdependence, Family loyalty	**High** Strong emphasis on: Respecting authority Social Status Hierarchy	**High** Strong emphasis on: Regulations Rules Avoiding risk
China South Korea Japan	4 CBT 3 CBT 4 Digital Detox 1 Digital Detox	**More collectivistic** Prioritize: Social Harmony Interdependence, Family loyalty	**High** Strong emphasis on: Respecting authority Social Status Hierarchy	**High** Strong emphasis on: Tradition Rules Avoiding risk

Table 4: Mapping the relevant research (Cemiloglu, et al., 2022) on CBT or Digital Detox countermeasures against the main three dimensions of Hofstede's Cultural Dimensions Theory

As a cross-check, we also mapped the relevant research on CBT and Digital Detox using Witkin's Theory of Cognitive Styles (Witkin et al., 1977). This theory integrates a person's interpretations into the mental model and subjective theories that guide their actions, and there is clearly overlap between Hofstede's Cultural Dimensions Theory (Hofstede,1984) and Witkin's Theory of Cognitive Styles (Witkin et al., 1977), We do not present the results here as they provide the same country-based distribution of relevant research on CBT and Digital Detox as the Hofstede's Cultural Dimensions Theory in Table 4.

All this leaves us to conclude that there is support for our contention that current research on CBT and Digital Detox may be missing important issues of culture that make such research less relevant across areas of the world beyond those most intensely covered in the literature. **T**

TikTok Time: Studies on PSU and Coping with PSU are predominately focused on Social Media

In addition to the fact that many studies on PSU and coping with PSU through CBT and Digital Detox are country-specific and largely in countries with a more collectivistic cultural

ISSN: 2473-4901
v10 n6116

outlook which prioritizes Social Harmony, Interdependence, and Family loyalty, in our review of studies on coping with PSU we noticed that the majority of the research was focused on the use and interaction with social media (Twitter, Facebook, Snapchat, Instagram) on PSU on smartphones.

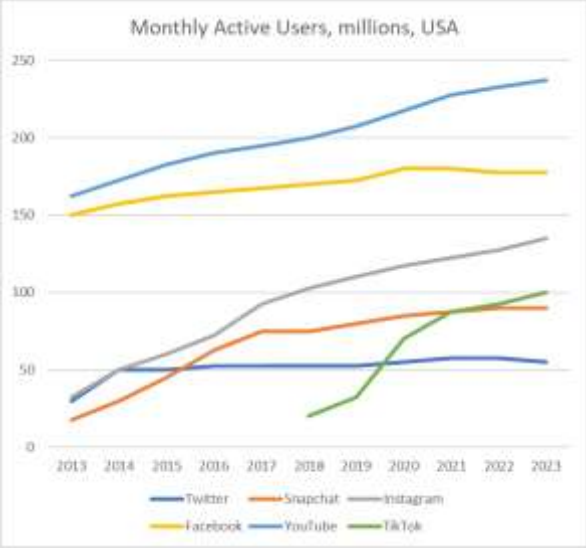

Chart 1: Data sourced from The Economist, 2023

This makes sense as much of this research was conducted in an era when social media (Twitter, Facebook, Snapchat, Instagram) accounted for significant monthly active users, and for significant growth. Chart 1 shows the month active users and associated growth for Twitter, Facebook, Snapchat, and Instagram from 2013 to 2023.

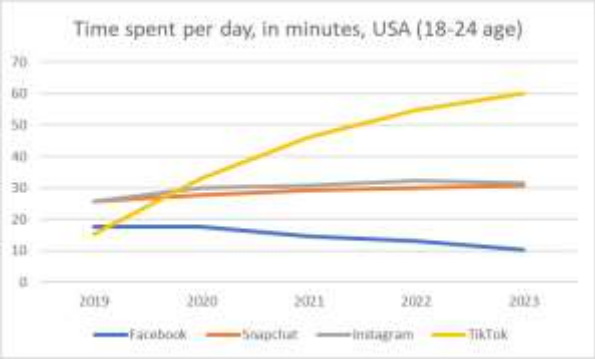

Chart 2: Data sourced from The Economist, 2023

Possibly more important than users when it comes to PSU, though, is the time spent per day on a smartphone with a particular app. Chart 2 maps out time spent per day, in minutes, on TikTok, Instagram, Snapchat and Facebook. As the chart shows, time spent with TikTok far exceeds Facebook, Snapchat and Instagram, and is almost the same as Snapchat and Instagram combined.

As a cross-check, we conducted an informal survey of 50 students in our Management Information Systems classes at the 200- and 400-level (with median age of 20.2 in the 200-level class and 21.6 in the 400-level class). We had students report the data by checking their "Digital Wellbeing" in their Android device or "Screen On Time with a specific focus on apps" for iPhones.

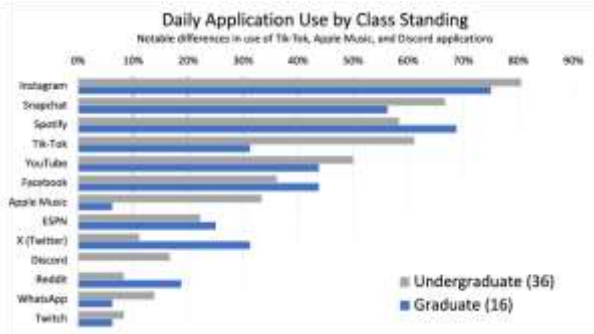

Chart 3: Daily app use by undergraduate class standing

In addition, we asked a follow-up question about the specific use of Instagram: "Are you watching videos or looking at photos?" Almost 80% of students reported that their main use of Instagram was to watch videos. This is important, as it highlights a major change in the way people, specifically students in this case, are engaging with the apps on their smartphones. In the past it was for social media, for which the main purpose was for social connection, and the main mental health issue was *fear of missing out (FOMO)* (Amran & Jamaluddin, 2022). The rise of TikTok (Chart 1) and more importantly the rise in time spent on TikTok (Chart 2) has changed how people engaged with their smartphones. There has been a move away from social networking, and instead to entertainment. The fact that Spotify, an app focused exclusively on music, is the number two most used app for our students (Chart 3) confirms that apps-for-entertainment is a big part of how people engage with their smartphones today.

According to TikTok itself, TikTok isn't a social media platform: "The audiences that love and build and create and connect with TikTok, they say they check Facebook, and they check Instagram and they check Twitter and they check

Snap and they check things. But they don't check TikTok. They tell us they watch TikTok" (Fast Company 2022).

We feel that this means that we need to look at PSU interventions around "entertainment" on smartphones as opposed to use of social media on smartphones.

3. COPING WITH PSU AS A RESULT OF SHORT FORM VIDEO USE

In addition to research about the use and abuse of social media on smartphones, there is a good deal of research around gaming on smartphones. For example, in a narrative review on approaches to combat digital addiction, the majority of studies delivered countermeasures for Internet Gaming Disorder (Cemiloglu, et al. 2022). However, we posit that gaming is very different to the short form videos (SFV) that provide entertainment which form the core of what TikTok delivers. Gaming is typically interactive (Baker et al. 2021). Watching short form videos, in contrast, is a passive, receptive activity.

Research on short form video is extremely limited. This makes sense as one could argue that TikTok defined the short form video format, and TikTok only became globally available in August 2018 (Wikipedia, 2024). We found zero articles using the following Google Scholar search term: "using cognitive behavioral therapy as an intervention for short form video addiction". Even searching for just "Short form video" yielded very few results, a confirmation that this entertainment format is a new phenomenon.

One such study looked at "the association between perceived stress and SVA [short form video] addiction, as well as its mechanism—the mediating role of self-compensation motivation (SCM) and the moderating role of shyness" (Yinbo et al. 2021). This does not address smartphone addiction in particular (short form videos can be watched on many platforms including TV and laptop), but we do note that it was conducted on a "total of 896 Chinese college students", furthering our findings that much of the research in this area is specific to a county with a collectivist cultural dimension.

Another study addressing short form video looked at how the "information system environment affects users' internal states of enjoyment, concentration, and time distortion (which scholars define as the flow experience)" (Yao, et al., 2022). This study finds that "TikTok addiction is determined by users' mental concentration on the medium and its content" but does not address the use of CBT or Digital Detox. We note again that the study was conducted on "659 adolescents in China aged between 10 and 19 years old".

In a study exploring stress and problematic use of Short-Form Video Applications (Huang et al. 2022) showed that stress was positively associated with problematic SVAs use. The paper did not suggest intervention strategies, and was conducted on 194 middle-aged adults from China.

Yinbo et al. (2021) examined perceived stress and short-form video application addiction and found that perceived stress was positively associated with SVA. They note that their research could provide suggestions for relevant prevention and intervention procedures, but do not cover this aspect. The study was conducted on a "total of 896 Chinese college students".

Finally, Zhang et al. (2019) looked at what factors affected addition to short form video apps. They found that "social interaction anxiety and social isolation were … positive influences on short-form video app addiction". There was no discussion of possible treatments such as CBT or Digital Detox, and we once again note that the study was conducted on users of TikTok in China.

With short form videos as provided by TikTok, and also by Instagram, YouTube Shorts and Facebook Reels, being a passive, receptive activity, we liken them closest to TV. TikToks, YouTube Shorts, Facebook Reels and Instagram videos, whose most common length is 26 seconds, according to Instagram (Adobe, 2024) are, in effect, just short television shows.

Accordingly, we posit that addressing smartphone addiction in the era of TikTok should commence with a review of the scholarly work on TV addiction. As a gauge of this line of research, we looked at Google Trends for "TV addiction". Google Trends starts from Jan 1, 2004 only (Chart 4). The peak at that time likely is an artifact of how the data is aggregated, that is, we do not believe that there was a massive spike in Google searches for "TV addiction" in January 2004, but rather all pre-January 2004 data is aggregated to January 2004. What the trend chart does show is that there has been little to no real activity in this space for almost 2 decades.

ISSN: 2473-4901
v10 n6116

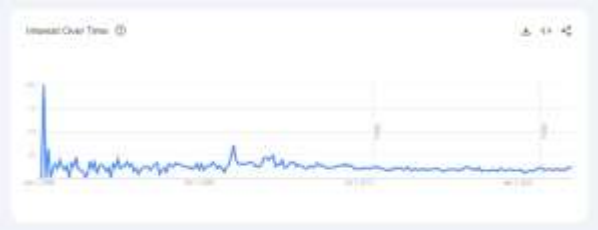

Chart 4: Google searches for "TV addiction" since 2004

We are confident that television addiction falls in the same realm as short-form video addiction, as it is measured with the distinct components of heavy viewing, problem viewing, and craving for viewing (Horvath, 2004). With this as a starting point, we then explored the literature for how to treat TV addiction, with the notion that such treatments could be translated into the short-form video addiction arena.

A seminal piece by Sussman & Moran (2013) "provide[s] a review of the definition, etiology, prevention and treatment of the apparent phenomenon of television addiction." Relevant to PSU and short-form video addiction, the authors found that "counseling that attempts to facilitate a secure attachment style with others may help delimit reliance on television as a form of passive social contact", and also that "mood management techniques might be instructed to reduce the desire to search out external sources of relief such as the TV". Both of these suggestions are elements of CBT and thus provide an indication that CBT might be an appropriate intervention for PSU and short-form video addiction.

A 2004 article by two of the pioneers of research on television addiction (Kubey & Csikszentmihalyi, 2004) noted that interventions for such included "promoting alternative activities" and "exercising willpower". They also noted digital detox interventions such as "enforcing limits" and "blocking channels/V-chip" use. A 1991 article noted, briefly, that "researchers are often asked how to break the television habit", and noted that there are few empirical studies for comparing methods for reducing excessive television viewing, but there are number of published accounts "based on common sense or generalizations from self-control techniques to gaining control over other habits" (McIlwraith et al. 1991).

4. CONCLUSIONS

The original purpose of this review was to show what Problematic Smartphone Use is, who it impacts, and ways in which it impacts individuals, with a focus on job and academic performance. As we got into our review, we realized that there were two issues at play with the extant research. Firstly, the vast majority of papers on PSU and treating it with CBT and Digital Detox were performed on subjects in collectivist (Hofstede 1984) countries: China, India, Pakistan, Japan, Indonesia. The literature already suggests that "there are persistent questions about the generalizability of CBTs to culturally diverse populations and whether culturally sensitive approaches are warranted" (Huey, et al. 2023). Combining our first finding with these "persistent questions" suggests that the current research on PSU and treating it with CBT and Digital Detox is far too myopic in scope, and needs to be broadened to populations that have high individualistic natures, such as the USA, western Europe, Africa, and Australasia.

Secondly, we realized that the vast majority of papers on PSU and treating it with CBT and Digital Detox were looking at issues related to social media use and gaming as the cause of PSU. We have labelled this the pre-TikTok era, as the arrival of TikTok in August 2018 has led to a fundamental change in how people use their smartphones, which has led to a change in how PSU is created. Watching short form videos is a passive, consumptive activity, very different from engaging in social media dialogue. As such, we believe that interventions such as CBT and Digital Detox, and their efficacy, need to be studied anew in the TikTok era.

In sum, this paper is a call to future research action around these two findings.

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Appendix A

In addition, the Cemiloglu, et al. (2022) review finds that six scales have been used to screen research participants for mobile phone or smartphone addiction: 1) Mobile Phone Addiction Index (Leung, L. 2008); 2) Smartphone Addiction Scale – short version (Kwon, M., Kim, D. J., Cho, H., & Yang, S. 2013); 3) Mobile Phone Internet Addiction Scale (Hu, D. D., Xu, Y., Ding, J. E., & Li, J. 2017); 4) Smartphone Addiction Inventory (Lin, Y. H., Pan, Y. C., Lin, S. H., & Chen, S. H. 2017); 5) Korean Smartphone Addiction Proneness Scale (Kim, D., Lee, Y., Lee, J., Nam, J. K., & Chung, Y. 2014); 6) Chinese Test of Mobile Phone Dependence (Li, T., Cui, L., Ma, S., Zhang, S., Zheng, J., Xiao, J., & Zhang, Q. 2018).