# Leveraging Family Force to Assist Adolescent Patients in The Treatment of Technology Abuse

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# ABSTRACT

Technology abuse refers to the excessive use of personal technology devices, which can have a negative impact on adolescent patients' lifestyles and might lead to negative physical and mental health outcomes. This study conducted a needs assessment study to gain guidelines for the development of assistive systems to help adolescents deal with technology abuse issues. Our results identify current difficulties to depict screen use on multiple devices for the recording of device usage data as well as behavioral data related to lifestyles (e.g., sleep conditions). We also proposed a preliminary design of technology solutions to make the information sharing among patients and parents possible for constructive communication between them and provide treatment teams with the data necessary for diagnosis and the formulation of treatment plans.

## CCS CONCEPTS

- Human-centered computing  $\rightarrow$  Empirical studies in ubiquitous and mobile computing.

# **KEYWORDS**

Technology abuse among adolescents; screen time; family support

## ACM Reference Format:

Min-Wei Hung, Chien Wen (Tina) Yuan, Yi-Chao Chen, Nanyi Bi, Wan-Chen Lee, Ming-Chyi Huang, and Chuang-Wen You. 2020. Leveraging Family Force to Assist Adolescent Patients in The Treatment of Technology Abuse. In *Adjunct Proceedings of the 2020 ACM* 

UbiComp/ISWC '20 Adjunct, September 12–16, 2020, Virtual Event, Mexico © 2020 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-8076-8/20/09.

https://doi.org/10.1145/3410530.3414391

International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2020 ACM International Symposium on Wearable Computers (UbiComp/ISWC '20 Adjunct), September 12–16, 2020, Virtual Event, Mexico. ACM, New York, NY, USA, 5 pages. https://doi.org/10.1145/3410530.3414391

## **1 INTRODUCTION**

Technology abuse disorders, including gaming disorder [5] and internet addiction disorder (IAD), have been investigated by experts in multiple disciplines; however, the findings have been somewhat controversial. At present, only gaming disorder [5] (a screen addiction involving video-gaming) is listed in the 11th Revision of the International Classification of Diseases (ICD-11). The fact that screen use is a necessary part of our lives makes the diagnosis of technology abuse more difficult than that of substance addiction. According to a survey by Common Sense Media [9], tweens (8  $\sim$  12 years old) spend an average of 4.6 hours using media screens each day, and teens (13  $\sim$  18 years old) spend an average of 6.67 hours. Researchers have reported that many adolescents engage in maladaptive internet usage to deal with psychological difficulties [10] resulting from problematic relationships with parents and/or peers [7]. There is at present a lack of data pertaining to screen usage, due largely to the fact that in characterizing usage behavior, psychiatrists are limited to querying subjects and/or their family members. Psychiatrists and parents require an easy-to-use tool to provide the screen time data required for meaningful analysis. Such a system should also make it easier for adolescents to self-monitor their screen use behavior and share their progress with their parents.

Previous studies [6, 8] emphasized that technology abuse behaviors are highly complex. Simon et al. [8] described a lack of clarity in the way we perceive and discussed our relationship with technological devices. An investigation into the role of technology in parent-child dynamics led Alex et al. [6] to conclude that the same technologies could be used to enforce boundaries pertaining to screen time. A number of screen time monitoring systems have been developed. Apple

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and Google have developed tools [13, 14] to measure screen time or app usage time by profiling software function calls that initiate/terminate apps at the OS level. Other third-party apps provide additional monitoring features; however, reviews at the app store suggest that many of those systems do not work as advertised [15]. Furthermore, most monitoring apps do not work across platforms (i.e., Android as well as iOS), and even those that do are difficult to install and configure.

Screens are powerful distraction, which can have a profoundly negative impact on sleep patterns and other everyday functions [2]. Nonetheless, researchers have shown that parent involvement can effectively ameliorate these effects [4]. Resolving the conflicts that inevitably arise between adolescents and parents hinges on the need to communicate and work together in developing constructive solutions and seeing them through [12]. These findings demonstrate the need to include parents in any plan for the treatment of technology abuse disorders. Thus, this project began with a needs assessment aimed at elucidating the challenges of establishing a system for self-monitoring screen time, while involving family members in the treatment process.

#### 2 THE NEEDS ASSESSMENT STUDY

Needs analysis was based on interviews with psychiatrists and individuals undergoing treatment for technology abuse (patients) as well as key family members. From Taipei City Psychiatrist Center, we recruited 3 psychiatrists (1 male and 2 females; D1 ~ D3), with over four years of experience in treating adolescent patients for technology abuse. We also recruited 6 dyads of adolescent patients (five males and one female; P1 ~ P6) aged 14 to 16 years old (AVG= 15.17 years old; SD = 0.98) and parents (two males and four females; F1 ~ F6) aged 44 to 70 years old (AVG= 52.67 years old; SD = 9.99). This study was approved by the Institutional Review Board of Taipei City Hospital (IRB No.: TCHIRB-10812024).

We first conducted semi-structured interviews with psychiatrists to clarify current practices in the treatment of technology abuse. We then conducted interviews with patients and parents to gather the information required to understand the patients' technology abuse behavior and characterize the family interactions associated with screen use problems. Note that these interviews were conducted separately in two rooms in order to alleviate pressure and encourage open discourse. Our objective was to collect information pertaining to technology abuse behavior and characterize family interactions associated with screen use problems. Audio recordings of the semi-structured interviews were transcribed to facilitate the identification of salient themes based on thematic analysis [3]. Our initial analysis revealed a number of key issues, which are detailed in the following subsections. Hard to Depict Screen Use on Multiple Devices

The ubiquity of screen media as an integral (even necessary) part of human lives makes it easy for adolescent patients to conceal problematic usage behaviors. All three of the psychiatrists described the difficulties they face when seeking to elucidate the actual behavior of patients. It appears that the primary problem is evasiveness on the part of patients and the fact that self-reported usage behavior is often underestimated or under reported. For example, D1 made the following comment: "Cigarette smoking and alcohol consumption can be quantified according to the money spent for those substances; however, this is not possible when dealing with screen-time. Furthermore, screen usage estimates are not necessarily proportional to the number of bytes transferred over the internet. [...] Patients tend to give vague responses or underestimate the amount of time they spend online."

Many young people spend an inordinate amount of time online and it is difficult for parents to differentiate between productive and unproductive screen usage behaviors. Even if parents were fully aware of all the apps used by their children, they would have considerable difficulty monitoring their actual behaviors. Many parents manually check how long their children use mobile devices (e.g., passing their room to see if he/she is using the device); however, having to deal with their own jobs and personal affairs makes it impossible to monitor their children all the time. F2 made the following comment: "In the past, my son would sneak out of bed to play games on his phone. So, before going to sleep, I would take his phone, hide it under my pillow, and lock my room. If I didn't do this, I couldn't be sure that he wasn't playing games while he was supposed to be sleeping." Five of the parents who described themselves as less than tech-savvy expressed their frustration with existing softwarebased solutions for the continuous tracking of phone usage. F2 made the following comment: "I tried to install a parental control app on my son's phone to limit his use of apps; however, I didn't know that there was a desktop version as well as a mobile phone version. I thought that the desktop version would work on the mobile phone ... Anyway, I never did install the app and finally gave up trying." Unless parents are provided easy-to-use monitoring tools, they have no way to find out precisely what their children are doing. This forces parents to make inferences and generalizations based on fragmentary observations.

The parents also described their frustration in trying to limit screen usage when their children have access to the devices of other family members or friends. For example, F1 made the following comment: "Once, after my son broke his phone, he didn't have one for a few days. He told me that he needed a smartphone with a dictionary app to look up new words in order to do his English homework assignments. [...] Leveraging Family Force to Assist Adolescent Patients in The Treatment ...

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# So, I lent him my tablet. Later, I was surprised to discover that he had figured out how to connect the tablet to the internet and had installed a number of games (sigh)."

Note that all of the adolescents in the current study reported owning a mobile phone as well as other devices, such as a tablet or PC for doing homework. Under these conditions, many of the parents resorted to the manual tracking of screen use behavior. For example, they described asking their kids about device usage or placing an arbitrary limit on internet access. F1 made the following comment: *"The only thing I can do is control WiFi access ... that is, I sometimes turn off the WiFi to stop my son playing games on his phone. As it turns out, this was not a good solution, because he would continuously argue with me claiming that he needed internet access for important things, such as homework."* 

# Recording Lifestyle Factors to Better Reflect the Impact of Technology Abuse

Many adolescent patients use their phones and computers for academic as well as recreational purposes; however, this can add up to a tremendous amount of time in front of screens. In an effort to offset the negative physical and mental health outcomes associated with this behavior, the American Academy of Pediatrics (AAP) originally recommended that screen use not exceed one to two hours per day [1]. However, these figures appear somewhat arbitrary. There remains considerable controversy pertaining to the definition of technology abuse [11] and its impact on children's well-being [2]. Later on, AAP revised their screen time guidelines to recommend to place consistent limits on screen time that allow the adolescents living in a healthy lifestyle. Therefore, all three of the recruited psychiatrists emphasized the need to examine technology use behavior within the context of its effect on lifestyle patterns. D3 made the following comment: "For any type of behavioral addiction, the primary diagnostic criterion is a loss of control [over the problematic behavior]. In the case of technology abuse, the patient has lost control over their gaming or surfing behavior. The excessive time spent on these activities impinges on their ability to fulfill other obligations, such as schoolwork. Among adolescents, technology abuse most commonly manifests in poor grades, poor sleep quality, and conflicts with family members."

All of the parents conceded that screen time is an important indicator of screen use behavior; however, they were more concerned about the negative effects that technology abuse had on the children's health and well-being. For example, F6 made the following comment: *"From my point of view, its reasonable for my son to use his phone to check messages or discuss assignments with classmates, and it's also fine to play mobile games for one or two hours a day. But when he stays up late playing these games. ... I really cannot accept this. [Because it affects his regular life routine?] Exactly.*" Despite the availability of apps that are capable of monitoring screen time over multiple devices, none of the parents in the current study succeeded in deploying such a system in their daily lives. In fact, five of the parents were unaware that such solutions were even available. In response to the question of how much time her child spends on his phone, F3 made the following comment: *"I couldn't say for sure. If he gets off from school at three, then he probably plays for seven or eight hours straight… until bedtime."* 

Parents want to be sure that their children are maintaining a healthy lifestyle; however, without a clear picture as to their children's actual behavior, it is exceedingly difficult for them to set reasonable screen time limits. Setting a time limit that appears too short can make children reluctant to obey the rules set by their parents, leading to conflict and resentment. P4 expressed her frustration as follows: "Currently I am only allowed to use my phone for thirty minutes a day. It's definitely too short! [Why don't you stand up to your mom?] I already gave up because she would take my phone away for three days if I disobey this rule." Note that the adolescents in the current study were aware (at least to a limited degree) of the effect that excessive screen usage had on their failure to fulfill obligations at home. When asked about becoming obsessed with a game, P5 made the following comment: "I remember that I once forgot to dump the trash because I was totally into a game, and got scolded by my dad. [Why is this incident so memorable to you?] Because ... because the house smelled really bad with all the trash." Without suitable reminders from their parents, children easily forget to complete assigned tasks, and addictive activities (e.g., gaming) can exacerbate this problem.

## Breaking Poor Communication with Timely Reminders or Treatment Support

When adolescents detect a lack of trust in their parents' demeanor, they often develop feelings of resentment, which can lead to various forms of conflict. Some of the adolescents in the current study described how their parents responded negatively to any screen use they observed. For example, P6 commented, "My dad frequently passed my room to check up if I was playing games. One time, my dad and I had an argument over this [i.e., screen use problem]. He angrily told me not to close my door. He was afraid that I would play games again when I was in my room."

All of the adolescents in the current study recounted how they tried to manage their screen time autonomously, but their parents were unable to appreciate these efforts. This is presumably due to the fact that parents tend to take note only when children use the devices and fail to notice when children abstain. For example, we had the following exchange with P3: "[Did you ever think about convincing your parent you can manage your screen time use?] Sometimes I try to UbiComp/ISWC '20 Adjunct, September 12-16, 2020, Virtual Event, Mexico

control your screen time but they [P3's parents] don't know I'm making an effort. Maybe if they gave me some words of encouragement, I would continue to progress."

When starting a new game, many players have difficulty estimating the time required to finish it. While playing the game, most players enter a state of flow, which renders them unaware of the time that has lapsed. In many cases, players disregard the amount of time already spent in the game, and most players feel sure that they can bring the game to a quick close simply by upping their performance in the following match. Many online gaming applications punish players by dropping their credibility scores if they leave a match before it ends. While playing this type of gaming app, it is natural for players to ignore demands to stop playing. Adolescents operating under these kinds of constraints have invested heavily in the outcome of the game and their reputation in it. Intervening in the game or forcing them to immediately stop playing can lead to intense emotional reactions and tense conflicts. P6 comments "There is a meme that says 'Parents never understand online games and keep asking you to you just pause' but it's online game!! How do you pause? [Do you get any punishment if you leave an ongoing game?] Sometimes ... and my player friends would be pissed off if I left in the middle of a match. [Would it be more effective if your parents reminded you to stop playing right after you finish the game?] Absolutely." A potential remedy to this situation is to make parents aware of the appropriate time for interventions and the appropriate means of doing so.

All of the adolescents in the current study expressed a desire for their parents to acknowledge their efforts in managing screen time. They also expressed a need for flexibility on the part of their parents. Unfortunately, previous conflicts made it difficult for four of the parents to provide very much latitude in their decisions. F2 made the following comment: "As I remember, I used to trust him and let him keep his phone, but he ended up staying up all night playing mobile games. I wanted to trust him, but he just couldn't keep his promise." Despite their doubts, most parents understand that close monitoring is neither sustainable nor suitable for teens growing into adulthood. Four of the parents reported a desire to loosen the constraints, as long as their child displays signs of progress. F1 acknowledged that completely blocking access to technology would not be an ideal strategy for his son: "I don't think I can forbid him from using his phone. He would view it as a form of deprivation. Everyone has a different personality. As for my son, if you dare to take his phone away, you can expect an outburst." F2 expressed concerns about continuing to limit screen time as her son is developing selfcontrol: "While he (P2) is growing up, perhaps I should adjust my strategy to foster the development of self-control. [...] Also, he is surrounded by friends with phones. If I insisted on limiting his screen time, there would be a strong backlash."

Lastly, it would be far easier for a treatment team to provide suitable interventions if they had a clear indication of the patients' technology abuse behavior. Four of the adolescents in the current study reported forming an intimate trusting relationship with their psychiatrists/therapists. It appears that the adolescents viewed them as trusted allies in the treatment process. P4 made the following comment: "[So far, do you feel that you benefiting from the treatment?] I like my psychotherapist. [Why?] Because I can talk to him/her and complain about my mom when she's not around. [You mean that the therapist helped you to express your emotions?] Absolutely." Furthermore, an experienced professional who has a clear understanding of the situation in the family and the trust of all stakeholders can help to break down many existing impediments to communication. For example, one of the psychiatrists helped F6 to reach a consensus with her husband: "My husband and I listened to suggestions made by the psychiatrist that we should treat our children with a consistent parenting style. I had previously talked to my husband but he didn't listen. When the psychiatrist talked to both of us together, my husband found it more convincing and was willing to heed the professional's advice."

### **3 PRELIMINARY SYSTEM DESIGN**

Observations gained in the needs assessment study provided guidelines for the development of assistive systems to help adolescents deal with technology abuse issues. The objectives of such endeavors should be to (1) create easy-to-use sensing solutions, which record device usage data as well as behavioral data related to lifestyle, (2) share the information required to facilitate constructive communication between patients and parents, and (3) provide treatment teams with the data necessary to make constructive suggestions aimed at preventing negative communication loops in the household.

Data related to screen time usage could be monitored using existing software solutions or a customized wearable device that characterizes app usage according to the EMI signals emitted by the device [16]. Sleep conditions can be tracked by existing wristband wearable sensors, while other lifestyle factors can be self-reported. An interface integrating screen use data with lifestyle indicators could be of considerable benefit to patients as long as it clearly conveys patterns within and between data types. Patients should be able to regulate the sharing of data with their parents in order to communicate the appropriate time window for interventions or reminders. This would also help to prevent potential conflicts caused by manual checks (e.g., passing by the adolescent's room every 30 minutes). Parents would be able to monitor screen use data unobtrusively, as in so doing provide the patients room to manage their screen use behavior by themselves.

The treatment team could review data related to screen use and lifestyle in formulating constructive suggestions aimed at breaking negative communication loops. For example, parents could be reminded to consider the advances made by the patient, rather than focusing on negative issues. This would also enable the treatment team to adjust their treatment plans based on long-term data trends.

#### **4 CONCLUSION & FUTURE WORK**

In the future, we will interview more patients and refine the design of the system. We will also explore the response of patients to various presentations of screen use data and lifestyle factors and communication with family members.

#### ACKNOWLEDGMENTS

This research was supported by the Ministry of Science and Technology of Taiwan (MOST 107-2221-E-007-118-MY2 and 109-2221-E-007-114).

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