Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

SELF-ADMINISTERED BEHAVIOR MODIFICATION TO REDUCE SMARTPHONE USAGE

Punithamalar Rajagopal[1,2*], Asma Perveen[1]

[1]Department of Psychology, Faculty of Human Development, Universiti Pendidikan Sultan Idris, Tanjong Malim, Perak, Malaysia
[2]Avicena Kids Sdn Bhd, Showme Eduwav, Country Garden, Danga Bay, Johor Bahru, Malaysia

Email*: punithamalarrajagopal@gmail.com

Received: 31 March 2024; *Accepted*: 1 May 2024; *Published*: 31 August 2024

ABSTRACT

Habitual or undesirable behaviours are a common target for self-managed behaviour-modification programs. The current self-experiment used an Applied Behavior Analysis (ABA) reversal design to study the effects of the intervention on smartphone usage. The 56 days of study consisted of self-monitoring and differential reinforcement of other behaviours treatment. A visual Android application installed in the device allowed the observer to monitor and keep track of the treatment progress and outcomes and to ensure treatment integrity. Results provide the support that the overall treatment package was successful in decreasing the duration of smartphone usage. This study demonstrates that self-administered behaviour-modification techniques can be successfully designed and implemented to reduce undesirable behaviour with sufficient knowledge of behavioural principles.

Keywords: *smartphone usage, behaviour modification, token-based DRO, self-monitoring, treatment integrity*

INTRODUCTION

One of the greatest inventions of all time is a smartphone as they have brought the entire world in our fingertips. However, the pervasiveness of this device, even in the most relevant moments of the day, has raised some concerns about its confinement capabilities (Gui & Gerosa, n.d.). Despite all the facilities and advantages, excessive use of smartphones can lead to addiction. According to American Addiction Centre Resource, even though smartphone addiction is not yet listed in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), research has compared it to gambling addiction, which has clearer diagnostic criteria and is included in the DSM-5. Choliz (2010), classified the problem of using smartphones as a behavioural addiction due to the significant clinical impairment such as psychological effects on emotions, personality and cognitive in which the younger generation is more vulnerable to excessive usage and dependency towards smartphones.

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

Malaysia recorded 18.46 million smartphone users in 2016 and this number is predicted to increase to more than 20 million in 2020 (Ithnain, Ghazali & Jaafar, 2018). A study by Ching et al. (2015) reported 46.9% of Malaysian students were addictive to a smartphone. With the passage of the time, more new features and advancements are added to the device, increasing our dependency towards the smartphone. According to the PEW Research Center, 67% of smartphone owners have admitted to checking their phone for calls or messages when their phone did not vibrate or ring. This is one major sign of cell phone dependence and should serve as a warning to cell phone owners. Smartphone usage has evolved from a necessity into compulsive use and addiction. People seek help and try to make changes only when there is concerning health issues or clinically significant impairment; by when it is too hard for recovery. Thus, early prevention is vital which is only possible when the individuals themself take the first move.

The first step of getting smartphone usage in control is through self-help; since most of these measures can be implemented on our own. However, an addiction is hard to beat on our own, especially when the temptation is always within easy reach; increasing the chances of relapse. Under such circumstances, one could seek outside support, whether it is from family, friends, or a professional therapist. The current study was a self-experiment that incorporated self-monitoring with a token-based Differential Reinforcement of Other Behaviours (DRO) to decrease my smartphone usage duration. Recently researcher has noticed a gradual increase of smartphone in personal life which has reached a concerning level. This usage includes both essential (e.g. study, transportation, reading, important calls) and non-essential (e.g. social media, entertainment, unnecessary calls) activities. To help identify the problematic areas, the researcher kept a log of when and how much they use the smartphone for non-work or non-essential activities. Based on the outcome of self-monitoring, researcher try to incorporate behaviour modification techniques to reduce the unnecessary or non-essential usage of the smartphone. This self-experiment also serves as an example of how the integrity of the intervention and the process of self-monitoring can be enhanced when a contingency-based intervention is largely self-implemented and conducted outside of a clinical or laboratory setting (Craig, 2010).

METHODOLOGY

Participant and Setting

At the time this research was conducted, researcher was a 25-year-old student studying Master's Degree in Clinical Psychology under Universiti Sains Malaysia (USM) and Universiti Pendidikan Sultan Idris (UPSI). As partial fulfilment of the course Psychological Intervention 1, they were assigned to conduct a self-administered behaviour modification. Thus, the researcher chooses to reduce own smartphone usage. As described below, researcher chose to implement a program consisting of self-monitoring and a token-based DRO.

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

Research Design

An Applied Behavior Analysis (ABA) reversal design was used to study the effects of the intervention on smartphone usage. Treatment consisted of self-monitoring plus DRO. Baseline consisted of self-monitoring only. The study lasted 56 days; monitoring and tracking of phone usage occurred on 56 of these days. ABA design was used as the model allows the researcher to isolate one behaviour for study and intervention; which decreases the chances of other variables influencing the results (Barlow, Nock, & Hersen, 2009). During the first week, a baseline was established for smartphone usage and the level of responding before any treatment of DRO sessions is recorded. When a steady state of responding is reached, phase B begins when researcher introduced the treatment. There was a period of adjustment to the treatment during which the smartphone usage becomes more variable and begins to decrease. Again, researcher waited around 6 weeks until the duration of smartphone usage reaches a steady desired state so that it is clear whether and how much it has changed. Finally, the researcher removed the treatment and again waited until the duration of smartphone usage reaches a steady-state which lasted for another week.

Data collection and Response Definition

Throughout baseline and intervention, researcher recorded the duration of smartphone usage for every single day. In order to aid in tracking smartphone usage accurately, researcher installed an application called StayFree. StayFree is a visual and user-friendly Android application that tracks how much time one spends on his/her smartphone. Besides the application also tracks the usage of every application individually which helps in understanding which applications are excessively used in a day. The application also allows the user to set usage limits for the applications and receive alerts when exceeding the usage limit. One can view the details of his/her usage and statistics of the history on a daily and weekly basis. During the intervention phase, additional data were collected, including the timing of each DRO interval and the time of each token delivery. The total duration of smartphone usage was graphed for visual analysis (Figure 1).

RESULTS

Preference assessment

To identify the most potent reinforcers to use in the DRO schedule, an informal duration-based preference assessment was conducted a day before treatment and the observation lasted about 10 hours. The researcher conducted this assessment by casually monitoring the duration of their engagement with various leisure activities through direct observation. The three activities with which researcher engaged the most were chosen as the reinforcers; these were watching Netflix

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

shows, reading non-academic materials, and listening to music. These activities were restricted during treatment unless delivered as reinforcers.

Baseline

The baseline line phase, also known as phase A is the period whereby, researcher collected data on the duration of smartphone usage. During this phase, researcher also keep track of the applications on which they spent more time to decide if the excessive usage is due to essential or non-essential activities (Table 1). Phase A lasted for one week and during this time researcher had free access to all reinforcers that were to be used in the treatment described below. Based on the self-monitoring conducted in week 1 the average usage of a smartphone during the baseline phase are around 5 hr and 5 min. Thus, through the intervention, the researcher aimed to reduce the duration of smartphone usage to less than 3 hr 30 min per day (Figure 1).

Table 1
Duration of Smart Phone Usage Based on Applications

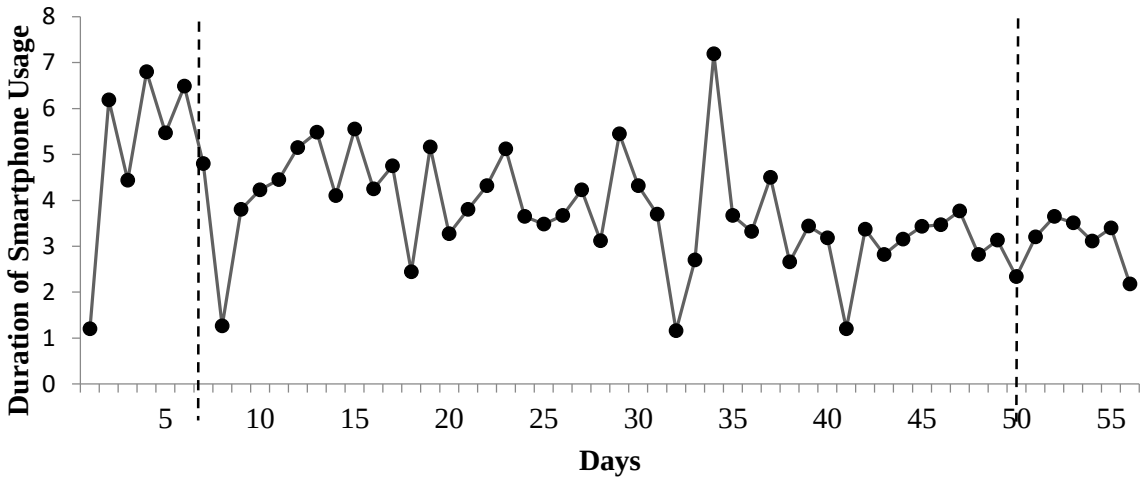
Application	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Anybook	35m 15s	2h 15m 41s	2h 4m 47s	2h 4m 26s	2 h 49m 13 s	1hr 21 m	1h 3m 55s	12h 14 m
Spotify	15m	12m 13s	1h 4m 47s	41m 33s	15m 12 s	45m 16s	33m 22s	3h 27 m
Netflix	0s	1h 2m 6s	5m 3s	3h 6m 31s	2h 15m 16s	3h 12m 37s	2h 31m	12h 12m
Other	11m 38s	3h 1m 38s	1h 25m	15m 30s	27m 19s	1h 30m 7s	13s	6h 51m
Total	**1 hr 2m**	**6h 19m**	**4h 44m**	**6h 8m**	**5hr 47**	**6hr 49**	**4hr 8m**	**$\bar{x}$= 5h 5 min**

DRO

During this phase, researcher reward themself with the reinforcers discussed above through the token-based DRO procedure. The beginning of the self-monitoring phase is marked by the ringing of the alarm in the morning, as they have the habit of checking through the phone right after waking up. The end of the self-monitoring phase is marked by the bedtime as it marks the end of that particular day for the researcher and they will not use the smartphone again after that until the next day. During the initial baseline component, duration of smartphone usage was variable but was relatively high throughout each session (M = 5 hr 5 min per day; Figure 1).

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

Figure 1
Duration of Smartphone Usage During Baseline (A) and DRO Sessions (B)



Based on the researcher's success in staying within the restricted duration of time for smartphone usage on that day, they will reward themself the following day with any of the selected reinforcers. For instance, if they used the smartphone less than 3 hours in a day then the researcher will get a token. These tokens were recorded in a habit tracker to keep track of the total number tokens they have collected at the end of the experiment. The tokens earned could be traded in for watching an episode of the Netflix show that they are currently following, listening to my Spotify playlist or reading three chapters of the favourite non-academic book. If not exchanged for reinforcers, tokens expired at the end of the day. Upon failing to stay by the boundaries all three leisure activities are prohibited for the next day. However, another important issue in the DRO token procedure of this study is that all the selected reinforcers involve usage of the smartphone. Thus, a rewarding procedure might affect the targeted variable. To eradicate this issue, other devices such as tablet and laptop were used for reinforcement purposes; while making sure the reinforcement period does not exit the pre-determined restrictions.

When the DRO was initially introduced, the duration of smartphone usage for the first week of phase B was reduced below baseline levels (M = 4 hr 6 min episodes per day). For the second week, the duration increased slightly (M = 4 hr 17 min per day). For the third week, there is a decrease in the average duration of smartphone usage (M = 3 hr 4 min per day). The duration slightly increased again in week 4 (M = 4 hr 2 min per day) and decreases again for week 5 (M = 3 hr 9 min per day). For week 6 the average duration slightly increased in comparison with the previous week (M = 3 hr 22 min per day), but still below 3 hr 30 min. Finally, for the eight weeks, the intervention is withdrawn and the average duration for smartphone usage still remained below the targeted duration (M = 3hr 5 min per day).

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

DISCUSSION AND IMPLICATIONS

The overall self-administered behaviour-modification package consisting of self-monitoring and DRO was effective for decreasing the duration of smartphone usage. Moreover, the treatment-integrity procedure may have assisted in assuring accurate reporting and adherence to the intervention protocol. Duration of smartphone usage decreased during the intervention and also showed less variability across intervention sessions. Based on the results (Figure 1) the duration reduced significantly in week 8 in comparison with the baseline phase and the target was achieved as the average as well as per day usage of smartphone recorded is below 3 hr 30 min. However, throughout the treatment phase, it can be seen that there is a recurrent increase in smartphone usage despite the administration of token-based DRO procedure.

There are several implications of the current study that are noteworthy to practitioners. First, the treatment integrity procedure only relied on an available and convenient technology (i.e., smartphone phone) but effectively maintained the contingencies of the token system. This procedure allowed for treatment to be participant-monitored while providing permanent products for an independent observer to conduct treatment-integrity checks (Craig, 2010). Thus, this procedure is applicable in future studies for self-administered behaviour modification without the need for a third party. Secondly, the study demonstrates the successful administration of the token-based DRO procedure in reducing undesirable behaviour. Leblanc, Hagopian and Maglieri (2000) suggested the use of a token economy is not just effective among normal adults and children but it is also helpful in eliminating excessive inappropriate behaviour among individuals with developmental disabilities.

Like every empirical research based on self-monitoring techniques, the present study is not void of limitations. Klonoff (2007) reported that one of the important issues of concern in self-monitoring studies is accuracy which directly applies to this study. The current study incorporates treatment-integrity checks utilizing Android application as well habit tracker chart to enhance the accuracy of the observation. However, in self-experimenting studies, there are higher chances of relapsing particularly when the stimulus is within the range of easy reach. Thus, for future studies, it is recommended that incorporating treatment-integrity checks employing social support (e.g., a cohabitant, parent, sibling, etc.) may enhance behaviour-modification techniques that are implemented largely outside of a clinical or laboratory setting without continuous observation by an outside party.

There are also methodological limitations of this study that should be addressed. The reinforcers chosen for the study requires the usage of a smartphone. The reinforcers are selected based preference assessment to increase the effectiveness of the treatment. However, they are contradicting with the aim of the study which is to reduce the duration of smartphone usage. Despite the usage of alternate devices for administration of reinforcers, it does not help in reducing the sedentary screen behaviour. Secondly, treatment-expectation effects (i.e., a change in behaviour due to prior knowledge of the typical effects of treatment contingencies) could have influenced my responding and threatened the validity of these findings (Craig, 2010).

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

CONCLUSION

ABAB design will be more effective than an ABA design as the current study does not involve any follow up with the modified behaviour; which raises questions about potential relapsing. However, despite these limitations, this study demonstrates that self-administered behaviour-modification techniques can be successfully designed and implemented to reduce undesirable behaviour with sufficient knowledge of behavioural principles. Besides, the study demonstrates the use of a novel technique for enhancing treatment integrity, which can easily be used and adapted for self- and clinician-administered behaviour-modification programs.

ACKNOWLEDGEMENT

I express my profound gratitude to my parents and family members for providing me with encouragement throughout my years of study and through the process of researching as well as writing this paper. I would also like to express my gratitude to the lectures and faculty members of Department of Psychology at Sultan Idris Education University for their guidance and support.

REFERENCES

Hersen, M. (1976). Single-case experimental designs. In *International Handbook of Behavior Modification and Therapy: Second Edition* (pp. 175-210). Boston, MA: Springer

US.Ching, S. Ching, S. M., Yee, A., Ramachandran, V., Sazlly Lim, S. M., Wan Sulaiman, W. A., Foo, Y. L., & Hoo, F. K. (2015). Validation of a Malay version of the smartphone addiction scale among medical students in Malaysia. *PloS one*, *10*(10), e0139337.Choliz, M. (2010). Mobile phone addiction: a point of issue. *Addiction*, *105*(2), 373-374.

Craig, A. R. (2010). Self-administered behavior modification to reduce nail biting: Incorporating simple technology to ensure treatment integrity. *Behavior Analysis in Practice*, *3*, 38-41.

Gui, M., & Gerosa, T. (2021). Smartphone pervasiveness in youth daily life as a new form of digital inequality. In *Handbook of digital inequality* (pp. 131-147). Edward Elgar Publishing.

Ithnain, N., Ghazali, S. E., & Jaafar, N. (2018). Relationship between smartphone addiction with anxiety and depression among undergraduate students in Malaysia. *Int J Health Sci Res*, *8*(1), 163-171.Klonoff, D. C. (2007). Benefits and limitations of self-monitoring of blood glucose.

LeBlanc, L. A., Hagopian, L. P., & Maglieri, K. A. (2000). Use of a token economy to eliminate Excessive inappropriate social behavior in an adult with developmental disabilities. *Behavioral Interventions*, *15*(2), 135-143.

Evaluation Studies in Social Sciences (ESSS)
eISSN 0128-0473 Vol 5/2024 (98-105)
https://ejournal.upsi.edu.my/index.php/ESSS/index
DOI: https://doi.org/10.37134/esss.vol5.1.7.2024

Mobile Technology Fact Sheet. (2013, December 27). Retrieved November 30, 2015, from http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/