

ORIGINAL ARTICLE

Usability and Usefulness of Mobile Health App for Social Media Addiction Prevention Among Adolescent in Indonesia

Benny Novico ZANI¹, Faridah Mohd SAID², Nisha NAMBIAR², Siti SHOLIHAT¹

¹ Sekolah Tinggi Ilmu Kesehatan Raflesia, Jawa Barat 16451 Indonesia

² Lincoln University College, 15050 Kota Bharu, Kelantan, Malaysia

ABSTRACT

Introduction: Mobile health apps may help adolescents overcome their social media addiction. The Social Media Safe app was developed by a multidisciplinary team to provide information about the impact of social media on mental health issues, tools to assess addiction, and time management. Objectives: The purpose of this study was to determine the usability and usefulness of the Social Media Safe app as perceived by users. **Methods:** Twenty adolescents gathered for a session, during which they completed five tasks. We used the Nielsen Severity Scale and the Intrinsic Motivation Inventory (IMI) score to evaluate the usability of a product. **Results:** Think Aloud sessions lasted an average of 20 minutes 40 seconds (SD=4 minutes 10 seconds). Task 1 (download the app) took significantly longer than the other tasks, while Task 4 (find the correct homepage) took the shortest time. The TA report identified 12 usability issues, eight of which were minor and four majors. Participants' views on the Social Media Safe App were assessed using the IMI. A 5.32 (SD=2.02) IMI score was averaged. The Social Media Safe App received a SUS score of 69.20 (SD=10.35). The average overall grade for the Social Media Safe App was 6.55 (SD=1.42). **Conclusion:** In accordance with their expectations, users found the information in the Social Media Safe app to be relevant and useful.

Keywords: Health, eHealth, Mobile phone application, Adolescent, Social media addiction, Qualitative research

Corresponding Author:

Benny Novico Zani, MM, M.Kes
Email: novicobenny@gmail.com
Tel: +62 813-6868-3241

INTRODUCTION

Indonesia ranked fourth in the world in terms of average daily internet usage time intensity, averaging 8 hours 51 minutes (1). These activities are dominated by social media activity in cyberspace, with social media users accounting for 49% of the population and an average daily time spent on social media of 3 hours and 23 minutes (1). Children, adolescents, and adults use social media at a much higher rate than other age groups. However, a closer examination of the current phenomenon reveals that active users of social media are late adolescents or early adults aged 18 to 24. One can say that an individual's interest is expressed in terms of intensity when the individual's quality and quantity exceed normal limits. The extent to which social media use has exceeded normal limits,

as well as what is done in daily life, will have an effect on interpersonal communication in the real world (2). According to previous research, there is no clear link between frequent use of social media and mental health. The scientific literature identifies a variety of potential negative influences on mental health (3). Numerous studies have consistently found that social media use, particularly excessive intensity and time spent on social media platforms, appears to be associated with an increased risk of a variety of mental health and well-being symptoms, particularly among young people (4), a higher anxiety disposition (5), depression symptoms (6), and physiological effects such as difficulty sleeping (7,8).

Adolescents are frequent internet users; thus a mobile health app could address this information gap (9–12). mHealth refers to using smartphones to educate adolescents about social media addiction and puberty issues. The literature is lacking on the efficacy of mobile health apps (11,13) and the optimal development process (14–18). Usability and/or utility should be

considered when developing mobile apps for a specific audience (19,20). Various unified endpoint management methods (UEMs) can be used to assess and improve MHealth application usability. The UEMs study how people interact with their devices to improve human-machine interaction (21). To better integrate a health-related product with the customer's context, an iterative schematic design approach is required. Improving mHealth design and usability is critical in the healthcare industry (22) claim (23).

We created the Social Media Safe App to help mental health professionals and the general public assess the extent of social media addiction and time management issues. The Social Media Safe App's content is based on social cognitive learning theory and the information-motivation-behavioral skills model (IBM) (24). Two multidisciplinary focus groups helped design the Social Media Safe App's content and instruction (nurses, physicians, and information technology experts). The Social Media Safe app was evaluated for usability using the Think Aloud and UEMa methods, and the participants' cognitive processes were examined. The TA approach may exacerbate user interaction issues by preventing users from verbalizing their thoughts while performing or finishing tasks (25–27). To better understand the Social Media Safe App (or, in other words, adolescent conceptual models), we used TA (26). App usability is affected by differences between the user's mental model and the app's development. Potential users rated the Social Media Safe App's usability and effectiveness in this study. This research measured the usability of the Social Media Safe App and its effectiveness as perceived by potential end users.

MATERIALS AND METHODS

Students from two different high schools (senior and junior high) were invited to participate in this study, resulting in a diverse group of individuals. In addition to posters and leaflets, all schools distributed a list of inclusion criteria developed by researchers and teachers, as well as a list of eligibility requirements. Students aged 12 to 19 years have a high level of proficiency in Bahasa Indonesia (a national language). As more students signed up to participate, the app's evaluation team was able to bring the final total of participants to 20 people. Each participant received a \$10 gift card as a thank you for their participation.

Ethical Considerations

Prior to data collection, ethical approval was obtained from the affiliated university, which was followed by data collection. Participants provided written informed consent, and all information was handled in an anonymous manner.

Social Media Safe App and Study Flow

The Social Media Safe App (bilingual: Indonesia-English language) was developed as a mobile app. The Social Media Safe application system is built on a server/client architecture based on HTTP (Hypertext Transfer Protocol) and Web API (Application Programming Interface). To configure the server, a Firebase database is used. Client configuration is carried out via an Android application created with Android Studio and the Kotlin programming language. The companion platform for Kodular allows developers to debug apps in a web browser, allowing for quick design iteration before testing on various mobile devices.

The app requires user authentication, and these sessions are tracked on both the device and the backend. When a user is inactive for an extended period of time, the system terminates the user session (ten minutes in the mobile app). The Android development platform includes a Keychain feature for storing user account information specific to a single application. On current smartphone operating systems, apps cannot exchange local data because they are designed with extremely limited permissions that prevent apps from accessing user data. By utilizing forged copies of developer software, the likelihood of malicious code being introduced into the program increases (Figure 1).

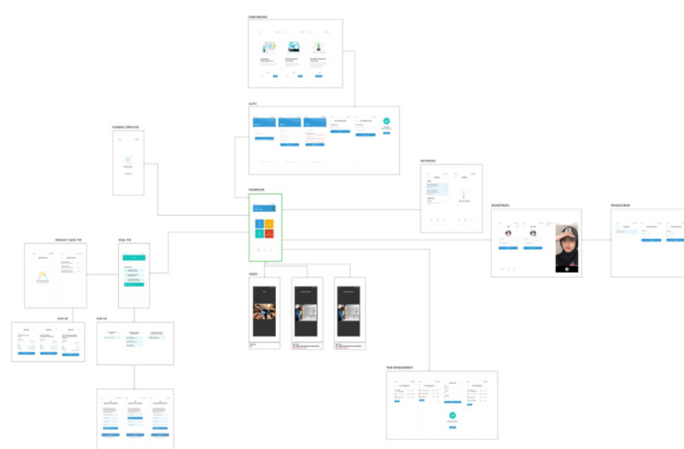


Figure 1. Work flow of the app

Figure 1 : Work flow of the App.

Step I: Preparation

After a two-week period of contemplation, those who agreed to participate in the study were able to reach an agreement. The principal's office was used for the TA activity. A beta version of the Social Media Safe App in Bahasa was provided to participants, along with

instructions on how to complete the TA activity. A short survey was administered to each participant after they signed the consent form, and results from the TA were compared to their health literacy levels, as measured by the validated health literacy evaluation method (Weiss et al., 2005).

Step II: Think Aloud Usability Analysis

In order to teach the participants how to think aloud, they began with a series of practical exercises. As each participant was made aware, they were encouraged to speak for longer than 5 seconds by the researcher who was only interested in the performance of the apps (28). A participant must complete six tasks related to the app's primary goal. Every TA activity was recorded on video.

Step III: Questionnaires Assessing Usability and Motivation

To assess the Social Media Safe App's perceived usability, participants completed the System Usability Scale (SUS), a 10-item questionnaire. The SUS uses a Likert scale of 1 (strongly disagree) to 5 (strongly agree). The Intrinsic Motivation Inventory was used to assess the Social Media Safe App (29). In the IMI, there are 7 items ranging from 1 (strongly disagree) to 7 (strongly agree). A second short survey was created to assess participant demographics, social media addiction, and prior app experience. Each participant is tested twice a week for two weeks. In the final section, participants were asked to rate the Social Media Safe App on a scale of 1 to 10.

Procedure and data analysis

Transcribing and studying videotaped sessions of TA was done by BMZ, FMS, SS. TA session transcripts should include both the text spoken by the participant and the task completion time and time required for the task completion. (25) 3-cycle iterative model was used to explore the themes. To begin, we conducted in-depth analyses of two TA meetings, resulting in a report on the usability concerns raised by the participants. We examined and grouped the codes to discover the major themes. Codes for the verbalizations of BMZ, FMS and SS were then used to evaluate their accuracy. New issues are examined to determine whether they fall under the coding tree or are a brand-new problem. The seriousness of the usability issues was evaluated. The Nielsen severity scale (30) is used to prioritize usability issues. For example, a score of 0 indicates that there are no usability issues; a score of 1 indicates that there is a graphics issue that can wait; a score of 2 indicates a minor usability issue of low priority; a score of 3 indicates a major usability issue that must be fixed; and a score of 4 indicates a usability failure that must be fixed prior to launching the software. In order to evaluate task efficacy based on IMI task feedback, the system entered all participant data from the Social Media Safe App during TA meetings into a file.

RESULTS

Participant Characteristics

TA sessions with participants were held between February and March 2022. Of 20 participants joined in the TA sessions, the mean age was 14.32 (SD=2.31), 55% female, 50% in junior high school and 50% in senior high school, 60% had high score of health literacy, and 35% of them utilize any mHealth. The score of social media addiction was 3.78 (SD=0.59) (See Table I for demographics).

Table I : Demographic characteristics

Demographics	(n = 20), %
Age (years old), Mean±SD	14.32±2.31
Gender	
Male	9 (45)
Female	11 (55)
Educational level	
Junior high school	10 (50)
Senior high school	10 (50)
Health literacy	
High	12 (60)
Low	8 (40)
Score in SMAS-SF	3.87±0.59
Utilized any mHealth (yes)	7 (35)

Task Performance

We used completion rates and times, as well as usability issues, to evaluate how well participants performed and were able to complete the tasks they were given. Data on completion rates and times are shown in Table II. The completion time for Task 1 (downloading and installing the application) was longer than the completion time for the other tasks, possibly due to connection issues and the application's size. All participants completed tasks 1 (download and install application) and 2 (fill in a questionnaire), only 15 of 20 finish the task 3 (create account) and 5 (find video education), and 16 of them complete task 4 (find the right homepage), while 18 and 17 of participants completed task 7 (find notification page) and 6 (find

Table II : Completion rates and time taken per task (n=20) by participants

Tasks	Completion rate	Times (minutes/seconds)
1. Download and install application	20/20	10/30
2. Fill in a questionnaire	20/20	7/45
3. Create account	15/20	5/15
4. Find your rights homepage	16/20	0/45
5. Find video education	15/20	1/05
6. Find notification page	18/20	1/20
7. Find account/profile page	17/20	1/00

Table III : Overview of severe usability problems per main problem type

Usability problem	Frequency	Severity
Unclear buttons	12	2 to 3
Functionality with layout	15	2 to 3
Terminology interpretation problems	7	4
Finding and understanding advice	10	3

account/profile page 0, respectively. The first tasks took the longest on average to accomplish, followed by task 2 (fill out the questionnaire) and 3 (create account). Task 4 (find the right homepage) had the fastest average time to accomplish.

Usability Problems

The TA report identified 12 usability issues, eight of which were considered legitimate but minor issues, and four of which were classified as major issues. A total of approximately 8 specific bugs were discovered in this mobile application. The most serious usability issues are summarized in Table III. The lengthy completion time to download the app appeared to be related to the numerous usability issues and limited internet access available in Indonesia. Approximately 10 participants experienced severe usability issues when attempting to interpret the terminology.

Qualitative Evaluation

This section examines the serious usability issues with terms and advice identification and comprehension that impacted the perceived value of the app's information.

Interpretation Problems in terminology

Participants were required to complete a survey about

their level of social media addiction before they could begin using the app. There were a lot of misinterpretations of terms in the TA analysis, which made it hard for the participants to get specific personal information at the end. There were a lot of misinterpretations of terms in the TA analysis, which made it hard for the participants to get specific personal information at the end. Participants in Indonesia, for example, may have been reluctant to share their stories. They thought that because she had been addicted to social media, her behavior and attitude were the same as before. Although she was unsure of how to answer, key information such as family support for social media use influenced the participants' responses.

"It's difficult to put into words why, even though my family doesn't support me, I can't stop using social media. Because we receive internet quotas from our parents"

Other examples of term interpretation issues that influenced participant responses included being exposed to "On social media, I am the person I want to be." Many respondents did not notice, or were embarrassed by the list of examples, and responded no if their experience was not on the list of issues:

"On social media, however, it is the inverse, with a great deal of manipulation and deception."

Seeking Prevention Advice

Some participants mistook the small section of the homepage devoted to information on how to avoid becoming addicted to social media for general advice about their personal lives. In the case of two participants, both of whom decided to skip ahead to the advice page:

"I just saw the advice in video education, and I thought it was interesting. "However, I require that they read the content."

Usability and usefulness

Thirteen out of the fifteen participants used the notification page to limit their time on social media. The mean IMI score was 5.32 (SD=2.02) out of 7. The Social Media Safe App had a SUS score of 69.20 (SD = 10.35). The participants gave the app an average of 6.55 (SD = 1.42) out of 10.

DISCUSSION

Social Media Safe App was found to be acceptable in terms of usability and usefulness by end-users. In addition to learning more about the impact of social media use and how to deal with social media addiction, the participant found the Social Media Safe App useful. We looked into the major usability issues related to describing terms and recognizing content, as these directly impacted the app's functionality. Due to some issues of norms and values in Indonesia, there was also an implicit assumption among participants about what the app will say about them when they couldn't understand the language in the social media addiction survey. Their actions in the system influenced how important information was filtered by their thought patterns and perceived. The participants' mental model did not match the app's creator's theoretical perspective on how potential users would understand the knowledge provided (31). The end-mental user's model, which includes principles, beliefs, and experience, can influence how an individual acts (32).

According to a specific group of adolescents, the layout and display of the app had a significant impact on their motivation and willingness to use it. Users' expectations were not met, despite the fact that they believed they had achieved the primary goal of the app. This has been found to be true in other studies of mHealth and digital health that have used TA (33,34). In a study conducted by (33), many users were unable to locate data on an online tool, despite the fact that participants in the study claimed it was straightforward to do so (33). In the future, apps for preventing social media addiction may include features such as online counseling and consider the layout with suitable current color trend for adolescents.

Previous studies have highlighted the importance of an iterative process when developing mHealth apps to account for end-user demands and improve usability and feasibility (35). App usability testing, particularly for those intended for healthcare settings, should be given considerable consideration. For mHealth applications aimed at changing individual patient behavior and/or influencing care, user testing is an essential component. Social Media Safe App, however, is a mobile-based app, which means it is needed space and size to use in mobile application. Future studies, may develop web-based application which will be more applicable and easier to use by using a QR code that directs the user to a mobile-friendly website. Consider a variety of educational strategies for youth, especially in the area of risk assessment and prevention of social media addiction when developing this app in the future.

Strengths and Limitations

This analysis has several strengths, including a large sample size for usability evaluation, a mixed-methods, interdisciplinary approach, and the use of the TA process. The study's limitation is that TA meetings took online; participants would have more time at home to explore the app. Furthermore, the volunteers in this study were more adept at using mobile applications than non-volunteer students, which could have an impact on TA outcomes. Despite a few technical difficulties, participants were generally satisfied with the Social Media Safe App; they thought the data it provided was useful and that it met their expectations. This study's usability findings can be used to make recommendations for the next version of the Social Media Safe App for Adolescents.

CONCLUSION

While users expressed satisfaction with the app's content, usability issues made it difficult for them to utilize the whole application. There is much improvements to be made in the development of health apps, as this study's findings demonstrate. It is critical to have a multidisciplinary team that includes members of the target community from the beginning of developing application. The future versions of the Social Media Safe App. can be a powerful tool for educating adolescents about, and assisting them in avoiding, and reducing the risk of social media addiction.

ACKNOWLEDGEMENT

The authors would like to thank all adolescent who participated in this study.

REFERENCES

1. Teendhuha AN. Hubungan Antara Intensitas Penggunaan Media Sosial Dan Komunikasi

- Interpersonal Pada Remaja. *J Komun Islam*. 2019;4(3).
2. Cotet GB, Balgiu BA, Negrea VCZ. Assessment procedure for the soft skills requested by Industry 4.0. *MATEC Web Conf*. 2017;121:1–8.
3. Seabrook EM, Kern ML, Rickard NS. Social networking sites, depression, and anxiety: a systematic review. *JMIR Ment Heal*. 2016;3(4):e5842.
4. Khairuzzaman MQ. No Title 血清及尿液特定蛋白检测在糖尿病肾病早期诊断中的意义. vol. 2016;4:64–75.
5. Vannucci A, Flannery KM, Ohannessian CM. Social media use and anxiety in emerging adults. *J Affect Disord*. 2017;207:163–6.
6. Aalbers G, McNally RJ, Heeren A, De Wit S, Fried EI. Social media and depression symptoms: A network perspective. *J Exp Psychol Gen*. 2019;148(8):1454.
7. van der Schuur WA, Baumgartner SE, Sumter SR. Social Media Use, Social Media Stress, and Sleep: Examining Cross-Sectional and Longitudinal Relationships in Adolescents. *Health Commun*. 2019 May;34(5):552–9.
8. Donnelly E, Kuss DJ. Depression among users of social networking sites (SNSs): The role of SNS addiction and increased usage. *J Addict Prev Med*. 2016;1(2):107.
9. Abroms LC, Johnson PR, Heminger CL, Van Alstyne JM, Leavitt LE, Schindler-Ruwisch JM, et al. Quit4baby: results from a pilot test of a mobile smoking cessation program for pregnant women. *JMIR mHealth uHealth*. 2015;3(1):e3846.
10. Evans W, Nielsen PE, Szekely DR, Bihm JW, Murray EA, Snider J, et al. Dose-response effects of the text4baby mobile health program: randomized controlled trial. *JMIR mHealth uHealth*. 2015;3(1):e3909.
11. Overdijkink SB, Velu A V, Rosman AN, Van Beukering MDM, Kok M, Steegers-Theunissen RPM. The usability and effectiveness of mobile health technology-based lifestyle and medical intervention apps supporting health care during pregnancy: systematic review. *JMIR mHealth uHealth*. 2018;6(4):e8834.
12. Van Dijk MR, Huijgen NA, Willemsen SP, Laven JSE, Steegers EAP, Steegers-Theunissen RPM. Impact of an mHealth platform for pregnancy on nutrition and lifestyle of the reproductive population: a survey. *JMIR mHealth uHealth*. 2016;4(2):e5197.
13. de la Vega R, Miry J. mHealth: a strategic field without a solid scientific soul. a systematic review of pain-related apps. *PLoS One*. 2014;9(7):e101312.
14. Badawy SM, Kuhns LM. Texting and mobile phone app interventions for improving adherence to preventive behavior in adolescents: a systematic review. *JMIR mHealth uHealth*. 2017;5(4):e6837.
15. Majeed-Ariss R, Baildam E, Campbell M, Chieng A, Fallon D, Hall A, et al. Apps and Adolescents: A Systematic Review of Adolescents' Use of Mobile Phone and Tablet Apps That Support Personal Management of Their Chronic or Long-Term Physical Conditions. *J Med Internet Res*. 2015 Dec;17(12):e287.
16. Free C, Phillips G, Watson L, Galli L, Felix L, Edwards P, et al. The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *PLoS Med*. 2013;10(1):e1001363.
17. Tamrat T, Kachnowski S. Special delivery: an analysis of mHealth in maternal and newborn health programs and their outcomes around the world. *Matern Child Health J*. 2012 Jul;16(5):1092–101.
18. Tripp N, Hainey K, Liu A, Poulton A, Peek M, Kim J, et al. An emerging model of maternity care: smartphone, midwife, doctor? *Women Birth*. 2014 Mar;27(1):64–7.
19. Brown W 3rd, Yen P-Y, Rojas M, Schnall R. Assessment of the Health IT Usability Evaluation Model (Health-ITUEM) for evaluating mobile health (mHealth) technology. *J Biomed Inform*. 2013 Dec;46(6):1080–7.
20. Kumar S, Nilsen WJ, Abernethy A, Atienza A, Patrick K, Pavel M, et al. Mobile health technology evaluation: the mHealth evidence workshop. *Am J Prev Med*. 2013 Aug;45(2):228–36.
21. Dumas J. The great leap forward: The birth of the usability profession (1988-1993). *J Usability Stud*. 2007;2(2):54–60.
22. Kushniruk AW, Triola MM, Borycki EM, Stein B, Kannry JL. Technology induced error and usability: the relationship between usability problems and prescription errors when using a handheld application. *Int J Med Inform*. 2005;74(7–8):519–26.
23. Horsky J, Zhang J, Patel VL. To err is not entirely human: complex technology and user cognition. *J Biomed Inform*. 2005 Aug;38(4):264–6.
24. Fisher JD, Fisher WA. Changing AIDS-risk behavior. *Psychol Bull*. 1992 May;111(3):455–74.
25. Jaspers MWM, Steen T, van den Bos C, Geenen M. The think aloud method: a guide to user interface design. *Int J Med Inform*. 2004 Nov;73(11–12):781–95.
26. Peute LWP, Spithoven R, Bakker PJM, Jaspers MWM. Usability studies on interactive health information systems; where do we stand? *Stud Health Technol Inform*. 2008;136:327–32.
27. Van Engen-Verheul M, Peute L, Kilsdonk E, Peek N, Jaspers M. Usability evaluation of a guideline implementation system for cardiac rehabilitation: think aloud study. *Stud Health Technol Inform*. 2012;180:403–7.

28. Ericsson KA, Simon HA. Verbal reports as data. *Psychol Rev.* 1980;87(3):215.
29. Plant RW, Ryan RM. Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *J Pers.* 1985;53(3):435–49.
30. Nielsen J. *Usability engineering.* Morgan Kaufmann; 1994.
31. Eckert E, Bell A. Invisible force: Farmers' mental models and how they influence learning and actions. *J Ext.* 2005;
32. Rook L. Mental models: A robust definition. *Learn Organ.* 2013;
33. Bolle S, Romijn G, Smets EMA, Loos EF, Kunneman M, van Weert JCM. Older Cancer Patients' User Experiences With Web-Based Health Information Tools: A Think-Aloud Study. *J Med Internet Res.* 2016 Jul;18(7):e208.
34. van der Vaart R, Drossaert CHC, de Heus M, Taal E, van de Laar MAFJ. Measuring actual eHealth literacy among patients with rheumatic diseases: a qualitative analysis of problems encountered using Health 1.0 and Health 2.0 applications. *J Med Internet Res.* 2013 Feb;15(2):e27.
35. White BK, Martin A, White JA, Burns SK, Maycock BR, Giglia RC, et al. Theory-Based Design and Development of a Socially Connected, Gamified Mobile App for Men About Breastfeeding (Milk Man). *JMIR mHealth uHealth.* 2016 Jun;4(2):e81.