Advances in Social Science, Education and Humanities Research, volume 494
Joint proceedings of the 3rd International Conference on Intervention and Applied Psychology (ICIAP 2019) and the 4th Universitas Indonesia Psychology Symposium for Undergraduate Research (UIPSUR 2019)

Stay Connected: Using Social Media in a Longitudinal Study

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ABSTRACT
Retention in longitudinal research can be problematic; furthermore, attrition in longitudinal study more likely reduces the number of participants, increases the costs, and introduces particular challenges to the researchers. Thus, establishing a systematic and organized protocol for participants to follow is crucial in an attempt to reduce the attrition rate. Technological improvements, such as personal computers, smartphones, and other devices, have made it easier for researchers to collect longitudinal data. Although technology has been useful in increasing opportunities in the data collection in longitudinal studies, knowledge on the attrition of participants is limited in such type of research. This study focused on illustrating how mobile communication was used as a way to maintain participation in a longitudinal study. This ongoing study is a part of a PhD project based on Indonesian students' transition process to higher education. In total, 734 senior year high school students (aged 16–19 years) were involved in this project for a full year after graduating from high school. Preliminary results of this study showed that mobile communication helped 70 % of participants to stay connected with the first author in a longitudinal study.

Keywords: *a longitudinal study, mobile communication, teenage participation.*

1. INTRODUCTION

Longitudinal studies have been identified to provide information that shows variable pattern over time. This information becomes powerful in determining cause-and-effect relationships within a study. However, participant attrition becomes a significant challenge for longitudinal studies as it requires more commitment from participants considering the study's longer time span (Estrada, Woodcock, & Schultz, 2014). Ribsl et al. (as cited from Tobler and Komro (2011) p. 88) proposed eight strategies in order to keep participants' commitment and maintain their engagement in longitudinal studies: (1) make an information baseline about the location of participant, friends, or relatives; (2) initiate connection with public and private agencies; (3) set up a project identity; (4) focus on the importance of tracking the project staff; (5) use the most straightforward and economical tracking method first, saving more extensive methods for participants who are difficult to find; (6) create excited involvement and reward for participants; (7) plot the highest number of tracking efforts at the initial follow-up; and (8) customize tracking efforts to individual

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participants' situation and study circumstances. Researchers in longitudinal studies should choose one of these identified effective strategies to achieve reasonable response rates to surveys. Creating participant involvement and giving reward are the most common strategies used in longitudinal study (Lamm et al., 2014; J. S. Peper, B. R. Braams, N. E. Blankenstein, M. G. N. Bos, & E. A. Crone, 2018).

Maintaining participants contacting them continuously as a way to keep their involvement as an idea to answer a question about the strategy to keep the retention in longitudinal studies. Some researchers suggested that numerous contact attempts can increase follow-up rates in order to keep their involvement (Cottler et al., as cited by Vincent et al. (2012) p.56). Although most longitudinal research has systematically reported their methods used in contacting participants, a recent study has suggested that a combination of traditional tracking method (e.g., phone and email) and new technology (e.g., social media and mobile communication) may be useful for specific participants. These methods can be achieved depending on the way the researcher maintained and monitored contact with their participants (Vincent et al., 2012). Some research examined the causes and consequences of repeated participation in long-term research; first is the decreased number of participants that led to an inappropriate number of samples for analysis. Understanding the participant characteristics will indirectly affect their participation. This understanding is essential in long-term research designs; however, this has not been much investigated. Therefore, this study focuses more on describing ways on how social media can be used to reach respondents based on their characteristics and behaviors in implementing a multi-wave data collection process.

Technological improvements have made it easier to collect longitudinal data in survey forms. Data can now be collected via personal computers, smartphones, and other devices, which are also quite flexible regarding time and place. Although technology can increase the number of data collection in longitudinal studies, the attrition of participants in this type of research has remained to be a problem. Therefore, predicting the number of attrition and the number of respondents who would complete the survey and those would not is deemed difficult (Barber, Gatny, Kusunoki, & Schulz, 2016). Research indicates that the number of participants in a longitudinal study varies, not only based on the respondents' characteristics but also based on their behaviors, and the related event was measured across the survey.

Participants who experience the situation measured in this study are suggested to maintain higher participating levels than those who do not experience the same situation (Barber et al., 2016). A previous research recommends that respondents directly involved in the measured phenomenon will be more likely willing to participate than those who have never been directly involved. Another threat that may occur is repeated data retrieval, which will only make people feel this task is too heavy; therefore, they are no longer willing to participate or respond in a guessing way. The impact can produce biased or unreliable results.

Acknowledging respondent characteristics do matter, especially if the study involved adolescents as participants. Adolescents nowadays grow up with contemporary mobile telecommunication and social media and further report that they cannot imagine a world without it (Barth, 2015). Social media has been defined as an electronic way of communication that provides a space for social engagement and interaction where users can both consume and create content (Reid Chassiakos, Radesky, Christakis, Moreno, & Cross, 2016). Thus, chatting, texting, friending, blogging, vlogging, tweeting, posting, etc. are considered as part of a healthy lifestyle among adolescents. Social media has become a new way of communication that guide adolescents' social interactions, learning strategies, and choice of entertainment (Mishna, Bogo, Root, Sawyer, & Khoury-Kassabri, 2012). The developmental process dynamics experienced by adolescents nowadays is often related to social media and technology.

Several modes of social media are used by adolescents nowadays. WhatsApp and Line are two types of instant communication applications in sending messages, images, audios, or videos. They are popular among teenagers because of their features such as group chatting, voice messaging, and video sharing (https://www.webwise.ie/parents/explainer-whatsapp/; https://en.wikipedia.org/wiki/Line_(software)). To use this program, someone needs a compatible phone, phone number, and Internet connection. Social networking sites such as WhatsApp and Line provide valuable features in communicating with participants. They also have one-to-one networking that allowed researchers to communicate with participants individually anonymously.

This study is a part of a PhD project that focuses on how students perceive themselves in terms of their academic self-concept and well-being when they are transitioning from high school to higher education in Indonesia. Longitudinal research is essential to better understand the causes and effect, identify risk populations, and evaluate programs and policies. There are only a few studies examining the transition process of students, from high school years to their tertiary education years (e.g., Busseri et al. (2011); Mackinnon and Sherry (2012)). Maintaining contact with and collecting outcome data from adolescent study participants (aged 16–19 years) can present a significant challenge to researchers conducting longitudinal studies, especially in maintaining contact after they graduate from high school. Retention in longitudinal research can be problematic. Participant attrition is a leading threat to the validity of longitudinal study outcomes, such as the statistical power and generalizability of these findings and the unequal proportion of the original sample (Tobler & Komro, 2011). Attrition has been determined to reduce the number of participants, which can only lead to more challenges; therefore, researchers should use a statistical approach to overcome this problem. The percentage of participants who discontinue also varied among longitudinal studies, from <10 % up to 56 % of the original cohort (Hansen, Tobler & Graham as cited in Tobler and Komro (2011) p. 87). Establishing a systematic and organized protocol for participants

during follow-up is crucial in reducing the attrition rate and maintaining a high retention rate (Davis, Demby, Jenner, Gregory, & Broussard, 2016).

UNICEF, in cooperation with Indonesia's ICT ministry, the Berkman Center for Internet and Society, and Harvard University, conducted a study on Indonesian teens' Internet usage and behaviors (https://www.techinasia.com/report-internet-users-indonesia-teenagers). The study showed that approximately 30 million Indonesian teenagers regularly accessed the Internet. The study had 400 respondents between the ages of 10 and 19 from all over Indonesia and found that:

- Most of Indonesia's 30 million teen Internet users reside in urban areas like Jakarta, Yogyakarta, and Banten.
- Approximately 79.5 % of all teen respondents are Internet users, and most of them have accessed the digital world for more than 1 year.
- When it comes to devices used to go online, 69 % of respondents use computers, 34 % use laptops, 52 % use handphone, 21 % use smartphones, and 4 % use tablets.
- Among those who cannot access the web, their most common reason is that their parents forbid them to use it.
- The three biggest drivers for teenagers to access the Internet are as follows: seeking information (mostly for school assignments), connecting with their friends and relatives, and for entertainment purposes.

The data above show that Indonesia is among the top five countries having the highest social media usage worldwide. Indonesia is quite a rapidly progressing country in terms of Internet usage since 2016, especially Indonesian teenagers. The most popular tools used are mobile devices such as smartphones that have doubled in use in recent years. This condition allows Indonesian teens to share, access, and upload various contents on the Internet, placing Indonesia on the third spot among countries with the highest number of social media users worldwide (https://thediplomat.com/2017/05/the-dark-side-of-indonesias-social-media-boom/).

Based on these conditions, this study will focus on describing how Indonesian adolescents use social media in order to maintain their participation in a longitudinal study. The study participants were located in Jakarta, the capital city of Indonesia. This study would answer a research question: "What is the attrition rate from T1 to T2 in a longitudinal study when using media communication among adolescents?" It was assumed that participants are Internet users and familiar with WhatsApp and Line social media platforms and have their mobile phones for daily use. There will be two waves of data collection within a year of participation. Participants will be asked to fill in a set of online questionnaires during the first semester of their grade 12. The follow-up study will be at the end of the first semester at the university. This study hypothesized that the attrition rate from T1 and T2 in the longitudinal study will be <27 % as what Tobler and Komro (2011) reported for the 12-month longitudinal study. In contrast to Tobler and Komro (2011), this study use social media communication in mainly keeping contact with the participants. Further, results have provided the number of active participants

before and after the study. Further, our findings may appropriately inform future studies on an alternative way of maintaining contact and collecting data over time among adolescents.

2. METHODS

This study was part of a longitudinal project on high school students who are transitioning to universities. Ethical approval was obtained from the University of Queensland Health and Behavioural Sciences, Low and Negligible Risk Ethics Sub-Committee (No. 2017002040). During the 1-year data collection period, attempts have been made to maintain students' awareness of the study through the social media platform. The participants' email addresses and mobile phone numbers will be put into WhatsApp/Line platform, where the researcher and participants can keep the communication open until the second data collection (T2). Once in every 2 months for about 12 months (the duration between T1 and T2), the first author will send some materials such as videos, articles, and pop-up quizzes related to daily teenage life issues. These materials are chosen in reference to Ribsl et al. (as cited from Tobler and Komro (2011) p. 88) study to maintain their involvement; rewards were also given to participants to prevent attrition. Line and WhatsApp are free virtual platforms receiving more significant popularity as they have been utilized to communicate and interact with students (participants).

2.1. Preliminary study

To make various materials attractive for adolescents, the researcher distributed an online survey to provide some interesting and updated topics for Indonesian adolescents aged 16–18 years, which served as the preliminary study. The researcher provided 12 issues teenagers can relate to, not exactly associated to the PhD project variables (achievement goal, academic self-concept, social comparison, achievement, well-being, and adjustment). These proposed topics were mostly lessons not taught in schools: reasons why one should express gratitude today, love at first sight, does birth order matter, the way to start conversation with a stranger, reasons when stress can be useful, the night type versus morning type, and how to deal with parents with different will. Participants were asked to rate each topic, from the most exciting and relevant issue for adolescents (rank 1) to the least exciting and relevant (rank 12) (see Table 1). Additionally, participants were also asked to list two additional exciting and related issues based on their opinions about adolescents. In total, 29 young people aged 16–22 years participated in this survey (21 girls and 8 boys). The results of the topic polling are as follows:

Table 1. List of topics chosen by participants in the preliminary study

No	Topics	Number of participants chose as best topic	Rank
1	Lessons not taught in school	2	6
2	Expressing gratitude today	3	2
3	Love at first sight	2	11
4	Does birth order matter?	0	12
5	Is it deja vu all over again?	2	8

6	Morning type versus night type	4	1
7	Why does friendship end?	0	10
8	Skills needed in the twenty-first-century job market	2	7
9	How to start a conversation with a stranger	2	9
10	How to make a great first impression	0	5
11	When stress can be good	2	3
12	How to deal with parents with a different will	0	4

Several topics were also proposed by participants, and they are as follows: how to love yourself, how to get away from suicidal thoughts, how to motivate yourself, how to find your potential, how to decide the right career for you, and sex education. From this survey, the researcher listed the topics most nominated by the participants (see Table 2).

Table 2. List of topics selected in the preliminary study

No	Topic	Time	Form
1	New state universities' application procedures	End of January 2019	Infographics
2	Two motivational quotes	During National Examination Period (March 2019)	
3	When stress can be good	Mid of April 2019	Infographics
4	How to deal with parents with a different will	Early June 2019 (Unreleased)	Infographics
5	Nationalism quote	Mid of August 2019	Quote
6	Morning bird vs. night owl	Early September 2019	Quiz and answer
7	National Hero Day	Early November 2019	Quiz and prizes
8	How to love yourself → sex education and obesity	End of November 2019	Short article
9	How to choose the right activity for you	January – February 2020	Infographics

Table 2 shows the number of topics listed in this study. The decision to pick the topic was based on the preliminary study's participants list of choice and need in that period and special occasions in that particular time. The first topic was chosen because it was a crucial topic for participants during this stage. In that time, Indonesia had a different procedure for state university application. Researchers decided to launch this topic to make participants more familiar with the system as needed. The motivational quotes were launched by the time all participants were preparing for the national examination. These quotes aimed to encourage and maintain their positive spirit in dealing with examination stress. The topic on stress was released to inform the participants about its positive effect. The topic on how to deal with parents with different will was not released because the participants were preoccupied with their higher education application, especially with recent changes its system that year. Considering the topic was inappropriate

for that period, its release was held. The nationalism quotes were launched to celebrate the Indonesian Independence Day.

2.2. Main Study

The study participants were the same participants included in the longitudinal study project. Approximately 734 12th-year students from six schools in Jakarta, aged 16–19 years, participated. The number of participants between males and females was determined to be similar. However, this study did not differentiate the participants' responses based on gender. They were recruited from six state and private schools based on random sampling (see Table 3). The demographic data of participants are as follows:

Table 3. Participants' demographic data

School	Number of students	Female	Male
School A	131	56	75
School B	197	75	122
School C	206	108	98
School D	50	27	23
School E	95	46	49
School F	55	33	22
Total number	**734**	**345**	**389**

The study started after the T1 data collection (from October to November 2018). The first topic was launched at the end of January 2019. Among the 734 students from the 6 schools who filled in the forms, only 482 students completed the online survey at T1 data collection. All students who participated in the survey study were asked to fill in the questionnaires within 2 months (T1 data collection period). After the T1 period, this study commenced.

3. RESULTS

This study started by recruiting students to participate, wherein only 66 % of them volunteered to do so (see Figure 1 and Table 4). Therefore, the attrition rate before the study even started was recorded to be at 34 %, i.e., higher than the average 27 % as reported by Tobler and Komro (2011) for a 12-month longitudinal study.

Table 4. The proportion of participants who filled in the forms and participated in the survey

School	Number of students	Number of participants
School A	131	117
School B	197	65
School C	206	216
School D	50	19
School E	95	31
School F	55	34
Total number	**734**	**482**
Percentage		**66%**

Figure 1 shows the trend in the number of participants' attrition. The researcher met the students face-to-face in class and asked their willingness to join the study. Those who volunteered were given notes, a pen, and refreshments as a reward for their willingness. Although all of the students (734 students) expressed their intention of joining in the study, within the 3-month survey T1 period, only 482 students genuinely participated.

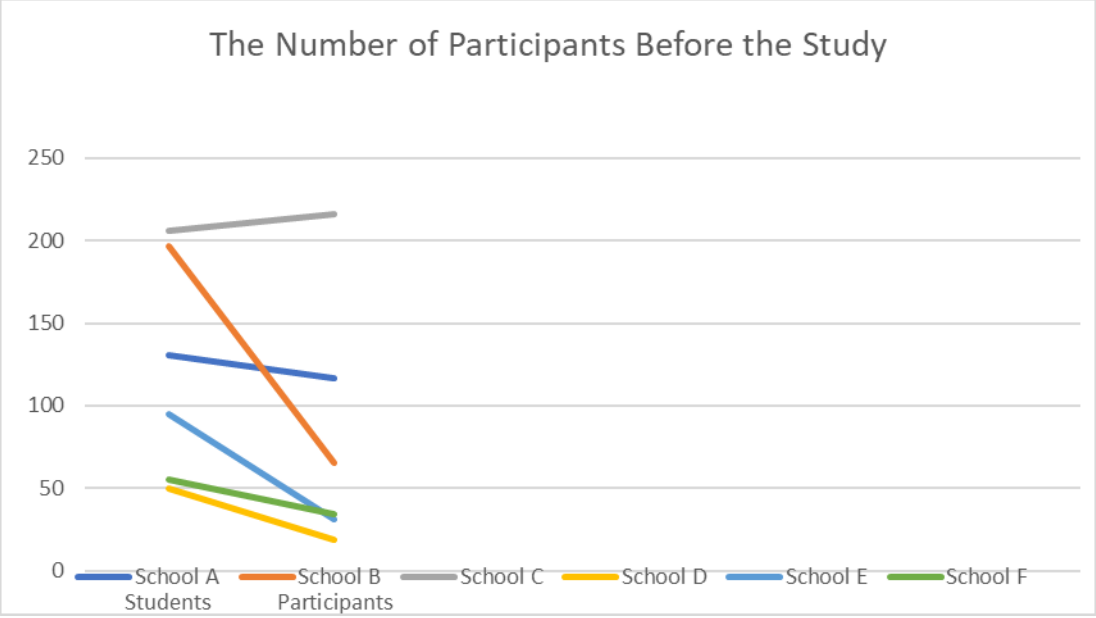

Figure 1. The proportion of participants who filled in the forms and participated in the survey

The numbers of sent, read, and responded messages were quantified as the number of participants, showing the intensity of engagement in the last two posts. The tables and charts (see Table 4 and Figure 2) below showed the attrition level before the study began and the intensity of engagement among participants in this study within the last 2 months.

After the researcher implemented the monitoring program, the number of participants who kept in touch with the researcher remained stable (61–69 %). It also showed a relatively stable number of students who joined in the study compared to the number of participants in T1 data collection (66 %). Given that the expected attrition rate in a 12-month longitudinal study is 27 % (Tobler & Komro, 2011), this program increased the participants' retention rate by 3 % from T1 on the way to T2 data collection within 10 months.

Table 5. The proportion of participants during the study in the last 2 months

School	Number of students	Number of participants	Delivered messages 1	Delivered messages 2	Response messages 1	Response messages 2
School A	131	117	80	77	24	16
School B	197	65	132	130	9	18

School C	206	216	101	163	3	12
School D	50	19	43	41	0	7
School E	95	31	76	72	2	3
School F	55	34	17	27	8	3
Total number	**734**	**482**	**449**	**510**	**46**	**59**
Percentage	**100 %**	**66 %**	**61 %**	**69 %**	**10 %**	**12 %**

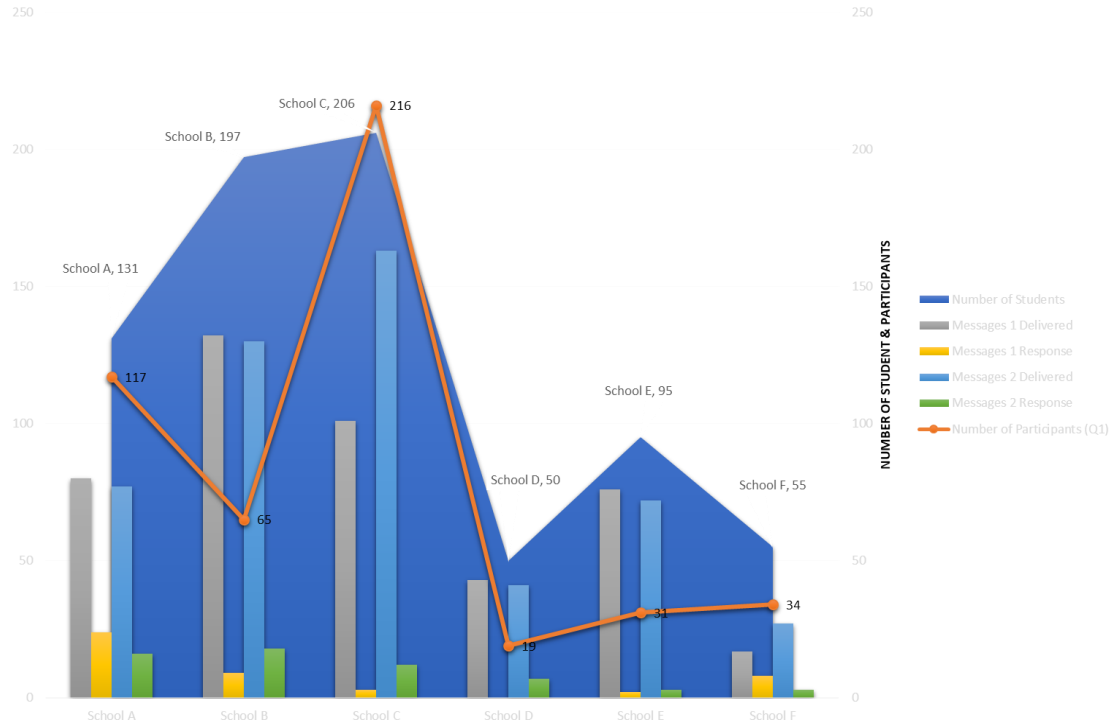

Figure 2. The proportion of participants during the study in the last 2 months

4. DISCUSSION

Maintaining long-term active participation presents many challenges in longitudinal studies. The participant demographics and specific strategies have always been the first author's primary concern in terms of maintaining communication with study participants (Tobler & Komro, 2011). Thus, this study has demonstrated an effective way of using social media to maintain the communication with Indonesian adolescents, who served as the respondents of this research, during the entire 1-year study period. Several postings were sent to the participants through social media, and the number of delivered messages and responses were counted as the intensity of keeping connected with them.

The current findings showed that the use of social media helped keep teenage participants' engagement in the project, further ensuring that the attrition rate was lower than expected. This outcome is consistent with that of Tobler and Komro (2011)'s findings stating that attrition can be reduced by developing an understanding of the participant cohort and the implementation of more resource-intensive efforts to retain teenage participation.

The percentage level of participation did not markedly change over the two time periods. However, this study has successfully maintained the number of participants from T1 data collection to T2 data collection, approximately 1 year after. This was in contrast to what was expected. The choice of topic and the media used in this study contributed to the number of responses and willingness to receive the messages among participants. The face-to-face interaction between the first author and participants at the beginning of T1 data collection and the credibility of the researchers have strengthened the participants' eagerness. Creating participant involvement and giving a reward, as one of Ribsl et al.'s (as cited from Tobler and Komro (2011) p. 88) strategies, were identified to be the most commonly effective methods in longitudinal studies.

Whatsapp and Line were useful tools for improving participants' retention in a longitudinal study. Whatsapp allows the researcher to build a one-on-one relationship with the participants. Evidence showed that researchers put a lot of effort in employing successful longitudinal research benefits, from devoting considerable time and money resources to developing, monitoring, and evaluating the retention protocols. As all participants agreed to participate in the T2 data collection and allowed researchers to contact them in the future, the use of Whatsapp and Line was not seen as harmful.

Although the responses and delivered messages cannot be generalized as the willingness to participate in the survey study, this study highlighted how social media can be utilized in keeping participants' involved. Other strategies for tracking the participants in the longitudinal study should also be included, such as a reward system and customized tracking efforts; therefore, further analysis should be performed to secure the study results.

5. CONCLUSION

The number of participants should be maintained in a longitudinal study using social media. Whatsapp and Line were used in this study, which were determined to have successfully reduced participant attrition by 30 % in a difficult-to-trace adolescent population who are transitioning to university. These results demonstrated that social media serve as a useful tool for maintaining teenage participants in a longitudinal study. Changing phone numbers and participants' mobility were identified challenges that can be prevented in the longitudinal study by using social media. Although our retention rate seemed low, it is in line with the standard (27 %) (Tobler & Komro, 2011). The result of this study demonstrated that social media should be integrated into research, especially for maintaining participants in a longitudinal study.

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