Paper analysis

Urša Zrimšek

Introduction

This report is an analysis of the Parasuraman et al.'s paper, titled Smartphone usage and increased risk of mobile phone addiction: A concurrent study, using the PPDAC investigative cycle. For each step and substep we will list what the authors explicitly or implicitly did, identify potential sources of error, and critique their choices.

Problem

The authors aimed to study the mobile phone addiction behavior and awareness on electromagnetic radiation (EMR) among a sample of Malaysian population. These are two different problems, where EMR awareness is easy to assess (if we assume that the respondents answer truthfully) and addiction behavior is a less defined term, difficult to detect only through questionnaires.

The target population in this problem is entire Malaysian adult population (as seen from abstract - the authors do not generalize their findings on wider public) and unit is one person. Response variates are addiction behavior and EMR awareness, and explanatory variates are participants demographic details and their mobile phone usage habits. Population attributes that the authors are interested in is the percentage of participants that have addiction (agree with statements from table 4) and are aware of EMR (table 3a, 3b) and the statistical significance of their hypotheses. The aspect of the paper was predictive, as they didn't only describe the response variates, but they also compared addiction and awareness based on demographics (sex, accommodation) of the respondents.

Plan

The study unit is again one person, but study population is now limited to a sample of Malaysian population that the authors managed to reach through personal communication. This exposes a big problem (leading to study error), that they don't address. Their sample is not random and so it doesn't represent the whole population. We will tell more about the possible problems in connection with sampling error.

As it is hard to directly measure addiction and awareness, response variates are the answers to their questionnaires. If we assume that participants didn't lie (which could also not be true, if they knew the authors and wanted to sound smart or were afraid of being judged), there shouldn't be any proxy error for awareness, but approximating addiction with answers on these questions could lead to error. There could be better questions or better way of combining the answer into deciding who is addicted. They just claim that a significant number of participants has addiction, without telling how they combined the answers into conclusion who is addicted. Explanatory variates are listed in tables 1 and 2, still demographic details and usage habits, but probably decided on more accurately in the Plan stage. The approach was observational, as they chose the population first and then asked them about these details.

The authors measured all variates of interest with questionnaire. This could lead to measurement error as the respondents can lie in their answers - intentionally (e.g. about awareness or addiction behavior) or unintentionally (e.g. about frequency of mobile phone checking, as it is difficult to know exactly). One possible improvement here could be, that the respondents would use an application that would gather these data based on their usage in the period of the study (between December 2015 and 2016).

They also made a big sampling error when they didn't try to make a representative sample, as more than 75% of the participants is 21-25 years old, and mean age of the study participants was 22.88, with standard error 0.24 years. The majority also had the same qualification and occupation, so their sample was very biased with low variability. Reaching them through personal communication with online surveys could also mean that they shared the questionnaires on some social platform, which would directly lead to leaving out the part of population that doesn't use the platform, maybe even because of bigger awareness of EMR dangers. And in that case also those that are more addicted and spend more time on mobile phone would have more chance to come across the questionnaire. In the limitations the authors mention that wider population base would be better, but they should also address all these sources of bias, or if these are wrong assumptions, they should tell more about their survey deployment. Around 10% of people informed didn't want to participate, which could lead to additional error. These people could be heavily addicted and in denial or embarrassed, or maybe they didn't have any problem with this and thought that the research is pointless.

In connection with data collection protocol the authors tell us that they gathered data through online surveys and that they conducted it according to the Declaration of Helsinki. They discarded incomplete forms and the participants' details were maintained confidentially.

Data

The authors examined the data to discard incomplete forms, but do not discuss this stage any further. We don't know if they monitored it during collection or stored it for further use. From their data they could see that their sample is not representative and change their way of sharing the surveys or at least change their findings from Malaysian adult population to Maleysian students or something similar. They should discuss this stage more.

Analysis

The authors calculated frequency of the data and analyzed it using two-sided Chi-square test with Yate's continuity correction. Even if they use the right models and did it correctly, their data was biased and this probably lead to wrong findings. They didn't iterate their research, or at least they don't mention it.

Conclusion

In conclusion they reported the results in simple and effective way. They could be more consistent and more precise in using quantification (e.g. most of, many of them, $\frac{1}{4}$). They address some limitation of their study, but as we found out through this report, they should think about their potential sources of error more thoroughly.