Reliability and Validity of CHO-CHO-Mobile Scale in Young Medical Adolescent Students in Bhopal - A Pilot Study

Sunil Chouhan*, Abhijit P Pakhare, E. Chiranjeevi Kumar***, E.P. Praveen******

* Associate Professor, ** Associate Professor, Department of Community Medicine, *** Tutor/Demonstrator, Department of Physiology, **** Senior Resident, Department of Biochemistry, AIIMS Bhopal 462024, India

Abstract: Context (Background): Mobile phone, the modern gadget is becoming integral part of daily human activity. This study attempts to develop a questionnaire to assess how mobile phone is being used by medical students in their daily life. Objective: To find out the Validity and reliability of CHO-CHO-Mobile scale in adolescents Indian medicals students in Bhopal. Method: A 30 item questionnaire was developed and its Content Validity Index was calculated by circulating it amongst 10 subject experts. Then cross-sectional study was designed to test a questionnaire (items with CVI-Item >0.8) among young medical students from three different medical colleges. Factor reduction and domain identification was done by using Principal Component Analysis wherein factors with Eigen value > 1 and which explains >5% variance was identified. Reliability analysis was done by using cronbach's alpha and Split Half reliability. All analyses were done by using IBM SPSS 21 version software. Result: Twenty seven questions were shortlisted based on Content Validity Index value for each item (Items with CVI-I>0.8) to be included in CHO-CHO Mobile Scale. This 22 item scale was administered to 286 medical students. We identified 9 factors based on criterion and further each question was selected if factor loading is >0.30. These 9 factors are General Utility, Time spent in different habits, Withdrawal, Control over usage, Time spent for social media, Academic utility, Relation to sleep, Habit, Preference over safety. CHO-CHO scale demonstrated medium reliability (Cronbach alpha = 0.667). Conclusion: A 22 item CHO-CHO Mobile scale has been developed which can be used to assess mobile dependence in medical students. Assessment of mobile dependence can be useful in studying its association with their lifestyle and health risk behaviours. This scale has acceptable value of Cronbach alpha and Split-half for assessing reliability. [Sunil C NJIRM 2017; 8(5):27-32]

Key Words: HPA Questionnaire, cronbach's alpha, Content Validity Index

Author for correspondence: Sunil Chouhan, Flat No: 4001, AIIMS Doctor Colony, Saket Nagar, Bhopal - 462020
M: 9425649056 E-Mail: sunil.physiology@aiimsbhopal.edu.in

Introduction: The technology of Smartphone has revalorized the world. Today, it is one of the most sold electronic gadgets and it has been estimated that by 2016, over a third of the world's population (1 in 5 people) will have mobile phone; an estimated total of almost 2.6 billion smart phones in the world[1].The student having Smartphone now days is in upward trend worldwide[2]. Numerous studies have revealed that smart mobile phone (SMP) adversely affect the student's mind and behaviour[3, 4] if not used within limit; it can lead to psychological[5] addiction[6, 7, 8, and 9] and even affect brain due to radiation[10]. On the contrary, there are various excellent uses of smart mobile phone, such as in medicine[11], health[13], education[14],learning of vocabulary[15] etc. The SMP addiction in south Korea among youth have reached 11.4% of the population and the top 2.2% of this population are facing difficulties in their daily lives due to this addiction[16].The adolescents experience elevated level of anxiety when their mobile phone is switched off[17]. Other health concerns include headache, fatigue, tiredness, stress, anxiety, concentration difficulties and sleep disturbances but results remain inconclusive[25]. There are numerous research articles linking brain tumour with mobile phone but no definitive association has been found[18, 19, 20, and 21,22,23,24]. Our aim in this questionnaire based study was to develop a tool to assess mobile phone indispensability in lives of Medical students and test its psychometric properties content. This scale, named as 'CHO-CHO-Mobile scale' has been develop by us to find the association of mobile phone with the daily life style of the medical students after analyzing the validity, consistency and reliability of each item in the scale.

Methods: CHO-CHO Mobile scale development: We developed 30 questions in English language, related to mobile dependence. Then we identified 10 subject experts, who have thorough knowledge regarding development of questionnaires based scale. All experts were MD from Medical background and these 30 item questionnaire was circulated among them. We asked experts to rate each item as 'Not relevant' 'Somewhat relevant' 'Relevant" and 'Very relevant'. Then we used method suggested by Lynn[4] for calculation of Content Validity Index (CVI) for each Item (CVI-I) and scale as well (CVI-S). Eight Questions

with CVI-I less than 0.8 were deleted. This 0.8 was taken as cut-off value as per Lynn adopted mythology[4]. Finally we shortlisted 22 items (Table-1) for further validity and reliability testing. For this purpose a cross-sectional study was done among 220 adolescent medical students (First and Second year MBBS students) male and female from three different medical colleges in Bhopal city in the month of January to April 2016. Considering 22 items, we targeted to enroll at least 10 participants per item i.e. a total of 220 participants which would be sufficient for conducting Principal Component Analysis in this study .Students were asked to rate each item in 4 point scale as 'Everyday', 'Often', 'Sometimes' and 'Never'. We have also collected demographic variables like gender, age, socio-economic status of respondents. The Institute review research board and Institute Ethical committee approval were taken before the commencement of this study. The anonymity and confidentiality of the data collected was guaranteed to the subject included in this study. The written consent was taken from all the participators. The sequence for development of cho-cho-scale has been shown in flow Chart (Figure -III).

Result: Statistical analysis was done by using IBM SPSS Software Version 21. Reliability analysis was done by calculating Cronbach alpha and Split-half reliability method.

A Principal Component Analysis (PCA) was done for summarization and identifying of underlying construct.

Aim of PCA and suitability of data for PCA: The primary aim of the analysis was to group the items into minimum factors, which may explain at least 60% variance of the questionnaire. Data for Principal component analysis(PCA) was assumed to be normally distributed and having linear relationship which were checked for deviation of homoscedasticity (if any) and presence of multi-co linearity by determinant of R-matrix ,Kaiser –Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity.

b) Performance of PCA and identification of factors: For inclusion in the model these factors have to fulfil at least two criteria out of three following criteria – first, factors extracted should be able to explain at least 5% of variances. Secondly, Eigen value of ≥1 for extracted factor and third factors at or below the level of flattening out of the slope of scree plot (Figure-I). The items which had a loading of 0.30 or higher were considered as significant loader for the factor. The scree plot for the factor extraction was drawn between the extracted factors on x-axis and Eigen value on y-axis for observing the level out.

c) Rotation: It was assumed before analysis that every factor contributes to a mutually exclusive dimension; accordingly in PCA we used varimax rotation method with Kaiser Normalization. This assumption proved right at later stages of analysis.

Questionnaire was distributed to 286 medical students from three medical colleges in central India. The principal component analysis was done in a sequential manner. At the beginning data was first analyzed to detect its degree of suitability for PCA. Multicollinearty was ruled out by R-matrix determinant value, maximum correlation between two items (through correlation matrix) and by 22 KMO test. Correlation matrix showed the R matrix determinant value as 0.0446 which was far greater than the threshold value (0.00001).Further maximum correlation between two items detected was 0.48. KMO value was calculated as 0.612. Bartlett's test of sphericity showed that there is some relationship between variables (χ^2=352.89, p=0.00, df =231). An inference was drawn that data was suitable for factor analysis.

At this juncture investigators felt that scree plot for the given study was steep throughout and did not flatten as expected so only first two deciding criteria (namely ability of the factor to explain at least 5% variance and Eigen value ≥1) for factor extractions were taken into account. Nine factors were extracted.
In the next step, the responses received from participants on dependence on mobile phone were analyzed for reliability. This questionnaire appeared to have a medium internal consistency with an $\alpha = 0.665$. Split half reliability was calculated by dividing the questionnaire into two equal parts. Gutman Split-Half coefficient was 0.654 and Spearman-Brown coefficient was 0.655.

Mean score on 22 item questionnaire for medical students were 57.22 with standard deviation of 8.27. Minimum possible score was 22 and maximum was 88. Thus it can be concluded that there was

moderately high dependence on mobile phones among medical students.

Table I: Item wise internal consistency of Cho Cho-Mobile scale

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	54.88	63.169	.222	.656
2	54.27	60.555	.369	.640
3	54.25	63.608	.203	.658
4	55.25	62.519	.267	.651
5	55.18	66.054	.118	.665
6	54.92	63.987	.172	.662
7	53.62	65.954	.132	.664
8	55.13	64.980	.185	.659
9	54.34	61.380	.336	.644
10	55.34	62.093	.320	.646
11	55.46	64.686	.177	.660
12	54.31	64.955	.136	.665
13	54.62	64.087	.185	.660
14	55.26	64.953	.168	.661
15	53.98	62.887	.266	.652
16	54.64	59.921	.431	.633
17	54.01	63.250	.231	.655
18	54.35	60.758	.297	.648
19	54.14	64.351	.168	.662
20	53.88	63.458	.249	.654
21	55.34	63.824	.235	.655
22	54.54	64.108	.227	.656

Discussion: This study was aimed to evaluate efficacy of "cho-cho mobile scale" in adolescent medical student. Health promoting lifestyle among every individual, especially young adult has become the centre of attention for research internationally. The purpose of this questionnaire study was to demonstrate reliability and validity of the scale. This scale has been developed to perceive the association of use of mobile phone among adolescent medical student and the name given to this scale was "Cho-Cho-mobile scale". Similar scales have been developed in the past by different authors[26, 27,28,29,30]. According to one study done on medical students it was seen that "over-use" of mobile phone lead to decrease in sleep quality among the students[31].This scale can be used along with other scale like HPLP II (Health-Promoting Lifestyle Profile)[32], which does not have question related to mobile phone to assess the health status of an individual. Studies related to mobile phone have been done in the past with different instruments. There are several studies done using different instruments already available. Some of the various instruments used in the past studies are (a) use of personnel information form, problematic mobile phone use scale, and UCLA-loneliness scale for analyzing university students loneliness to mobile phone addiction with reference to daily use time and gender[33]. (b) Rosenberg's self-esteem scale, Lai's personality Inventory for mobile phone usage questionnaire and mobile phone addiction scale[34]. (c) Self-report questionnaire for dependence to mobile phone among female nursing students[35], (d) for surveys[36], (e)students learning-(video lecture taken)[37] etc. This scale developed 22 item related to SMP which can be used for data collection for exploring how a student uses their SMP in his/her daily life. For practical actual utilization of this scale the developers have kept the language of the questionnaire extremely simple. This scale final Cronbach's alpha was 0.665, (Table 1) thereby demonstrating this scale to be moderately reliable

Conclusion: This Cho-Cho mobile scale which has been developed among medical students will summarize the habit of the medical students pertaining with the mobile phone. Timely use of this scale can reveal more or less alliance with the mobile phone and if more, timely intervention can resolve the various problems arise due to over use of mobile phone.

Figure I: Scree plot

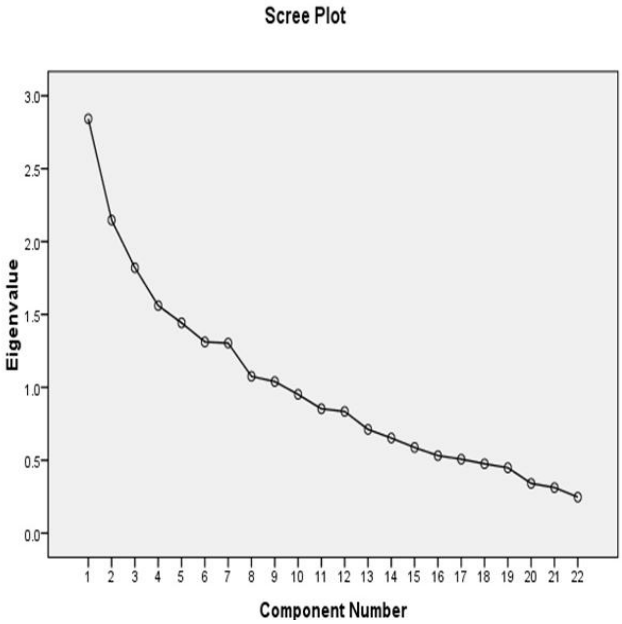


Figure II: Component Plot

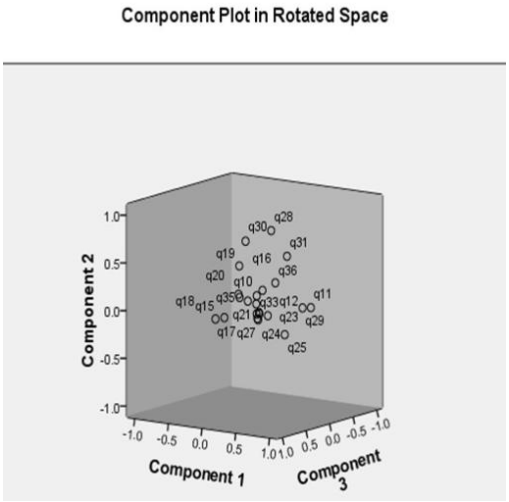
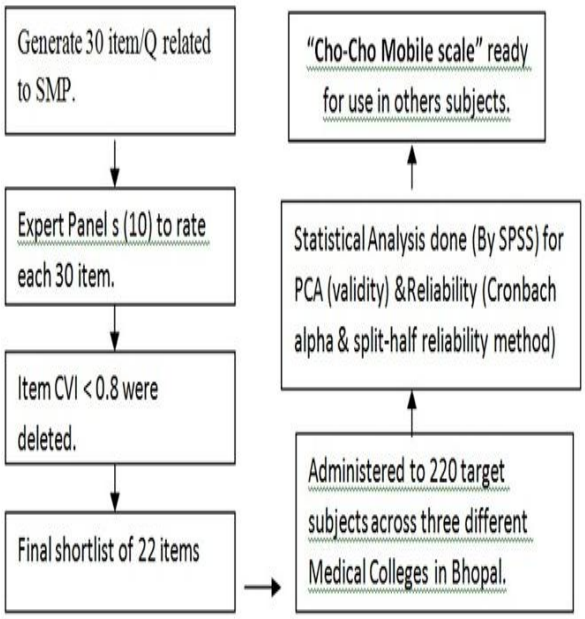


Figure III: Sequence for development of "Cho-Cho Mobile scale".



Abbreviations - SMP-Smart Mobile phone; Q-Questionnaires; CVI- Content Validity Index; PCA-Principal component analysis

Acknowledgment: We thank Dr. Abishek, Senior Resident, Community Medicine, AIIMS, Bhopal for his technical assistance for collecting the questionnaire and Dr.Saleem Naik, MS (Surgery) for suggesting the name 'cho-cho' long time back.

Limitation: The information was obtained from expert and students from self-reported questionnaires, which could be one of the factors for information bias. Some of the questions were deleted since two options were attempted instead of one, in spite of clear instruction.

References:

1. Heggustuen J. One In Every 5 People In The World Own A Smartphone, One In Every 17 Own A Tablet. Bus Insid. 2013;5–6.
2. Chen J V., Yen DC, Chen K. The acceptance and diffusion of the innovative smart phone use: A case study of a delivery service company in logistics. Inf Manag. 2009;46(4):241–8
3. Lapidot-Lefler N, Barak A. Effects of anonymity, invisibility, and lack of eye-contact on toxic online disinhibition. Comput Human Behav. 2012;28(2):434–43.
4. Suler J. The online disinhibition effect. CyberPsychology Behav. 2004;7(3):321–6.
5. Hong FY, Chiu SI, Huang DH. A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students. Comput Human Behav. 2012;28(6):2152–9.
6. Takao M, Takahashi S, Kitamura M. Addictive personality and problematic mobile phone use. Cyberpsychol Behav. 2009;12(5):501–7.
7. Kim D, Lee Y, Lee J, Nam JK, Chung Y. Development of Korean Smartphone Addiction Proneness Scale for youth. PLoS One. 2014;9(5).
8. Lee. Exploration of the Predicting Variables Affecting the Addictive Mobile Phone Use. The Korean Journal of Social and Personality Psychology.2008; 22(1):133–157.
9. Kim D, Lee Y, Lee J, Kim M, Keum C, Nam J. New patterns in media addiction: is smartphone a substitute or a complement to the internet? Korea J Youth Couns. 2012;20(1):71–88.
10. Roggeveen S, van Os J, Viechtbauer W, Lousberg R. EEG Changes Due to Experimentally Induced 3G Mobile Phone Radiation. PLoS One. 2015;10(6):e0129496.
11. Preziosa A, Grassi A, Gaggioli A, Riva G. Therapeutic applications of the mobile phone. Br J Guid Counc. 2009;37(3):313–25.
12. Arsand E, Tatara N, Ostengen G, Hartvigsen G.Mobile Phone-Based Self-Management Tools for Type 2 Diabetes: The Few Touch Application. J Diabetes Sci Technol. 2010;4(2):328–36.
13. Patrick K, Griswold WG, Raab F, Intille SS. Health and the Mobile Phone. American

journal of preventive medicine.2008; 35(2):177-181.
14. Bomhold CR. Educational use of smart phone technology: A survey of mobile phone application use by undergraduate university students. Progr Electron Libr Inf Syst. 2013;47(4):424–36.
15. Lu M. Effectiveness of vocabulary learning via mobile phone. J Comput Assist Learn. 2008;24(6):515–25.
16. Kim D, Development of Korean Smartphone Addiction Proneness Scale for youth. PLoS One. 2014;9(5).
17. Sohn S. Competition and Substitution of Digital Media: Usage Patterns of News, Sports, and Adult Content. Journal of Cyber communication 2005; 16:273–308.
18. Johansen C, Boice Jr JD, McLaughlin JK, Olsen JH. Cellular telephones and cancer Fa nationwide cohort study in Denmark. J Natl Cancer I 2001; 93:203–7.
19. Auvinen A, Hietanen M, Luukkonen R, Koskela RS. Brain tumours and salivary gland cancers among cellular telephone users. Epidemiology 2002; 13:356–9.
20. Christensen HC, Schu¨z J, Kosteljanetz M, Poulsen HS, Boice JD, McLaughlin JK, et al. Cellular telephones and risk for brain tumours': a population-based, incident case-control study. Neurology 2005; 64:1189–95.
21. Hepworth SJ, Schoemaker MJ, Muir KR, Swerdlow AJ, van Tongeren MJA, McKinney PA. Mobile phone use and risk of glioma in adults: case-control study. Brit Med J 2006; 332:883–7.
22. Takebayashi T, Varsier N, Kikuchi Y, Wake K, Taki M, Watanabe S, et al. Mobile phone use, exposure to radiofrequency electromagnetic field, and brain tumour: a case-control study. Brit J Cancer 2008; 98:652–9.
23. Hours M, Bernard M, Montestrucq L, Arslan M, Bergeret A, Deltour I, et al. Cell phones and risk of brain and acoustic nerve tumours: the French INTERPHONE case-control study. RevEpidemiol Sante 2007; 55:321–32.
24. Klaeboe L, Blaasaas KG, Tynes T. Use of mobile phones in Norway and risk of intracranial tumours. Eur J Cancer Prev 2007; 16:158–64.
25. Ro¨o¨sli M. Radiofrequency electromagnetic field exposure and non-specific symptoms of ill health: a systematic review. Environ Res 2008; 107:277–87.
26. Koo HY. [Development of a cell phone addiction scale for korean adolescents]. J Korean Acad Nurs. 2009;39(6):818–28.
27. Güzeller CO, Coşguner T. Development of a problematic mobile phone use scale for Turkish adolescents. Cyberpsychol Behav Soc Netw. 2012;15(4):205–11.
28. Ryu YS, Smith-Jackson TL. Reliability and Validity of the Mobile Phone Usability Questionnaire (MPUQ). J Usability Stud. 2006;2(1):39–53.
29. Turpin RS, Ozminkowski RJ, Sharda CE, Collins JJ, Berger ML, Billotti GM, et al. Reliability and validity of the Stanford Presenteeism Scale. J Occup Environ Med. 2004;46(11):1123–33.
30. Demirci K, Orhan H, Demirdas A, Akpinar A, Sert H. Validity and reliability of the Turkish Version of the Smartphone Addiction Scale in a younger population. Klin Psikofarmakol Bülteni / Bull Clin Psychopharmacol. 2014;24(3):226–34.
31. Mohammadbeigi A, Absari R, Valizadeh F, Saadati M, Sharifimoghadam S, Ahmadi A, et al. Sleep Quality in Medical Students; the Impact of Over-Use of Mobile Cell-Phone and Social Networks. J Res Health Sci. 2016;16(1):46–50.
32. Nacar M, Baykan Z, Cetinkaya F, Arslantas D, Ozer A, Coskun O, et al. Health promoting lifestyle behaviour in medical students: A multicentre study from Turkey. Asian Pacific J Cancer Prev. 2014;15(20):8969–74.
33. 33.Tan Ç, Pamuk M, Dönder A. Loneliness and Mobile Phone. Procedia - Soc Behav Sci. 2013;103:606–11.
34. Hong FY, Chiu SI, Huang DH. A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students. Comput Human Behav. 2012;28(6):2152–9.
35. Ezoe S, Toda M, Yoshimura K, Naritomi A, Den R, Morimoto K. Relationships of personality and lifestyle with mobile phone dependence among female nursing students. Soc Behav Personal an Int J. 2009;37(2):231–8.
36. Santhalingam B, Revathi K, Devi J. Mobile Phone Usage Survey among Students and

Staffs of Universities Using Data Mining Technique. Int J Sci Eng Res. 2011;2(10):1–5.
37. 37.Kuznekoff JH, Titsworth S. The Impact of Mobile Phone Usage on Student Learning. Commun Educ. 2013;62(3):233–52.

Conflict of interest: None

Funding: None

Cite this Article as: Sunil C, Abhijit P, E. Chiranjeevi K, E.P. Praveen. Reliability and Validity of CHO-CHO-Mobile Scale . Natl J Integr Res Med 2017; 8(5):27-32