Indonesian Journal of Global Health Research
Volume 6 Number 2, April 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

RELATIONSHIP BETWEEN ALEXITHYMIA AND DURATION OF INTERNET USE

Iyus Yosep*, Rachmawati Kusuma Wardani, Zahrul Insan Sismayadi, Ai Mardhiyah
Faculty of Nursing, Universitas Padjadjaran, Jl. Raya Bandung Sumedang KM.21, Hegarmanah, Kec. Jatinangor, Sumedang Regency, West Java 45363, Indonesia
*iyus.yosep@unpad.ac.id

ABSTRACT
One of the problems faced by nursing students is alexithymia, alexithymia is an emotion that can appear unintentionally, but there is a state of emotional processing deficit that causes a person to be unable to express his emotions or known as alexithymia. Internet use in Indonesia, which reaches 160 million people, has a link between addiction to internet use and the incidence of alexithymia. Objective: This study aims to find out the relationship between alexithymia and duration of internet use at the Faculty of Nursing, Universitas Padjadjaran. Method: The research population is active students of the Faculty of Nursing Universitas Padjadjaran. This type of research is quantitative with a descriptive correlation design. The sampling technique to be used is total sampling (n=590). The instrument in this study used an instrument, namely the Toronto Alexithymia Scale-20 (TAS-20). Data analysis used univariate and bivariate analysis. Bivariate analysis used spearman test. Results: The results of data analysis obtained sig. 0.045 < 0.05 with a positive correlation coefficient of 0.083, which means the strength of the relationship is weak. Individuals who experience depression and bullying can change their emotions for the better when using the internet and text messages than using drugs illegally and the internet is easy to access and easy to use. Research shows that the higher the level of internet or social media addiction, the higher the alexithymia score. Conclusion: There is a weak and positive relationship between alexithymia and duration of internet use at the Faculty of Nursing Universitas Padjadjaran.

Keywords: alexithymia; duration; internet; students

First Received	Revised	Accepted
17 January 2024	28 January 2024	30 January 2024
Final Proof Received		**Published**
12 March 2024		01 April 2024

How to cite (in APA style)
Yosep, I., Wardani, R., Sismayadi, Z., & Mardhiyah, A. (2024). Relationship Between Alexithymia and Duration of Internet Use. *Indonesian Journal of Global Health Research*, *6*(2), 743-750. https://doi.org/10.37287/ijghr.v6i2.3038.

INTRODUCTION

One of the problems that students often face during lectures, both academic and non-academic, is alexithymia. Students are often seen not recognizing their own problems (Alzahrani et al., 2020). Emotions can appear accidentally, but there are problems that cause a person to be unable to express his emotions or known as alexithymia (Donges & Suslow, 2017). Stress can arise while in the world of lectures where stress is an early sign of alexithymia symptoms (Messedi et al., 2017). The challenges faced by students are anxiety, loneliness, and alexithymia (Alzahrani et al., 2020). Nursing students often experience difficult emotions (Popa-Velea et al., 2017), and there is vulnerability when conducting learning and training that is passed during lectures (Alzahrani et al., 2020).

In general, the incidence of alexithymia can reach 9-17% in men and reach 5-10% in women (4,5). Several studies have explained the various events of alexithymia that occur during lectures. Research shows that 347 nursing students experience alexithymia (49%), males (51%) are higher than females (Lyvers et al., 2016). In another study it was found that 297 out

of 1,886 nursing students in China had alexithymia tendencies (15.7%) (Zhu et al., 2017). It is supported by research in Indonesia showing 150 people aged 18-23 years. 47% experienced alexithymia tendency level, male (52%) higher than female (Mersin et al., 2020).

Based on other studies showing different results, nursing students who are female (24%) in Jordan experience a higher tendency for alexithymia than men (Hamaideh, 2017). Researchers conducted a preliminary study on 10 students of the Faculty of Nursing, University of Padjadjaran, the results of the preliminary study were that 8 out of 10 felt confused about the emotions they felt and had difficulty describing feelings (Tang et al., 2020). Then 7 out of 10 students find it difficult to tell in-depth stories to express deep feelings to their closest friends. Some research results show that internet user penetration data is 171.17 million out of 264.16 million people in Indonesia. Students are the most internet users, which is equal to 92.6%. Judging from the use of the internet for 8 hours and above, it is equal to 19.1%. (Hamaideh, 2017). Therefore, teenagers and college students are easily addicted to using the internet.

Internet use continues to increase as seen from statistical data which shows that 59% (4.57 billion) of the world's population actively uses the internet in July 2020 (Clement, 2020), and Asia is the continent with the largest population in internet usage (Youssef et al., 2020). Indonesia itself occupies the 4th position as a country with the most internet users after China, India and the United States (Tang et al., 2020). The total population in Indonesia who uses the internet is 175.4 million people out of a total population of 273 million in January 2020 (Linn et al., 2020). According to a survey conducted by APJII (2012) the higher a person's education level, the higher the intensity of accessing the internet (Soliha, 2015).

Several risk factors, one of which is alexithymia, seems to produce compulsive behavior, one of which is addiction to using the internet (Lyvers et al., 2019). Several studies have shown a link between alexithymia and internet addiction (Lestari et al., 2020). The use of the internet in alexithymia sufferers is considered to make it easier for them to express emotions and meet the need to communicate without doing it directly, which can result in them experiencing social media addiction (Ozsivadjian et al., 2021). Difficulty communicating and having poor interpersonal relationships can increase a person's risk of developing an addiction to using the internet, such as someone with alexithymia (Wardani et al., 2022). Judging from the use of the internet in Indonesia, which reached 160 million people (Hikmat et al., 2024), There is a relationship between internet use and the incidence of alexithymia (Yang et al., 2022). Based on the explanation of the background above, further research is needed that can explain the relationship between alexithymia and duration of internet use at the Faculty of Nursing, University of Padjadjaran.

METHOD

This study used a quantitative research type with a correlation design and used an analytic method with a cross-sectional design which was conducted on students at the Faculty of Nursing Universitas Padjadjaran. The population of this study are active students of the Faculty of Nursing, Padjadjaran University, Jatinangor, Garut and Pangandaran campuses of 2017, 2018, 2019 and 2020. The sampling technique used in this study was total sampling (n=590). The instrument in this study used the Toronto Alexithymia Scale-20 (TAS-20) (Lyvers et al., 2019). The Toronto Alexithymia Scale 20 (TAS-20) is an instrument containing 20 statement items used to assess the level of alexithymia (Bagby et al., 1994). Testing the validity of the TAS-20 instrument was also carried out by Geni (2020) by adapting and translating the instrument into Indonesian where the P-Value on Chi-Square was > 0.05, namely 1.0000. Reliability test of the TAS-20 instrument with a Cronbach Alpha

coefficient of 0.81 and a reliability value with test-retest for 3 weeks of 0.77 (Bagby et al., 1994). The level or level of alexithymia was assessed using a five-point Likert scale, namely Strongly Disagree (STS), Disagree (TS), Neutral (N), Agree (S), and Strongly Agree (SS). The alexithymia score range is 20-100. A total score <51 indicates low alexithymia or no alexithymia, a score between 52-60 indicates probable alexithymia, and a score >61 indicates high alexithymia. So the higher the score, the higher the level of alexithymia. This principle can be done by providing informed consent on the first page of the Google form and asking the respondent's availability to participate in this study. Data collection was carried out on May 10-25 2021. Data collection was carried out using online surveys or Google forms. After the data is collected, data analysis will be carried out using the Spearman test to find out the results of the correlation hypothesis and get the final results of the study.

RESULTS

The research results obtained a sample of 590 respondents. The tabulation of data based on demographic data includes age, gender, class, campus location, and duration of using the internet by respondents can be seen in the following table.

Table 1.
Frequency Distribution of Characteristics of Research Respondents (n=590)

Characteristics of Respondents	f	%
Age		
18 – 20 years	341	57,8
21 – 23 years	249	42,2
Gender		
Man	58	9,8
Woman	532	90,2
Force		
2017	164	27,8
2018	144	24,4
2019	130	22,0
2020	152	25,8
Campus Location		
Jatinangor/Garut	531	90,0
Pangandaran	59	10,0
Duration of using the internet		
<1 hour	6	1,0
1 hour	19	3,2
2 hours	58	9,8
3 hours	103	17,5
4 hours	404	68,5

Table 2, it was found that the respondents were aged 18-23 years, with the majority of respondents (57.8%) being respondents aged 18-20 years (n=341). Of the 590 respondents, the majority of respondents were female with a total of 532 (90.2%), and male respondents amounted to 58 (9.8%). This can happen because the majority of students of the Faculty of Nursing Universitas Padjadjaran are female. Then based on the lecture batch at the Faculty of Nursing Universitas Padjadjaran, data was obtained that the most respondents (27.8%) came from the 2017 class (n=164), and the respondents with the least number (22.0%) came from the 2019 class (n= 130). Meanwhile, judging from the two current campus locations of the Faculty of Nursing Universitas Padjadjaran, it was found that the majority of respondents (90.0%) came from the Jatinangor/Garut campus (n=531). A total of 404 respondents used the

internet for 4 hours a day (68.5%) and only a few respondents used the internet for less than one hour (1.0%).

Table 2.
Frequency Distribution of Alexithymia Levels (n=590)

Category	f	%
No Alexithymia	140	23,7
Possible Alexithymia	204	34,6
High Alexithymia	246	41,7

Table 3. It was found that 246 respondents had a high level of alexithymia (41.7%). Then 140 respondents did not experience alexithymia and 204 respondents might have alexithymia (34.6%).

Table 3.
Spearman Alexithymia Test Results with Duration of Internet Use

Significance Value	Correlation coefficient
0,045	0,083

Table 4. The significance value between alexithymia and the duration of using the internet is 0.045. So if the significance value is <0.05, the relationship between alexithymia and the duration of using the internet is correlated. The strength level of the correlation is positive 0.083. Then the value of the relationship between alexithymia and the duration of using the internet is related to the level of the value of the weak correlation coefficient.

DISCUSSION

Students who are studying at the initial level are more likely to experience alexithymia compared to other classes. This is proven by research conducted by Mersin et al., (2020), that the smaller the class of nursing students, the higher the level of alexithymia. This can happen because students who have just entered college from school experience various challenges, including anxiety, alexithymia, and loneliness (Alzahrani et al., 2020). Apart from that, health students are also considered to be more susceptible to experiencing alexithymia due to the nature of the learning and training provided. Meanwhile, based on research conducted by Hamaideh (2017), age has a negative correlation with alexithymia. The results of this study are in accordance with research conducted by Hamaideh (2017) on Jordanian University students, where female students experienced more alexithymia (28.8%) than males (20.2%). Research conducted by Mul et al., (2018) also showed that women had a higher average alexithymia score (56.99 + 9.38) compared to men (54.16 + 9.19). However, several other studies actually showed the opposite results, where men had higher alexithymia scores than women. Like research conducted by Alzahrani et al., (2020) that of all health students at King Abdulaziz University in Saudi Arabia, more men (51%) experienced alexithymia than women (49%). This could possibly be caused by men tending to have lower emotional regulation intelligence than women. However, from previous studies there was no significant difference in the prevalence of alexithymia between men and women. Several studies also showed that there were no significant differences in the incidence of alexithymia between men and women (Hamaideh, 2017; Tahir et al., 2012).

The individual's ability to express emotions can be reflected as joy, fear, sadness, and so on (Budiono, 2016). But there is a condition in which individuals who are unable to recognize and express emotions are called alexithymia. Individuals who have difficulty recognizing and expressing emotions and thoughts that are more oriented to external events are hallmarks of alexithymia (Donges & Suslow, 2017). Some research results show that the level of alexithymia or percentage is higher than the research that has been done, such as nursing students at Sfax University, Tunisia. As many as 16.5% of the total respondents experienced a high level of

alexithymia (Youssef et al., 2020). Then another study showed that 15.7% of the total number of Shenyang College student respondents in China experienced a high level of alexithymia, and 24.6% of students at the University of Jordan have high levels of alexithymia (Geni, 2020; Hikmat et al., 2024; Yosep et al., 2023).

The percentage that experiences a high level of alexithymia will be compared with some of the findings of previous studies because research respondents have the same criteria for experiencing excessive duration of internet use. Several studies have stated that the longer the duration of the internet used, the higher the alexithymia score will be (Geni, 2020; Lestari et al., 2020). Individuals can show difficulty socializing, because the inability to identify emotional states is a feature of people who experience alexithymia, it can make individuals more comfortable using the internet to communicate and use the internet longer (Ozsivadjian et al., 2021; Song et al., 2020). Individuals who experience high levels of alexithymia often have low interpersonal relationships, this is related to the individual's comfort with the internet. Other studies explain that addiction or overuse of social media experience higher alexithymia (Estévez et al., 2022; Greene et al., 2020). Based on the results of correlation testing using the Spearman rank technique which can be seen in the table. 4 above, it was found that research conducted at the Faculty of Nursing Universitas Padjadjaran totaling 590 student respondents, obtained a significance value of 0.045. This means that the significance value is less than 0.05, so H1 is accepted and H0 is rejected, meaning that there is a relationship between alexithymia and the duration of using the internet at the Faculty of Nursing Universitas Padjadjaran.

The strength of the relationship can be seen from the value of the positive correlation coefficient of 0.083. The strength of the relationship is weak because it includes the range from 0.00 – 0.25. Alexithymia is an independent variable said to be able to influence the dependent variable, namely the duration of internet use, even though its strength is quite weak. If there are more negative emotions, such as stress and depression, then the symptoms of alexithymia increase. People with alexithymia vent their emotions on things that can make them feel happy, such as using the internet (Gurkan et al., 2022; Scarpazza et al., 2022). Individuals who experience depression and bullying can change their emotions for the better when using the internet and text messages instead of using drugs illegally and the internet is easy to access and easy to use (Estévez et al., 2022; Lv et al., 2023). The use of the internet can help overcome discomfort in socializing and make it more enjoyable when communicating, even if only via the internet (Lyvers et al., 2016; Wardani et al., 2022).

Some of the positive effects of using the internet are being able to express oneself, being able to communicate, being able to express feelings (Rahmawati & Halim, 2018; Sowden et al., 2016). Someone with excessive use of social media is likely to develop alexithymia as an internal defense mechanism (Palser et al., 2018; Taycan et al., 2014). Research also shows that the level of internet or social media addiction is high, so the alexithymia score will be high (Evren et al., 2015; Messedi et al., 2017). This is in line with the results of alexithymia research with duration of internet use at the Faculty of Nursing Universitas Padjadjaran.

CONCLUSION

Based on the results of the correlation analysis that was carried out using the Spearman rank correlation technique, it was found that the significance value was 0.045 <0.05. As for the strength of the relationship, it can be seen from the positive correlation coefficient value of 0.083 so it can be concluded that there is a weak and positive relationship between alexithymia and the duration of using the internet at the Faculty of Nursing Universitas Padjadjaran.

REFERENCES

Alzahrani, S. H., Coumaravelou, S., Mahmoud, I., Beshawri, J., & Algethami, M. (2020). Prevalence of alexithymia and associated factors among medical students at King Abdulaziz University: a cross-sectional study. Annals Saudi Medicine, 40(1), 55–62. https://doi.org/10.5144/0256- 4947.2020.55

Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia scale-I. Item selection and cross-validation of the factor structure. In Journal of Psychosomatic Research (Vol. 38, Issue 1, pp. 23–32). https://doi.org/10.1016/0022-3999(94)90005-1

Budiono. (2016). Konsep Dasar Keperawatan (Vol. 63, Issue 2, pp. 421–430). https://doi.org/10.1016/j.geb.2007.09.001

Clement, J. (2020). Internet usage worldwide. Statistica.

Donges, U.-S., & Suslow, T. (2017). Alexithymia and automatic processing of emotional stimuli: a systematic review. https://doi.org/DOI 10.1515/revneuro-2016-0049

Estévez, A., Jauregui, P., Macía, L., & Martín-Pérez, C. (2022). Alexithymia and Emotion Regulation Strategies in Adolescent Gamblers with and Without At-Risk Profiles. Journal of Gambling Studies, 38(1), 15–29. https://doi.org/10.1007/s10899-021-10057-8

Evren, C., Cinar, O., Evren, B., Umut, G., Can, Y., & Bozkurt, M. (2015). Relationship between alexithymia and aggression in a sample of men with substance dependence. Klinik Psikofarmakoloji Bülteni-Bulletin of Clinical Psychopharmacology, 25.

Geni, P. L. (2020). Struktur Internal dan Validitas Konstruk dari Toronto Alexithymia Scale (TAS-20) dengan Sampel Mahasiswa pada Universitas di Jakarta. In Jurnal Pengukuran Psikologi dan Pendidikan Indonesia (JP3I) (Vol. 9, Issue 1, pp. 30–40). https://doi.org/10.15408/jp3i.v9i1.15450

Greene, D., Boyes, M., & Hasking, P. (2020). The associations between alexithymia and both non-suicidal self-injury and risky drinking: A systematic review and meta-analysis. Journal of Affective Disorders, in Press., 260. https://doi.org/10.1016/j.jad.2019.08.088

Gurkan, Z. M., Sengul, Y., Ekiz, T. G., & Pak, A. T. (2022). Effect of alexithymia and difficulty of emotion regulation, neuroticism, low extraversion, and suicidality on quality of life in epilEPQy. EpilEPQy & Behavior, 135. https://doi.org/10.1016/j.yebeh.2022.108887

Hamaideh, S. H. (2017). Alexithymia among Jordanian university students: Its prevalence and correlates with depression, anxiety, stress, and demographics. Perspect Psychiatr Care, 54(2), 274–280. https://doi.org/10.1111/ppc.12234

Hikmat, R., Yosep, I., Hernawaty, T., & Mardhiyah, A. (2024). A Scoping Review of Anti-Bullying Interventions: Reducing Traumatic Effect of Bullying Among Adolescents. Journal of Multidisciplinary Healthcare, 17(null), 289–304. https://doi.org/10.2147/JMDH.S443841

Lestari, Dewi, S. Y., & Chairani, A. (2020). Hubungan Alexithymia dengan Kecanduan Media Sosial pada Remaja di Jakarta Selatan. In SCRIPTA SCORE Scientific Medical Journal (Vol. 1, Issue 2, pp. 1–9).

Linn, B. K., Stasiewicz, P. R., Fillo, J., & Bradizza, C. M. (2020). The great disrupter: relationship of alexithymia to emotion regulation processes and smoking among pregnant women. Subst Use Misuse, 55.

Lv, J., Ren, H., Qin, Z., Hu, Y., Cao, R., Liang, L., Li, C., Meng, C., Guo, X., Fei, J., Mei, H., & Mei, S. (2023). Alexithymia and Mobile Phone Addiction Among College Students With and Without Siblings: a Moderated Mediation of Depression and Gender. International Journal of Mental Health and Addiction, 21(5), 2877–2891. https://doi.org/10.1007/s11469-022-00761-w

Lyvers, M., Cutinho, D., & Thorberg, F. A. (2019). Alexithymia, impulsivity, disordered social media use, mood and alcohol use in relation to facebook self-disclosure.

Lyvers, M., Karantonis, J., Edwards, M. S., & Thorberg, F. A. (2016). Traits associated with internet addiction in young adults: Potential risk factors. Addictive Behaviors Reports, 3, 56–60. https://doi.org/https://doi.org/10.1016/j.abrep.2016.04.001

Mersin, S., İbrahimoğlu, Ö., Saray Kılıç, H., & Bayrak Kahraman, B. (2020). Social media usage and alexithymia in nursing students. In Perspectives in Psychiatric Care (Vol. 56, Issue 2, pp. 401–408). https://doi.org/10.1111/ppc.12448

Messedi, N., Feki, I., Saguem, B. N., Masmoudi, R., & Masmoudi, J. (2017). Alexithymia and Coping Strategies among Medical Students. 41(S1), S695. https://doi.org/http://dx.doi.org/10.1016/j.eurpsy.2017.01.1223 EV0894

Mul, C. L., Stagg, S. D., Herbelin, B., & Aspell, J. E. (2018). The feeling of me feeling for you: interoception, alexithymia and empathy in autism. J Autism Dev Disord, 48. https://doi.org/10.1007/s10803-018-3564-3

Ozsivadjian, A., Hollocks, M. J., Magiati, I., Happé, F., Baird, G., & Absoud, M. (2021). Is cognitive inflexibility a missing link? The role of cognitive inflexibility, alexithymia and intolerance of uncertainty in externalising and internalising behaviours in young people with autism spectrum disorder. Journal of Child Psychology and Psychiatry, 62. https://doi.org/10.1111/jcpp.13295

Palser, E. R., Palmer, C. E., Alejandro, G. P., Ricci, H., Aikaterini, F., & Kilner, J. M. (2018). Alexithymia mediates the relationship between interoceptive sensibility and anxiety. PLoS ONE. https://doi.org/10.1371/journal.pone.0203212

Popa-Velea, O., Diaconescu, L., Mihăilescu, A., Popescu, M. J., & Macarie, G. (2017). Burnout and Its Relationships with Alexithymia, Stress, and Social Support among Romanian Medical Students: A Cross-Sectional Study. International Journal of Environmental Research and Public Health Article, 14. https://doi.org/10.3390/ijerph14060560

Rahmawati, I. M., & Halim, M. S. (2018). Alexithymia pada Sampel Non Klinis: Keterkaitannya dengan Gaya Kelekatan. Jurnal Psikologi, 45(3), 200. https://doi.org/10.22146/jpsi.29106

Scarpazza, C., Zangrossi, A., Huang, Y.-C., Sartori, G., & Massaro, S. (2022). Disentangling interoceptive abilities in alexithymia. Psychological Research, 86(3), 844–857. https://doi.org/10.1007/s00426-021-01538-x

Soliha, S. F. (2015). Tingkat Ketergantungan Pengguna Media Sosial Dan Kecemasan Sosial. In Tingkat Ketergantungan Pengguna Media Sosial Dan Kecemasan Sosial (Vol. 4, Issue 1, pp. 1–10). https://doi.org/10.14710/interaksi.4.1.1-10

Song, X., Li, D., Hu, J., Yang, R., Wan, Y., Fang, J., & Zhang, S. (2020). Moderating role of health literacy on the association between alexithymia and depressive symptoms in middle school students. Int J Environ Res Public Health, 17. https://doi.org/10.3390/ijerph17155321

Sowden, S., Brewer, R., Catmur, C., & Bird, G. (2016). The specificity of the link between alexithymia, interoception, and imitation. J Exp Psychol Hum Percept Perform, 42. https://doi.org/10.1037/xhp0000310

Tahir, I., Ghayas, S., & Tahir, W. (2012). Personality traits and family size as the predictors of Alexithymia among university undergraduates. Journal of Behavioural Sciences, 22.

Tang, W., Hu, T., Yang, L., & Xu, J. (2020). The role of alexithymia in the mental health problems of home-quarantined university students during the COVID-19 pandemic in China. IN Press. https://doi.org/10.1016/j.paid.2020.110131

Taycan, O., Taycan, S. E., & Celik, C. (2014). Relationship of burnout with personality, alexithymia, and coping behaviors among physicians in a semiurban and rural area in Turkey. Arch Environ Occup Health, 69. https://doi.org/10.1080/19338244.2013.763758

Wardani, R. K., Yosep, I., Yamin, A., & Mardhiyah, A. (2022). The Description of Alexithymia in Nursing Students at Padjadjaran University with Social Media Addiction . Jurnal Keperawatan Komprehensif (Comprehensive Nursing Journal), 8(4 SE-Articles). https://doi.org/10.33755/jkk.v8i4.422

Yang, H.-X., Hu, H.-X., Zhang, Y.-J., Wang, Y., Lui, S. S. Y., & Chan, R. C. K. (2022). A network analysis of interoception, self-awareness, empathy, alexithymia, and autistic traits. European Archives of Psychiatry and Clinical Neuroscience, 272(2), 199–209. https://doi.org/10.1007/s00406-021-01274-8

Yosep, I., Wardani, R. K., Yamin, A., Sismayadi, Z. I., Mardhiyah, A., & Hikmat, R. (2023). The Correlation between Alexithymia with Gender among Nursing Students. Jendela Nursing Journal, 7(1), 42–52. https://doi.org/10.31983/jnj.v7i1.9726

Youssef, L., Hallit, R., Akel, M., Kheir, N., Obeid, S., & PharmD, S. H. (2020). Social media use disorder and alexithymia: Any association between the two? Results of a cross-sectional study among Lebanese adults.

Zhu, Y., Luo, T., Liu, J., & Qu, B. (2017). Influencing factors of alexithymia in Chinese medical students: a cross-sectional study. In BMC Medical Education (Vol. 17, Issue 1). https://doi.org/10.1186/s12909-017-0901-8.