

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

Shemonti Biswas¹, Atreye Guha^{2*}

ABSTRACT

At present times, people spend more and more time engaging in social networking and hence, the use of social networking sites has alarmingly increased over the years. The amount of time one spends on social media and its excessive usage has quite a significant effect on an individual's mental health and well-being. This research, therefore, aims to determine whether there is a significant association of usage and time spent on social networking with self-esteem, perceived stress and subjective happiness of young adults. Using the Social Networking Time Use Scale (SONTUS), Rosenberg's Self-Esteem Scale (RSES), Perceived Stress Scale (PSS) and Subjective Happiness Scale (SHS), data were collected from 180 participants (female=94, male= 86) aging between 20 to 24 years, based in West Bengal, India. The findings indicate a significant negative correlation between social networking usage and self-esteem, and social networking usage and subjective happiness.

Keywords: *Social Networking, Perceived Stress, Self-Esteem, Subjective Happiness, Young Adults*

Social media refers to interactive technologies that allow individuals to create and share information, ideas, hobbies, interests, activities, and other kinds of expression using virtual communities and networks (Kietzmann, 2011). It broadly includes web and mobile platforms, which help people to form connections within a virtual network (e.g., Facebook, WhatsApp, Twitter, LinkedIn, Instagram, YouTube), where they can co-create, exchange, or share different forms of digital content, including information, messages, photos and videos (Ahmed, 2019). Over 3 billion people around the world have been reported to be active users of social networking sites or SNS (Kemp, 2019). Most users report using various social networking sites daily (Jacobson, 2018), and that they check their accounts multiple times a day (Hampton et al., 2011). Using social networking sites has become a prominent and inseparable part of our daily lives, which contributes either positively or negatively to different aspects of our mental health and wellbeing.

Research studies have found certain benefits of using social media. Social networking sites help to facilitate social interactions (Batterham, 2017; Brusilovskiy et al. 2016; Gowen et al.

¹Student (Post-graduation), Department of Psychology, University of Calcutta, Kolkata, India

²Student (Post-graduation), Department of Applied Psychology, Amity Institute of Psychology and Allied Sciences, Amity University, Kolkata, India

*Corresponding Author

Received: July 23, 2022; Revision Received: September 18, 2022; Accepted: September 30, 2022

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

2012; Highton-Williamson et al. 2015; Indian and Grieve 2014; Schrank, 2010; Spinzy et al., 2012; Torous and Keshavan, 2016). Online interactions might be easier for individuals exhibiting impairment in social functioning. Anonymity can be helpful for those with stigmatizing conditions in establishing social connections. Many young adults with mental illness have been commonly found to engage in online relationships, like individuals with depressive symptoms were found to prefer interacting on social media than in-person as online conversations are usually devoid of immediate responses or non-verbal cues (Naslund, 2020). Social media provide adequate access to peer support network (Bauer et al. 2013; Berry et al. 2017; Bucci et al., 2019; Highton-Williamson et al. 2015; Naslund et al. 2014; 2017; Vayreda and Antaki 2009). Online peer support facilitates gathering information, discussing symptoms and medication, sharing experiences, coping, and self-disclosure. Through social networking sites, individuals suffering from mental disorders can establish new relationships, and reduce loneliness by reconnecting with people. Various support patterns (e.g., informational, esteem, emotional) can be noted in these networks. Social media also helps to promote engagement and retention in services (Alvarez-Jimenez et al. 2013, 2018, 2019; Aschbrenner et al. 2018; Biagiante et al. 2018; Birnbaum et al. 2017; Gleeson et al. 2017; Lal et al. 2018; Naslund et al. 2016, 2018). Individuals with psychological distress can connect with care providers on social media platforms, and access evidence-based services. Caregivers of those suffering from mental disorders can also seek help and comfort from other caregivers having similar experiences, and mental health practitioners on social media platforms. Online peer networks and support can increase client engagement and compliance towards existing interventions, and also facilitate social connectedness and empowerment during recovery. Multiple mobile apps provide potential features to help users monitor symptoms, prevent relapses, and set goals.

On the other hand, some studies have focused upon the drawbacks and challenges faced by social media users. Social networking sites can have profound impact on psychological symptoms (Berry et al. 2018; Feinstein et al. 2013; Kross et al. 2013; Lin et al. 2016; Mittal et al. 2007; Stiglic and Viner 2019; Twenge and Campbell 2018; Vannucci et al. 2017; Woods and Scott 2016). Researchers found users are exposed to increased risk of harm, social isolation, depressive symptoms and bullying. Individuals largely suffer from social comparison pressure and social isolation after facing rejection on social media. Frequent usage and addiction of multiple social media platforms have been found to be strongly associated with greater depressive symptoms, anxiety and risk of suicide (Naslund, 2020). Replacing in-person interactions with online communication may contribute to greater loneliness, and lead to deterioration of existing mental health symptoms. Users of social networking sites often face hostile interactions (Hamm et al. 2015; Rideout and Fox 2018; Ybarra 2004). Researchers stated that cyberbullying is associated with increased depressive and anxiety symptoms. Higher chances of online harassment have been observed in individuals with major depressive symptoms than those with mild or no symptoms. Social media usage can be responsible for major consequences (Moorhead et al. 2013; Naslund, 2019; Torous and Keshavan 2016) like potential threat to privacy, confidentiality, personal health information; promotion of misleading information or conflicts of interest; stigmatization and discrimination; complications in relationships, and online hostility.

Social Networking (Time spent and Usage) and Self-Esteem:

Self-esteem refers to an individual's either positive or negative attitude towards oneself, and also how one evaluates his or her own thoughts and feelings overall in relation to oneself (Rosenberg, 1965). Although self-esteem is generally a stable trait for most individuals

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

(Robins, 2003), it might fluctuate for some people (Baldwin & Sinclair, 1996; Kernis, 1995). High self-esteem is frequently related with happiness, confidence, and a positive and optimistic attitude toward life, whereas low self-esteem is associated with pessimism, lack of confidence in skills, and an overall self-deflating attitude (Baumeister et al., 2003).

Cast & Burke (2002) stated that self-esteem can be conceptualized in three ways, which can provide insight into how using social networking sites and self-esteem may be associated:

- a) Self-esteem, as an outcome, may be enhanced or deflated depending upon different social cognitive processes (Coopersmith, 1967; Rosenberg, 1979). Researchers have found social comparisons related to content posted on social networking sites tend to deflate self-esteem (Vogel, Rose & Roberts, 2014), while receiving ‘likes’ or support on posted content may enhance self-esteem of social media users (Burrow & Rainone, 2017).
- b) Self-esteem, as an outcome, can be explained through the *replacement hypothesis* (Hill, 2014; Huang, 2017), which states that low self-esteem can be caused due to replacement of strong, face-to-face relationships with weaker, online relationships, especially with random strangers. Self-esteem can act as a buffer against activities on social networking sites, causing harm to overall well-being (Longmore, 1997; Schooler, 1978), e.g., users with high self-esteem are more likely to protect themselves from negative experiences on social networking sites, such as cyberbullying victimization (Dredge et al., 2014).
- c) Self-esteem, as a self-motive, can motivate people to use social networking sites in certain ways (Tesser, 1988). According to the *social compensation hypothesis*, users with low self-esteem often feel more comfortable socializing on social networking sites compared to offline contexts, and can find these online sites to be beneficial for increasing their social capital (Kraut et al., 2002; Ellison, 2008). Alternatively, according to the *rich get richer hypothesis*, users with high self-esteem and good socializing skills will continue to use social networking sites in a positive manner, and receive those benefits from these online platforms similar to what they gain from socializing in offline settings (Faraon, 2014).

However, the relationship between using social networking sites and self-esteem may differ due to individual differences and types of social networking services used by people (Saiphoo et al., 2020).

Social Networking (Time spent and Usage) and Perceived Stress:

The term “stress” may hold a different meaning to different individuals. Some may think of it as a sort of pressure they feel externally or internally, while others may think of it as tension or even worry in some way. Therefore, stress has been defined in various ways to incorporate every such perspective over the long years of research in the said field. Most appropriately stated, stress may refer to a range of negative emotional experiences which are accompanied by certain predictable biochemical, psychological, cognitive and behavioral changes with the aim of either altering the stressful event or accommodating to its effects (Baum, 1990).

With the increase in the use of social media, a lot of researchers have shown interest in determining whether the extent of social media usage as well as general participation in various social networking sites (SNS) have any influence on an individual’s mental health

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

and well-being. One such study conducted by Guntuku, Buffone, Jaidka, Eichstaedt and Ungar in 2019 indicated that an individual's mental health conditions like stress can be predicted by their social media language and usage. The findings of another study conducted in 2014 by Park, Song and Lee suggested that Facebook, among other leading social networking sites, has a positive association with acculturation stress of East Asian college students in the US. Further studies were conducted to determine the positive and negative effects of social media usage on the mental health of individuals. One such study conducted by Kaur and Bashir, 2015, demarcated between the positive and negative influences of social media on the mental health and well-being of adolescents, highlighting the positive effects being increased socialization and improved communication skills, along with various learning opportunities and a positive spread of awareness regarding various issues; on the contrary, the negative effects were found to include stress, fatigue, cyberbullying, a decline of intellectual abilities among others. Similarly, another study was conducted by Sriwilai and Charoensukmongkol, 2015, the findings of which indicated that individuals engaging in excessive use of social media are likely to have lower levels of mindfulness and also, they are more likely to use emotion-focused coping mechanisms to deal with stress, which may often lead to emotional exhaustion.

Social Networking (Time spent and Usage) and Subjective Happiness:

Happiness can be described as the concept that one's life is meaningful, good and worthwhile when combined with the sense of contentment, positive wellbeing and the experience of joy (Lyudomirsky, 2007). Russell in 2018 referred to happiness as an important aspect to our global community as well as our personal and social lives. Lu in 2001 stated that happiness consists of a) mental state of satisfaction and contentment, b) harmonious homeostasis, c) positive emotions, d) hope and achievement, e) freedom of ill-being. Those studies which are being conducted on social media usage have been considered to be the most examined one (Fox, 2015; Ryan, 2011).

Owing to the increase in use of social media among individuals belonging to almost all walks of life, researchers have taken a keen interest in determining whether individuals happen to associate social media with happiness, and if so, why? Therefore, a number of researches have been conducted on the same, some of which have been cited as follows.

Several studies conducted by Mathers et.al, (2009) have proved that there is a negative correlation between psychological well-being and electronic media usage. Lee, Choi, Kim, and Han in 2014 stated that these investigations were fundamentally executed on traditional media and conveyed that usage of internet deranged social relationships; the individual renounces his real relationships with his environment because of the social media and devotes himself to his virtual relationships which might negatively influence the psychological well-being of the person. However, some studies oppose the previous findings by stating that social networking sites allow people to freely connect with each other by different modes of communication; thus, the usage of social media shows that there is a positive correlation between social media usage and well-being (Huang & Chen, 2013). In a study by Chae, 2018, it was found that social comparison significantly influences overall life satisfaction and happiness. Though, without social comparison, social media can increase people's levels of happiness. Another study was conducted by Yao and Cao (2017) through a survey of Social Networking Sites (SNS) users in China. The findings from the survey suggested that (1) there was a significant positive impact on techno-stress due to social interaction overload, invasion privacy and work invasion; (2) perceived usefulness and

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

enjoyment of SNS had subsequent positive effect on rational usage; 15 and (3) social interaction had a significant negative effect on performance, and performance and happiness was negatively affected because of invasion of privacy. Similarly, another study conducted by Phu and Gao in 2019 indicated that a higher number of “Facebook friends” was associated with lower loneliness; and in respect to Facebook usage, constant usage was associated with higher levels of loneliness among young adults. This study not only highlighted the negative outcomes, but also the positive outcomes of Facebook use, depending on the nature of engagement.

METHODOLOGY

Objectives

The aim of the present study is to find the association of time spent on social networking sites and their usage with self-esteem, perceived stress, and subjective happiness of young adults.

Hypothesis

- There is no significant relationship between time spent while using social networking sites and self-esteem of young adults.
- There is no significant relationship between time spent while using social networking sites and perceived stress of young adults.
- There is no significant relationship between time spent while using social networking sites and subjective happiness of young adults.

Research Design

The present study follows a non-experimental correlational research design.

Sample

In the present research, 180 young adults (female= 94, male= 86), aged between 20 to 24 years constituted the sample. Participants were chosen from West Bengal using purposive sampling method.

Tools

A booklet containing standardized instructions, information schedule, and psychometrically validated tests were constructed. The following psychological tools which have been used in the present research are:

- *Social Networking Time Use Scale* (SONTUS; Olufadi, 2016): The SONTUS (Olufadi, 2016) was designed to measure time spent on social media. In order to improve content validity, the items were created in collaboration with a number of professional researchers. The scale consists of 29 items assessing five characteristics, four of which reflect distinct settings in which SNS are utilized, i.e., relaxation and free periods, academic-related periods, public-places-related use, stress-related periods, and one factor reflects motives for use.
- SONTUS addresses two of the six dimensions of SNS engagement: uses and gratifications (the element of motivations for use) and use and activity counts (the remaining four factors). In scoring, the five component scores are summed up to produce a global score which ranges from 5 to 23. The thoroughly tested psychometric properties of the SONTUS demonstrates reliability as well as structural

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

and convergent validity, with no apparent concerns for its response processes (Sigerson and Cheng, 2018).

- *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965): The Rosenberg's Self-Esteem Scale is a 10-item self-report instrument used to evaluate an individual's self-esteem by measuring both positive and negative feelings about self. All items of the instrument are answered using a 4-point likert scale, the responses being Strongly Agree, Agree, Disagree and Strongly Disagree. For scoring, 1 point is allotted to "Strongly Disagree", 2 points for "Disagree", 3 points for "Agree" and 4 points for "Strongly Agree". Item numbers 2, 5, 6, 8 and 9 are reversed scored, that is, the scores allotted for "Strongly Disagree", "Disagree", "Agree" and "Strongly Agree" is 4, 3, 2 and 1 respectively. The Rosenberg Self-Esteem Scale presented high scores in reliability areas, where its internal consistency was found to be 0.77, and the minimum coefficient of reproducibility was found to be at least 0.90. Various studies were conducted and after a series of investigations the alpha coefficient was found to be ranging from 0.72 to 0.87, all fairly high.
- *Perceived Stress Scale* (PSS; Cohen, 1983): The Perceived Stress Scale (PSS) developed by Sheldon Cohen (1983) is the most widely used psychological instrument for measuring the perception of stress and current levels of experienced stress, and also the degree to which situations are appraised by individuals as stressful, unpredictable, uncontrollable and overloaded. This scale consists of 10 items, and responses are reversely scored (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) for the four positively stated items (4, 5, 7, & 8), and then all scale items are summed up together. It has good internal consistency reliability (Barbosa-Leiker et al., 2013; Reis et al., 2010). Adequate convergent validity based on relationship with mental and physical health measures (Mitchell, 2008; Wu and Amtmann, 2013) has also been reported.
- *Subjective Happiness Scale* (SHS; Lyubomirsky and Lepper, 1999): The Subjective Happiness Scale (SHS), also known as General Happiness Scale is a 4-item self-report measure used to assess overall happiness of an individual through self-evaluation (Lyubomirsky & Lepper, 1999). The response format is a 7-point Likert-type scale, where 1= less/ not very/ not at all happy and 7= more/very happy or a great deal. Continuous scoring includes summing up the scores for each item together. The internal consistency of this scale is 0.85 (Segrin & Taylor, 2007).

Procedure

Consent forms were prepared following the ICMR (2017) guidelines, and were provided to each participant. The purpose, objectives, and methodology of the research were informed to and discussed with the participants prior to the investigation. Anonymity and confidentiality of the participants were ensured by the researchers. Information schedule, Social Networking Time Use Scale, Rosenberg Self-Esteem Scale, Perceived Stress Scale, and Subjective Happiness Scale were provided to those participants who had given consent to voluntarily participate in the research. A non-experimental correlational research design was used for the current study. After establishing rapport with the participants, data were collected from each participant directly in offline mode. The researchers had clarified the doubts of the participants during the process of data collection. Participants were thanked for their co-operation. Scores were tabulated in Microsoft Excel, and statistical analysis was done by using the Statistical Package for Social Sciences (IBM-SPSS 25). Pearson product-moment correlation was used to find out the association of time spent on and usage of social

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

networking sites with the respective variables, self-esteem, perceived stress and subjective happiness of young adults.

RESULTS

Table-1: Pearson Product-Moment Correlation between Social Networking (Time spent and Usage) and Self-Esteem of young adults

		Social Networking (Time spent and Usage)	Self-Esteem
Social Networking (Time spent and Usage)	Pearson Correlation	1	-.451**
	Sig. (2-tailed)		.000
	N	180	180
Self-Esteem	Pearson Correlation	-.451**	1
	Sig. (2-tailed)	.000	
	N	180	180

** Correlation is significant at 0.01 level (2-tailed).

Table-1 indicates that social networking (time spent and usage) is significantly and negatively correlated ($r = -.451, p < 0.01$) with self-esteem of young adults.

Table-2: Pearson Product-Moment Correlation between Social Networking (Time spent and Usage) and Perceived Stress of young adults

		Social Networking (Time spent and Usage)	Perceived Stress
Social Networking (Time spent and Usage)	Pearson Correlation	1	.094
	Sig. (2-tailed)		.209
	N	180	180
Perceived Stress	Pearson Correlation	.094	1
	Sig. (2-tailed)	.209	
	N	180	180

Table-2 indicates that there is no significant relationship between social networking (time spent and usage) and perceived stress of young adults.

Table-3: Pearson Product-Moment Correlation between Social Networking (Time spent and Usage) and Subjective Happiness of young adults

		Social Networking (Time spent and Usage)	Subjective Happiness
Social Networking (Time spent and Usage)	Pearson Correlation	1	-.248**
	Sig. (2-tailed)		.001
	N	180	180
Subjective Happiness	Pearson Correlation	-.248**	1
	Sig. (2-tailed)	.001	
	N	180	180

** Correlation is significant at the 0.01 level (2-tailed)

Table-3 indicates that there is a significant and negative relationship between social networking (time spent and usage) and subjective happiness of young adults.

DISCUSSION

Result of the present study indicate that social networking sites usage and time spent on them can be negatively correlated with self-esteem of young adults, which can be supported by previous research findings. Problematic and addictive SNS usage leading to engagement in controversial behaviours like making social comparisons can associated with lower self-esteem (Andreassen & Griffiths, 2017). Mehdizadeh (2010) found more frequent usage of SNS is associated ($r = -0.43$) with lower self-esteem. Tazghini & Siedlecki (2013) found that users who are more emotionally invested in the intense use of SNS exhibit lower self-esteem (especially in case of Facebook users, $r = -0.22$). Researchers have found a negative relationship between intensity of SNS use and self-esteem (Huang, 2017; Liu & Baumeister, 2016). A meta-analysis (Saiphoo, Halevi and Vahedi, 2020) indicates a negative and significant relationship between SNS use and self-esteem. It has been found in the current research that social networking sites usage and time spent on them can be negatively correlated with subjective happiness of young adults, which can be supported by previous studies. Manago and Vaughn (2015) found that it is risky for the youth to gain transient pleasures from immediate gratification, instant friendship, social snacking, and due to increased demands for negotiating promotional self-presentations transmitted by shallow networks, and the challenge to develop the sense of happiness in a social world which tends to increasingly describe self-worth and life satisfaction on the basis of image, success, and popularity. Khodabakhsh and Ahmadi (2020) found a significant negative correlation between social media usage and subjective happiness. Bai and Yang (2021) found that subjective well-being of users get negatively affected by inappropriate use of mobile social media, where boredom plays the role of a partial mediator.

CONCLUSION

The findings of the current research indicate a significant negative correlation between social networking usage and the respective variables, self-esteem and subjective happiness. Although the result was not statistically significant, a positive correlation between social networking usage and perceived stress was noticed. However, it can be suggested that the true association of social media usage with self-esteem, perceived stress and subjective happiness could be person-specific, and influenced by individual uses and susceptibilities.

REFERENCES

- Bai, J., Mo, K., Peng, Y., Hao, W., Qu, Y., Lei, X., & Yang, Y. (2021). The Relationship Between the Use of Mobile Social Media and Subjective Well-Being: The Mediating Effect of Boredom Proneness. *Frontiers in Psychology, 11*. <https://doi.org/10.3389/fpsyg.2020.568492>
- Bashir, H., & Bhat, S. A. (2017). Effects of social media on mental health: A review. *International Journal of Indian Psychology, 4*(3), 125-131.
- Chae, J. (2018). Reexamining the relationship between social media and happiness: The effects of various social media platforms on reconceptualized happiness. *Telematics and Informatics, 35*(6), 1656-1664.
- Cingel, D. P., Carter, M. C., & Krause, H. V. (2022). Social media and self-esteem. *Current Opinion in Psychology, 45*, 101304. <https://doi.org/10.1016/j.copsy.2022.101304>
- CIPLAK, E. (2020). Variables Predicting Social Media Addiction: Narcissism, Happiness and Average Weekly Time Spent on Social Media. *International Online Journal of Educational Sciences, 12*(5).
- Guntuku, S. C., Buffone, A., Jaidka, K., Eichstaedt, J. C., & Ungar, L. H. (2019). Understanding and measuring psychological stress using social media. In

Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults

Proceedings of the international AAAI conference on web and social media, Vol. 13, pp. 214-225.

- Khodabakhsh, S., & Ahmadi, S. (2021). The relationship between subjective happiness and social media usage during the COVID-19 pandemic: the moderating role of resilience. *Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport*, 38(2), 105–112. <https://doi.org/10.51698/aloma.2020.38.2.105-112>
- Manago, A. M., & Vaughn, L. (2015). Social Media, Friendship, and Happiness in the Millennial Generation. *Friendship and Happiness*, 187–206. https://doi.org/10.1007/978-94-017-9603-3_11
- Mathers, M., Canterford, L., Olds, T., Hesketh, K., Ridley, K., & Wake, M. (2009). Electronic media use and adolescent health and well-being: cross-sectional community study. *Academic pediatrics*, 9(5), 307-314.
- Olufadi, Y. (2016). Social networking time use scale (SONTUS): A new instrument for measuring the time spent on the social networking sites. *Telematics and Informatics*, 33(2), 452–471. <https://doi.org/10.1016/j.tele.2015.11.002>
- Park, N., Song, H., & Lee, K. M. (2014). Social networking sites and other media use, acculturation stress, and psychological well-being among East Asian college students in the United States. *Computers in Human Behavior*, 36, 138-146.
- Phu, B., & Gow, A. J. (2019). Facebook use and its association with subjective happiness and loneliness. *Computers in Human Behavior*, 92, 151-159.
- Saiphoo, A. N., Dahoah Halevi, L., & Vahedi, Z. (2020). Social networking site use and self-esteem: A meta-analytic review. *Personality and Individual Differences*, 153, 109639. <https://doi.org/10.1016/j.paid.2019.109639>
- Sigerson, L., & Cheng, C. (2018). Scales for measuring user engagement with social network sites: A systematic review of psychometric properties. *Computers in Human Behavior*, 83, 87–105. <https://doi.org/10.1016/j.chb.2018.01.023>
- Sriwilai, K., & Charoensukmongkol, P. (2016). Face it, don't Facebook it: impacts of social media addiction on mindfulness, coping strategies and the consequence on emotional exhaustion. *Stress and Health*, 32(4), 427-434.
- Yao, J., & Cao, X. (2017). The balancing mechanism of social networking overuse and rational usage. *Computers in Human Behavior*, 75, 415-422.

Acknowledgement

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Biswas, S. & Guha, A. (2022). Association of Social Networking with Self-Esteem, Perceived Stress and Subjective Happiness of Young Adults. *International Journal of Indian Psychology*, 10(3), 1450-1458. DIP:18.01.155.20221003, DOI:10.25215/1003.155