

A Study of Internet Addiction and Its Effects on the Mental Health of Medical Students: A Cross-Sectional Study in Western Iran

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Abstract

Background: The internet itself is a harmless technology. However, its overuse and misuse will expose its users to internet addiction. On the other hand, diagnosis of students' mental dysfunction is of prime importance, and their progress and academic success in the future can be prevented by this technology if not properly handled.

Methods: In this descriptive and correlational study, the statistical population consisted of all students at Kermanshah University of Medical Sciences, of which 447 students studying in the first and second semesters of the academic year 2017-18 were selected through Cochran's Sample Size Formula and Stratified Random Sampling. As for data collection, the Young's Internet addiction Test (IAT) and Goldberg General Health Questionnaire (GHQ-28) were utilized. Moreover, for data analysis, the descriptive statistics (percentage, mean, standard deviation) and inferential statistics (T-test, Pearson correlation coefficient, and multiple regression analysis) were employed in the environment of SPSS Statistical Software Version 23.0.

Results: The results of the present study demonstrated that the total mean score of students' internet addiction and mental health measured 3.81 ± 0.88 and 2.56 ± 0.33 , respectively. The results also indicated that internet addiction correlated positively with depression whereas negatively with mental health ($P < 0.001$). Besides, the results of multiple regression analysis revealed that the five major predictors of vulnerability to internet addiction in university students were as follows: the key reason for using the internet, faculty, depression, the main place for using the internet, and somatic symptoms.

Conclusions: According to the findings of the present study, it can be concluded that students' excessive use of the internet leads to depression, anxiety, and reduced mental health, thereby affecting their academic performance. Hence, it is suggested that further monitoring and control be exercised on how the internet is used by university students, and they should be informed of the detrimental effects of this technology in the case of misuse or overuse.

Background

In today's complex world, given the major role that the internet plays in acquiring various learning

skills, it is seen as a necessity for university students. Nevertheless, there are concerns about the use of this technology and its hidden risks on the users' somatic and mental health (1). The internet is a medium for people to easily and quickly access their intended information towards communication with others worldwide. However, one's lack of control over its excessive use can disturb his/her living and relationships between family members, or even bring about instability of feelings (2). Nowadays, using this network is on the rise worldwide, and the peak of a digital industrial revolution is now in progress, and any new revolution will undoubtedly create new problems and predicaments (3, 4). Not to mention, the number of internet users around the world is rising incredibly. For example, its users numbered 665 million in December 2002 (5). In recent years, the internet usage in Iran has grown dramatically. For instance, according to the reported statistics, the number of Iranian users in 2006 measured 11 million, reaching 33 million and 200 thousand in 2010. In other words, the number of internet users has risen 25 times, and according to a recent research conducted in the country, the young made up the majority of internet users (6). On average, while connected to the internet, the Iranian users devote 35% of their time to chat rooms, 28% to online games, 30% to checking emails, and 25% to surfing the net. In addition, the average time spent on internet measured 52 minutes per week (5). Internet addiction is an interdisciplinary phenomenon, which has been investigated from different perspectives by various disciplines, such as medicine, computer science, sociology, law, and psychology (7).

Further, internet addiction can be regarded as a social crisis, which has nowadays attracted the attention of various experts in all fields of study. This phenomenon is a biological, psychological, social, economic and cultural problem, which is impossible to be taken into account as a simple matter since it is influenced by different factors (8). The excessive and pathological use of the internet is called internet addiction (9). Therefore, with the growing number of internet users and its widespread psychological and sociological implications, it is necessary to determine and recognize the contribution of predictive factors in internet addiction, and conducting pathological studies about internet addiction can enable us to better and more usefully utilize this technology (9). Internet addiction is generally defined as a type of applying the internet that leads to psychological, social,

educational, or occupational problems in a person's life (10). This phenomenon is described as internet addiction/dysfunction (2), and the problematic application of the internet (11), or habitual use of the internet (12) is seen as one of the forms of behavioral addiction (Holden, 2001). Internet addiction is called "the modern addiction." In practice, this type of addiction is true dependency, like drug addiction and other kinds of dependency. Although this kind of dependency does not have the somatic problems of chemical addiction, its resultant social problems are like other types of addiction (13). In the 2015 World Statistics, in which the number of internet users and the population of countries were specified, it was reported that, of the world's total population measuring 7,264,623,793 people, 3,079,339,857 were using the internet, and the young made up the majority of users (14). While taking into account the many points for its proper and practical use and prevention of mental illness, these statistics underscore the importance of the internet and social networks. Internet addiction is an etymological process of using the internet that creates a psychological state in which the user's behavior is disturbed, thereby leading to a dysfunction in his/her cognitive status (15).

One of the main pillars of the health of societies is mental health, which plays a key role in ensuring the dynamism and efficiency of any society. Moreover, since university students are among the most prestigious layers of societies and seen as future builders in any country, and given that newly arrived students in universities coming from faraway cities are the first who fall victim to internet addiction, their mental health is of particular importance for raising their learning and scientific awareness (16). Furthermore, mental health is a concept that reflects our thinking, feelings and functioning in dealing with life situations (17). Today, the disease patterns are shifting towards noncommunicable diseases, and the rising rate of mental dysfunction and the resultant costs imposed on societies have attracted the attention of health promotion specialists (18). In this regard, the global burden of disease statistics have introduced mental illnesses as one of the three primary causes of lost years of life due to disability (19). According to WHO, mental health is defined as one's ability to communicate with others harmoniously, modify the personal and social environment, resolve conflicts and personal preferences logically, fairly, and appropriately (20). Moreover, according to the statistics announced

by WHO, 52 million people of different age groups suffer from severe illnesses worldwide, and 250 million have mild mental dysfunction. In Iran, these statistics are not lower than those in other countries (21). Moreover, the results of the epidemiological studies conducted about the psychiatric dysfunction in Iran are indicative of the variability of the prevalence of dysfunction between 11.9% and 30.2% (22).

As for internet addiction, addressing the mental health of individuals is of prime significance. For example, Fallah (2007) reported that depression was more prevalent among the internet addicts than normal internet users. The results also demonstrated that the internet addicts were more anxious and their mental health was more at risk (23). Lashgarara et al. (2011) concluded that 34% of university students were addicted to the internet based on the Young's categorization (24). In a study performed by Shahbazirad and Mirderikvand (2013), it was shown that the students' internet addiction and mental health were negatively related, and the students' internet addiction was not significantly different from the variables of gender and marital status (16). In another study done by Nastiezaie (2009), the general health of internet addicts was more at risk than the ordinary users (25). In addition, Fonia et al. (2016) found out that there was a significance difference between the internet addiction of male and female students (26). The results of a study conducted by Atash Pour and Kazemi (2003) revealed that the excessive use of the internet reduced the mental health of the users (27). For example, Dargahi and Razavi (2007) showed that 30% of users were addicted to the internet, and all of them were suffering from varying degrees of psychological and social dysfunction (28). Similarly, the role of internet addiction in the mental health of users and the need to pay attention to the matter have been emphasized in studies conducted by Fallah (29), Alavi et al, (5), Mirzaeyan et al, (30) and Taheri Mobarakeh et al, (31).

Given that the student population use the internet very much and they are at high risk of internet addiction (32), paying attention to students' mental health is of prime importance in terms of their future and the country's development (20). Obviously, universities should do their utmost to boost the mental health, personal growth and well-being of students (33). Therefore, the present study aimed to investigate internet addiction and its effects on the mental health of medical students at Kermanshah

University of Medical Sciences.

Methods

Study population and design

In this descriptive and correlational study, the statistical population consisted of all students at Kermanshah University of Medical Sciences, of which 447 students studying in the first and second semesters of the academic year 2017-18 were selected through Cochran's Sample Size Formula and Stratified Random Sampling. Further, the ethical principles employed in the present study included obtaining the necessary permits, retaining the right for the schools under study to either accept or reject to participate in the study, and ensuring the confidentiality and non-disclosure of agreement. Then, the questionnaires were distributed among the target sample. To this end, the objectives of the present study were explained to the target subjects, and informed consent was obtained from all participants before the study began. Not to mention, the exclusion criteria were the samples disinterest in participation in the study and handing over incomplete questionnaires.

Demographic Questionnaire: The first part of the instrument dealt with the demographics and comprised questions on gender, age, marital status, place of residence, faculty, education, having a personal computer, main location and time of using the internet, and the major reason for using the internet.

Measures

Internet addiction Test (IAT): This 20-item questionnaire was developed by Young (1988) for measuring the internet addiction, which is affected by a variety of aspects in users' lives (12). The questions were scored with five-point Likert Scaling (5 = always, 4 = usually, 3 = most of the time, 2 = sometimes, and 1 = seldom). Moreover, the minimum and maximum ranges of scores were 20-100. According to the scores, the internet users were grouped into three categories: a score of 20-49 for typical users, a score of 50-79 for at-risk users, and a score of 80-100 for addicted users. It should be noted that the highest scores represent the highest levels of dependency on the internet. According to the latest studies, a score of 50 is considered for internet addiction. Furthermore, the validity of the questionnaire was confirmed by three experts using the content validity index (0.84), and its reliability was confirmed using the test-retest (0.88) by 20 medical students using Cronbach's alpha

(0.87) within two weeks. The reliability and validity of this tool have been reported above 90% in previous studies (34-38).

The General Health Questionnaire (GHQ)(39):The self-reported Goldberg's 28-item questionnaire examines the subject's mental health in the recent month and includes symptoms such as abnormal thoughts and feelings and aspects of visible behavior. This questionnaire consists of four sub-scales: somatic symptoms (questions 1-7), anxiety (questions 8-14), social dysfunction (questions 15-21), and depression (questions 22-28). Each sub-scale contains seven questions that measure various aspects of mental health, ranging from somatic to psychological dysfunction. The questions were scored with a four-point Likert Scaling (0 = not at all, 1 = average, 2 = more than average, and 3 = far more than average). The minimum and maximum ranges were 0-84, which were categorized into four levels of mental health: normal (0-22), weak (21-40), balanced (41-60), and severe (61-84). It should be noted that the highest scores represent the lowest levels of mental health. The reliability of the questionnaire was confirmed for each section using content validity (0.80) by three experts and its reliability was confirmed using the test-retest (0.87) and Cronbach's alpha (0.93) by 20 medical students within two weeks. Moreover, the reliability and validity of the questionnaire have been confirmed in all previous studies around the world (40-43).

Statistical Analysis

for data analysis, the descriptive statistics (percentage, mean, standard deviation) and inferential statistics (T-test, Pearson correlation coefficient and multiple regression analysis) were employed in the environment of SPSS Statistical Software Version 23.0. Not to mention, all tests were analyzed at the significance level of 0.05 ($p < 0.01$) using SPSS 23 software.

Ethical consideration

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Results

Sample Characteristics

Of the total of 447 subjects in the present study, 215 students (48.1%) were male and 232 (51.9%)

were female. The average age of the subjects was 23.47 ± 4.58 , and the majority of subjects were aged between 19 and 24 (69.6%). In terms of marital status, 360 of the participants (80.5%) were single. In addition, the majority of students were studying bachelor's degrees (202 students or 45.2%), and the majority of students were studying at the medicine school (71 students or 15.9%). Further, the majority of students were living in dormitories (216 students or 48.3%). The results also showed that 356 subjects had their own personal computers (79.6%), and 205 subjects (45.9%) used the internet at their dormitories. It was also revealed that they mainly got connected to the internet in the morning or evening (367 subjects or 82.1%), and their main reason for being online was using chat applications (Table 1).

Table 1
Demographic Characteristic of the Samples under Study

Characteristics	N	%
Gender		
Male	215	48.1
Female	232	51.9
Age group (years) Mean \pm SD = 23.47 \pm 4.58		
19-24	311	69.6
25-30	78	17.4
> 35	58	13
Marital status		
Single	360	80.5
Married	87	19.5
Education		
Bachelor's degree	202	45.2
Master's degree	48	10.7
Ph.D.	197	44.1
Faculty		
Medicine	71	15.9
Dentistry	52	11.6
Pharmaceutical medicine	39	8.7
Nursing & Midwifery	64	14.3
Paramedicine	59	13.2
Public health	56	12.5
Nutrition Sciences and Food Industries	45	10.1
Self-governing college	61	13.6
Place of residence		
Living with parents or spouse	216	48.3
Dormitory	129	28.9
Rental	102	22.8
Having a personal computer		
Yes	356	79.6
No	91	20.4
Main location of using the Internet		
Home	43	9.6
University	199	44.5
Dormitory	205	45.9
Main time of using the Internet		
Morning till evening	367	82.1
Evening till night	44	9.8
Night till morning	36	8.1
The major reason for using the Internet		
Scientific topics	26	5.8
Research	75	16.8
Surfing the net	80	17.9
Downloading (films, music, or pictures)	103	23
Chatting Online	163	36.5

The mean and standard deviation of students' internet addiction measured 3.81 ± 0.88 . In addition, the mean and standard deviation of students' mental health was 2.56 ± 0.33 , which indicates that the general mental health of students was not in good condition. As for the mental health of the samples, the results demonstrated that the highest and lowest rates were related to depression with a mean and standard deviation of 2.84 ± 0.21 and somatic dysfunction with a mean and standard deviation of 2.16 ± 0.79 , respectively (Table 2).

Table 2

Internet addiction and Mental Health Scores for Different Genders at Kermanshah University of Medical Sciences

Variable	Male	Female	Total	P-value
Non-addicted Users (A score of 20-49)	8(1.8%)	32(7.2%)	40(8.9%)	0.042
At-risk Users (A score of 50-79)	104(23.3%)	100(22.4%)	204(45.6%)	
Addicted Users (A score of 80-100)	103(23%)	100(22.4%)	203(45.4%)	
Internet addiction	2.44 ± 0.56	2.29 ± 0.69	3.81 ± 0.88	0.013
Mental Health	2.57 ± 0.33	2.55 ± 0.34	2.56 ± 0.33	0.574

The Pearson correlation coefficient was used to determine the relationship between the students' internet addiction and mental health. The results of correlation matrix demonstrated that they did not significantly correlate with each other ($p < 0.001$, $r = 0.052$). It was also concluded that depression and somatic symptoms had the highest ($p = 0.001$, $r = 0.166$) and lowest ($P > 0.001$, $r = 0.006$) relationships with internet addiction, respectively (Table 3).

Table 3

The Results of Pearson Correlation Coefficient between Internet Addiction and Mental Health among Students at Kermanshah University of Medical Sciences

Variable	1	2	3	4	5	6
Somatic Symptoms	1					
Anxiety	0.020	1				
Social Dysfunction	0.055	0.071	1			
Depression	0.153**	0.002	0.155**	1		
Mental Health	0.419**	0.374**	0.871**	0.340**	1	
Internet addiction	0.006	0.054	0.048	0.166**	-0.052	1

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

To analyze the relationship between the variables of mental health and internet addiction, a model was used. This model consisted of five major factors: the key reason for using the internet, faculty, depression, the main place for using the internet, and somatic symptoms (Table 4).

Table 4

The Results of Multiple Regression Analysis to Predict Internet addiction Using the Mental Health Variables

Mental Health Dimensions	Unstandardized Coefficients		R		Standardized Coefficients	Sig	
	B	Std. Error			Beta		
(Constant)	2.710	0.449				6.037	0.000
The key reason for using the internet	0.443	0.024	0.656	0.430	0.639	18.405	0.000
Faculty	0.048	0.013	0.671	0.450	0.128	3.675	0.000
Depression	0.512	0.144	0.678	0.460	0.126	3.556	0.000
The main place for using the internet	0.146	0.047	0.686	0.471	0.107	3.089	0.002
Somatic Symptoms	0.147	0.067	0.490	0.477	0.077	2.186	0.029

Discussion

The present study aimed to investigate internet addiction and its effects on the mental health of medical students at Kermanshah University of Medical Sciences. The results of the present study demonstrated that 45.5% of students at Kermanshah University of Medical Sciences were addicted to the internet. This finding was concurrent with the results of studies conducted by Farhadini et al, (44), Sepehrian and Jokar, (45), Fonia et al, (26), and Dargahi and Razavi, (28). According to Douglas et al, internet addiction is a kind of excessive compulsive use of this tool, which, in the event of being deprived of it, the user becomes highly irritable, and his/her reaction manifests itself in the form of bad temper (25). Those who use the internet more than others can replace stronger relationships in real life with lower-quality social relationships, thereby resulting in more loneliness and depression. To further explicate the matter, the internet may serve as a substitute for lives without vitality.

Loneliness and isolation may cause people to spend more time on the internet, thereby decreasing the quality of their social relationships.

As for the demographic characteristics, the results demonstrated that there was a significant difference between male and female students in terms of internet addiction. Additionally, 23% of male students were internet addicts, which exceeded that of female students by 22.4%. In this study, male students should be given priority in prevention programs for internet addiction. These results were consistent with the results of studies conducted by Alavi et al, (5), Orsal et al, (46) and Fonia et al, (26) whereas inconsistent with the results of studies performed by Atashpour et al, (47) and

Shahbazirad and Mirderikvand, (16). In a study done by Ghahremani et al, (6), the internet addiction in boys was higher than that in girls. Similarly, Solhi et al, (32) concluded that 18% of students at Tehran University of Medical Sciences had internet addiction behaviors, and 13% and 5% of men and women were internet addicted, respectively. However, Pirzadeh et al, (2011) reported that 8.3% of students at Payame Noor University of Isfahan had mild internet addiction(48). However, in a study done by Bandani Tarashoki et al, (2017) about the students at Dezful University of Medical Sciences, it was found out that 1.8% of female students had internet addiction behaviors, which was higher than that in male students by 0.9% (49). Male students seem to have more internet addiction than girls. On the other hand, with the growing number of girls entering universities, they have the chance to become more familiar with technologies and have a greater chance of using the internet. In fact, the present research, in line with the findings of previous studies, shows that men are more exposed to internet addiction, not because of biological differences between the two genders, but due to different social and environmental factors to which each gender is exposed. According to the results, it seems that this finding can be an alarm at the increase in this disorder among students, and it is better that proper planning be done in this area in cooperation with university officials.

Based on the results of the present study, the mean score of male students' mental health was higher than that of female students, and no significant difference was seen between gender and mental health. This finding was inconsistent with the results of a study by Ghodasara et al, (2011) at Vanderbilt University, in which gender served as one of the most important determinants of student's mental health(50). However, this finding of the present study was consistent with the results of studies conducted by Taji and Verdinejad, (51), Sadeghian and Heidarian Pour, (52), Namdar et al, (53) and Imani et al, (54). In studies done by Asadi (55), Rafati et al, (56), Biro et al, (57), Chen et al, (58) and Shahabinejad et al, (59), it was expressed that female students had more mental disorders than male students, which was inconsistent with the results of the present study. It should be noted that the mean score of male students' mental health was higher than that of female students, possibly due to men's ability to communicate with others in society and university, the ability to deal with problems and difficulties and the ability to earn money, as well as the women's excessive emotional

dependency on their families and lack of social security in society.

The results of this study revealed that half of the students had poor mental health, and there was a significant difference between the mean scores of depression and internet addiction. These results were consistent with the results of studies done by Nastiezaie (25), Xiuqin et al, (60) and Chung and Wong (61). Kessler et al, (62) concluded that 9.7% of the young aged 18-25 in the USA suffered from depression disorders. The mental health disorders in students cause a significant portion of their mental force to be devoted to such problems, thereby resulting in their lack of ability and interest to study, disturbing their educational tasks and reducing their motivation, as well as fear, concern, and anxiety. In a study done by Abdollahi (2016) about the nursing students at Tehran University of Medical Sciences, it was shown that 32.1% of students had suspected mental disorders, which was 29.7% in women and 34.3% in men (63). In addition, Rafiei et al, (2012) showed that 67.9% of students at Arak University of Medical Sciences had symptoms of mental disorders, and only 32.1% of them had normal mental health (64). According to the results of a study conducted by Sherina et al, (2004) about the students of medical universities in Malaysia, it was found that 42.9 percent of students experienced psychological stress (65). Similarly, Masoudi Asl et al, (2013) concluded that 52.4% of students at Tehran University of Medical Sciences were suffering from mental health disorders (66). Likewise, in a study done by Yavarian et al, (2017) about the students at Uromia University of Medical Sciences, it was demonstrated that 45.8% of students had different degrees of mental health disorders. In their study, it was also revealed that 10%, 0.5% and 3.2% of students had severe disorders in terms of somatic symptoms, anxiety and insomnia, and depression, respectively. This finding was concurrent with the results of the present study (67). According to the results of studies conducted by Ofili et al, (68), Jadoon et al, (69) and Chen et al, (58), the medical students of Nigeria, Pakistan and China were suffering from depression and psychological stress. It seems that the different prevalence of psychiatric disorders in various studies can be attributed to several factors, including the differences in groups under study.

The results revealed that internet addiction and mental health were negatively related, which was consistent with the results of studies conducted by Shahbazirad and Mirderkvand (16), Fallah (23)

and Mousavomoghadam et al, (70). Hosseini et al, (2015) showed that 4.2% of students at Payam Nour University of Charm had severe addiction to the internet. Additionally, a significant relationship was observed between internet addiction and mental health (21). Similarly, in a study performed by Farhadinia et al, (2015), it was demonstrated that internet addiction and mental health significantly correlated among the students of Lorestan University of Medical Sciences (44). Likewise, Marashyan and Asgari (2008) concluded that there was a significant relationship between anxiety and internet addiction. Additionally, students addicted to the internet experience more depression than normal users, thereby leading to their academic failure (71). In a study performed by Shek and Tang (2008) on Chinese adolescents, it was shown that 91% of Chinese adolescents were addicted to the internet, which affected their somatic and mental health and family life and caused depression. Nastiezaie (2009) and Whang et al. (2003) concluded that the mental health of users addicted to the internet was more at risk than normal users, especially in terms of the subscales of anxiety and depression (25, 72). Vizehfar (2005) expressed that 33% of people used the internet to entertain or forget about their problems. Moreover, the results of studies conducted by Nathan et al, (73), Ko et al, (2) and Alavi et al, (5) revealed that depression and internet addiction correlated. Similarly, Marcantonio et al, (74), Alavi et al, (5) and Shepherd et al, (75) found out that there was a relationship between anxiety and internet addiction. These two findings were consistent with the results of the present study. Depression, as a psychological trauma, seems to lay the groundwork for the internet addicts. Some people resort to the internet to reduce their depression. In this case, the internet may provide a substitute for the joyless lives of depressed people, or they may get depressed as a result of internet addiction. In other words, the internet addicts will experience the negative consequences, such as depression.

In justifying the relationship between depression and internet addiction, it can be expressed that the excessive use of the internet can lead to social isolation and depression through reducing familial, social and local connection. Therefore, depression may occur as a result of internet addiction, and in this case, the internet addicts experience the resultant negative consequences, such as depression (25).

The results revealed that the five major predictors of vulnerability to internet addiction in university students were as follows: the key reason for using the internet, faculty, depression, the main place for using the internet, and somatic symptoms.

Limitations of the Study

The present study had some limitations. First, the data were collected through a self-reporting method, possibly affecting the accuracy of the results. Second, the subjects' personal differences may also affect the generalizability of the research findings. Hence, it is suggested that further studies be conducted in this respect to draw comparisons towards reaching a consensus on this matter.

Conclusion

According to the findings of the present study, it can be concluded that students' excessive use of the internet leads to depression, anxiety, and reduced mental health, thereby affecting their academic performance. Hence, It is suggested that further monitoring and control be exercised on how the internet is used by university students, and they should be informed of the detrimental effects of this technology in the case of misuse or overuse. The findings of the present study are also indicative of the significance of preventative measures in the form of educational and counseling programs for students regarding the proper and practical use of the internet. Additionally, addressing the issues and problems relating to communication technologies, such as the internet, can lay the groundwork for proper education and parents and families' further attention to proper and effective use of the internet.

Abbreviations

IA: Internet Addiction; MH: Mental Health

Declarations

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Authors' contributions

All authors participated and approved the study design. JYL and HDG contributed in designing the study, AZ, FC and MSH collected the data, and analyzed by NK, FM and RT. The final report and article were written by AZ and JYL All authors read and approved the final manuscript

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Availability of data and materials

Authors report that the data supporting their findings can be publicly shared.

Ethics approval and consent to participate

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Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

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