6

7 **Association between Internet Addiction and Dietary Habits among**

8 **Omani Junior College Students**

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16

17 **Abstract**

18 ***Objectives*:** To investigate the association between internet addiction and dietary habits

19 among Omani junior college students. ***Methods*:** In this cross-sectional study at Sultan

20 Qaboos University, 377 junior college students were surveyed in November 2020 using

21 demographic data, the Compulsive Internet Use Scale, and a dietary habits questionnaire.

22 Chi-square cross-tabulation analyses explored the relationship between internet addiction

23 and dietary habits. ***Results*:** Overall, 59.9% of junior college students were identified as

24 having an internet addiction. Within this group, 62.8% reported reduced meal sizes and

25 54.4% reported a decrease in appetite. There was a statistically significant difference in

26 both meal size (X^2=30.528, p<0.001) and appetite changes (X^2=28.731, p<0.001) among

27 student with different levels of internet addiction. These results suggest a possible link

28 between internet addiction and altered dietary habits among this population. ***Conclusion*:**

29 This study highlights the need for strategies that encourage healthy living behaviors and

30 raise awareness about the adverse effects of internet addiction.

Introduction

The widespread of internet usage and the growth of digital devices in recent years have significantly changed several aspects of life, including education.[1] This digital revolution has enabled quick communication across great distances, allowing people to stay in touch with friends, family, and coworkers all around the world.[2] Furthermore, the internet has transformed education by providing an abundance of online resources, e-learning platforms, and virtual classrooms. Students can now access a wealth knowledge and skills from the comfort of their own homes using their mobiles.[3] The internet's huge array of entertainment, such as streaming services, social networking, and online gaming, have increased leisure activities.[4] However, the rising frequency of internet addiction has emerged as a major global issue, particularly among younger populations such as junior college students[5] Internet addiction is defined by compulsive and excessive internet use, which has a negative impact on an individual's physical health, psychological well-being, and social interactions.[6]

Internet addiction can give rise to sedentary behavior and a decrease in physical activity, which may contribute to overweight, obesity, and sleep disruptions.[7-9] Internet addiction, particularly in the context of digital gaming, can have a substantial impact on individuals' eating habits and nutritional practices.[10] Because of the immersing nature of digital gaming, there is a tendency known as "gaming binge," in which gamers become profoundly absorbed in extended gaming sessions, often disregarding other activities, such as eating.[11]

Several studies have been conducted to investigate the link between internet usage and dietary changes. Hassan et al.[10] studied the dietary habits of Egyptians adolescents suffering from internet addiction problem. According to the study, when compared to their non-addicted peers, these adolescents were more prone to experiencing loss of appetite and eating large meals at a fast rate. In a Pakistani study, Waheed, Jamil et al.[12] found that internet addiction is an increasing issue among university students and

62 negatively affects their dietary patterns. At a Turkish university, Gündüz, Gokcen et al.[13]

63 examined how excessive internet use among university students can negatively affect

64 daily life and contribute to lifestyle-related issues such as alcohol use. Furthermore,

65 Stiglic et al.[14] conducted a systematic review on the association between screen time

66 (including internet usage) and dietary patterns in children and adolescents. The review

67 found a link between higher screentime and increased obesity, unhealthier diet, lower

68 quality of life, poorer well-being, and poorer cardiorespiratory fitness. These results show

69 that young people's less-than-ideal diets may be related to their increased time spent

70 online, particularly playing video games. Studying the impact of internet addiction on

71 dietary habits in young university students is essential for identifying its links to health

72 issues, academic performance, mental well-being, and lifestyle choices, thereby enabling

73 targeted interventions and public health strategies.

74

75 In recent years, Oman has witnessed a significant increase in internet usage.[15] While

76 internet usage is prevalent worldwide, a concerning issue arises with addiction to the

77 internet in young adults in particular. Masters[16] found evidence of social networking

78 addiction among Omani students and suggested a need for intervention. However, there

79 have been no study investigating the prevalence of addiction to the internet among Omani

80 students, nor have there been studies about the potential changes in dietary patterns

81 associated with such addiction. Although numerous studies worldwide have explored the

82 effect of internet addiction on dietary habits, this data cannot be generalized to Oman. It

83 is crucial to consider the unique cultural, societal, and economic factors that distinguish

84 Omani students, emphasizing the need for local research to provide tailored insights and

85 inform effective interventions. Therefore, it is hypothesized that internet addiction is

86 prevalent among Omani junior university students and that it influences their dietary

87 habits.

88

89 **Methods**

90 A quantitative cross-sectional study was conducted at Sultan Qaboos University (SQU),

91 targeting junior students of 18-19 years old. This age group was chosen because it is in a

92   critical transitional phase from adolescence to early adulthood, a period marked by

93   significant personal and academic developments that may influence Internet use patterns.

94

95   Inclusion criteria included students who are within the age range of 18-19 years and

96   enrolled in their foundation or first year at SQU. Exclusion criteria excluded students

97   outside this age range. The sample size was calculated using Slovin's formula.[17] Based

98   on the statistical report from SQU, the university enrolls approximately 3088 students

99   into their foundation program each fall semester.[18] The formula used to compute the

100   sample size is $n= N/(1+N.e^2)$. with N representing the population size, e the desired

101   margin of error (0.05), the calculation $n =3088/(1+3088.0.05^2)$ results in a sample size of

102   approximately 354 students. To accommodate a potential 5% attrition rate, the sample

103   size was adjusted to 370 students. A nonprobability sampling technique with a

104   convenience sampling approach was used, selecting junior college students who were

105   available during the data collection period.

106

107   Three instruments were used in this study.

108   1. Socio-demographic questionnaire

109   The first tool consisted of socio-demographic measures, including variables such as

110   gender, age, college, year of study, and grade point average (GPA).

111

112   2. The Chen Internet Addiction Scale

113   The second tool was the Chen Internet Addiction Scale (CIAS), a self-reported

114   questionnaire of 26 items where respondents are asked to rate the degree to which each

115   statement matches their Internet use experience over the last three months. It assesses the

116   primary symptoms of Internet addiction, such as tolerance, compulsive use, and

117   withdrawal. Additionally, it evaluates the negative effects of Internet addiction on social

118   activities, interpersonal relationships, physical health, and time management. The

119   questionnaire also explores the number of hours spent online each week and the user's

120   level of internet experience. The scale is a four-point Likert scale, with 1 representing

121   'strongly disagree', and 4 signifying 'strongly agree'.[19] The total score a student could

122   achieve extended from a minimum of 26 to a maximum of 104, with higher scores

123 indicating greater addiction to the internet. Chen et al.[20] suggested a cut-off point of

124 63/64 as optimal for distinguishing cases of internet addiction from non-cases, achieving

125 a high diagnostic accuracy of 87.6%. As a result, students with CIAS scores exceeding 64

126 were classified into the internet addiction diagnosis group. The CIAS demonstrated high

127 reliability, with Chen et al.[20] reporting Cronbach's alpha of 0.94, and this study

128 confirming a high internal reliability of 0.962.

129

130   3. The Change in Dietary Habit Questionnaire

131 The third instrument was the Change in Dietary Habit Questionnaire, adapted from the

132 Dietary Behavior and Diet Quality Questionnaire developed by Kim et al.[21] The dietary

133 behavior questionnaire assessed recent changes in meal size, appetite, eating speed,

134 frequency and reasons for skipping meals, and the frequency, type, and reasons for

135 snacking. The first part of the questionnaire which assessed changes in dietary habits,

136 including meal size, appetite, and eating speed while using the Internet was utilized. The

137 original questionnaire's Cronbach's alpha was not reported by the authors. In this study,

138 using only three questions from the questionnaire, the Cronbach's alpha was 0.387.

139

140 Data were collected over a span of four weeks in November during the Fall 2020

141 semester. After receiving ethical approval from the Research and Ethics Committee of

142 the College of Nursing at SQU, the administrators in charge of the foundation program

143 and first year studies at SQU were contacted and informed about the study and its

144 objectives. With the assistance of the course coordinators, junior college students were

145 approached. The research objectives and the voluntary nature of the study were explicitly

146 communicated to the students, who then signed a consent form and completed the

147 questionnaires. It was also assured to the students that their responses would remain

148 confidential, with no names being reported or any identifying information being

149 disclosed. Statistical analysis was performed using the Statistical Package for the Social

150 Sciences (SPSS) software program, version 23. Descriptive statistics, including

151 frequency, percentage, mean, and standard deviation, were employed to describe

152 demographics, prevalence of internet addiction, and changes in eating habits. To assess

153 the relationship between internet addiction and eating habits among adolescents, Chi-

154 square cross-tabulation analyses were conducted. To assess the association between

155 internet addiction and demographics, Chi-square cross-tabulation and logistic regression

156 were employed.

157

158 **Results**

159 A total of 377 junior college students were recruited for this study, with 55.2% being

160 female and 44.8% were male. The average age was 18.28 ± 0.45 years, with the majority

161 being 18 years old (71.9%) and the remaining 28.1% being 19 years old. The study

162 included students from various colleges at SQU, with the majority from the College of

163 Engineering (17.2%), followed by the College of Nursing (15.4%), and the College of

164 Science (13.0%). Most of the participants were from the foundation level (70.3%),

165 followed by those in their first year of study (24.7%). Due to the fact that many

166 participants were foundation level students who had not yet finished the mandatory or

167 elective university courses required to generate a GPA, nearly half of participants

168 (49.9%) had no GPA. The participants' demographic characteristics are summarized in

169 Table 1.

170

171 The diagnosis of internet addiction was made using the overall score from the CIAS, with

172 participants deemed to be internet addicts if they had a CIAS score of 64 or higher. This

173 threshold was used to estimate the prevalence rate of internet addiction among the study

174 population, revealing that 59.9% of the junior college students at SQU were struggling

175 with internet addiction. A total of 226 participants (59.9%) were identified as having

176 internet addiction, compared to 151 participants (40.1%) who did not.

177

178 The majority of the junior college students studied who had internet addiction (62.8%)

179 reported a change in their dietary habits, specifically a decrease in meal size.

180 Furthermore, 54.4% of them experienced a worse appetite compared to those students

181 who maintained control over their internet use. Regarding changes in eating speed, there

182 was no significant relationship observed between internet use and eating speed among the

183 students in either group ($X^2 = 5.687$, $p = 0.128$). Table 2 reveals a statistically significant

184 difference in both meal size ($X^2 = 30.528$, $p < 0.001$) and appetite changes ($X^2 = 28.731$,

185 p < 0.001) between different levels of internet addiction among the studied junior college

186 students.

187

188 Chi-Square crosstabulation and logistic regression analyses were used to investigate

189 whether there is a link between internet addiction and demographic variables, including

190 gender, age, college affiliation, and GPA. However, these analyses did not reveal any

191 statistically significant results, suggesting that there is no association between these

192 demographic factors and internet addiction in this study.

193

194 **Discussion**

195 This study examined the prevalence of internet addiction among young junior students at

196 SQU and its association with dietary habits. It is crucial to distinguish between internet

197 addiction and necessary internet use for academic purposes. Thus, employing a validated

198 and reliable scale is essential. The CIAS effectively identifies compulsive and detrimental

199 internet behaviors. We recognize that many students heavily depend on the internet for

200 academic research, communication, and coursework completion. However, this extensive

201 but necessary use should not be misconstrued as addictive behavior. According to the

202 CIAS score, a large percentage of junior college students (59.9%) were struggling with

203 internet addiction. This high prevalence rate highlights the growing concern of internet

204 addiction among young individuals, particularly in the digital age, where internet usage

205 has become an essential component of daily life. The results are consistent with another

206 study carried out in Oman among SQU students. Masters[16] asked students to report their

207 addiction levels and found that approximately 47.2% are addicted to social media,

208 particularly YouTube. However, this study's results do not align with those from Far

209 Eastern studies (China and Taiwan) where the use of the CIAS showed that addiction

210 prevalence ranged from 6.9% to 17.9%, which is relatively low. [22] This discrepancy

211 could be explained by the fact that the students included in the Far Eastern studies were

212 above 20 years of age. Lozano-Blasco et al.[23] showed that internet addiction is high

213 among young adults and there is a significant incidence among new generations.

214

215 Surprisingly, more than half of students with internet addiction (62.8%) reported a

216 decrease in meal size, indicating a possible link between excessive internet use and

217 changes in dietary habits. This result is consistent with prior research suggesting that

218 internet addiction may contribute to irregular eating patterns and meal skipping as a result

219 of excessive screen time and gaming binge episodes.[10] These poor eating habits might

220 have a negative impact on students' nutritional intake as well as their general health.

221 Snacking may be associated with the high frequency of skipping dinner; more frequent

222 snacking was reported in high-risk internet users than in low risk internet users.[24]

223

224 Furthermore, more than half of students with internet addiction (54.4%) reported having a

225 worse appetite than those without addiction. This data suggests a possible link between

226 internet addiction and reduced appetite, which could be related to the psychological stress

227 and isolation from real-life experiences that are typically associated with internet

228 addiction.[25] The results of this study are in accordance with international studies showing

229 that internet addiction among young university students is related to uncontrolled eating

230 habits and skipping breakfasts.[26] Similarly, Hassan et al.[10] showed that internet addiction

231 in adolescents leads to loss of appetite. In contrast, this study found no significant

232 association between internet addiction and the speed of eating among both groups. This

233 finding suggests that, within the context of this research, internet addiction may not

234 directly influence the speed at which students eat. However, it is important to note that

235 other unexamined factors could affect eating speed. It is also worth considering that

236 dietary habits are significantly influenced by local dietary culture.[27]

237

238 This study underscores the importance of counseling for junior students who struggle

239 with internet addiction. Given the strong association between internet addiction and poor

240 dietary habits, it is crucial to focus on comprehensive therapies that address both

241 behavioral aspects. Addressing the underlying causes of excessive internet use is critical,

242 and this should be complemented by raising awareness and implementing prevention

243 strategies. Encouraging healthy eating habits and regular meals can also be effective in

244 mitigating the negative effects of internet addiction on dietary patterns.[28]

245

246 This study has several limitations. Conducting the research at a single university in Oman
247 restricts the generalizability of the results. Furthermore, small sample size and restriction
248 of the study population to junior students may also impact the findings. The self-reporting
249 nature of the questionnaire may introduce response biases, such as recall bias, which
250 relies on students' memory of their Internet use and dietary habits and may lead to
251 inaccuracies in the reported data. Additionally, the cross-sectional design of the study
252 prevents the establishment of causality between internet addiction and dietary changes.
253 Not all dietary habits identified in the literature were examined, which could inhibit a
254 comprehensive understanding of the impact of internet addiction on dietary habits.
255 Furthermore, because the dietary habits questionnaire did not follow a logical sequence in
256 the four-point Likert scale, it was not possible to use regression analysis to better
257 understand predictors of internet addiction. Finally, the CIAS does not clearly
258 differentiate between internet use for academic purposes and non-academic activities,
259 which could affect the interpretation of internet addiction levels among students.
260

261 **Conclusion**
262 This study showed a significant prevalence of internet addiction among Omani junior
263 college students, which was associated with negative changes in their eating habits.
264 Nearly 60% of the students were identified as internet addicts, exhibiting dietary changes
265 like reduced meal size and appetite compared to non-addicted peers. These findings
266 emphasize the need for targeted awareness and interventions to treat internet addiction
267 and its consequences on dietary habits.
268

269 **Conflict of Interest**
270 The authors declare no conflict of interest.
271

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273 No funding was received for this study.
274

Authors' Contribution

MAJ contributed to the conceptualisation, methodology, investigation, data curation, data analysis, writing (original draft), supervision and project administration. JN contributed to the conceptualisation, methodology, investigation, data curation, data analysis and writing (original draft). HA-H contributed to the conceptualisation, methodology, data collection and writing (review and editing).

References

1. Pontes HM, Szabo A, Griffiths MD. The impact of Internet-based specific activities on the perceptions of Internet addiction, quality of life, and excessive usage: A cross-sectional study. Addictive Behaviors Reports. 2015;1:19-25.

2. Perset K. The economic and social role of Internet intermediaries. 2010.

3. Tamilarasi M. Mobile Empowerment: Enhancing Education and Connectivity for College Students. International Journal of English Literature and Social Sciences (IJELS). 2023;8(3).

4. Sheng N, Fang Y, Shao Y, Alterman V, Wang M. The impacts of digital technologies on successful aging in non-work and work domains: An organizing taxonomy. Work, aging and retirement. 2022;8(2):198-207.

5. Salari N, Zarei H, Hosseinian-Far A, Rasoulpoor S, Shohaimi S, Mohammadi M. The global prevalence of social media addiction among university students: a systematic review and meta-analysis. Journal of Public Health. 2023:1-14.

6. Shaw M, Black DW. Internet addiction: definition, assessment, epidemiology and clinical managemen. CNS drugs. 2008;22:353-65.

7. Kuss DJ, Kristensen AM, Lopez-Fernandez O. Internet addictions outside of Europe: A systematic literature review. Computers in Human Behavior. 2021;115:106621.

8. Noroozi F, Hassanipour S, Eftekharian F, Eisapareh K, Kaveh MH. Internet Addiction Effect on Quality of Life: A Systematic Review and Meta-Analysis. The Scientific World Journal. 2021;2021:2556679.

304 9.   Aghasi M, Matinfar A, Golzarand M, Salari-Moghaddam A, Ebrahimpour-Koujan
305 S. Internet Use in Relation to Overweight and Obesity: A Systematic Review and Meta-
306 Analysis of Cross-Sectional Studies. Advances in Nutrition. 2020;11(2):349-56.
307 10.   Hassan AM, Ahmed ES. Impact of internet addiction on lifestyle and dietary
308 habits of secondary school adolescents. Am J Nurs Res. 2020;8(2):263-8.
309 11.   Marmet S, Wicki M, Dupuis M, Baggio S, Dufour M, Gatineau C, et al.
310 Associations of binge gaming (5 or more consecutive hours played) with gaming disorder
311 and mental health in young men. Journal of behavioral addictions. 2023;12(1):295-301.
312 12.   Waheed W, Jamil W, Rahat T, Zahra S, Perwaiz M, Amjad S, et al. Relationship
313 between Internet Addiction and Dietary Behaviors of Students, Studying in a Teaching
314 Hospital. International Journal of Nutrition Sciences. 2021;6(4):189-93.
315 13.   Gündüz N, Gokcen O, Eren F, Erzincan E, Timur O, Turan H, et al. The
316 relationship between internet addiction and eating attitudes and obesity related problems
317 among university students. KLINIK PSIKIYATRI DERGISI-TURKISH JOURNAL OF
318 CLINICAL PSYCHIATRY. 2019;22(3).
319 14.   Stiglic N, Viner RM. Effects of screentime on the health and well-being of
320 children and adolescents: a systematic review of reviews. BMJ open. 2019;9(1):e023191.
321 15.   Khan MA, Khan S, Rehman A, Ghouse SM. Internet usage patterns: An
322 exploratory study in Oman. International journal of applied engineering research.
323 2017;12(7):1232-6.
324 16.   Masters K. Social networking addiction among health sciences students in Oman.
325 Sultan Qaboos University Medical Journal. 2015;15(3):e357.
326 17.   Supranto J. Sampling techniques for surveys and experiments. Rineka Cipta
327 Jakarta. 2000:37.
328 18.   SQU. Universtiy Profile Statistics Overview. 2022.
329 19.   Ko C-H, Yen J-Y, Chen S-H, Yang M-J, Lin H-C, Yen C-F. Proposed diagnostic
330 criteria and the screening and diagnosing tool of Internet addiction in college students.
331 Comprehensive psychiatry. 2009;50(4):378-84.
332 20.   Chen S-H, Weng L-J, Su Y-J, Wu H-M, Yang P-F. Development of a Chinese
333 Internet addiction scale and its psychometric study. Chinese Journal of Psychology. 2003.

334 21. Kim W-Y, Cho M-S, Lee H-S. Development and validation of mini dietary

335 assessment index for Koreans. The Korean Journal of Nutrition. 2003:83-92.

336 22. Li L, Xu D-D, Chai J-X, Wang D, Li L, Zhang L, et al. Prevalence of Internet

337 addiction disorder in Chinese university students: A comprehensive meta-analysis of

338 observational studies. Journal of behavioral addictions. 2018;7(3):610-23.

339 23. Lozano-Blasco R, Robres AQ, Sánchez AS. Internet addiction in young adults: A

340 meta-analysis and systematic review. Computers in Human Behavior. 2022;130:107201.

341 24. Mekhemer FA, Ahmed ES, Hassan AM. Consequences of internet addiction on

342 dietary behavior among adolescents in Assiut City. Assiut Scientific Nursing Journal.

343 2019;7(17):13-23.

344 25. Kim Y, Park JY, Kim SB, Jung I-K, Lim YS, Kim J-H. The effects of Internet

345 addiction on the lifestyle and dietary behavior of Korean adolescents. Nutrition research

346 and practice. 2010;4(1):51-7.

347 26. Tsai HF, Cheng SH, Yeh TL, Shih C-C, Chen KC, Yang YC, et al. The risk

348 factors of Internet addiction—a survey of university freshmen. Psychiatry research.

349 2009;167(3):294-9.

350 27. Pitt E, Gallegos D, Comans T, Cameron C, Thornton L. Exploring the influence

351 of local food environments on food behaviours: a systematic review of qualitative

352 literature. Public health nutrition. 2017;20(13):2393-405.

353 28. Ying Ying C, Awaluddin SM, Kuang Kuay L, Siew Man C, Baharudin A, Miaw

354 Yn L, et al. Association of internet addiction with adolescents' lifestyle: a national

355 school-based survey. International journal of environmental research and public health.

356 2020;18(1):168.

357

358 **Table 1:** Baseline characteristics of the participants included in this study (N = 377)

Demographics	n (%)
Gender	
Male	169 (44.8%)
Female	208 (55.2%)
Age	
18	271 (71.9%)
19	106 (28.1%)
College	
Engineering	65 (17.2%)
Nursing	58 (15.4%)

Science	49 (13.0%)
Arts	46 (12.2%)
Education	42 (11.1%)
Commerce	37 (9.8%)
Law	29 (7.7%)
Agriculture	27 (7.2%)
Medicine	24 (6.4%)
Year of study	
Foundation	265 (70.3%)
First Year	93 (24.7%)
Second Year	19 (5.0%)
GPA	
No GPA yet*	188 (49.9%)
Less than 2.0	20 (5.3%)
2.0 – 3.0	20 (5.3%)
3.1 – 3.5	108 (28.6%)
3.6 – 4.0	41 (10.9%)

359 *GPA: Grade Point Average*

360 **First semester students are classified as 'No GPA yet' because they have not yet*

361 *received a GPA score.*

362

363 **Table 2:** Dietary habits changes among internet addiction and non-internet addiction
364 participants

Addiction Status Dietary habits	**Internet Addiction N = 226**	**Non-Internet Addiction N = 151**	**Chi-square test**	**P value**
	n (%)	n (%)		
Changes in meal size				
Increased	54 (23.9%)	36 (23.8%)	30.528	<0.001
Decreased	142 (62.8%)	60 (39.7%)		
No change	30 (13.3%)	55 (36.5%)		
Changes in appetite				
Better	51 (22.6%)	27 (17.9%)	28.731	<0.001
Worse	123 (54.4%)	52 (34.4%)		
No change	32 (14.2%)	55 (36.4%)		
Do not know	20 (8.8%)	17 (11.3%)		
Changes in eating speed				
Fast	56 (24.8%)	39 (25.8%)	5.687	0.128
Slow	122 (54.0%)	70 (46.4%)		
Average	34 (15.0%)	36 (23.8%)		
Irregular	14 (6.2%)	6 (4.0%)		

365