

Frequent internet gamers' sociodemographic characteristics, depressive symptoms, and substance use: Results from 2018 National Survey of Substance Use in Taiwan

網路遊戲高頻玩家的社會人口學特徵、憂鬱症狀及物質使用： 2018年臺灣全國物質使用調查結果

Student: Hao-Ting Yu (游皓婷)^{1,2} / Advisor: Prof. Wei J. Chen (陳為堅 教授)^{1,3}

¹ Department of Public Health, College of Public Health, National Taiwan University; ² Department of Psychology, College of Science, National Taiwan University; ³ Center for Neuropsychiatric Research, National Health Research Institutes

Introduction

Background

Internet gaming has become widespread in 2000s. Over 90% of children and adolescents in the U.S. play internet games. However, frequent internet gaming may cause negative consequences, such as interfering normal routine and functions and having mental health problems. "Internet gaming disorder" and "gaming disorder" were also included in DSM-5 and ICD-11, respectively, to raise concerns. Research has found that about 1% adolescents have internet gaming disorder.

Research Gaps and Aims

Few study uses national representative samples and measures the negative consequences of frequent players instead of disorder patients. This study aims to:

- To estimate the prevalence of frequent internet gaming across sociodemographic characteristics using national representative samples in Taiwan.
- To find negative consequences of frequent internet gaming in general population and whether there are dose-response relationships.

Method

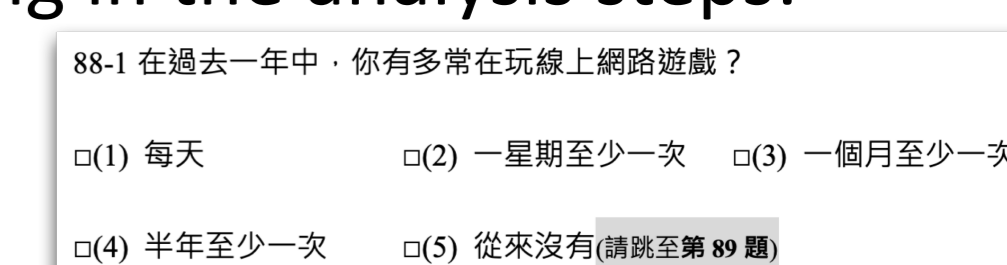
2018 National Survey of Substance Use (NSSU)

NSSU is a national survey conducted each four years. Participants used an anonymous, computer-assisted self-interview (CASI) system on a tablet computer to finish the questionnaire. There are two versions for adults and adolescents, respectively, with some different questions.

Question about internet gaming frequency in 2018 NSSU

The frequency of internet gaming regroup as the following in the analysis steps:

- Never (level (5) in the questionnaire)
- Low frequency (level (2), (3), (4) in the questionnaire)
- High frequency (level (1) in the questionnaire)



Participants

- Age: 12-64
- Area: all counties in Taiwan except Jinmen and Lienchiang
- Sample size: 18,626, with 64.6% response rate

Sampling design

- Stratified, multi-staged, probability proportional to size sampling

Sociodemographic characteristics

- Adult: gender, age, marital status, occupation, education, income
- Adolescent: gender, age, single-parent family, truancy, part-time job, monthly allowance

Measurements of negative outcomes

- Depressive symptoms
 - Center of Epidemiological Study—Depressive scale (CES-D)
 - Range from 0 to 60. The higher the score is, the more depressive the participant is.
- Past-year substance use
 - Substance including cigarette, e-cigarette, alcohol, betel nut, and illicit drug

Statistical Analyses

- Using PROC SURVEY in SAS to estimate weighted prevalence in complex sampling design.
- For continuous variables, conduct multinomial logistic regression.
- For discrete variables, calculate mean and variance, and conduct Kruskal Wallis test and DSCF test.

Result

Sociodemographic characteristics

Table 1. Multivariable multinomial logistic regression of past-year internet gaming frequencies across difference sociodemographic characteristics of adults(18-64 years old) in 2018 National Survey of Substance Use

Variable	N	Never		Low frequency		High frequency	
		n (%)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	
Total	15027	9157 (60.26)	3240 (21.77)	ref.	2630 (17.97)	ref.	
Gender							
Female	7547	5233 (68.62)	1383 (18.75)	ref.	931 (12.63)	ref.	
Male	7480	3924 (51.87)	1857 (24.80)	1.92 (1.70 - 2.16)*	1699 (23.33)	2.57 (2.26 - 2.94)*	
Age							
18-34	4901	1600 (32.86)	1822 (37.01)	ref.	1479 (30.13)	ref.	
35-64	10126	7557 (73.94)	1418 (14.16)	0.27 (0.24 - 0.32)*	1151 (11.90)	0.27 (0.23 - 0.31)*	
Marital status							
Married	8478	6216 (72.74)	1282 (15.42)	ref.	980 (11.85)	ref.	
Divorced or widowed	1216	912 (73.48)	156 (12.63)	1.03 (0.81 - 1.30)	148 (13.89)	1.35 (1.05 - 1.74)*	
Single	5333	2029 (38.13)	1802 (33.54)	1.71 (1.48 - 1.99)*	1502 (28.33)	1.98 (1.70 - 2.32)*	
Occupation							
Unemployed	4467	2829 (62.21)	891 (20.85)	ref.	747 (16.94)	ref.	
Service industry	2841	1705 (59.23)	640 (21.82)	1.09 (0.89 - 1.33)	496 (18.95)	1.07 (0.86 - 1.33)	
Labor intensive industry	1397	850 (60.37)	261 (18.04)	1.08 (0.84 - 1.38)	286 (21.59)	1.20 (0.93 - 1.53)	
Others	6322	3773 (59.40)	1448 (23.20)	1.15 (0.96 - 1.37)	1101 (17.41)	0.94 (0.77 - 1.14)	
Education							
≥College	7026	3683 (52.58)	1967 (27.72)	ref.	1376 (19.70)	ref.	
Senior high	5048	3058 (60.00)	1017 (20.27)	0.86 (0.75 - 0.98)*	973 (19.74)	1.16 (1.00 - 1.33)*	
≤Junior high	2953	2416 (81.08)	256 (8.80)	0.38 (0.31 - 0.47)*	281 (10.15)	0.62 (0.51 - 0.77)*	
Income							
No income	2647	1750 (64.50)	478 (19.78)	ref.	419 (15.72)	ref.	
<20,000	3552	2208 (61.70)	738 (21.37)	0.99 (0.81 - 1.20)	606 (16.93)	1.00 (0.81 - 1.23)	
<40,000	5418	3077 (56.36)	1290 (23.33)	0.90 (0.72 - 1.12)	1051 (20.31)	1.11 (0.88 - 1.39)	
<60,000	2257	1347 (58.96)	506 (22.03)	0.80 (0.62 - 1.03)	404 (19.01)	1.07 (0.82 - 1.40)	
≥60,000	1153	675 (67.77)	228 (19.39)	0.75 (0.66 - 1.00)	150 (12.85)	0.81 (0.58 - 1.13)	

Table 2. Multivariable multinomial logistic regression of past-year internet gaming frequencies across difference sociodemographic characteristics of adolescents(12-17 years old) in 2018 National Survey of Substance Use

Variable	N	Never		Low frequency		High frequency	
		n (%)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	
Total	3599	494 (13.58)	1558 (43.59)	ref.	1547 (42.82)	ref.	
Gender							
Female	1699	358 (20.49)	779 (46.61)	ref.	562 (32.89)	ref.	
Male	1900	136 (7.27)	779 (40.83)	2.47 (1.87 - 3.27)*	985 (51.90)	4.36 (3.28 - 5.79)*	
Age							
12-14	1555	179 (11.31)	691 (43.79)	ref.	685 (44.91)	ref.	
15-17	2043	315 (15.33)	867 (43.49)	0.76 (0.57 - 1.00)	861 (41.18)	0.68 (0.50 - 0.89)*	
One-parent family							
No	2874	411 (14.05)	1302 (45.99)	ref.	1161 (39.96)	ref.	
Yes	725	83 (11.78)	256 (34.25)	0.88 (0.63 - 1.24)	386 (53.97)	1.53 (1.09 - 2.15)*	
Truancy							
No	3374	475 (13.96)	1484 (44.27)	ref.	1415 (41.77)	ref.	
Yes	225	19 (7.86)	74 (33.28)	1.35 (0.72 - 2.52)	132 (58.86)	2.22 (1.20 - 4.09)*	
Part-time job							
No	3296	445 (13.49)	1441 (44.31)	ref.	1383 (42.20)	ref.	
Yes	330	49 (14.44)	117 (36.88)	0.84 (0.53 - 1.31)	164 (48.68)	1.01 (0.65 - 1.56)	
Monthly allowance							
0	889	158 (17.36)	395 (42.66)	ref.	336 (39.97)	ref.	
<200	545	58 (10.90)	236 (45.90)	1.64 (1.06 - 2.53)*	251 (44.10)	1.68 (1.08 - 2.63)*	
<500	715	89 (11.57)	326 (45.78)	1.67 (1.14 - 2.45)*	300 (42.66)	1.73 (1.16 - 2.58)*	
<1000	511	57 (11.95)	220 (42.89)	1.51 (0.98 - 2.33)*	234 (45.16)	1.73 (1.11 - 2.70)*	
≥1000	939	132 (14.16)	381 (42.33)	1.27 (0.89 - 1.82)	426 (43.51)	1.33 (0.92 - 1.92)	

Depressive symptoms

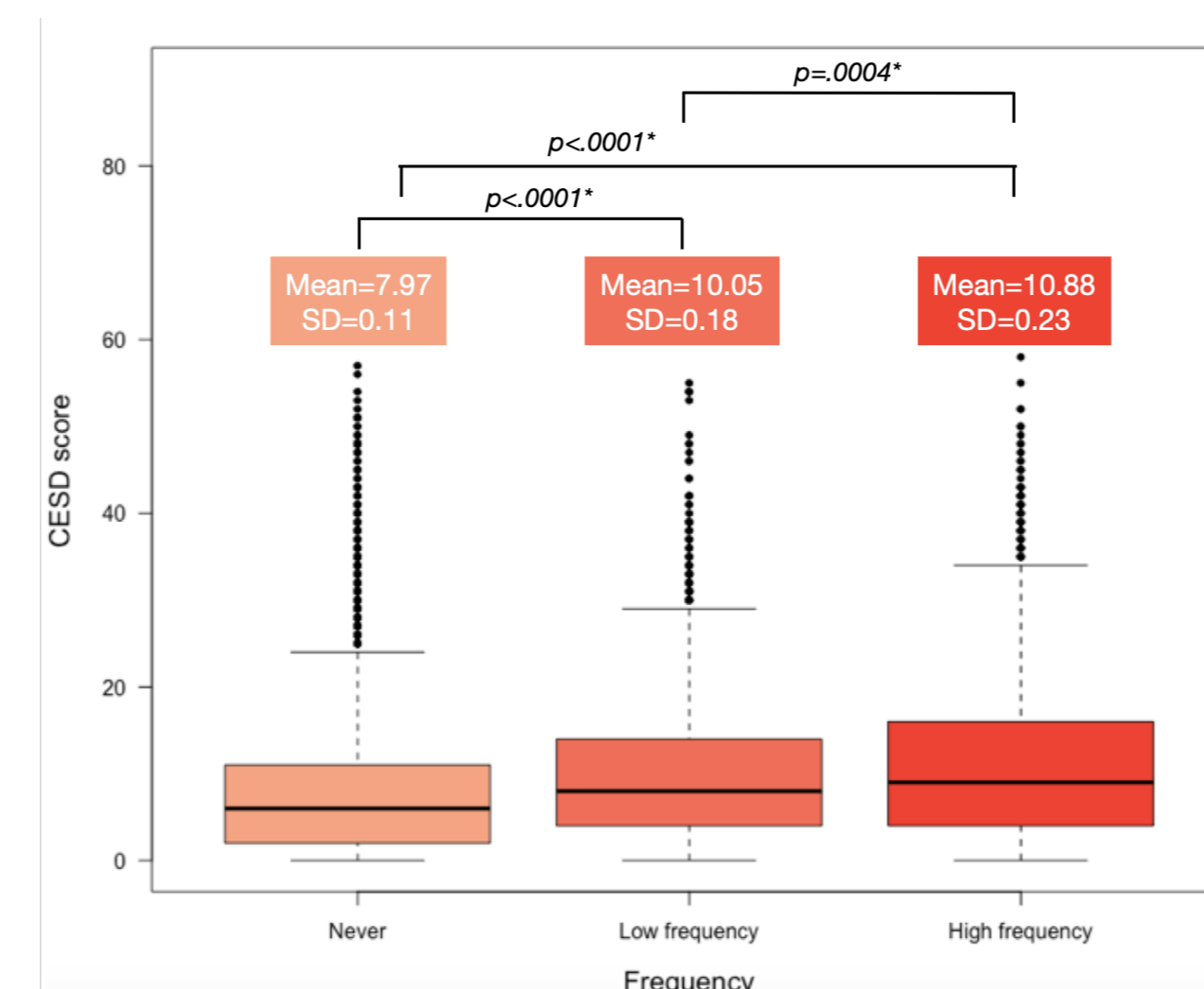


Figure 1. Comparing the distribution of the CES-D score between different internet gaming frequency groups among adults

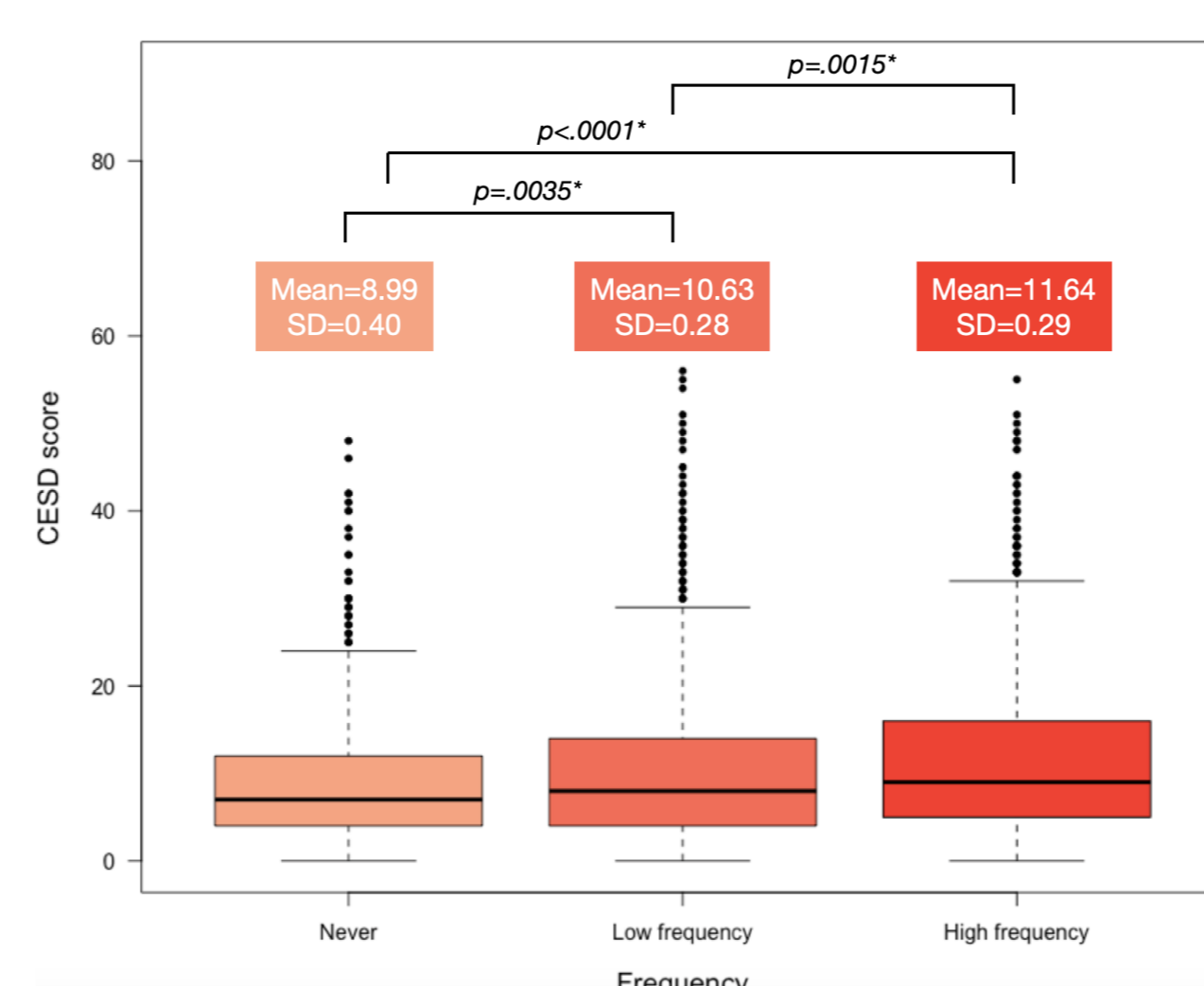


Figure 2. Comparing the distribution of the CES-D score between different internet gaming frequency groups among adolescents

Substance use

Table 3. Multinomial logistic regression of past-year internet gaming frequencies across past-year substance use of adults(18-64 years old) in 2018 National Survey of Substance Use

Variable	N	Never		Low frequency		High frequency	
		n (%)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	
Total	15027	9157 (60.26)	3240 (21.77)	ref.	2630 (17.97)	ref.	
Cigarette							
No	12158	7615 (62.21)	2582 (21.49)	ref.	1961 (16.30)	ref.	
Yes	2869	1542 (51.97)	658 (22.94)	1.18 (1.01 - 1.37)*	669 (25.10)	1.55 (1.33 - 1.81)*	
E-cigarette							
No	14770	9085 (60.78)	3156 (21.59)	ref.	2529 (17.63)	ref.	
Yes	257	72 (28.74)	84 (32.67)	1.47 (0.93 - 2.32)	101 (38.59)	1.97 (1.27 - 3.07)*	
Alcohol							
No	8321	5679 (67.62)	1480 (18.14)	ref.	1162 (14.24)	ref.	
Yes	6706	3478 (51.56)	1760 (26.05)	1.46 (1.30 - 1.64)*	1468 (22.38)	1.54 (1.36 - 1.74)*	
Betel nut							
No	13820	8493 (60.72)	2981 (21.81)	ref.	2346 (17.47)	ref.	
Yes	1207	664 (55.05)	259 (21.26)	0.94 (0.76 - 1.16)	284 (23.70)	1.17 (0.96 - 1.43)	
Illicit drug							
No	14988	9146 (60.31)	3226 (21.76)	ref.	2616 (17.93)	ref.	
Yes	39	11 (44.59)	14 (23.13)	0.85 (0.32 - 2.30)	14 (32.39)	1.40 (0.55 - 3.57)	

Low frequency: at least 1 time/year; High frequency: everyday
Controlled for age and gender.

Table 4. Multinomial logistic regression of past-year internet gaming frequencies across past-year substance use of adolescents(12-18 years old) in 2018 National Survey of Substance Use

Variable	N	Never		Low frequency		High frequency	
		n (%)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	
Total	3599	494 (13.58)	1558 (43.59)	ref.	1547 (42.82)	ref.	
Cigarette							
No	3513	486 (13.74)	1532 (43.90)	ref.	1459 (42.37)	ref.	
Yes	86	8 (7.62)	26 (31.91)	1.31 (0.53 - 3.27)	52 (60.47)	1.83 (0.65 - 5.18)	
E-cigarette							
No	3571	494 (13.68)	1549 (43.65)	ref.	1528 (42.67)	ref.	
Yes	28	0 (0.00)	9 (35.14)	ref.	19 (64.86)	ref.	
Alcohol							
No	2978	439 (14.72)	1316 (44.31)	ref.	1223 (40.96)	ref.	
Yes	621	55 (7.94)	242 (40.04)	1.83 (1.22 - 2.77)*	324 (52.02)	2.64 (1.76 - 3.98)*	
Betel nut							
No	3559	493 (13.72)	1544 (43.70)	ref.	1522 (42.59)	ref.	
Yes	40	1 (2.01)	14 (34.37)	4.59 (0.59 - 35.50)	25 (63.63)	7.95 (1.03 - 61.72)*	
Illicit drug							
No	3597	494 (13.59)	1556 (43.58)	ref.	1547 (42.83)	ref.	
Yes	2	0 (0.00)	2 (100.00)	ref.	0 (0.00)	ref.	

Low frequency: at least 1 time/year; High frequency: everyday
Controlled for age and gender.

Summary

- Correlates of adult high-frequency internet gamers include male gender, young age, being not married, and having middle-to-high educational level.
- Correlates of adolescent high-frequency internet gamers include male gender, young age, from single-parent family, having truancy experience, and having monthly allowance.
- High frequency players show more depressive symptoms than people never playing internet games or playing in low frequency.
- High frequency players are more likely to use cigarette, e-cigarette, or alcohol among adults, and are more likely to use e-cigarette, alcohol, or betel nuts among adolescents.