

**Supplementary Table 1-1.** Association between smartphone use duration and main purpose, unhealthy behaviors, and mental health status among boys

Variables	Smoking		Drinking		Physical inactivity $\geq 3$ days/week		Skipping breakfast $\geq 5$ times/week		Eating fast food $\geq 3$ times/week	
Total, N (%)	2,428 (9.4)	OR (95% CI)*	4,835 (18.6)	OR (95% CI)*	21,348 (80.1)	OR (95% CI)*	6,129 (22.7)	OR (95% CI)*	5,652 (21.5)	OR (95% CI)*
Number of hours spent using a smartphone on weekdays										
<2	424 (5.3)	1.00	1,077 (12.9)	1.00	6,844 (80.2)	1.00	1,596 (18.4)	1.00	1,403 (16.4)	1.00
>2, <4	835 (7.9)	1.38 (1.21–1.58)	1,887 (17.5)	1.36 (1.24–1.50)	8,865 (80.2)	0.99 (0.92–1.08)	2,538 (22.7)	1.21 (1.11–1.31)	2,286 (21.2)	1.37 (1.27–1.48)
$\geq 4$	1,169 (16.8)	2.82 (2.45–3.23)	1,871 (27.1)	2.25 (2.02–2.50)	5,639 (80.0)	0.98 (0.89–1.07)	1,995 (28.0)	1.46 (1.33–1.60)	1,963 (28.2)	1.97 (1.80–2.15)
Number of hours spent using a smartphone on weekends										
<4	726 (6.3)	1.00	1,681 (14.1)	1.00	9,879 (80.4)	1.00	2,475 (19.9)	1.00	2,218 (18.4)	1.00
>4, <8	876 (9.4)	1.38 (1.24–1.53)	1,887 (19.7)	1.42 (1.31–1.53)	7,841 (80.0)	0.96 (0.90–1.04)	2,353 (23.7)	1.16 (1.08–1.25)	2,177 (22.6)	1.28 (1.19–1.38)
$\geq 8$	826 (18.6)	2.76 (2.46–3.09)	1,267 (28.8)	2.27 (2.05–2.52)	3,628 (79.8)	0.96 (0.87–1.06)	1,301 (28.7)	1.38 (1.26–1.51)	1,257 (28.2)	1.71 (1.55–1.88)
Main purpose for using a smartphone										
Education	161 (6.5)	1.00	396 (15.6)	1.00	2,175 (82.6)	1.00	518 (19.6)	1.00	483 (19.4)	1.00
Communication	1,357 (15.7)	2.76 (2.29–3.33)	2,319 (26.7)	2.21 (1.94–2.51)	6,794 (77.2)	0.76 (0.67–0.86)	2,091 (23.4)	1.15 (1.02–1.29)	2,176 (25.1)	1.37 (1.21–1.55)
Enjoyment	910 (6.2)	1.09 (0.91–1.32)	2,120 (14.2)	1.13 (0.99–1.29)	12,379 (81.4)	1.04 (0.92–1.18)	3,520 (22.9)	1.09 (0.97–1.22)	2,993 (19.8)	1.05 (0.93–1.19)
Variables	Sleep disturbances		Stress		Depressive symptoms		Suicidal ideation		Suicide attempt	
Total, N (%)	18,549 (70.1)	OR (95% CI)*	8,146 (30.5)	OR (95% CI)*	5,426 (20.4)	OR (95% CI) <sup>†</sup>	2,500 (9.3)	OR (95% CI) <sup>‡</sup>	499 (1.8)	OR (95% CI) <sup>‡</sup>
Number of hours spent using a smartphone on weekdays										
<2	5,761 (68.1)	1.00	2,456 (28.8)	1.00	1,566 (18.3)	1.00	718 (8.5)	1.00	145 (1.7)	1.00
>2, <4	7,732 (70.3)	1.06 (0.99–1.13)	3,267 (29.5)	1.00 (0.93–1.07)	2,152 (19.7)	1.06 (0.98–1.15)	994 (8.9)	1.00 (0.89–1.11)	175 (1.5)	0.86 (0.67–1.11)
$\geq 4$	5,056 (72.1)	1.11 (1.02–1.21)	2,423 (34.1)	1.16 (1.07–1.26)	1,708 (24.1)	1.25 (1.13–1.37)	788 (11.0)	1.10 (0.97–1.25)	179 (2.5)	1.26 (0.96–1.65)
Number of hours spent using a smartphone on weekends										
<4	8,164 (67.2)	1.00	3,420 (28.0)	1.00	2,265 (18.7)	1.00	1,029 (8.4)	1.00	219 (1.7)	1.00
>4, <8	7,065 (72.2)	1.20 (1.13–1.28)	3,023 (30.5)	1.08 (1.01–1.16)	2,003 (20.4)	1.03 (0.96–1.11)	916 (9.1)	0.98 (0.89–1.09)	153 (1.5)	0.82 (0.65–1.04)
$\geq 8$	3,320 (73.5)	1.27 (1.16–1.40)	1,703 (37.3)	1.42 (1.30–1.54)	1,158 (25.3)	1.21 (1.09–1.34)	555 (12.4)	1.20 (1.05–1.38)	127 (2.9)	1.30 (0.99–1.72)
Main purpose for using a smartphone										
Education	1,833 (70.8)	1.00	846 (32.1)	1.00	557 (20.8)	1.00	237 (8.8)	1.00	51 (1.9)	1.00
Communication	6,613 (74.9)	1.30 (1.17–1.44)	2,695 (30.4)	0.92 (0.84–1.01)	2,097 (23.8)	1.20 (1.06–1.35)	884 (10.0)	1.12 (0.94–1.33)	175 (2.0)	1.00 (0.70–1.42)
Enjoyment	10,103 (67.0)	0.99 (0.90–1.10)	4,605 (30.2)	0.93 (0.85–1.02)	2,772 (18.3)	0.87 (0.77–0.98)	1,379 (9.0)	1.02 (0.97–1.20)	273 (1.8)	0.87 (0.62–1.22)

\*adjusted for school year, perceived academic record, family structure, parental educational level, perceived economic status, and place of residence, <sup>†</sup>adjusted for school year, perceived school record, family structure, parental educational level, perceived economic status, place of residence, and stress, <sup>‡</sup>adjusted for school year, perceived academic record, family structure, parental educational level, perceived economic status, place of residence, stress, and depressive symptoms. OR: odds ratio; CI: confidence interval

**Supplementary Table 1-2.** Association between smartphone use duration and main purpose, unhealthy behaviors, and mental health status among girls

Variables	Smoking		Drinking		Physical inactivity ≥3 days/week		Skipping breakfast ≥5 times/week		Eating fast food ≥3 times/week	
Total, N (%)	811 (3.0)	OR (95% CI)*	3,709 (13.9)	OR (95% CI)*	25,467 (92.6)	OR (95% CI)*	6,652 (24.1)	OR (95% CI)*	5,248 (19.4)	OR (95% CI)*
Number of hours spent using a smartphone on weekdays										
<2	79 (1.4)	1.00	413 (7.3)	1.00	5,430 (93.1)	1.00	1,026 (17.4)	1.00	740 (12.8)	1.00
>2, <4	178 (1.6)	0.99 (0.73–1.34)	1,294 (11.5)	1.64 (1.44–1.87)	10,620 (92.6)	0.96 (0.84–1.09)	2,537 (22.1)	1.25 (1.14–1.38)	2,029 (18.2)	1.49 (1.35–1.65)
≥4	554 (5.6)	2.92 (2.19–3.91)	2,002 (20.6)	3.14 (2.74–3.61)	9,417 (92.3)	1.01 (0.87–1.16)	3,089 (30.3)	1.72 (1.55–1.90)	2,479 (24.7)	2.12 (1.90–2.36)
Number of hours spent using a smartphone on weekends										
<4	131 (1.6)	1.00	656 (8.4)	1.00	7,500 (92.6)	1.00	1,529 (18.6)	1.00	1,113 (13.9)	1.00
>4, <8	220 (2.0)	1.06 (0.82–1.36)	1,435 (13.0)	1.53 (1.37–1.70)	10,673 (93.0)	1.08 (0.95–1.22)	2,632 (23.0)	1.20 (1.11–1.30)	2,160 (19.2)	1.43 (1.31–1.56)
≥8	460 (6.0)	2.64 (2.06–3.38)	1,618 (21.6)	2.77 (2.45–3.13)	7,294 (92.0)	1.01 (0.87–1.16)	2,491 (31.8)	1.69 (1.55–1.84)	1,975 (25.6)	2.02 (1.84–2.21)
Main purpose for using a smartphone										
Education	32 (2.0)	1.00	139 (9.1)	1.00	1,456 (94.1)	1.00	309 (20.0)	1.00	232 (14.9)	1.00
Communication	642 (3.9)	1.91 (1.26–2.91)	2,699 (16.6)	2.43 (1.96–3.02)	15,448 (92.4)	0.89 (0.71–1.13)	4,237 (25.4)	1.22 (1.05–1.41)	3,369 (20.5)	1.44 (1.23–1.70)
Enjoyment	137 (1.5)	0.74 (0.48–1.16)	871 (10.0)	1.34 (1.07–1.67)	8,563 (92.7)	0.93 (0.73–1.19)	2,106 (22.5)	1.05 (0.90–1.22)	1,647 (18.3)	1.27 (1.07–1.51)
Variables	Sleep disturbances		Stress		Depressive symptoms		Suicidal ideation		Suicide attempt	
Total, N (%)	22,441 (81.8)	OR (95% CI)a	12,440 (44.8)	OR (95% CI)*	8,424 (30.5)	OR (95% CI)†	4,214 (15.2)	OR (95% CI)‡	888 (3.2)	OR (95% CI)‡
Number of hours spent using a smartphone on weekdays										
<2	4,618 (79.5)	1.00	2,454 (41.8)	1.00	1,491 (25.4)	1.00	759 (13.1)	1.00	149 (2.5)	1.00
>2, <4	9,277 (81.1)	1.08 (0.99–1.19)	4,946 (42.8)	1.02 (0.95–1.08)	3,232 (28.1)	1.11 (1.02–1.21)	1,548 (13.2)	0.93 (0.83–1.04)	287 (2.4)	0.86 (0.68–1.08)
≥4	8,546 (84.0)	1.32 (1.19–1.47)	5,040 (49.0)	1.23 (1.14–1.33)	3,701 (36.4)	1.42 (1.30–1.56)	1,907 (18.6)	1.08 (0.96–1.21)	452 (4.4)	1.13 (0.90–1.42)
Number of hours spent using a smartphone on weekends										
<4	6,308 (78.6)	1.00	3,316 (41.0)	1.00	2,086 (25.9)	1.00	998 (12.5)	1.00	197 (2.5)	1.00
>4, <8	9,427 (82.2)	1.18 (1.09–1.28)	5,073 (44.0)	1.08 (1.02–1.15)	3,431 (29.9)	1.13 (1.04–1.22)	1,632 (14.1)	1.03 (0.92–1.14)	298 (2.5)	0.87 (0.70–1.08)
≥8	6,706 (84.8)	1.46 (1.32–1.61)	4,051 (50.3)	1.34 (1.24–1.44)	2,907 (36.7)	1.35 (1.24–1.47)	1,584 (19.7)	1.25 (1.11–1.41)	393 (4.9)	1.29 (1.04–1.59)
Main purpose for using a smartphone										
Education	1,202 (78.3)	1.00	712 (46.3)	1.00	441 (28.8)	1.00	2,574 (15.3)	1.00	42 (2.8)	1.00
Communication	13,857 (83.1)	1.53 (1.32–1.78)	7,549 (44.7)	0.95 (0.86–1.06)	5,321 (31.7)	1.11 (0.97–1.28)	1,435 (15.3)	1.04 (0.87–1.24)	544 (3.2)	0.88 (0.63–1.23)
Enjoyment	7,382 (80.1)	1.27 (1.11–1.48)	4,179 (44.8)	0.96 (0.86–1.07)	2,662 (28.7)	0.96 (0.83–1.12)	205 (13.1)	1.14 (0.95–1.36)	302 (3.2)	0.96 (0.68–1.36)

\*adjusted for school year, perceived academic record, family structure, parental educational level, perceived economic status, and place of residence, †adjusted for school year, perceived school record, family structure, parental educational level, perceived economic status, place of residence, and stress, ‡adjusted for school year, perceived academic record, family structure, parental educational level, perceived economic status, place of residence, stress, and depressive symptoms. OR: odds ratio, CI: confidence interval