

# Adolescents online

## Supplementary materials

November 2021

## MEASURES

### Use of Social Networking Sites (SNS)

Measures of Social Networking Site use were developed for LSAC.

**At ages 12-13 (Wave 5; 2012), 14-15 (Wave 6; 2014) and 16-17 (Wave 7; 2016), the LSAC K cohort participants were asked:**

How often do you use a computer or computer-like device to spend time on social networking sites?

- Almost every day
- Once or twice a week
- A few times a month
- Once a month or less
- Never

**Respondents were classified into three groups according to their frequency of SNS use:**

- a. Almost every day
- b. Once or twice a week
- c. Less often/never

### Interaction with close friends

**At ages 14-15 (Wave 6; 2014) and 16-17 (Wave 7; 2016) LSAC K cohort participants were asked about spending time with friends face-to-face and via electronic devices:**

Thinking about your close friends, how much of the time do you interact with them face-to-face or via electronic devices?

- All or almost all face-to-face
- Mostly face-to-face
- About half and half
- Mostly via electronic devices
- All or almost all via electronic devices
- No close friends

### Respondents were classified into three groups

1. Mostly face-to-face
2. Both equally
3. Mostly via electronic devices

At age 14–15 and 16–17, 14 and 20 participants respectively reported having no close friends. These respondents were excluded from the analysis of this item.

## Online versus offline support

**At age 16–17 (Wave 7; 2016), K cohort participants were asked their level of agreement with the following statements related to interacting online<sup>1</sup>:**

- you find it easier to be yourself when online than when you are with people face-to-face?
- you talk about private things that you do not share with people face-to-face?
- when you are going through a difficult time, you go online less often?
- when you are going through a difficult time, going online makes you feel better?

**Responses were coded 1 ('strongly agree' or 'agree'), 2 ('neither agree' nor 'disagree') or 3 ('disagree' or 'strongly disagree').**

## Cyberbullying

A number of items in the LSAC questionnaire asked respondents about their experiences of bullying in the last 12 months. For each bullying behaviour experienced in the last 12 months, participants were asked 'How did this happen?'. Cyberbullying was defined as bullying behaviours experienced via video chat, private messaging, open forum or via other non-face-to-face means (excluding phone calls). Cyberbullying was assessed at age 14–15 (Wave 6; 2014) and age 16–17 (Wave 7; 2016).

**The bullying victimisation behaviours in the present analysis include situations where respondents reported that someone:**

- Threatened to take my things (age 14–15 only)
- Forced me to do something I didn't want to do (age 14–15 only)
- Threatened to hurt me (both ages)
- Said mean things to me or called me names (both ages)
- Tried to keep others from being my friend (both ages)
- Did not let me join in what they were doing (both ages)
- Spread rumours about me behind my back (age 16–17 only)
- Deliberately tried to hurt me by not talking to me (age 16–17 only)
- Deliberately excluded me from an activity, event or group (age 16–17 only)

## Autism and long-term health conditions

**A variable was derived to identify study children with certain ongoing or long-term health conditions. Two questions responded by the primary caregiver were used to generate this variable:**

1. Does study child have any of these ongoing conditions? 'Ongoing conditions' exist for some period of time (weeks, months or years) or re-occur regularly. They do not have to be diagnosed by a doctor – respondents were provided with a list of conditions.
2. Child has a condition which has lasted or is expected to last for at least 12 months which causes him/her to use medicine prescribed by a doctor, other than vitamins, or more medical care, mental health or educational services.

<sup>1</sup> Adapted from the Young and Well Cooperative Research Centre's Young and Well questionnaire.

Based on caregiver's responses to the questions above, study children were classified into three categories:

- Autism (3.5% of the sample at age 16-17)
- Other long-term health condition (19.6% of the sample at age 16-17; excludes autism)
- No long-term health condition (76.9% of the sample at age 16-17)

## Sexual attraction

At age 14-15 (Wave 6; 2014), LSAC K cohort adolescents were asked, 'Which of these statements best describes your sexual feelings at this time in your life?'

1. I'm attracted only to girls
2. I'm attracted only to boys
3. I'm attracted to girls and boys
4. I'm not sure who I am attracted to
5. I don't feel any attraction to others.

Males who responded (1) and females who responded (2) were coded as heterosexual (88.7%). Other responses were classified as same-sex attracted, unsure or not attracted to others (11.3%).

## MENTAL HEALTH MEASURES

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### Depressive symptoms

Depressive symptoms were measured in LSAC at ages 12-13, 14-15 and 16-17 using the 13-item Short Mood and Feelings Questionnaire.<sup>2</sup> Sum scores ranged from 0-26 with higher scores reflecting a greater level of depression. Consistent with previous analyses of LSAC, depressive symptoms at each age were coded 0 (no significant depressive symptoms; sum score less than 8) or 1 (elevated depressive symptoms; sum score 8 or higher).

### Anxiety symptoms

Anxiety was measured at ages 12-13, 14-15 and 16-17 using the 8-item Spence Anxiety Scale, short form.<sup>3</sup> Sum scores ranged from 0-24, with higher scores reflecting higher levels of anxiety symptoms. At each age, anxiety scores one standard deviation above the mean were indicative of elevated anxiety symptoms and were coded 1. Lower scores in the anxiety scale were coded 0.

## PARENT AND PEER RELATIONSHIP MEASURES

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### Primary caregiver psychological distress

Primary caregiver's mental health was assessed using the Kessler-6 scale of psychological distress.<sup>4</sup> This scale contains six items about feelings and emotions in the past four weeks, including how often respondents felt nervous, hopeless, and restless or fidgety. Response options ranged from 0 'none of the time' to 4 'all of the time'. Total scores ranged from 0-24, with higher scores indicating higher levels of distress.

2 Angold, A., Costello, E. J., Messer, S. C., Pickles, A., Winder, F., & Silver, D. (1995). Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. *International Journal of Methods in Psychiatric Research*, 5, 237-249.

3 Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy*, 36(5), 545-566; Spence, S. H., Barrett, P. M., & Turner, C. M. (2003). Psychometric properties of the Spence Children's Anxiety Scale with young adolescents. *Journal of Anxiety Disorders*, 17(6), 605-625.

4 Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S.-L. et al. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(6), 959-976.

## Communication with peers

The quality of peer communication was measured with four items adapted from the Inventory of Peer and Parental Attachment<sup>5</sup> at ages 12–13, 14–15 and 16–17. This scale reflects the extent and quality of communication in peer relationships. Adolescents rated statements such as ‘My friends sense when I’m upset about something’ and ‘My friends encourage me to talk about my difficulties’. Statements were rated on a five-point scale from ‘1 = Almost always true’ to ‘5 = Almost never true’ and a sum score was generated (higher scores = poorer communication). In line with previous research on peer communication,<sup>6</sup> the sample was classified into two groups:

Low communication: scores one standard deviation above the mean (15% of adolescents at age 16–17)

Good communication: scores within one standard deviation above the mean, or lower (85% of adolescents at age 16–17).

## Trust and communication with parents

At ages 12–13, 14–15 and 16–17, adolescents rated eight statements related to trust and communication with their parents, also adapted from the Inventory of Peer and Parental Attachment.<sup>7</sup> Statements included ‘My parents accept me as I am’, ‘I trust my parents’ and ‘I share my thoughts and feelings with my parents’. Items were rated on a four-point scale from ‘1 = Almost never true’ to ‘4 = Almost always or always true’. Based on the sum score of the eight items, respondents were classified into three groups:

Very high trust/communication (scores 30–32): respondents who rated most items as ‘almost always or always true’ (43% of adolescents at age 16–17)

High/moderate trust/communication (scores 24–29): respondents who rated most items as ‘often true’ (27% of adolescents at age 16–17)

Lower trust/communication (scores below 24): respondents who provided lower ratings (29% of adolescents at age 16–17).

## CHILDHOOD MEASURES

### Bullying victimisation across childhood

Experiences of bullying in late childhood and adolescence were captured with one item taken from the Strengths and Difficulties Questionnaire, peer problems scale. Between ages 10–11 and 16–17, respondents rated the item ‘Other children or young people pick on me or bully me’ (based on the last six months). Responses were 1 ‘not true’, 2 ‘somewhat true’, 3 ‘certainly true’. Codes 2 and 3 were classified as having experienced bullying between ages 10–11 and 16–17, which included 35% of respondents.<sup>8</sup>

### Temperament in early adolescence

Adolescents’ temperament at the start of this study’s observation period (age 12–13) was assessed with the School-Age Temperament Inventory [SATI],<sup>9</sup> adapted by the Australian Temperament Project. The inventory contains three scales – introversion, persistence and reactivity – and each scale has four items rated from ‘1 = Never’ to ‘5 = Always’. The mean score for each scale was used in the analysis, with some items reverse-coded.<sup>10</sup>

5 Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, 16(5), 427–454.

6 Gray, S., Romaniuk, H., & Daraganova, G. (2018). Adolescents’ relationships with their peers. In D. Warren and G. Daraganova (Eds.), *Growing Up in Australia: The Longitudinal Study of Australian Children. Annual Statistical Report 2017*. Melbourne: Australian Institute of Family Studies.

7 See footnote 5.

8 Unweighted.

9 McClowry, S. G. (1995). The development of the School-Age Temperament Inventory. *Merrill-Palmer Quarterly*, 41, 271–285.

10 For more details, see [Release 8 Rationale document](#).

## SOCIO-ECONOMIC CONTROL MEASURE

### Socio-economic position (SEP)

This score ranked each family in terms of their socio-economic position relative to all other families in the sample.<sup>11</sup> The score was derived by combining variables that measured the education level (school and post-school qualifications), income and occupational status (according to ANZCO codes) of the parents in each family (Parent 1 and, where appropriate, Parent 2). To capture exposure to low socio-economic status during the high school years, adolescents were classified into three categories according to the lowest SEP experienced between age 12-13 and 16-17:

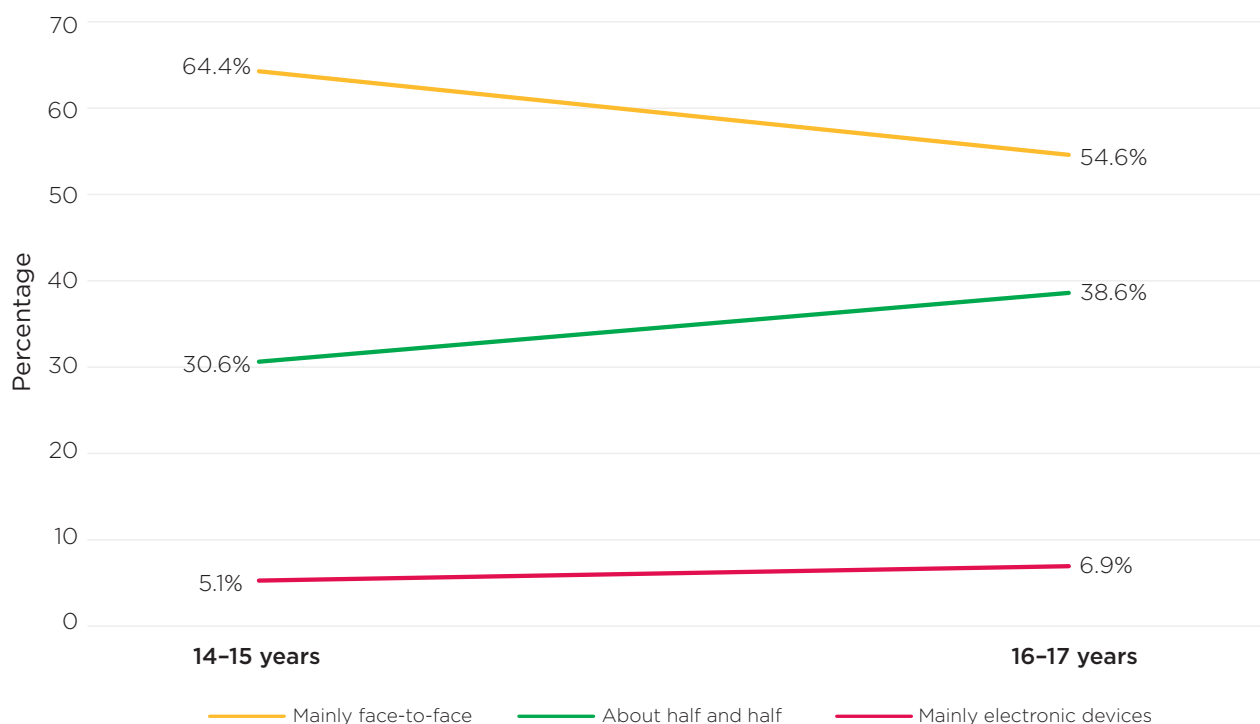
Bottom 25% (34% of adolescents between age 12-13 and 16-17)

Middle 50% (47% of adolescents between age 12-13 and 16-17)

Top 25% (19% of adolescents between age 12-13 and 16-17).

## FULL RESULTS

**Figure S1:** Interactions with close friends at age 14-15 and 16-17



**Notes:** Statistically significant difference between 14-15 and 16-17 for 'mainly face-to-face' (yellow line) and 'about half and half' (green line). Difference was marginally significant for 'mainly electronic devices' (red line). Percentages for each age do not add up to 100% due to rounding.

**Source:** LSAC K cohort, Waves 6 and 7, weighted.  $n = 3,303$  at Wave 6 (14-15).  $n = 2,927$  at Wave 7 (16-17). Excludes respondents who reported 'no friends' at 14-15 ( $n = 14$ ) or 16-17 ( $n = 20$ ).

<sup>11</sup> For more details, see LSAC Technical Paper No. 18 (Baker, Siphthorp & Edwards, 2017): [growingupinaustralia.gov.au/sites/default/files/tp18.pdf](http://growingupinaustralia.gov.au/sites/default/files/tp18.pdf)

**Table S1:** Attitudes towards online interaction at age 16-17 by sex

	Sex					
	Male		Female		Total	
	%	95% CI	%	95% CI	%	95% CI
<b>Easier to be self when online</b>						
Agree	15.2	[13.4, 17.3]	13.8	[11.7, 16.1]	14.5	[13.0, 16.1]
Neutral	33.5	[30.9, 36.2]	33.5	[30.6, 36.5]	33.5	[31.6, 35.5]
Disagree	51.3	[48.5, 54.0]	52.7	[49.6, 55.9]	52.0	[49.8, 54.1]
Total	100.0		100.0		100.0	
<b>Talk about private things when online</b>						
Agree	10.6	[8.8, 12.7]	10.8	[9.2, 12.6]	10.7	[9.4, 12.1]
Neutral	22.7	[20.2, 25.3]	18.2	[15.7, 21.1]	20.5	[18.7, 22.4]
Disagree	66.8	[63.8, 69.6]	71.0	[67.9, 73.9]	68.8	[66.6, 71.0]
Total	100.0		100.0		100.0	
<b>During difficult time, go online less often</b>						
Agree	26.2	[23.7, 28.9]	35.7	[32.9, 38.5]	30.9	[28.8, 33.0]
Neutral	37.9	[35.1, 40.7]	38.1	[35.1, 41.2]	38.0	[35.9, 40.2]
Disagree	35.9	[33.2, 38.7]	26.2	[23.6, 29.0]	31.2	[29.2, 33.2]
Total	100.0		100.0		100.0	
<b>During difficult time, going online makes me feel better</b>						
Agree	25.7	[23.1, 28.5]	20.2	[17.9, 22.7]	23.0	[21.2, 24.9]
Neutral	41.5	[38.6, 44.5]	37.9	[35.1, 40.7]	39.7	[37.7, 41.7]
Disagree	32.8	[30.2, 35.5]	41.9	[39.2, 44.7]	37.3	[35.3, 39.3]
Total	100.0		100.0		100.0	
<b>N</b>	1,496		1,450		2,946	

**Note:** CI = confidence interval.

**Source:** LSAC K cohort, Wave 7, weighted

**Table S2:** Attitudes towards online interaction at age 16-17 by mental health difficulties

	Anxiety				Depression				Total	
	No elevated symptoms		Elevated symptoms		No elevated symptoms		Elevated symptoms			
	%	95% CI	%	95% CI	%	95% CI	%	95% CI		
<b>Easier to be self when online</b>										
Agree	12.3	[10.8, 14.0]	24.3	[20.4, 28.6]	10.3	[8.8, 12.2]	20.3	[17.7, 23.3]	14.5	[13.0, 16.1]
Neutral	32.5	[30.5, 34.7]	37.7	[33.0, 42.6]	31.8	[29.3, 34.5]	36.1	[33.1, 39.1]	33.5	[31.6, 35.5]
Disagree	55.1	[52.7, 57.5]	38.1	[33.5, 42.9]	57.9	[55.1, 60.5]	43.6	[40.4, 46.9]	52.0	[49.8, 54.1]
Total	100.0		100.0		100.0		100.0		100.0	
<b>Talk about private things when online</b>										
Agree	9.7	[8.3, 11.3]	15.0	[11.9, 18.7]	8.1	[6.8, 9.7]	14.2	[12.0, 16.7]	10.7	[9.4, 12.1]
Neutral	19.3	[17.6, 21.2]	25.6	[21.0, 30.7]	17.5	[15.6, 19.7]	23.9	[21.0, 27.0]	20.5	[18.7, 22.4]
Disagree	71.0	[68.8, 73.1]	59.4	[54.3, 64.4]	74.3	[71.9, 76.6]	61.9	[58.4, 65.3]	68.8	[66.6, 71.0]
Total	100.0		100.0		100.0		100.0		100.0	
<b>During difficult time, go online less often</b>										
Agree	29.0	[26.9, 31.2]	39.1	[34.7, 43.8]	28.7	[26.2, 31.2]	34.4	[31.2, 37.7]	30.9	[28.8, 33.0]
Neutral	39.7	[37.4, 42.1]	30.3	[26.1, 34.9]	41.9	[39.2, 44.6]	32.4	[29.3, 35.6]	38.0	[35.9, 40.2]
Disagree	31.3	[29.0, 33.6]	30.6	[26.8, 34.7]	29.4	[27.1, 31.9]	33.2	[30.2, 36.3]	31.2	[29.2, 33.2]
Total	100.0		100.0		100.0		100.0		100.0	
<b>During difficult time, going online makes me feel better</b>										
Agree	21.8	[19.9, 23.9]	28.0	[24.1, 32.3]	19.6	[17.4, 21.9]	27.4	[24.6, 30.4]	23.0	[21.2, 24.9]
Neutral	41.1	[38.9, 43.4]	33.7	[29.2, 38.5]	42.4	[39.8, 45.0]	35.9	[32.8, 39.0]	39.7	[37.7, 41.7]
Disagree	37.1	[34.8, 39.3]	38.3	[33.9, 42.9]	38.0	[35.6, 40.6]	36.7	[33.7, 39.9]	37.3	[35.3, 39.3]
Total	100.0		100.0		100.0		100.0		100.0	
<b>N</b>	2,421		525		1,765		1,155		2,946	

Notes: CI = confidence interval.

Source: LSAC K cohort, Wave 7, weighted.

**Table S3:** Attitudes towards online interaction at age 16-17 by health conditions

	Health conditions							
	No long-term health condition		Autism		Other long-term health condition		Total	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
<b>Easier to be self when online</b>								
Agree	14.0	[12.3, 15.8]	26.3	[17.4, 37.7]	14.8	[11.8, 18.3]	14.5	[13.0, 16.1]
Neutral	32.7	[30.5, 34.9]	37.6	[26.1, 50.7]	36.1	[31.9, 40.6]	33.5	[31.6, 35.5]
Disagree	53.4	[51.0, 55.7]	36.1	[26.2, 47.3]	49.1	[44.5, 53.8]	52.0	[49.8, 54.1]
Total	100.0		100.0		100.0		100.0	
<b>Talk about private things when online</b>								
Agree	9.9	[8.5, 11.5]	16.3	[8.5, 29.1]	12.8	[9.9, 16.3]	10.7	[9.4, 12.1]
Neutral	19.8	[17.9, 21.7]	23.0	[14.2, 35.0]	22.9	[18.2, 28.2]	20.5	[18.7, 22.4]
Disagree	70.3	[68.0, 72.5]	60.7	[48.4, 71.7]	64.4	[59.0, 69.4]	68.8	[66.6, 71.0]
Total	100.0		100.0		100.0		100.0	
<b>During difficult time, go online less often</b>								
Agree	31.0	[28.8, 33.4]	26.3	[17.3, 38.0]	30.9	[26.7, 35.4]	30.9	[28.8, 33.0]
Neutral	38.7	[36.3, 41.1]	30.3	[21.0, 41.4]	36.5	[32.4, 40.9]	38.0	[35.9, 40.2]
Disagree	30.3	[28.2, 32.5]	43.4	[33.1, 54.2]	32.6	[28.1, 37.4]	31.2	[29.2, 33.2]
Total	100.0		100.0		100.0		100.0	
<b>During difficult time, going online make me feel better</b>								
Agree	21.3	[19.3, 23.3]	48.3	[37.8, 59.1]	25.5	[21.9, 29.6]	23.0	[21.2, 24.9]
Neutral	41.3	[39.1, 43.6]	23.0	[14.2, 35.0]	36.1	[32.0, 40.5]	39.7	[37.7, 41.7]
Disagree	37.4	[35.2, 39.7]	28.7	[18.9, 41.0]	38.3	[34.1, 42.7]	37.3	[35.3, 39.3]
Total	100.0		100.0		100.0		100.0	
<b>N</b>	2,262		87		597		2,946	

**Notes:** Autism includes autism, Asperger's syndrome and other autism spectrum. Long-term health condition includes a condition that has lasted or is expected to last for at least 12 months which causes the adolescent to use medicine prescribed by a doctor, other than vitamins, or more medical care, mental health or educational services. CI = confidence interval.

**Source:** LSAC K cohort, Wave 7, weighted

Over time, adolescents were more likely to show elevated depressive symptoms when they had lower levels of communication with peers and lower levels of trust and communication with parents as well as higher parental psychological distress (Table S4). Females, youth who are same-sex attracted, unsure or not attracted to others and those who were victims of cyberbullying in adolescence or victims of bullying across childhood were more likely to have elevated depressive symptoms compared with males, heterosexual youth, and non-victims of cyberbullying/bullying, respectively. Socio-economic position and personality were also significantly associated with elevated depressive symptoms.

Like the results for depressive symptoms, significant factors associated with elevated anxiety symptoms included (Table S5): communication with peers, trust and communication with parents, sex, sexual attraction, cyberbullying victimisation in adolescence, bullying victimisation across childhood, and personality. In addition, adolescents with a long-term health condition were more likely to show elevated anxiety symptoms.



**Table S4:** Multi-level mixed-effects logistic regression model for elevated depressive symptoms with time-variant and time-invariant covariates, age 12-13 to 16-17

	SNS	Demographics	Parents-peers <sup>a</sup>	Full model <sup>b</sup>	Time interaction
Age 14-15	1.86*** [1.49, 2.33]	2.11*** [1.68, 2.65]	1.56*** [1.26, 1.94]	1.52*** [1.24, 1.87]	2.05*** [1.56, 2.68]
Age 16-17	4.11*** [3.15, 5.37]	4.95*** [3.75, 6.51]	3.57*** [2.80, 4.56]	3.44*** [2.72, 4.35]	4.37*** [3.30, 5.81]
<b>Time variant</b>					
SNS use (ref. almost daily)					
Once/twice a week	0.60*** [0.50, 0.74]	0.64*** [0.52, 0.78]	0.71** [0.57, 0.87]	0.71** [0.57, 0.87]	0.99 [0.69, 1.41]
Less often/never	0.50*** [0.42, 0.61]	0.52*** [0.42, 0.63]	0.61*** [0.50, 0.75]	0.60*** [0.49, 0.73]	0.91 [0.69, 1.21]
Health condition (ref. no long-term health condition)					
Autism		3.28*** [1.99, 5.39]	2.41*** [1.51, 3.86]	1.53 [0.95, 2.44]	1.56 [0.98, 2.49]
Other long-term health condition		1.50*** [1.25, 1.79]	1.30** [1.09, 1.56]	1.17 [0.97, 1.40]	1.17 [0.97, 1.40]
Low communication with peers (ref. good communication)			2.72*** [2.26, 3.29]	2.47*** [2.04, 2.98]	2.46*** [2.04, 2.96]
Trust/communication with parents (ref. very high)					
High/moderate			1.90*** [1.60, 2.25]	1.88*** [1.59, 2.24]	1.88*** [1.58, 2.23]
Lower			5.86*** [4.79, 7.17]	5.38*** [4.40, 6.57]	5.40*** [4.42, 6.60]
Primary caregiver K6 score			1.04*** [1.02, 1.06]	1.03** [1.01, 1.05]	1.03** [1.01, 1.05]
<b>Time invariant (between person)</b>					
Female (ref. male)		2.06*** [1.74, 2.43]	1.55*** [1.32, 1.81]	1.94*** [1.64, 2.29]	1.93*** [1.63, 2.28]
Lowest socio-economic position age 12-17 (ref. lowest 25%)					
Middle 50%		0.62*** [0.52, 0.74]	0.77** [0.65, 0.91]	0.84 [0.71, 1.00]	0.84 [0.71, 1.00]
Top 25%		0.46*** [0.36, 0.58]	0.62*** [0.50, 0.78]	0.72** [0.57, 0.89]	0.72** [0.57, 0.89]
Same-sex attracted, unsure or not attracted to others age 14-15 (ref. heterosexual)		1.69*** [1.39, 2.06]	1.60*** [1.28, 2.00]	1.45*** [1.17, 1.80]	1.46*** [1.18, 1.81]
Cyberbullying victim age 14-17 (ref. not victim)			2.99*** [2.49, 3.59]	2.34*** [1.95, 2.80]	2.31*** [1.93, 2.76]

Table continued over page →

	SNS	Demographics	Parents-peers <sup>a</sup>	Full model <sup>b</sup>	Time interaction
Bullying victim self-report age 10-17				2.11*** [1.79, 2.49]	2.11*** [1.79, 2.49]
12/13 - SATI Reactivity score				1.17** [1.05, 1.30]	1.17** [1.05, 1.31]
12/13 - SATI Persistence score				0.75*** [0.68, 0.84]	0.75*** [0.67, 0.83]
12/13 - SATI Introversion score				0.93 [0.84, 1.03]	0.93 [0.84, 1.02]
<b>Time interaction</b>					
14-15 # Once/twice a week					0.60* [0.37, 0.97]
14-15 # Less often/never					0.46*** [0.30, 0.70]
16-17 # Once/twice a week					0.71 [0.41, 1.21]
16-17 # Less often/never					0.48** [0.28, 0.80]
<b>Random effects (variance components)</b>					
Variance time	0.66** [0.35, 1.24]	0.62** [0.32, 1.21]	0.31 [0.09, 1.02]	0.38 [0.14, 1.04]	0.33 [0.11, 1.02]
Variance intercept	3.34*** [2.36, 4.75]	3.31*** [2.34, 4.68]	1.47*** [0.83, 2.60]	0.99** [0.47, 2.07]	0.87* [0.39, 1.97]
Covariance (time, intercept)	-0.66* [-1.23, -0.10]	-0.83** [-1.40, -0.27]	-0.30 [-0.74, 0.15]	-0.19 [-0.60, 0.23]	-0.11 [-0.51, 0.30]
<b>N</b>	3,958	3,303	2,881	2,808	2,808

**Notes:** OR = odds ratio; SNS = social networking sites; SATI = school-age temperament inventory; K6 = Kessler-6 psychological distress scale; 95% CI = 95% confidence intervals in brackets. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . <sup>a</sup> Adds concurrent parent and peer relationship variables to demographic model. <sup>b</sup> Adds childhood temperament and bullying variables to parents-peers model. There was a statistically significant interaction effect between SNS use and sexual attraction, indicating a greater negative impact of daily SNS use on depressive symptoms among adolescents who are same-sex attracted, unsure or not attracted to others.

**Source:** LSAC K cohort, ages 10-11 to 16-17

**Table S5:** Multi-level mixed-effects logistic regression model for elevated anxiety symptoms with time-variant and time-invariant covariates, age 12-13 to 16-17

	SNS	Demographics	Parents-peers <sup>a</sup>	Full <sup>b</sup>
Age 14-15	1.04 [0.77, 1.41]	1.36* [1.01, 1.83]	1.23 [0.91, 1.66]	1.10 [0.82, 1.47]
Age 16-17	0.75 [0.47, 1.19]	1.22 [0.79, 1.90]	1.38 [0.92, 2.08]	1.16 [0.79, .70]
<b>Time variant</b>				
SNS use (ref. almost daily)				
Once/twice a week	0.54*** [0.41, 0.72]	0.61** [0.46, 0.82]	0.72* [0.53, 0.98]	0.68* [0.50, 0.93]
Less often/never	0.57*** [0.44, 0.74]	0.67** [0.51, 0.87]	0.74* [0.56, 1.00]	0.68* [0.51, 0.92]
Health condition (ref. no long-term health condition)				
Autism		2.92** [1.41, 6.05]	2.12* [1.02, 4.41]	1.20 [0.58, 2.49]
Other long-term health condition		1.88*** [1.45, 2.43]	1.60*** [1.23, 2.08]	1.45** [1.11, 1.89]
Low communication with peers (ref. good communication)			3.04*** [2.33, 3.96]	2.67*** [2.05, 3.48]
Trust/communication with parents (ref. very high)				
High/moderate			2.55*** [1.97, 3.30]	2.47*** [1.91, 3.20]
Lower			7.05*** [5.18, 9.58]	6.13*** [4.53, 8.29]
Primary caregiver K6 score			1.04* [1.01, 1.07]	1.02 [1.00, 1.05]
<b>Time invariant (between person)</b>				
Female (ref. male)		6.24*** [4.66, 8.35]	4.93*** [3.69, 6.59]	5.81*** [4.26, 7.91]
Lowest socio-economic position age 12-17 (ref. lowest 25%)				
Middle 50%		0.79 [0.60, 1.03]	0.97 [0.74, 1.29]	1.13 [0.85, 1.49]
Top 25%		0.55*** [0.38, 0.78]	0.71 [0.50, 1.02]	0.82 [0.58, 1.17]
Same-sex attracted, unsure or not attracted to others age 14-15 (ref. heterosexual)		1.60** [1.20, 2.13]	1.74** [1.24, 2.46]	1.41* [1.01, 1.98]
Cyberbullying victim age 14-17 (ref. not victim)			3.82*** [2.86, 5.10]	2.70*** [2.04, 3.58]

Table continued over page →

	SNS	Demographics	Parents-peers <sup>a</sup>	Full <sup>b</sup>
Bullying victim self-report age 10-17 (ref. not victim)				3.78*** [2.85, 5.01]
12/13 - SATI Reactivity score				1.12 [0.94, 1.33]
12/13 - SATI Persistence score				0.88 [0.74, 1.03]
12/13 - SATI Introversion score				1.37*** [1.17, 1.61]
<b>Random effects (variance components)</b>				
Variance time	1.87*** [1.21, 2.89]	1.76*** [1.10, 2.80]	1.45*** [0.85, 2.48]	1.44*** [0.84, 2.46]
Variance intercept	7.09*** [5.06, 9.93]	7.08*** [5.14, 9.75]	6.58*** [4.67, 9.26]	5.33*** [3.71, 7.67]
Covariance (time, intercept)	-1.07* [-1.95, -0.20]	-1.74*** [-2.72, -0.75]	-1.91*** [-2.93, -0.89]	-1.56*** [-2.47, -0.65]
<b>N</b>	3,976	3,306	2,882	2,808

**Notes:** OR = odds ratio; SNS = Social networking sites; SATI = school-age temperament inventory; K6 = Kessler-6 psychological distress scale; 95% CI = 95% confidence intervals in brackets. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . <sup>a</sup> Adds concurrent parent and peer relationship variables to demographic model. <sup>b</sup> Adds childhood temperament and bullying variables to parents-peers model. There was a statistically significant interaction effect between SNS use and sexual attraction, indicating a greater negative impact of daily SNS use on anxiety symptoms among adolescents who are same-sex attracted, unsure or not attracted to others. There was no significant SNS-time interaction in the anxiety model.

**Source:** LSAC K cohort, ages 10-11 to 16-17

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