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## Using the Internet to access health-related information: results from a nationally representative sample of New Zealand secondary school students

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## Using the internet to access health-related information: Results from a nationally representative sample of New Zealand secondary school students

### Abstract

**Objective:** To determine if secondary school students in New Zealand who report greater health concerns (e.g. significant depressive symptoms) are more likely to use the internet to access health-related information.

**Methods:** A nationally representative health and wellbeing survey was undertaken in 2012 (n=8,500). Multiple regression models were used to examine the associations between students' use of the internet to access health-related information and selected outcomes or indicators.

**Results:** Over 90% of students used the internet on a daily basis, with 15.4% of students reporting that they had used the internet to access health-related information. Students experiencing household poverty were more likely to report not using the internet daily (17.4% compared to 4.2%). Odds ratios for accessing the internet for this sort of information were highest for students who reported self-harm (OR 2.7, 95% CI 2.3-3.3), disordered eating (OR 2.7, 95% CI 2.4-3.2), or a suicide attempt (OR 2.5, 95% CI 1.9-3.3).

**Conclusion:** Our findings suggest that internet-based health interventions may be a viable way to reach young people with high health needs, but consideration needs to be given to those with limited internet access.

## Introduction

The contemporary world of adolescents in Western countries is rapidly changing alongside advancements in digital technologies. For instance, the combination of mobile phones and the internet has transformed the way in which young people access information, interact with their family and peers, and entertain themselves<sup>1</sup>. These developments have implications for the health and wellbeing of young people, as they have grown up 'native' to the digital world, and because they have never known other ways of being. In New Zealand, almost all young people have used the internet in the past year<sup>2</sup>, and, like adolescents in other high income countries, they report many hours of use per day, with some young people online almost constantly<sup>1</sup>.

Many aspects of the digital world are positive for youth, as this medium provides: new communication channels with peers and family members; greater accessibility to information; creative outlets or opportunities; and, ways to engage in collaborative educational activities<sup>3,4</sup>. The internet also offers unique avenues for accessing health-related information. In New Zealand, over half of all internet users have searched the internet for health-related information<sup>5</sup>. Not surprisingly, young people also obtain information about health-related issues from the internet, for instance about topics pertaining to sexual health, diet, fitness, and mental health<sup>6,7</sup>. This has opened up new areas of research to determine the effectiveness of health interventions delivered over the internet for young people<sup>8,9</sup>. Despite the growth and promise in these interventions, concerns about the reach and actual uptake of digital interventions remain, especially for under-served groups<sup>10</sup>. This is particularly important as significant social and economic disparities already exist in the health of young people across many nations<sup>11</sup>, including New Zealand<sup>12</sup>.

The current study provides an overview of the characteristics of secondary school students in New Zealand who use the internet to access health-related information, including information on sensitive health issues. Using nationally representative data, the current research describes the students who used the internet to access health-related information, and determines if students who experience greater health concerns are more likely to use the internet to obtain health-related

information. We hypothesise that those with greater health concerns are more likely to use the internet in this way, as the presence of symptoms, problem behaviours, and impairment in functioning is thought to be a powerful predictor of help-seeking behaviour in young people <sup>13</sup>.

## **Methods**

Data for the current study were collected as part of Youth'12, a nationally representative survey of the health and wellbeing of secondary school students in New Zealand. Full details of the methodology and design of the Youth'12 survey have been described previously <sup>14</sup>. In summary, the Youth'12 survey utilized a two-stage sampling design. First, of the 397 eligible schools, 125 were randomly selected to participate, with 91 agreeing to do so (73% of the selected schools). From the participating schools, 12,503 students were randomly selected to take part, and 8,500 students consented to do so (68% of the selected students). Reasons for non-participation were largely unknown or due to students being absent from school on the day of the survey <sup>14</sup>.

Consent for participation was obtained from school principals on behalf of their school's Board of Trustees. Students and parents were provided with information sheets about the survey. Parents were encouraged to discuss the survey with their child, and could withdraw their child from participation. Parents did not provide written consent. Students consented themselves to participate in the survey. The University of Auckland Human Participants Ethics Committee granted ethical approval for the study (ref 2011/206).

All data collection took place at the student's school during time-tabled classes. On the day of the survey, students were asked to come to a designated room. Upon arrival they were given an anonymous login code to access the survey. The survey included a 608 item multimedia questionnaire administered on an internet tablet. The questionnaire was branched so that students only answered questions that were relevant for them. Identification of the student's census meshblock number (based on their residential address) was used to determine the geographical location of the small unit area in which a student lived (approximately 90 households per meshblock).

## Measures

*Uses the internet to access health-related information* was assessed with a series of questions. First students were asked “How much time do you spend doing these activities each day [several activities listed]: Go on the internet?” Students who responded, “None” were defined as *No daily internet use*. Students who responded “less than one hour” or more were then asked “What do you do on the internet? (you may choose as many as you need): Chat or talk to others; School work; Find out about music, sport or hobbies or interests; Look at things to buy or sell; Play games by myself; Play games with others on the internet; Look at porn or sex sites; Gamble or bet money; Do my own website or blog; Look up health, dieting or physical fitness information; and, Look up about a health topic that’s hard to talk about like drug use, sexual health, or depression”. Students who responded that they used the internet for the last two options (i.e. looks up health-related information or looks up topic/s that are hard to talk about) were categorized as *Uses the internet to access health-related information*. The remaining students were classified as *Uses the internet for other reasons*.

### *Demographics variables:*

The demographic variables, *age* (13 to 17 years old), *sex* (male and female), and *ethnicity* (Asian, European, Māori, Pacific, or an Other ethnicity), were determined by self-report. Ethnicity was assessed using the standard measures developed for the New Zealand census<sup>15</sup> where participants can select all of the ethnic groups that they identify with. To facilitate statistical analyses, discrete ethnic populations were created using a prioritization method where students were assigned to one ethnic group in the following order: Māori (Indigenous people of New Zealand), Pacific (includes Samoa, Tonga, Cook Island, and other Pacific Islands), Asian, Other ethnicity, European.<sup>15</sup> *Household poverty* was assessed by the presence of any two of the following nine indicators: household food insecurity (often/all the time); moving homes frequently (2 or more times in past year); not having a working car at home; not having a telephone at home; not having a computer at home; overcrowding (more than 2 people per bedroom); both parents unemployed;

use of rooms other than bedrooms for sleeping (e.g. living room or garage); and, not going away on a family holiday during the past 12 months<sup>12</sup>. *Area deprivation* was determined by linking the small area meshblock of the student's residential address to the New Zealand Index of Deprivation to measure area-level deprivation<sup>16</sup>. *Area deprivation* was categorized into three groups: low deprivation (deciles 1-3); medium deprivation (deciles 4-7); and, high deprivation (deciles 8-10).

*Selected outcomes and indicators:*

Students who have *tried to lose weight* reported that they had attempted weight loss in the past 12 months. *Disordered eating* was assessed by responding positively to any one of the following strategies for weight loss: "I fasted or did not eat for more than a day", "I skipped one or more meals a day", "I smoked cigarettes", "I took diet pills or other pills" or "I made myself vomit".

*Current cigarette use* includes students who reported smoking cigarettes "occasionally" or more often. *Binge drinking* included students reporting that they had consumed five or more alcoholic drinks in one session, in the past 4 weeks. *Weekly marijuana use* includes students who reported marijuana use at least once a week, over the past four weeks.

*Risky motor vehicle use* was defined as reporting one or more risky behaviours related to motor vehicle use in the last month. These behaviours were assessed with six questions which asked about past month frequency of driving a car (and riding in a car) when the driver had: drunk more than two glasses of alcohol in the two hours before driving; had been using drugs; or, had been driving dangerously (e.g. speeding, chases, 'burnouts'). Involvement in *violent behaviours* was assessed with four questions assessing past year frequency of: getting into a serious fight; being hit or physically harmed someone on purpose; carrying a weapon (e.g. knife); thinking about harming someone; or, being attacked by someone using a weapon. Students who reported one or more of these behaviours were defined as engaging in *violent behaviours*.

*Ever had sex* was assessed with the question, "Have you ever had sex? (by this we mean sexual intercourse). Do not include sexual abuse." *Unsafe sex* was defined as inconsistent use of contraception and condoms among sexually active students. Such that students who had responded

that they had ever had sex were asked “How often do you use condoms as protection against sexually transmitted infections?” and “How often do you or your partner use contraception?” Students were defined as engaging in *Unsafe sex* if they reported inconsistent use (sometimes or never) of condoms or contraception.

*Self-harm* was assessed by students affirmative response (two times or more) to the item asking “During the last 12 months, have you deliberately hurt yourself or done anything you knew might have harmed you (but not kill you)”. *Suicide attempt* was assessed with one item asking if students had tried to kill themselves or attempt suicide in the previous 12 months. *Chronic health condition or disability* was assessed with an affirmative response to either of the following the two questions: “Do you have any long-term health problems or conditions (lasting 6 months or more) (e.g. asthma, diabetes, depression)?” and “Do you have any long-term disability (lasting 6 months or more) (e.g. sensory impaired hearing, visual impairment, in a wheelchair, learning difficulties)?” *Unable to access healthcare* was assessed with the question, “In the last 12 months, has there been any time when you wanted or needed to see a doctor or nurse (or other health care worker) about your health, but you weren't able to?” with response options of yes or no.

*Mental wellbeing* was assessed with the World Health Organization Wellbeing Index, a 5-item scale assessing constructs of positive mood, vitality, and general interests<sup>17</sup>. Higher scores indicate greater levels of wellbeing. This assessment has been previously validated with adolescent populations<sup>18</sup>. *Significant depressive symptoms* were assessed using a standardized assessment, specifically the Reynolds Adolescent Depression Scale – Short Form<sup>19</sup> which has been validated for use with adolescents in New Zealand<sup>20</sup>. The score includes 10 items with 4-point Likert response options. Higher scores indicate greater depressive symptoms. *SDQ total difficulties* was measured with the previously validated Strengths and Difficulties Questionnaire<sup>21</sup>, a self-administered assessment measuring five domains (emotional symptoms, conduct problems, hyperactivity, peer problems, and a prosocial scale). The four deficit-focused domains (i.e. all the domains other than the prosocial scale) were combined to create a measure of total difficulties, where higher scores indicate greater difficulties. Height and weight measurements were taken by trained research staff

on portable scales and stadiometers. Height and weight measurements were then used to calculate body mass index (*BMI*) as weight (kg)/ height (m) squared.

## **Analyses**

All analyses were conducted using the SURVEY procedures in SAS v9.4 (SAS Institute, Cary, NC). The prevalence of internet use is reported with percentages and 95% confidence intervals for the total population and sociodemographic subgroups. The bivariate relationship between internet use for health and health risk behaviours are presented as percentages. Multiple regression models were created to test the independent associations between internet use for health and health risk behaviours, mental health and BMI, adjusting for age, sex, ethnicity, area level deprivation and household poverty. For the regression models, using the internet for other reasons was the reference group and the no daily internet use group was removed from analyses. All differences are considered statistically significant at  $p < 0.05$  or where the 95% confidence intervals are non-overlapping. Analyses tested the global null hypothesis that all parameters = 0. For all regression models the likelihood ratio p value was less than  $< 0.001$ , rejecting the null hypothesis that all parameters = 0.

## **Results**

More than 90% of students accessed the internet on a daily basis, and approximately 15% of high school students use the internet to access health-related information (see Table 1). Using the internet in this way was more common among: females (18% compared to 12% in males); older students (24% among those 17 years and older compared to 8% in those 13 years or less); students living in more affluent households (16% compared to 12% of those living in poverty); and those residing in areas with low level deprivation (18% compared to 12% in areas of high deprivation). There were fewer differences by ethnicity. Of note, a small proportion of students (7%) reported that they do not use the internet daily. No daily internet use was more common among: younger students, Pacific students, Māori students; and, students living with household poverty and students residing in areas of high deprivation.



**Table 1. Daily internet use, by socio-demographic characteristics of students**

	n	Internet for health		Internet for other		No daily internet use	
		%	95% CI	%	95% CI	%	95% CI
Total	8235	15.4%	(14.2,16.7)	77.9%	(76.7,79.1)	6.6%	(5.4,7.8)
By sex							
Females	4522	18.3%	(16.7,19.9)	75.1%	(73.5,76.7)	6.6%	(5.2,8.1)
Males	3711	12.0%	(10.6,13.4)	81.3%	((79.9,82.8)	6.7%	(5.2,8.1)
By age							
13 or younger	1771	7.7%	(6.5,9.0)	83.3%	(81.4,85.3)	8.9%	(7.1,10.8)
14 years	1850	12.4%	(10.5,14.3)	81.1%	(78.8,83.4)	6.4%	(4.9,8.0)
15 years	1697	16.2%	(13.7,18.6)	76.1%	(73.5,78.7)	7.7%	(5.9,9.4)
16 years	1529	19.7%	(17.7,21.6)	74.8%	(72.7,76.9)	5.5%	(3.9,7.2)
17 and older	1378	23.9%	(21.1,26.6)	72.4%	(70.0,74.9)	3.7%	(2.6,4.9)
By ethnicity							
Asian	1022	17.9%	(15.8,20.1)	80.5%	(78.3,82.7)	1.6%	(0.7,2.4)
European	3958	15.9%	(14.5,17.4)	79.4%	(77.9,81.0)	4.6%	(3.7,5.4)
Māori	1631	13.6%	(12.0,15.2)	76.5%	(74.6,78.4)	9.8%	(8.3,11.4)
Pacific	1119	12.4%	(9.8,15.0)	73.0%	(70.3,75.8)	14.5%	(12.3,16.7)
Other	496	19.1%	(15.5,22.7)	75.8%	(71.8,79.8)	5.1%	(3.4,6.7)
Household poverty							
No poverty	6713	16.1%	(14.9,17.4)	79.7%	(78.4,80.9)	4.2%	(3.5,4.9)
Yes	1522	12.4%	(10.4,14.4)	70.2%	(68.2,72.2)	17.4%	(15.1,19.8)
Area Deprivation							
Low deprivation	2434	18.3%	(16.5,20.0)	78.3%	(76.5,80.1)	3.4%	(2.5,4.3)
Middle levels	3043	15.9%	(14.4,17.4)	78.3%	(76.9,79.7)	5.8%	(4.8,6.8)
High deprivation	2605	12.4%	(10.7,14.2)	76.8%	(74.6,79.0)	10.8%	(9.0,12.6)

Students engaging in health risk behaviours and those with health concerns were more likely to use the internet for accessing health information than other students (Table 2). Specifically, students who were trying to lose weight and engage in disordered eating had 2.0 and 2.7 times, respectively, the odds of using the internet for health reasons than students not reporting these behaviours. Similarly, BMI was positively associated with using the internet for health information ( $p=0.003$ ). Using the internet for health information was more common among students reporting health risk behaviours including substance use, risky motor vehicle use, violent behaviours, and ever having sex. Though there were no difference in using the internet for health information between students participating in unsafe sex and those who were not ( $p=0.9$ ).

Using the internet to access health information was more common among students reporting indicators of emotional distress and chronic health conditions or disabilities. Students who have self-harmed and students who have made a suicide attempt had approximately 2.5 times the odds of using the internet to access health information compared to students who did not report these behaviours ( $p<0.001$  for both). Similarly, using the internet for health information was positively associated with depressive symptoms and total difficulties and negatively associated with wellbeing ( $p<0.001$  for all). Students with a chronic health condition or disability were also more likely to using the internet for health information than students with no chronic conditions or disabilities ( $p<0.001$ ). Similarly, not being able to access health care when needed was associated with greater odds of using the internet for health information ( $p<0.001$ ).

**Table 2. Relationship between using the internet for health and indicators of health and wellbeing**

	%	Internet for Health			
		OR <sup>1</sup>	CI	r <sup>2</sup> <sup>2</sup>	p-value
Tried to lose weight	19.5%	2.0	1.8,2.4	0.050	<0.001
Not tried to lose weight	10.2%	ref			
Disordered eating	28.7%	2.7	2.4,3.2	0.065	<0.001
No disordered eating	12.2%	ref			
Current cigarette use	20.0%	1.3	1.0,1.6	0.037	0.043
No cigarette use	14.9%	ref			
Binge drinking	22.0%	1.4	1.2,1.7	0.039	<0.001
No binge drinking	13.6%	ref			
Weekly marijuana use	21.9%	1.7	1.2,2.4	0.037	0.002
Less than weekly or no marijuana use	15.4%	ref			
Risky motor vehicle use	20.9%	1.50	1.2,1.8	0.038	<0.001
No risky motor vehicle use	14.9%	ref			
Violent behaviours	20.3%	1.8	1.3,2.5	0.038	<0.001
No violent behaviours	15.2%	ref			
Ever had sex	22.6%	1.6	1.4,1.8	0.041	<0.001
Not had sex	13.2%	ref			
Unsafe sex	16.7%	1.10	0.8,1.5	0.035	0.66
No unsafe sex	15.4%	ref			
Self harm	30.0%	2.7	2.3,3.3	0.059	<0.001
No self harm	13.5%	ref			
Suicide attempt	28.4%	2.5	1.9,3.3	0.043	<0.001
No suicide attempt	14.8%	ref			
Chronic health condition or disability	20.5%	1.6	1.4,1.8	0.042	<0.001
No chronic health condition	13.7%	ref			
Unable to access health care	25.2%	2.2	1.9,2.6	0.053	<0.001
No health care access issues	13.3%	ref			
Wellbeing		0.95	0.94,0.97	0.047	<0.001
Depressive symptoms		1.08	1.07,1.09	0.069	<0.001
Total difficulties		1.06	1.05,1.07	0.051	<0.001
BMI		1.03	1.01,1.04	0.037	0.002

<sup>1</sup> Odds ratios and 95% confidence intervals controlling for age, sex, ethnicity, household poverty and area level deprivation <sup>2</sup> Tjur r<sup>2</sup>

## Discussion

In the current study we found that approximately one in six high school students in New Zealand use the internet to access health-related information. The prevalence of young people using the internet in this way appears much lower than in previous studies, but this is likely to be a reflection of differences in the measures. For example, in a 2014 survey of adolescents, more than 80% of teenagers reported that they had received health information online during their lifetime<sup>7</sup>. Whilst the question used in the current study assessed if young people who used the internet daily (i.e. 93% of participants) did so to access information about health-related matters. There were marked differences in the sociodemographic profiles of young people who used the internet in this way. This finding is consistent with studies that have been conducted amongst adult populations, which has noted a 'digital divide' between those who access the internet for these reasons and those who do not<sup>22,23</sup>. Placing these findings into the context of a greater body of literature in relation to young people is difficult due to the lack of comparable population-based studies that have been carried out in the field. It was striking to us, however, that nearly 20% of young people living with household poverty reported no daily internet use. With this occurring in 2012, when approximately 80% of New Zealand homes had access to the internet, and one of the major reasons given for there being no internet access was that the costs linked to this were too high<sup>2</sup>.

Secondary students who reported a wide range of health concerns and health risk behaviours, were more likely to use the internet to access health-related information, compared to other students. Findings from the current study are generally consistent with the wider body of literature on the internet and health-seeking behaviours. For example, in a study where young people could choose between a web-based or clinic-based mental health support program, Rickwood and colleagues<sup>24</sup> found that participants with greater levels of emotional distress were more likely to enrol in a web-based program than in clinic-based support. Similarly, young people seeking help online for self-injury reported worse mental health indicators compared to those who

self-injure but do not seek help online<sup>25</sup>. The internet may appeal to young people with health concerns and health risk behaviours because it provides young people with easy accessibility to information about sensitive health issues, in addition to anonymity<sup>26,27</sup>.

Findings from the current study suggest that web-based interventions may be effective in reaching young people with the greatest health concerns. In the last decade there has been a sizeable increase in the number of e-health interventions that are being developed to address a wide range of youth health issues, including mental health<sup>28,29</sup>, weight management<sup>30</sup>, substance use<sup>31</sup>, and sexual health concerns<sup>8</sup>. However, outside of trial settings the uptake of digital interventions is often disappointing, especially among high need groups. In real world settings, use of digital technology interventions appears to be associated with notably higher rates of attrition (drop-out or non-adherence) than in randomized controlled trials, even when the same programme is used<sup>32</sup>. Furthermore, consideration is needed for the young people who report that they do not use the internet or have no access to the internet, as their health concerns may go unattended.

Strengths of the current study include the large, nationally representative sample and the wide range of health indicators included in the survey. That said, there are limitations to the current study that warrant consideration when interpreting the findings. Firstly, this was a cross-sectional survey, and therefore the direction of the relationships remain unknown. For example, it has been hypothesised that exposure to the internet increases young people's desire to lose weight and eating disorder behaviours<sup>33,34</sup>. Secondly, the survey was completed in 2012 and since that time internet access has generally continued to increase. Internet use and adolescent help-seeking behaviours is a fairly new field of research, and as such survey items pertaining to internet use were not validated. However, this is not uncommon in a fast changing area of study, and survey items were subjected to cognitive testing and thorough piloting. The current study is not able to answer questions about youth help-seeking, specifically, on the internet. The question in the current study asked about accessing information, not seeking help for various issues. Similarly, the current study is unable to answer important questions about the nature and quality of the information accessed and

how it was used. Further research is needed to assist in advancing our understanding of these issues.

In summary, young people accessing health-related information on the internet report more health risk behaviours and compromised mental health. Internet-based health interventions may be a viable way to reach young people with the greatest health concerns, but care is needed to ensure the health needs are being met for young people who experience financial hardships who have limited internet access.

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