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Screen time is associated with depression and anxiety in Canadian youth

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ABSTRACT

Objective. This study examined the relationships between screen time and symptoms of depression and anxiety in a large community sample of Canadian youth.

Method. Participants were 2482 English-speaking grade 7 to 12 students. Cross-sectional data collected between 2006 and 2010 as part of the Research on Eating and Adolescent Lifestyles (*REAL*) study were used. Mental health status was assessed using the Children's Depression Inventory and the Multidimensional Anxiety Scale for Children—10. Screen time (hours/day of TV, video games, and computer) was assessed using the Leisure-Time Sedentary Activities questionnaire.

Results. Linear multiple regressions indicated that after controlling for age, sex, ethnicity, parental education, geographic area, physical activity, and BMI, duration of screen time was associated with severity of depression ($\beta = 0.23$, $p < 0.001$) and anxiety ($\beta = 0.07$, $p < 0.01$). Video game playing ($\beta = 0.13$, $p < .001$) and computer use ($\beta = 0.17$, $p < 0.001$) but not TV viewing were associated with more severe depressive symptoms. Video game playing ($\beta = 0.11$, $p < 0.001$) was associated with severity of anxiety.

Conclusion. Screen time may represent a risk factor or marker of anxiety and depression in adolescents. Future research is needed to determine if reducing screen time aids the prevention and treatment of these psychiatric disorders in youth.

Introduction

Depression and anxiety are among the leading causes of burden of disease in youth (Patel, 2013). Epidemiological data show that 5 to 9% of adolescents are clinically depressed (Mental Health, 1999), while 21% to 50% report depressed mood (Merikangas and Avenevoli, 2002). The prevalence of anxiety disorders in youth ranges from 12% to 20% (Costello et al., 2005), with subclinical rates paralleling those of depressed mood (Merikangas and Avenevoli, 2002). These figures are alarming given that depression and anxiety are strong predictors of a multitude of negative health and psychosocial outcomes, such as interruption in development, academic difficulties, poor interpersonal relationships, behavioral problems, low self-esteem, substance abuse, and suicide (Hawgood and De Leo, 2008; Lemstra et al., 2008). Moreover, youth experiencing anxiety and depression are at significantly increased risk of these psychiatric conditions in adulthood (Pine et al., 1999). The World Health Organization predicts that by the year 2020, childhood and adolescent mental health problems will become one of the leading causes of morbidity, mortality, and disability among children worldwide (Mental Health, 2001).

The use of electronic devices is a popular sedentary activity in Western society, particularly among youth. In Canada and the U.S., youth spend an average of 7 to 8 h per day engaging in sedentary screen-based activities (Canada AHK, 2013; Rideout et al., 2010), drastically exceeding the 2-hour recommended daily maximum (Tremblay et al., 2011; Anon, 2013). The pervasiveness of screen time among adolescents is of concern given its demonstrated association with obesity (Andersen et al., 1998; Gortmaker et al., 1996), cardiometabolic risk (Andersen et al., 2006; Carson and Janssen, 2011; Goldfield et al., 2011a; Hardy et al., 2010), and diabetes (Bowman, 2006; Jakes et al., 2003). However, previous research examining the relationship between sedentary screen-based activities and mental health in adolescents is sparse and has yielded mixed results: some studies have shown a positive association with anxiety or depression (Sund et al., 2011; Primack

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et al., 2009; Kremer et al., 2013; Cao et al., 2011; Mathers et al., 2009), and others have not (Casiano et al., 2012; Hume et al., 2011). While all studies statistically controlled for the confounding effects of socio-demographic factors, only two (Mathers et al., 2009; Rosen et al., 2014) accounted for BMI and physical activity. These are important methodological limitations since screen time has been previously associated with increased adiposity and reduced physical activity levels in youth (Marshall et al., 2004), and obesity and physical activity are well documented risk and protective factors, respectively, for anxiety and depression in youth (Roberts et al., 2003; Goldfield et al., 2011b; De Moor et al., 2006).

Given that the use of electronic media devices (typically sedentary) is rampant among youth in Western (Canada AHK, 2013; Rideout et al., 2010) and other industrialized societies (Rey-López et al., 2010; Martin, 2011), and that symptoms of depression and anxiety are prevalent in this age group (Patel, 2013; Costello et al., 2005), further examination of the relationship between sedentary screen time and mental health in youth is warranted. Moreover, given that youth spend more time on the computer and playing video games, compared to watching TV (Canada AHK, 2013; Rideout et al., 2010), and that little is known on how specific screen time activities relate to mental health (Mathers et al., 2009; Casiano et al., 2012), further inquiry is needed. Elucidating a better understanding of any association between duration and types of screen time behaviors and mental health may be critical to developing more effective strategies to prevent or treat anxiety and depression in youth.

The present study aimed to examine the relationships between sedentary screen time and symptoms of depression and anxiety in a large community sample of Canadian youth. It was hypothesized that longer duration of screen time would be associated with more severe symptoms of depression and anxiety, after controlling for a wide set of possible confounders. The effects of the type of screen behavior (TV, video games, computer use) on depression and anxiety symptomatology were also examined as secondary objectives.

Methods

Participants

Participants were 2482 English-speaking grade 7 to 12 students (1048 males and 1434 females), ranging in age from 11.08 to 20.75 years (M = 14.10 years, SD = 1.57). Data were collected between 2006 and 2010 as part of a larger study, i.e. the Research on Eating and Adolescent Lifestyles (*REAL*) study, originally conceived to test a psychosocial model expected to predict eating and weight disorders in a community sample of adolescents. This study was approved by the relevant institutional research ethics boards.

Procedure

All schools within three school boards and several private schools in the capital region of Canada (Ottawa, Ontario) were invited to participate. Based on schools' interest and feasibility, a total of 31 schools permitted study recruitment in one or several of their classrooms, representing a school participation rate of approximately 34%. Signed informed consent was obtained from students and their parents, and small incentives were provided to participants (pizza party or lottery for gift certificates). The overall student participation rate was 45%. The survey was conducted during regularly scheduled class time under the supervision of research staff, which upon survey completion, took objective measures of participants' height and weight in a private area. A more detailed description of the study procedure has been published elsewhere (Goldfield et al., 2011b).

Measures

Demographics

Socio-demographic information included sex, age, school, grade, mother's and father's education level, ethnic background of the family, and language spoken at home.

Sedentary screen time

The Leisure-Time Sedentary Activities 6-item questionnaire was designed by the investigators to measure how many hours per day respondents typically engage in: TV viewing, video game playing, and computer use. Scores range from 0 to 5, where 0 = not at all; 1 = less than 1 h; 2 = 1 to 3 h; 3 = 3 to 5 h; 4 = 5 to 8 h; and 5 = more than 8 h. The first three items address time spent engaging in screen-based activities during a typical week day, and the last three items assess screen time accrued on a typical weekend day. Total screen time and time spent on each specific screen activity were weighted as follows: [(week day × 5) + (weekend × 2)] / 7. Higher scores are representative of more time engaged in sedentary screen-based activities; note that the raw score does not represent the number of hours of screen-time.

Depression

The Children's Depression Inventory (CDI) is a self-report questionnaire consisting of 27 items reflecting cognitive, affective, and behavioral signs of depression (Kovacs, 1992). Each item is assigned a score from 0 to 2, with the higher number being attributed to the most depressive statement (Kovacs, 1992). The total score ranges from 0 to 54. This widely used inventory has ample evidence supporting its psychometric properties, with high internal consistency (r = .71 to r = .89), and test–retest reliability (r = .50 to r = .83), and good concurrent validity (Kovacs, 1992). In the present study, Cronbach's alpha for the total score was .89.

Anxiety

The Multidimensional Anxiety Scale for Children—10 (MASC-10) is a 10-item, 4-point Likert-style, self-report scale that is a short and efficient global measure of anxiety symptoms (March and Sullivan, 1999). The MASC-10 is a uni-factorial scale that evaluates anxiety symptoms across the four basic anxiety dimensions assessed by the original (39-item) MASC (physical symptoms, harm avoidance, social anxiety and separation anxiety/panic) (March et al., 1997). The MASC-10 has demonstrated satisfactory internal reliability and excellent stability in adults and youth (March and Sullivan, 1999; Osman et al., 2008). Cronbach's alpha in the present sample was .76.

Physical activity

The Godin Leisure-Time Exercise Questionnaire (GODIN) measures how often participants engage in strenuous, moderate, and mild exercise for more than 15 min at a time, and has been shown to be reliable and valid with test–retest reliability coefficients as high as r = 0.94 (Godin and Shephard, 1985). In this study, the total volume of physical activity was calculated as follows: (frequency of mild exercise × 3 METS (metabolic equivalent of task) + (frequency of moderate exercise × 5 METS) + (frequency of strenuous exercise × 9 METS). Higher total scores are indicative of more volume of exercise. Sedentary behavior is conceptually and empirically distinct from a lack of physical activity (Healy et al., 2008; Hamilton et al., 2004), and physical activity has been associated with decreased anxiety and depression (De Moor et al., 2006). Thus, physical activity was controlled for in the present study to better isolate the association between screen time and symptoms of anxiety and depression.

Covariates

Age, sex, ethnicity, parental education, and school geographic area were included as covariates. Height and weight were measured using an HM200P Portable Stadiometre (Quick Medical Equipment and Supplies, U.S.A.), and a UC-321 Digital Weighing Scale, respectively (Quick Medical Equipment and Supplies, U.S.A.). BMI was calculated by dividing weight in kilograms (kg) by height in squared meters (m^2), and was also statistically controlled for because increased BMI has been associated with increased symptoms of depression (Goldfield et al., 2010) and anxiety (Van Reedt Dortland et al., 2013).

Statistical analysis

All variables were examined for outliers and normality, and all assumptions for multiple regression were met. To test whether total sedentary screen time (hours per day spent watching TV + recreational computer use + video games) was associated with more severe symptoms of depression and anxiety, two separate multiple linear regressions were conducted, controlling for: age (years), sex (0 = female, 1 = male), ethnicity (0 = Caucasian, 1 = other), parental education (0 = neither parent completed college, 1 = at least one parent completed college or higher), geographic area of school (0 = urban, 1 =

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