



The Longitudinal Association of Childhood and Adolescent Television Viewing with Substance Use Disorders and Disordered Gambling in Adulthood up to Age 45

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Abstract

Excessive leisure-time television viewing in childhood has been associated with a range of poorer outcomes in adulthood and may represent an early form of addictive disorder. As addictive disorders are often correlated, we tested the hypothesis that television viewing in childhood and adolescence would be longitudinally associated with adulthood substance-related and behavioural addictive disorders in a population-based cohort born in 1972/1973. Weekday television viewing time was reported at multiple ages from 5 to 15 years, and criteria for alcohol, cannabis, and tobacco use disorders and disordered gambling were assessed at multiple adult ages up to 45 years. Higher television viewing times were associated with a greater likelihood of meeting diagnostic criteria for all substance-related disorders and disordered gambling in models that were adjusted for sex (p values < 0.05). After adjustment for childhood socioeconomic status and childhood self-control, mean television viewing time (hours/day) remained associated with tobacco use disorder (OR = 1.22, 95% CI = 1.04–1.42, $p = 0.017$) and disordered gambling (OR = 1.33, 95% CI = 1.07–1.66, $p = 0.010$). Excessive, leisure-time television viewing in childhood and adolescence may be a modifiable risk factor for tobacco use disorder and/or disordered gambling in later life.

Keywords Television viewing; Alcohol · Cannabis · Tobacco · Gambling · Substance-related and addictive disorders

Like substance-related disorders, behavioural addictive disorders may result in neglect of responsibilities, roles, and interpersonal relationships (Potenza, 2006). Currently, only gambling is recognised as a diagnosable behavioural addictive disorder by the Diagnostic

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and Statistical Manual (DSM-V), although the International Classification of Diseases (ICD-11) recognises disordered gaming (an online behaviour) as a diagnosable condition (American Psychiatric Association, 2013; World Health Organization, 2018). These inclusions raise the question of whether other behaviours could meet criteria for addictive disorder. Television viewing, for example, is a common behaviour worldwide, and excessive television viewing has been described by lay media, and even some researchers, as an addiction almost since its inception (Kubey & Csikszentmihalyi, 2002; Meerloo, 1954).

Substance-Related and Addictive Disorder Theory

Recent research suggests that behavioural addictive disorders are organic conditions that deserve similar interventions as substance-related disorders (Chamberlain et al., 2016; Holden, 2001; Pinna et al., 2015). There are key similarities between the pathological features of both addictive behavioural disorders and substance use disorders, such as salience, mood modification, tolerance, withdrawal, conflict, and relapse. However, Kardefelt-Winther et al. (2017) proposed that studies that investigate behavioural disorders should only use the term “behavioural addiction” where there is distress to the individual, day-to-day functional impairment, or a larger public health concern. In part, this is to avoid pathologising typical or commonplace behaviours, but this strict definition also recognises that behaviours that are coping mechanisms are not necessarily addictive (Kardefelt-Winther et al., 2017). However, it should be noted that *excessive* television viewing during childhood has been associated with a myriad of long-term negative outcomes (see McAnally & Hancox, 2021 for a review), and thus, if excessive television viewing is a coping mechanism (rather than a reflection of an addiction to a behaviour), it is unlikely to be associated with positive outcomes in way that adaptive coping mechanisms are.

Excessive behaviours have also been argued to share commonalities with substance-related disorders (Griffiths, 1996) and excessive childhood television viewing is no exception. It has the potential to cause interpersonal conflict (if parents and children disagree about time spent watching television, or if interpersonal relationships are ignored in favour of television viewing) and is linked with crime (Griffiths, 1996; Robertson et al., 2013). It is also likely that in cases where viewing times are excessive, there is decreased enjoyment of the activity (despite a desire to continue engaging in it) particularly if the excessive viewing is being used to modify affect (e.g. through providing a distraction from reality) and also likely that there is a sense of ongoing involvement in the behaviour despite its excessive nature (Sussman & Sussman, 2011; Sussman et al., 2011). Consequently, while excessive leisure television use is unlikely to be an indicator of behavioural addiction in all cases, investigating whether excessive viewing time is associated with other addictive behaviours is important.

Despite the longstanding idea that excessive television viewing may be a behavioural addictive disorder, there is limited research into whether this is the case. Sussman and Moran (2013) reviewed the evidence and found that, in contrast to substance use disorder and disordered gambling, “addictive” or disordered television viewing is unlikely to cause immediate physical harm or legal consequences. However, as noted above, other potential negative consequences may result from excess time and energy spent on television viewing, such as ignoring one’s responsibilities at work or home and disruption of interpersonal relationships. It should also be noted that substance use disorders (particularly tobacco but also other substances) can be associated with delayed, rather than immediate, harm to

health—a feature that disordered television viewing may share due to the sedentary nature of the activity (Hancox et al., 2004). It may also be the case that childhood self-control problems, known to influence later outcomes like smoking, are related to excessive childhood television viewing, as they may reflect a predisposition to generally unhealthier lifestyle outcomes (Moffitt et al., 2011).

Screen Time

Although excessive television viewing is not recognised as a diagnosable disorder, children and adolescents' screen time use has been widely reported. Recently, Twenge and Campbell (2018) found that average viewing time was 4 h 35 min per day among 14- to 17-year-old Americans. Other research found that 8- to 12-year-olds use almost 5 hours of leisure screen media per day, and teens use an average of nearly 7 and a half hours, not including time spent using screens for school or homework (Rideout & Robb, 2019). This contrasts sharply with the fact that for 30 years, the American Academy of Pediatrics' guidelines suggested limiting leisure screen time to no more than 1 to 2 hours per day (American Academy of Pediatrics, 1990; American Academy of Pediatrics Committee on Public Education, 2001; Strasburger et al., 2009).

The screen times reported in recent literature are much higher than for the previous generation. In New Zealand data from the Dunedin Multidisciplinary Health and Development Study (Dunedin Study), collected from 1977 to 1987, participants reported watching an average of 2.33 hours of television each weekday (aged between 5 and 15) and girls watched slightly less than boys (Hancox et al., 2004). These lower screen times reflect the limited modes of TV watching available at the time: live programmed television (two channels) was the only option for watching TV, viewing hours were limited, and there were no personal computers or devices. Despite this, the average TV viewing time in this New Zealand cohort exceeded the American Academy of Pediatrics' recommended maximum of 2-hours of leisure-time screen use even in the 1980s. However, despite changes to the screen environment, television viewing remains one of the most commonly engaged in screen behaviours (Common Sense Media Inc., 2015).

We are unaware of any research on the long-term consequences of excessive leisure-time television viewing in childhood for addictive disorders in adulthood. In this study, we investigated the associations between childhood and adolescent leisure-time television viewing and substance-related and addictive disorders in a birth cohort study followed to age 45. It is possible that excessive television viewing is a form of addictive behaviour, and our research question was whether *excessive* leisure-time spent watching television in childhood and adolescence would be associated with an increased risk of substance-related and behavioural addictive disorders in adulthood. Specifically, we hypothesised that higher viewing times across childhood and adolescence would be associated with an increased risk of meeting diagnostic criteria for substance use disorders (alcohol, cannabis, tobacco) and disordered gambling in adulthood (age 18–45).

Methods

Participants are members of the Dunedin Study, an ongoing longitudinal investigation of the health and behaviour of a complete birth cohort born between April 1, 1972, and March 31, 1973, in Dunedin, New Zealand. All participants were born in the main maternity

hospital in Dunedin, the second largest population centre in the South Island of New Zealand (current population approximately 125,000). The participants are those who attended the first assessment at age 3 years ($n = 1037$), representing 91% of eligible births based on residence within the province. The cohort is primarily New Zealand European (964 participants, 93%), with 7.5% self-identifying as of Māori descent (Poulton et al., 2015). Follow-up assessments were at ages 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, 38, and 45 years (see Supplementary Table 1). Cohort families represented the full range of socioeconomic status in the South Island of New Zealand and the sample has previously been found to be broadly generalisable to the wider New Zealand population on a range of health measures and outcomes (Poulton et al., 2006). The appropriate ethics committees approved each phase of the study and informed consent was obtained for each assessment.

Measurements of Variables

Childhood TV Viewing (Mean Viewing per Weekday (Hours) Between Ages 5 and 15 Years)

Information on television watching was collected at ages 5, 7, 9, 11, 13, and 15 years. At ages 5, 7, 9, and 11 years, parents were asked how much time study members spent watching weekday television. At ages 13 and 15, study members themselves were asked how long they usually watched television on weekdays and at weekends. The screen time measure used for this study is the average number of weekdays viewing hours between ages 5 and 15 years as previously reported (Hancox et al., 2004). Additional analyses divided the viewing time into categories of under 2 h and 2 h or more of TV per day.

Family Socioeconomic Status (Birth to Age 15)

Socioeconomic status of study members' families was recorded according to parental self-reported occupational status and was assessed from birth to age 15. This was based on the highest parental occupation on a six-point scale based on the educational level and income associated with that occupation in the New Zealand census (6 = unskilled labourer, 1 = professional). Childhood socioeconomic status was calculated as the mean of assessments between birth and age 15 years.

Self-control (Ages 3–11)

The self-control measure used has been described previously (Moffitt et al., 2011). Briefly, the composite variable consists of observer reports of under-controlled behaviour at ages 3 and 5 years (e.g. liable, impulsive); parent and teacher ratings of impulsive aggression and hyperactivity at ages 5, 7, 9, and 11 years (e.g. fights, cannot settle, "on the go"); parent and teacher reports of impulsivity and lack of persistence at 9 and 11 years (e.g. easily distracted, acts without thinking); and self-reports of hyperactivity, inattention, and impulsivity at 11 years (e.g. fidgety, trouble sticking with a task, difficulty waiting turn).

Substance Use Disorders

Past-year substance dependence was assessed at face-to-face interviews conducted at ages 18, 21, 26, 32, 38, and 45 with the Diagnostic Interview Schedule following the Diagnostic

and Statistical Manual of Mental Disorders (DSM) criteria. At ages 18 and 21, assessments used DSM-III-R criteria. Assessments between ages 26 and 45 used DSM-IV criteria. The outcome of interest in this study was an adult substance use disorder or dependency for alcohol, nicotine/tobacco, or cannabis based on meeting the criteria at least once from ages 21, 26, 32, 38, or 45 years.

Problem Gambling Disorder

Assessments of past-year disordered gambling were administered via structured face-to-face interviews at ages 21, 32, and 45 years. At age 21, the assessment consisted of an adapted South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1987). This questionnaire of eight items applied only to those participants who reported that they had bet \$50 or more in a single month in the past year. Disordered gambling at age 21 was then based on meeting both the “\$50 or more” criterion and one or more of the eight items on the SOGS questionnaire. At ages 32 and 45, the assessment was based on two different published gambling assessments—the Sydney-Laval Universities Gambling Screen (SLUGS; Blaszczynski et al., 2008) and the National Opinion Research Centre DSM-IV Screen for Gambling Problems (NODS; Gerstein et al., 1999). The SLUGS assessment includes seven items that focus on gambling-impaired control, the severity of the problem, and the expressed need for treatment. Participants who had answered positively to one or more of the SLUGS questionnaires also completed the NODS, consisting of 16 items that are used to assess the 10 common symptoms of pathological gambling as defined in DSM-IV. Disordered gambling at ages 32 and 45 was defined as meeting one or more of the SLUGS criteria and one or more of the criteria from the NODS score. The primary outcome of interest in this study was an adult disordered gambling composite that was based on meeting the criteria for disordered gambling at either age 21, 32, or 45.

Statistical Analysis

Logistic regression was used to investigate associations between mean childhood television viewing time as the predictive variable and diagnoses of substance use disorder (alcohol, cannabis, or tobacco) or disordered gambling between ages 18 and 45 years of age as the dependent variable. Analyses adjusted for sex and further analyses also adjusted for childhood socioeconomic status and childhood self-control. To assess whether associations were different for male and female study members, initial analyses were tested for sex by television viewing interactions. p values < 0.05 were considered statistically significant. The analyses were conducted using Stata 16.1 (StataCorp, 1985–2017).

Results

Descriptive Analyses

Study participants watched an average of 2.33 mean (SD 0.88) hours of television each weekday between the ages of 5 and 15 years. Girls spent less time watching television than boys ($p = 0.002$; Table 1). Sixty-two percent of the cohort (612/993) watched an average of greater than 2 h of television per weeknight between ages 5 and 15. Higher mean television viewing from ages 5 to 15 was correlated with poorer self-control from age 3 to 11 ($r = 0.20$, $p < 0.001$). Men were more likely to have met the criteria (at any assessment between ages 18 and 45) for alcohol use

Table 1 Descriptive values for the variables used in analysis

Predictor variables	Ages (years)	<i>N</i>	Mean	Std Dev
TV viewing hours				
Whole sample	5–15	1018	2.33	0.88
Girls	5–15	495	2.24	0.89
Boys	5–15	523	2.42	0.86
Childhood SES	0–15	1031	3.24	1.14
Self-control	3–11	1037	0.00	1.00
Disorder diagnoses	Ages (years)	Whole sample	Women	Men
		<i>n/N (%)</i>	<i>n/N (%)</i>	<i>n/N (%)</i>
Alcohol use disorder	18	152/930 (16.34)	54/455 (11.87)	98/475 (20.63)
	21	176/957 (18.39)	55/469 (11.73)	121/488 (24.80)
	26	133/976 (13.63)	34/479 (7.10)	99/497 (19.92)
	32	78/959 (8.13)	25/471 (5.31)	53/488 (10.86)
	38	91/950 (9.58)	32/475 (6.74)	59/475 (12.42)
	45	104/924 (11.26)	35/462 (7.58)	69/462 (14.94)
Any alcohol use disorder	18–45	372/1003 (37.09)	132/487 (27.10)	240/516 (46.51)
Tobacco use disorder	18	181/937 (19.32)	98/455 (21.54)	83/482 (17.22)
	21	174/959 (18.14)	86/469 (18.34)	88/490 (17.96)
	26	132/973 (13.57)	59/478 (12.34)	73/495 (14.75)
	32	187/970 (19.28)	94/476 (19.75)	93/494 (18.83)
	38	158/956 (16.53)	78/475 (16.42)	80/481 (16.63)
	45	107/922 (11.61)	53/461 (11.50)	54/461 (11.71)
Any tobacco use disorder	18–45	369/1003 (36.79)	183/487 (37.58)	186/516 (36.05)
Cannabis use disorder	18	61/930 (6.56)	20/455 (4.40)	41/475 (8.63)
	21	91/946 (9.62)	22/465 (4.73)	69/481 (14.35)
	26	92/976 (9.43)	25/479 (5.22)	67/497 (13.48)
	32	52/963 (5.40)	10/473 (2.11)	42/490 (8.57)
	38	39/952 (4.10)	6/475 (1.26)	33/477 (6.92)
	45	19/924 (2.06)	6/462 (1.30)	13/462 (2.81)
Any cannabis use disorder	18–45	190/1003 (18.94)	52/487 (10.68)	138/516 (26.74)
Disordered gambling	21	125/939 (13.31)	34/464 (7.33)	91/475 (19.16)
	32	40/959 (4.17)	9/472 (1.91)	31/487 (6.37)
	45	42/908 (4.63)	15/452 (3.32)	27/456 (5.92)
Any disordered gambling	21–45	156/861 (18.12)	47/434 (10.83)	109/427 (25.53)

disorder, cannabis use disorder, and disordered gambling than women, but men and women had similar rates of tobacco use disorder. Chi-squared analyses were used to determine whether the four substance-related and addictive disorder outcomes were associated with each other. These were significant at $p < 0.05$ for all associations, indicating that meeting diagnostic criteria for one disorder at any age often meant that diagnostic criteria were met for a second disorder at any age.

Main Analyses

In analyses adjusted for sex, childhood and adolescence mean television viewing time was associated with a higher risk of alcohol use disorder, tobacco use disorder, cannabis use disorder, and disordered gambling in adulthood at any assessment between ages 18 and

45 (Table 2). When further adjusted for socioeconomic status and self-control, television viewing time was associated with tobacco use disorder (OR = 1.20, 95% CI = 1.02–1.41, $p = 0.026$) and disordered gambling (OR = 1.29, 95% CI 1.04–1.60, $p = 0.022$), indicating that the risk of meeting criteria for tobacco use disorder was approximately 20% higher with each standard deviation increase in television viewing time and the risk of disordered gambling was approximately 29% higher. The associations with alcohol and cannabis use disorders no longer met statistical significance.

There were no statistically significant interactions between sex and television viewing for any of the substance use or disordered gambling outcomes, indicating that the observed associations were not statistically significantly different in male and females. When data were analysed separately by sex, however, the associations between television viewing and tobacco use disorder and disordered gambling were only significant for women (Supplementary Table 2).

Figure 1 shows substance-related and addictive disorders among those who met or did not meet the American Academy of Pediatrics' recommendation of no more than 2 h of leisure-time television viewing a day. Participants who watched an average of more than 2 h of television a day were more likely to meet the criteria for tobacco use disorder and cannabis use disorder in adulthood (at least one assessment between ages 18 and 45) (Fig. 1).

Discussion

We found that spending time watching television during childhood and adolescence is associated with a higher risk of substance use disorder and disordered gambling in adulthood. For tobacco use disorder and disordered gambling, these associations were independent of the potential confounding influences of sex, childhood socioeconomic status, and childhood self-control. While alcohol use disorder and cannabis use disorder were also associated with TV viewing time in sex-adjusted analyses, these associations were not statistically significant in the fully adjusted models.

Excessive television viewing is very common and has become even more common since these data were collected (Rideout & Robb, 2019; Twenge & Campbell, 2018). Television viewing has also been supplemented with other forms of screen behaviours, such as online gaming, that may be even more “addictive”. It is therefore of concern that we found that childhood television viewing predicted later disordered gambling (the only DSM-5 recognised addictive behaviour) and tobacco use disorder. These two disorders are responsible

Table 2 Associations between mean television viewing time between 5 and 15 years and substance-related and addictive disorders from age 18 to 45

	Sex-adjusted		Fully adjusted ^a	
	Odds ratio (95% CI)	<i>p</i> value	Odds ratio (95% CI)	<i>p</i> value
Alcohol use disorder	1.19 (1.03–1.39)	0.021	1.16 (0.99–1.36)	0.071
Tobacco use disorder	1.32 (1.13–1.54)	<0.001	1.20 (1.02–1.41)	0.026
Cannabis use disorder	1.26 (1.04–1.52)	0.016	1.13 (0.93–1.37)	0.228
Disordered Gambling	1.42 (1.15–1.74)	0.001	1.29 (1.04–1.60)	0.022

^aAdjusted for sex, socioeconomic status from birth to 15 and self-control from ages 3 to 11

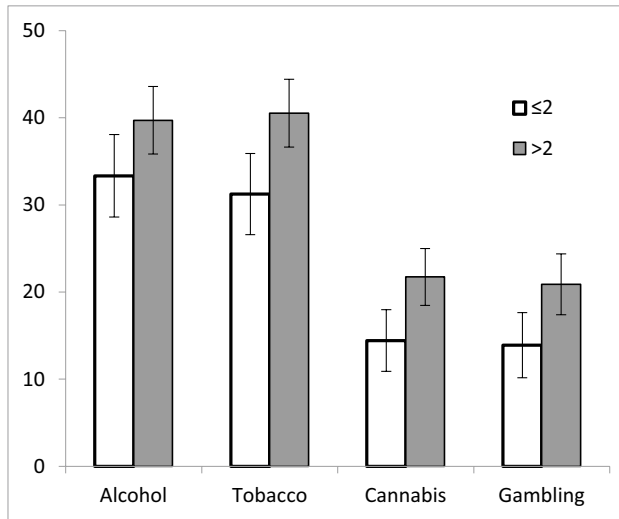


Fig. 1 Adulthood substance-related and addictive disorders according to mean childhood and adolescent TV hours, grouped according to AAP guidelines. Error bars show 95% confidence intervals

for a considerable burden of social and physical health harms. These findings support our hypothesis that, for some, excessive television viewing may be an expression of addictive disorder or may lead to later substance-related and other addictive disorders. Although the association between television viewing and substance-related disorder was only statistically significant for tobacco use in the fully adjusted analyses, there was a non-significant tendency to higher risk of alcohol use disorder too.

All substance use disorders have behavioural components, and the behaviours associated with tobacco use disorder are well recognised, as is the need for treating such behaviours to resolve the disorder (Benowitz, 2010; Prochaska & Benowitz, 2019). We also found that those with one substance use or behavioural disorder were more likely to have a second disorder, in keeping with other research on addictive disorders (e.g. Sussman et al., 2011). Thus, prevention efforts for any given substance-related or addictive disorder may have indirect effects on the other disorders.

As far as we are aware, this is the first longitudinal study to assess associations between childhood and adolescent television viewing and the presence of behaviour or substance use addictive disorders in adulthood. The finding that excessive television viewing during childhood is associated with tobacco use disorder and disordered gambling in adulthood indicates that persistent excessive television viewing may share traits with other, recognised, addictive disorders. This finding supports the view that for some people, excessive television viewing may be a precursor to other addictions. Alternatively, it may be an early form of addictive disorder, which, like other substance-related and addictive disorders, predisposes people to developing other disorders later in the life course.

As with substance-related disorders, the aetiology of behavioural addictions is poorly understood but likely to be multifactorial. While there is limited evidence on the reasons for excessive (or disordered) television viewing, the available research focuses on the motivation behind television watching. Generally, these motivations (such as enjoyment, relaxation) are not problematic for most of the population and may be similar to the motivations for alcohol use or gambling (for example). However, for some people, these habits

may predispose them to substance-related or addictive disorders. For example, excessive television viewing might be more likely in those who have lower turnover of mesolimbic dopamine, or who are anxious or bored, or have difficulty with social communication (Kardefelt-Winther et al., 2017; Koob, 2006; Olsen, 2011).

A strength of the present research is that television viewing time was recorded over multiple ages during childhood and adolescence, from ages 5 to 15 years. Substance-related disorders and disordered gambling were also assessed over multiple ages throughout adulthood using standard diagnostic instruments. We also have prospectively collected information on socioeconomic status throughout childhood and assessments of childhood self-control from multiple ages based on observer measurements and independent and self-reports. Limitations for this study include the fact that data regarding behavioural and substance-related disorders were only recorded for the year prior to assessment. Given the complexity of these outcomes, there may also be other unsuspected or unmeasured confounding factors that influence these associations, such as aspects of temperament not captured by the self-control measure or mental health comorbidities in adulthood. Furthermore, despite high levels of participation, many participants missed at least one follow-up assessment. Estimates of television viewing were based on parental estimates in childhood and self-reports during adolescence. We have no way to validate these television viewing estimates and they will have inaccuracies and may have been prone to social desirability response bias with participants potentially underreporting their viewing habits. It is likely that if viewing habits are underreported, the observed associations will be attenuated. Although restricted availability meant there was little variation in what participants could watch, we have no data on the content of their viewing or on the portrayal of addictive behaviours on television to investigate if these influence the risk of latter addictive disorders.

The generalisability of the results is also unclear, as the media environment has changed dramatically over the decades since this study started. At the time that this cohort was growing up (1977–1988), television formed the only screen-based option for entertainment, as there were few homes with computers and gaming consoles. Viewing options were also limited, as there were only two television channels available in New Zealand. Despite this, the findings indicate that, even with just 2 channels available and during somewhat restricted times of viewing in the week (i.e. after school), there were longstanding links with adult tobacco use disorder and disordered gambling.

Research often now focuses on the broader concept of “screen use” or “screen time” and the positive and negative ramifications of this. “Screen time” incorporates the many modes of using technology (i.e. smartphones, computers, gaming consoles, and tablets). Despite this, leisure-time television viewing remains common (Common Sense Media Inc., 2015) and has been associated with other negative outcomes such as poorer educational attainment in adulthood, poorer adult health, and greater likelihood of a criminal conviction (McAnally & Hancox, 2021). Furthermore, streaming services have a large share of modern television viewing across all age groups across many screen use modes. As a consequence, television viewing is now more accessible than ever: with streaming available on many different devices, viewers can watch multiple seasons of their favourite shows on demand rather than episode by episode. Additionally, streaming services allow for computer algorithms to tailor the content to the individual user the aim of which is to incentivise continuous viewing. “Television addiction” in the modern setting could be considered part of a broader category of excessive leisure-time screen use, which encompasses other technologies. Given that the average viewing times in our cohort were much lower than those reported in more recently, we believe that our findings may underestimate the impact that contemporary levels of leisure-time television use during childhood may have on addictive disorders in adulthood.

At a population level, this study highlights the potential need for guidance on digital health and wellbeing. Public health agencies have put great effort into advocating for safer alcohol use and safe sexual practices: similar campaigns could be used to advocate for safe screen use. On an individual and family level, the findings support limiting leisure-time screen use. The American Academy of Pediatrics previously recommended a daily average limit of 2 h of media/screen time, but current recommendations focus on the creation of a family media plan (Council on Communications and Media & MBE, 2016). Although our observational study is unable to prove that the association is causal, the findings suggest that leisure-time screen use in early life may be a modifiable risk factor exposure that influences the risk of tobacco use disorder and disordered gambling. Therefore, the previous 2-h limit recommendation may remain a reasonable guide for leisure-time screen use in children and adolescents. This research also highlights the need for further study of the impact of other excessive leisure-time technology use, particularly involving newer media formats.

In summary, children who watched more television in childhood and adolescence were more likely to have tobacco use disorder and disordered gambling as adults independently of the potential confounding factors of sex, socioeconomic status, and childhood self-control. These findings support the idea that excessive television viewing may represent an addictive disorder similar to other, recognised, behavioural addictions and may increase the risk for other adult disorders.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11469-022-00918-7>.

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Author Contribution McAnally and Wiki Te Oi co-wrote the first draft, completed the analyses, and edited later drafts. Nada-Raja provided data on gambling and edited drafts. Hancox designed the study and had input into the drafts. All authors had input into the manuscript and approved the manuscript for submission.

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Declarations

Conflict of Interest The authors declare no competing interests.

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