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## Association between childhood and adolescent television viewing and unemployment in adulthood

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### Abstract

**Objective**—To assess the long-term association between childhood television viewing and adult unemployment, and if this association is mediated by educational achievement.

**Method**—Study members were a general-population birth cohort of 1037 participants born in New Zealand in 1972/1973. Hours of weekday television viewing were reported at ages 5–15. Since age 18, unemployment was assessed retrospectively using life-history calendars to age 32. Information on educational qualifications was collected at age 32.

**Results**—Childhood and adolescent television viewing predicted adult unemployment. This association was significant for male study members only ( $\beta=0.20$ ,  $p<0.0001$ ). The association for male study members remained after further controlling for socioeconomic status, cognitive ability, and early indications of behaviour problems ( $p<0.0007$ ). The association was only partially mediated by educational achievement and television viewing remained a predictor of unemployment after adjusting for this ( $p=0.0035$ ). By logistic regression, each additional hour of daily television viewing was associated with an increased likelihood of spending at least 6 months in unemployment between ages 18–32 years (OR=1.36, 95% CI=1.06, 1.76,  $p=0.0157$ ).

**Conclusion**—Childhood and adolescent television viewing may have long-lasting consequences for adult unemployment for boys. This association is only partially explained by the association between television viewing and educational achievement.

### Keywords

adolescence; child; cohort studies; television; workforce

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#### Conflict of interest statement

The authors declare that there are no conflicts of interest

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## Introduction

There is increasing evidence that excessive television viewing in childhood and adolescence may have adverse consequences for education (Hancox et al., 2005, Ozmert et al., 2002, Razel, 2001), health (Gortmaker et al., 1996, Hancox et al., 2004, Landhuis et al., 2008, Strasburger et al., 2010), and behaviour (Christakis et al., 2004, Gidwani et al., 2002, Landhuis et al., 2007, Johnson et al., 2002). These consequences are of concern in themselves, but they may also influence other life outcomes. One of these is risk for unemployment.

Lower educational attainment is associated with increased risk of adult unemployment (Nickell, 1979, Caspi et al., 1998, Kettunen, 1997, Wikström and Stenberg, 2004). Since childhood television viewing is associated with poor educational outcomes (Hancox et al., 2005, Ozmert et al., 2002, Razel, 2001), we might anticipate that excessive childhood television also increases risk for unemployment. However, childhood television viewing could also affect future employment through other mechanisms. Furthermore, there are many other childhood factors that determine educational achievement and/or future employment that may also influence patterns of childhood television viewing, including sex differences, socioeconomic factors, cognitive ability, and behaviour problems.

To the best of our knowledge, the association between childhood television viewing and adult employment has not been explored. The Dunedin Multidisciplinary Health and Development Study collected information on television viewing throughout childhood and adolescence, has a comprehensive record of adult employment, and has information on important covariates in a birth cohort. We assessed the association between childhood and adolescent television viewing from age 5–15 years, and employment history from age 18–32 years. We hypothesise that the time spent watching television predicts risk for adult unemployment and that this association is mediated by educational achievement.

## Methods

### Participants

The Dunedin Multidisciplinary Health and Development Study is a longitudinal study of health, development, and behaviour in a general-population birth cohort. The study is described in detail elsewhere (Silva and Stanton, 1996). Briefly, Study members were born in Dunedin, New Zealand, between April 1972 and March 1973. All children still residing in the Otago province were invited to participate in the first follow-up assessment at age 3 years. One thousand and thirty-seven children (91% of eligible births; 502 girls) participated in this first assessment, forming the base sample for the longitudinal study. Study members were assessed every two years up to age 15 years, and again at ages 18, 21, 26, and most recently at age 32 years, when we assessed 96% (n=972) of the living Study members. Study members represent the full range of socioeconomic status in the general population of New Zealand's South Island and are mostly of New Zealand European ethnicity.

We obtained written informed consent for each assessment. The study was approved by the Otago Ethics Committee.

### Television Viewing

Weekday television viewing hours were obtained at ages 5, 7, 9, 11, 13 and 15 years. From ages 5 to 11 years, the Study members' parents were asked how long their children spent watching television on weekdays. At 13 and 15 years, the Study members themselves were asked how long they usually spent watching television on weekdays. Our summary variable

of childhood and adolescent television viewing was the mean viewing hours per weekday between ages 5 and 15 years (Hancox et al., 2004).

### Unemployment

At the age 21, 26 and 32 assessments, employment history was collected using life-history calendars (Freedman et al., 1988, Caspi et al., 1996). Study members reported on unemployment, full-time and part-time employment, education, homemaking, travel, and other activities for each month since the last assessment. Unemployment was defined as not working for a month or more despite being available for work. Unemployed Study members did not necessarily collect an unemployment benefit. The total number of months unemployed obtained from the three life-history calendars were summed to provide the cumulative months of total unemployment between ages 18 and 32 years. Continuous unemployment was defined as the longest unbroken period of unemployment, and categorised as  $\geq 6$ ,  $\geq 12$ , and  $\geq 24$  months. Only data from those who completed all three life-history calendars are included in these analyses ( $n=928$ ).

### Educational achievement

At age 32, the Study members reported their highest level of educational attainment. These were scored using a 4-point scale: school qualifications; any school certificate passes (the most basic New Zealand school qualification); higher-level school qualification (e.g. sixth form certificate) or post-school qualification (e.g. trade certificate or diploma); bachelor's degree or higher.

### Covariates

**Family socioeconomic status**—Socioeconomic status of the Study members' families was measured using parental self-reported occupational status assessed from birth to age 15. Each parent was assigned an occupational code (ranging from 1=professional to 6=unskilled labourer) based on the educational level and income for that occupation from data in the New Zealand census (Elley and Irving, 1985). The mean of the highest score of either parent was used to assess family socioeconomic status from birth to age 15 (Poulton et al., 2002).

**Cognitive ability**—Intelligence quotient was measured at ages 7, 9, 11, and 13 years using the Wechsler Intelligence Scale for Children (WISC) (Wechsler, 1974). The mean of these four scores was calculated and this composite score was used as a measure of cognitive ability.

**Early behaviour problems**—At age 5, the Study members' parents and teachers were asked to complete the Rutter Child Scales (Rutter et al., 1970). Individual items were scored using a 3-point response scale; "doesn't apply" (scored 0); applies somewhat (scored 1); and "certainly applies" (scored 2). To control for early behaviour problems (Hancox et al., 2005), the mean of the parent and teacher ratings from the anti-social subscale (6 items; fights, bullies, irritable, disobedient, destructive, and not liked) and the hyperactivity subscale (3 items; restless, squirmy, and poor concentration) were included as covariates. The psychometric properties of the two scales have been described previously (McGee et al., 1984, McGee et al., 1985).

**Statistical analyses**—We examined the association between childhood and adolescent television viewing and adult unemployment using Spearman's rank-order correlation coefficients and multiple linear regression. As many Study members reported little or no unemployment between ages 18 and 32 years, the data were positively skewed, resulting in skewed residuals. A log-transformation ( $\log_{10}(X + 2)$ ) produced residuals that were more

normally distributed (skew=0.594, se=0.082) and ordinary least squares (OLS) regression analyses used these log-transformed data. We calculated unadjusted and adjusted models. Adjusted models controlled for family socioeconomic status, childhood cognitive ability and early behaviour problems. To test if the association between childhood and adolescent television viewing and adult unemployment was mediated by educational achievement (i.e., an indirect association in which television viewing leads to poorer educational achievement which in turn leads to increased risk of unemployment), highest educational qualification was included in the subsequent regression models. The mediation effect was analysed using methods by Preacher and Hayes (2004, 2008). We repeated the analyses using logistic regression with unemployment dichotomised into less than six months of unemployment versus six months or more of unemployment (either in total, or continuously). Because unemployment was a limited dependent variable (ie, contains a large number of zero-values), slopes from OLS regression models using untransformed data may be biased, therefore censored (Tobit) regressions were also analysed.

## Results

Most Study members (n=567/928, 61%) reported at least some unemployment between ages 18 and 32 years. Of these, nearly a third (175/567) were unemployed for a cumulative total of three months or less over the entire 18 to 32 year period. The prevalence of total months of unemployment between ages 18 and 32 is presented in Figure 1. 245/928 Study members reported at least one unbroken period of unemployment of 6 months or more; 126 reported at least 12 months; and 50 reported at least 24 months of continuous unemployment. Men reported slightly more unemployment than women (Mann-Whitney U test,  $z=2.45$ ,  $p=0.0142$ )

Childhood television viewing at each age was positively correlated with total months of unemployment between ages 18 and 32 years (all  $p$ -values $<0.01$ ) and inversely correlated with educational achievement (all  $p$ -values $>0.001$ ). The composite measure of television viewing between ages 5 and 15 years was correlated with total months of unemployment ( $r_s=0.13$ ,  $p<0.0001$ ) and educational achievement ( $r_s=-0.29$ ,  $p<0.0001$ ). Educational achievement was also inversely correlated with total months of unemployment between ages 18 and 32 years ( $r_s=-0.14$ ,  $p<0.0001$ ).

Initial analyses found a significant sex by television interaction in the unadjusted ( $p=0.0336$ ) and the fully-adjusted models ( $p=0.0179$ ), so separate analyses were conducted for each sex. An association between television viewing and unemployment was observed for male Study members (Table 1, Model 1). Although the association between television viewing and unemployment for the female Study members was in a similar direction, it was not statistically significant. After adjusting for family socioeconomic status, cognitive ability, and indications of behaviour problems at age 5, the association between television viewing and unemployment observed for the male Study members remained. There was no such association for the female Study members (Table 1, Model 2). Censored (Tobit) regression analyses provided similar findings (males: unadjusted  $p<0.001$ , adjusted  $p=0.002$ ; females  $p=0.076$  and  $p=0.634$  respectively).

To test for the possible mediating role of education, highest educational qualification obtained by age 32 years was entered into the unadjusted and fully-adjusted models. Assessing data from the male Study members only, education was found to be a significant mediator ( $z=3.35$ ,  $p=0.0008$  and  $z=2.83$ ,  $p=0.0047$  in the unadjusted- and fully-adjusted models respectively). However, education only partially mediated the association, and television viewing remained a significant independent predictor of unemployment (standardised regression coefficient ( $\beta$ )=0.15,  $p=0.0014$  and  $\beta=0.14$ ,  $p=0.0035$  for the

unadjusted- and fully-adjusted models respectively). As television viewing in girls was not significantly associated with adult unemployment, mediation analyses were not computed.

Logistic regression analyses confirmed the findings of the linear regression models (Table 2). Childhood television viewing was a significant predictor of being unemployed for 6 months or more in the men but not in women. The association with male unemployment remained significant after adjusting for family socioeconomic status, cognitive ability, and early behaviour problems. The pattern of results was similar for 12 months or more and 24 months or more of total unemployment (fully-adjusted models,  $p=0.0427$  and  $p=0.0089$  respectively).

We further assessed the association between television viewing and the longest period of continuous unemployment. Using logistic regression analyses, we found that television viewing during childhood predicted a period of at least 6 months continuous unemployment and similar results were obtained when analyses were repeated using  $\geq 12$  months and  $\geq 24$  months cut-offs (Table 3).

Finally, we compared total months of unemployment among those who had watched less than 2 hours of television per day during childhood (the maximum recommended by the American Academy of Pediatrics (2001)), 2 to 3 hours per day, and more than 3 hours per day. The results for female and male Study members were similar: those who watched more television during childhood and adolescence, reported more months of unemployment between ages 18 and 32 years (Figure 2).

## Discussion

We found that more time spent watching television during childhood is associated with an increased risk of unemployment as adults. This association was only statistically significant for male Study members. The association for male Study members persisted after adjusting for the potential confounding effects of socioeconomic status, cognitive ability and early behaviour problems.

We also found that this association was partly mediated by educational achievement. That is, television viewing may lead to poorer educational achievement (Hancox et al., 2005, Ozmert et al., 2002, Razel, 2001), which in turn may lead to increased risk of unemployment (Nickell, 1979, Caspi et al., 1998, Kettunen, 1997, Wikström and Stenberg, 2004). However, education did not fully explain the association and television viewing remained a significant predictor of unemployment, after controlling for education. We were unable to identify other variables that accounted for the remaining variance in the model, although it has been suggested that television viewing may adversely impact “social capital” (Putnam, 1995), “the social relationships that provide access and control over various types of resources” (Caspi et al., 1998), and that a reduction in social capital, in turn, increases the risk of unemployment (Caspi et al., 1998). Although not shown, we conducted additional analyses with early predictors of unemployment including family conflict, family structure, and reading ability (Caspi et al., 1998). Inclusion of these additional covariates did not materially alter the results reported, with television viewing by boys remaining a predictor of unemployment ( $\beta=0.14$ ,  $p=0.0054$ ). Even when measures such as conduct disorder at ages 13, 15 and 18 years, hyperactivity and antisocial behaviour from ages 5 through to 11 years, measures of family cohesion at ages 7, 9, 15 and 15 years, and adolescent attention problems were included in the regression models, the association between television viewing and unemployment for male Study members remained virtually unchanged ( $\beta=0.14$ ,  $p=0.0075$ ), although the mediating effect of education became non-significant ( $p=0.0881$ ).

We found that men were unemployed for more months than women, and that the association between television viewing and unemployment was stronger and only significant for male Study members. It is known that experience and expectations of employment for men and women are different (Blau and Kahn, 2000, Wootton, 1997, Ridgeway, 1997), and these differences may be responsible for the sex-differences we observed. For example, women without formal paid work were more likely to be classified as homemakers and therefore less likely to be identified as unemployed. It is difficult to know to what extent homemaker status was due to unemployment, but controlling for homemaker-status, or excluding homemakers from the analyses, did not affect our findings.

We believe that this is the first study to show that increased childhood and adolescent television viewing is associated with later adult unemployment. As with any observational research, establishing a causal relationship is difficult. However, our measures of childhood television viewing were obtained long before Study members entered the workforce, so reverse causation is unlikely. It is possible that unidentified confounders explain this relationship, although we have adjusted for several of the most obvious ones.

A potential limitation of this analysis is that we did not adjust for time spent in full-time education, which precluded classification as unemployed. That is, if a Study member was in full-time education for part of the assessment period, they could not be “unemployed” for this time. We therefore repeated all our analyses with additional adjustment for time spent in full-time education. The results were virtually identical to those reported in Table 1. Analyses of time unemployed as a proportion of time not in full-time education also obtained very similar results.

Unfortunately, we do not have data on “educational” and “non-educational” television viewing (Chernin and Linebarger, 2005, Wright et al., 2001). It has been suggested that the adverse effects of television viewing are due to non-educational entertainment television programmes, but that educational television leads to positive outcomes (Wright et al., 2001, Anderson et al., 2001, Rice et al., 1990). While we accept that this is plausible, it is important to note that any potential benefits from watching educational television rely on selectively viewing educational television programmes and minimising entertainment television. Our data reflect ‘normal’ viewing habits that include both educational and non-education television. Our results show that, for boys at least, the net effect of television viewing appears to have an adverse effect on risk for unemployment.

This study has several important strengths. We obtained detailed information on employment history collected using life-history calendars (Freedman et al., 1988, Caspi et al., 1996). We also have good information on several prospectively measured covariates. In addition, the Dunedin Study enjoys a very high participant retention rate, so it is unlikely that these results are influenced by attrition.

## Conclusion

Our results provide evidence that television viewing by boys during childhood and adolescence may increase the risk for unemployment in adulthood. Associations between girls’ television viewing and later unemployment were weaker and not significant. We believe that this is the first study to investigate these associations and further research is needed to verify these findings. We found that the association was only partially mediated by educational achievement, and were unable to identify any other confounding variables that explained the association.



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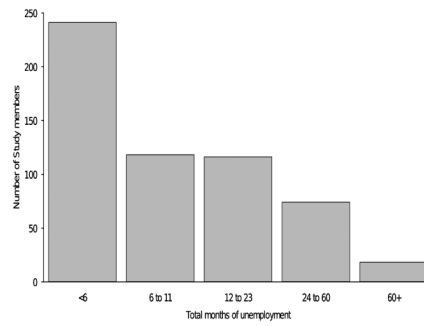
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### Highlights

- We assessed the effect of childhood TV viewing on later unemployment as adults.
- Data were collected over 32 years from a general population birth cohort.
- Boys who were heavy TV viewers were more likely to be unemployed as adults.
- This association was only partially attributable to educational outcomes.



**Figure 1.** Number of Study members unemployed as a function of categories of total time spent unemployed between the ages of 18 and 32 years for a New Zealand birth cohort assessed from 1972 to 2005.

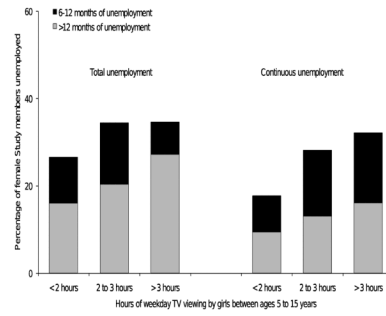


Figure 2a

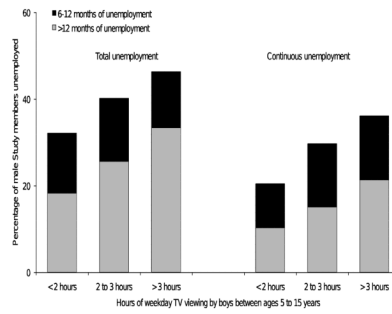


Figure 2b

**Figure 2.** Proportion of Study members that reported at least 6 months, or at least 12 months of unemployment between ages 18 and 32 years, as a function of childhood and adolescent weekday television viewing. Results include total months of unemployment (the cumulative month of unemployment between 18 to 32 years) and longest period of continuous unemployment (the longest unbroken period of unemployment). Results presented separately for female (Figure 2a) and male (Figure 2b) Study members in New Zealand between 1972 and 2005. For TV <2 hours, n=318; 2 to 3 hours, n = 411; > 3 hours, n = 189.

**Table 1**

Linear regression models showing associations between childhood and adolescent weekday television viewing and log-transformed months of unemployment between 18 and 32 years of Study members in New Zealand between 1972 and 2005.

	female		male	
	beta	p	beta	p
Model 1				
TV at ages 5–15	0.08	0.0891	0.20	0.0000
Model 2				
TV at ages 5–15	0.03	0.6220	0.17	0.0007
Family SES	0.07	0.1919	0.07	0.1930
IQ at ages 7–13	–0.10	0.0792	–0.06	0.2657
Antisocial at age 5	0.04	0.4786	0.03	0.6141
Hyperactive at age 5	0.06	0.3486	0.11	0.0729

Betas in the table are standardised regression coefficients and represent the SD change in unemployment for each SD change in television viewing or the covariates. For model 1, n=454 and n=464 for female and male Study members respectively. For model 2, n=438 and n=455 for female and male Study members respectively.

**Table 2**

Logistic regression models showing associations between childhood and adolescent weekday television viewing and more than a total of at least 6 months of unemployment between 18 and 32 years Study members in New Zealand between 1972 and 2005.

	female		male	
	OR (95%CI)	p	OR (95%CI)	p
Model 1				
TV at ages 5–15	1.12 (0.90, 1.40)	0.3192	1.45 (1.15, 1.82)	0.0016
Model 2				
TV at ages 5–15	1.04 (0.81, 1.34)	0.7534	1.36 (1.06, 1.76)	0.0157
Family SES	1.14 (0.93, 1.41)	0.2117	1.16 (0.95, 1.42)	0.1503
IQ at ages 7–13	0.99 (0.97, 1.00)	0.1382	1.00 (0.98, 1.02)	0.9770
Antisocial at age 5	1.16 (0.95, 1.40)	0.1398	1.02 (0.88, 1.20)	0.7677
Hyperactive at age 5	1.03 (0.83, 1.28)	0.7986	1.25 (1.02, 1.53)	0.0326

OR=odds ratios and represent the likelihood of total of at least 6 months unemployment for each hour of television viewing versus less than 6 months of unemployment; unemployment is not necessarily continuous. 95%CI= 95% confidence interval of the odds ratio. For model 1, n=454 and n=464 for female and male Study members respectively. For model 2, n=438 and n=455 for female and male Study members respectively.

**Table 3**

Logistic regression models showing association between childhood and adolescent weekday television viewing, and continuous long-term unemployment between 18 and 32 years of Study members in New Zealand between 1972 and 2005.

	female		male	
	OR (95%CI)	p	OR (95%CI)	p
≥6 months continuous unemployed				
unadjusted	1.43 (1.12, 1.82)	0.0037	1.56 (1.22, 2.00)	0.0005
fully-adjusted*	1.24 (0.95, 1.62)	0.1180	1.44 (1.09, 1.89)	0.0095
≥12 months continuous unemployed				
unadjusted	1.33 (0.98, 1.82)	0.0690	1.62 (1.19, 2.20)	0.0022
fully-adjusted*	1.08 (0.76, 1.53)	0.6831	1.40 (0.99, 1.98)	0.0535
≥24 months continuous unemployed				
unadjusted	2.07 (1.27, 3.39)	0.0037	2.11 (1.35, 3.29)	0.0011
fully-adjusted*	1.59 (0.89, 2.83)	0.1167	2.14 (1.25, 3.67)	0.0054

\* Fully-adjusted models controlled for family socioeconomic status, childhood cognitive functioning, and indicators of behaviour problems (antisocial behaviour and hyperactivity) at age 5.