

1 Adolescent mental health and behavioural predictors 2 of being NEET: a prospective study of young adults 3 not in employment, education, or training

Q1 4 L. Rodwell^{1,2*}, H. Romaniuk^{1,2,3}, W. Nilsen^{4,5}, J. B. Carlin^{1,2}, K. J. Lee^{1,2} and G. C. Patton^{2,3}

5 ¹Clinical Epidemiology and Biostatistics Unit, Murdoch Childrens Research Institute, Parkville, VIC, Australia

6 ²Department of Paediatrics, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Melbourne, VIC, Australia

7 ³Centre for Adolescent Health, Murdoch Childrens Research Institute, The Royal Children's Hospital, Parkville, VIC, Australia

8 ⁴Work Research Institute, Oslo and Akershus University College of Applied Sciences, Oslo, Norway

9 ⁵Department of Mental Disorders, Mental and Physical Health, Norwegian Institute of Public Health, Oslo, Norway

10 **Background.** Young adults who are not in employment, education, or training (NEET) are at risk of long-term economic
11 disadvantage and social exclusion. Knowledge about risk factors for being NEET largely comes from cross-sectional
12 studies of vulnerable individuals. Using data collected over a 10-year period, we examined adolescent predictors of
13 being NEET in young adulthood.

14 **Methods.** We used data on 1938 participants from the Victorian Adolescent Health Cohort Study, a community-based
15 longitudinal study of adolescents in Victoria, Australia. Associations between common mental disorder, disruptive
16 behaviour, cannabis use and drinking behaviour in adolescence, and NEET status at two waves of follow-up in
17 young adulthood (mean ages of 20.7 and 24.1 years) were investigated using logistic regression, with generalised esti-
18 mating equations used to account for the repeated outcome measure.

19 **Results.** Overall, 8.7% of the participants were NEET at age 20.7 years and 8.3% at 24.1 years. After adjusting for poten-
20 tial confounders, we found evidence of increased risk of being NEET among frequent adolescent cannabis users [adjusted
21 odds ratio (OR_{adj}) = 1.71; 95% confidence interval (CI) 1.09–2.69] and those who reported repeated disruptive behaviours
22 (OR_{adj} = 1.66; 95% CI 1.13–2.43) or persistent common mental disorders in adolescence (OR_{adj} = 1.58; 95% CI 1.08–2.33).
23 Similar associations were present when participants with children were included in the same category as those in
24 employment, education, or training.

25 **Conclusions.** Young people with an early onset of mental health and behavioural problems are at risk of failing to make
26 the transition from school to employment. This finding reinforces the importance of integrated employment and mental
27 health support programmes.

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29 **Key words:** Cannabis use, common mental disorder, disruptive behaviour, NEET, unemployment.

30 Introduction

31 With youth unemployment in many high- and
32 middle-income countries at unprecedented high levels
33 since the global financial crisis of 2008, the transition
34 from school into employment has become increasingly
35 difficult, leaving many young adults in unstable, infor-
36 mal employment or unable to find work at all (Lloyd,
37 2005; ILO, 2015).

38 In this context, there has been increased social policy
39 interest in young adults who are failing to make a suc-
40 cessful transition into employment. One indicator used

to identify difficulties with making this transition is 41
'NEET' – not in employment, education, or training. 42
The Organisation for Economic Co-operation and 43
Development (OECD, 2015) estimated the average per- 44
centage of young adults (20–24 years of age) who were 45
NEET in 2014 to be 18%. This group of young adults 46
are more likely to have lower earnings, be in unstable 47
employment conditions and face more frequent and 48
longer periods of unemployment through adult life 49
(Hale *et al.* 2015; ILO, 2015). A young person's risk of 50
being NEET depends on country-specific unemploy- 51
ment rates, government-led employment and training 52
initiatives, and cultural factors (European Union 53
Committee, 2014). Aspects of family background includ- 54
ing socioeconomic status, parental employment, and 55
parental divorce are also associated with NEET status 56
in young adulthood (Coles *et al.* 2002; Eurofound, 2012). 57

* Address for correspondence: L. Rodwell, Clinical Epidemiology and Biostatistics Unit, Murdoch Childrens Research Institute, Parkville, VIC, Australia.

(Email: laura.rodw@gmail.com)

58 High rates of common mental disorders (i.e. anxiety
 59 and depression), suicide risk, and substance abuse
 60 have been observed in young adults who are NEET
 61 (Benjet *et al.* 2012; Baggio *et al.* 2015), leading to ques-
 62 tions around the extent to which earlier common men-
 63 tal disorders contribute to the risk of being NEET in
 64 young adulthood. Current evidence suggestive of an
 65 association between common mental disorder and
 66 NEET status in young adulthood mainly comes from
 67 cross-sectional studies with young adults from clinical
 68 or disadvantaged settings (Benjet *et al.* 2012; Nardi
 69 *et al.* 2013; O'Dea *et al.* 2014). Such cross-sectional
 70 profiles are limited in their capacity to identify the dir-
 71 ectionality in associations, as an episode of depression
 72 or anxiety may be either a cause or consequence of
 73 being NEET.

74 Several prospective cohort studies have reported a
 75 relationship between common mental disorders in ado-
 76 lescence and subsequent NEET status. However, these
 77 studies have either measured NEET status before 20
 78 years of age (Cornaglia *et al.* 2012; Veldman *et al.*
 79 2015), used a definition of NEET that included working
 80 with a basic level of education (Veldman *et al.* 2015), or
 81 only considered a limited set of potential confounders
 82 (e.g. socioeconomic status and gender) (Power *et al.*
 83 2015). Further research is required to examine the rela-
 84 tionship between common mental disorders in adoles-
 85 cence and the risk of being NEET in young adulthood,
 86 with adequate adjustment for family background and
 87 other potential risk factors. The current study includes
 88 the behavioural adolescent risk factors of high-risk can-
 89 nabis and alcohol use and disruptive behaviour, which
 90 have been examined as risk factors for employment
 91 and education-related outcomes in previous studies.

92 Although there is strong evidence of an association
 93 between cannabis use and educational outcomes
 94 (Horwood *et al.* 2010; Silins *et al.* 2014), few studies
 95 have considered cannabis use as a potential risk factor
 96 for being NEET. Associations between cannabis use
 97 and NEET status in young adulthood have been
 98 reported in cross-sectional studies (Benjet *et al.* 2012;
 99 O'Dea *et al.* 2014; Nardi *et al.* 2015). Baggio *et al.*
 100 (2015) also found an association between cannabis
 101 use and NEET status for males, but cannabis use was
 102 measured around 20 years of age, when some partici-
 103 pants were already NEET. Alcohol use has been exam-
 104 ined as a risk factor for unemployment and
 105 educational outcomes separately, but there has been
 106 little examination of potential associations between
 107 drinking behaviour in adolescence and later NEET sta-
 108 tus. It is therefore important to examine the association
 109 between earlier substance use and NEET status using
 110 longitudinal data.

111 A final potential risk factor for being NEET in young
 112 adulthood is aggressive or disruptive behaviour in

adolescence. Moore *et al.* (2015) examined the relation-
 113 ship between experiences with peer aggression (i.e.
 114 being a victim, perpetrator, or victim-perpetrator of
 115 threatening or nasty behaviour, hitting or kicking, or
 116 ostracism) at 14 years of age and employment and edu-
 117 cation status at 17 and 20 years (defined as an ordinal
 118 outcome of: enrolled in education; employed full-time
 119 or part-time; or NEET). Perpetrators and victim-
 120 perpetrators of peer aggression were more likely to be
 121 in employment or NEET than in education at 17
 122 years of age, with perpetrators also more likely to be
 123 NEET at 20 years of age.
 124

Most published studies have only considered a
 125 definition of NEET in which participants with children
 126 are classified according to their activities (i.e. they are
 127 NEET if not also in employment, education, or training).
 128 The inclusion of young adults who have children
 129 in the NEET category may capture an important group
 130 of vulnerable people who face social and economic dis-
 131 advantage. Research on early parenting, focused
 132 mainly on teenage pregnancy, has identified several
 133 risk factors for becoming a parent in late adolescence
 134 that are similar to those for young adults who are
 135 NEET (Woodward *et al.* 2001; Nilsen *et al.* 2012).
 136 Long-term consequences of early parenting similar to
 137 those for unemployment have also been reported,
 138 including fewer life opportunities, higher psychosocial
 139 disadvantage, and prolonged welfare dependence
 140 (Nanchahal *et al.* 2005; Olsson *et al.* 2014). An argument
 141 against including young adults with children in the
 142 NEET group is that becoming a parent represents a
 143 level of responsibility and, particularly for females,
 144 may limit a young person's ability to participate in
 145 employment or education. Therefore, it may be impor-
 146 tant to examine young adults with children separately
 147 and not automatically classify them as being NEET.
 148

In the current study, we use a prospective
 149 population-based longitudinal cohort to examine inde-
 150 pendent associations between common mental dis-
 151 order, substance (i.e. alcohol and cannabis) use, and
 152 disruptive behaviours in adolescence and being
 153 NEET in young adulthood. We also introduce a second
 154 outcome of 'not in employment, education, parenting,
 155 or training' (NEEPT), and investigate how results are
 156 affected when we include young adults with children
 157 in the same category as those in employment, educa-
 158 tion, or training.
 159

Method 160

Study participants and analysis sample 161

Participants were recruited into the Victorian 162 Adolescent Health Cohort Study (VAHCS) at 14–15 163 years of age through a two-stage cluster random 164

165 sampling procedure. In the first stage, a stratified sample of 45 government, independent, and Catholic secondary schools in Victoria, Australia were randomly selected. One school with 13 participants did not continue beyond the first wave and was withdrawn from 170 the study, leaving 44 schools. In the second stage, 171 two classes from each school were randomly selected 172 to participate. Within each school, one of the classes 173 entered the study in 1992, at the end of their ninth 174 school year (wave 1), and the second class entered 175 the study 6 months later in 1993 (wave 2). 176 Participants from both entry waves were followed up 177 a further four times in adolescence at 6-monthly intervals (waves 3–6), and four times in young to mid- 179 adulthood at age 20–21 years (wave 7), 24–25 years 180 (wave 8), 28–29 years (wave 9), and 34–35 years 181 (wave 10). **Figure 1** shows the flow of participants 182 through the study.

183 In waves 1–6, participants self-administered the 184 study questionnaire on laptops in their classrooms, 185 with telephone follow-up attempted for anyone who 186 was absent. In waves 7–10, participants were surveyed 187 over the phone using computer-assisted telephone interviews. Participants' parents or guardians provided written informed consent at the entry waves. Participants 190 gave verbal consent at each wave after receiving information on the content of the questionnaire.

192 The study design omitted more than half of the 193 cohort in wave 1; therefore, waves 2–6 were used to 194 summarise behaviours in the adolescent period. 195 Some participants ($n = 56$) completed the questionnaire 196 at wave 1 and had no further participation in adolescence. As waves 1 and 2 were only 6 months apart, 198 we considered it reasonable to fill in wave 2 data for 199 these 56 participants using their responses on the 200 same measures at wave 1. This method has been 201 adopted in previous analyses of this cohort (Patton 202 *et al.* 2014). We restricted the measurement of the outcome (NEET status) to the young adult period, 20–25 204 years of age (waves 7 and 8). From the initial intended 205 sample of 2032 participants, 1943 (96%) took part at 206 least once across the adolescent waves and hence had 207 available data on the predictors of interest. Five participants 208 had died by wave 8 and were excluded from 209 the analysis, leaving a total of 1938 participants.

210 Measures

211 NEET status

212 The primary outcome, NEET status, was defined at the 213 young adult waves 7 and 8 (mean ages 20.7 and 24.1 214 years) using participant-reported information on 215 employment, education, and training activities. 216 Participants were asked whether they were currently 217 enrolled in: university, private college, or an institute

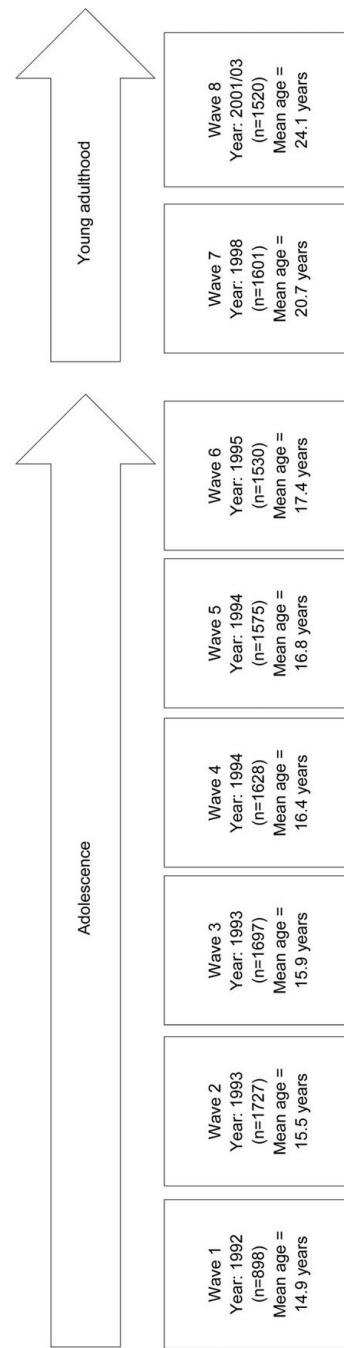


Fig. 1 - Recruitment and follow-up of participants in the Victorian Adolescent Health Cohort, 1992–2003. There were two entry points (at wave 1 and wave 2).

218 for vocational education and training. Participants
 219 were also asked about their current work status with
 220 options of: have a paid job, volunteering, receiving
 221 payment in kind (i.e. receiving goods or services in
 222 return for work), or unemployed. We classified partici-
 223 pants who did not have a paid job and were not cur-
 224 rently studying or in training as NEET.

225 Some participants had children by waves 7 and
 226 8. For the primary analysis, these participants were
 227 classified according to their reported activities (i.e. if
 228 they were not in employment, education, or training,
 229 they were classified as NEET). For the secondary ana-
 230 lysis, participants were classified using the outcome of
 231 NEEPT (not in employment, education, *parenting*, or
 232 training).

233 Adolescent risk factors

234 Information on common mental disorder, disruptive
 235 behaviour, cannabis use, and drinking behaviour was
 236 collected at each adolescent wave. Information across
 237 waves 2–6 was used to create summary measures
 238 that represent the severity or persistence of each risk
 239 factor during adolescence.

240 Common mental disorder

241 Common mental disorder was assessed at each adoles-
 242 cent wave using the revised Clinical Interview
 243 Schedule (CIS-R), a standardised assessment designed
 244 to measure symptoms of depression and anxiety in
 245 non-clinical populations (Lewis *et al.* 1992). The total
 246 CIS-R score (range 0–57) measures the severity of com-
 247 mon mental disorder based on 14 symptoms: depres-
 248 sion, anxiety, worry, irritability, compulsiveness,
 249 obsessiveness, fatigue, somatic symptoms, concentra-
 250 tion, sleep problems, worry over physical health,
 251 depressive ideas, phobias, and panic.

252 The CIS-R was designed to be administered by
 253 trained interviewers or self-administered using a com-
 254 puter. Reliability studies have shown a good level of
 255 agreement between CIS-R scores obtained by trained
 256 interviewers and psychiatrists [$\kappa = 0.70$, 95% confidence
 257 interval (CI) 0.51–0.88] and a moderately strong corre-
 258 lation (0.77) between the CIS-R score and a clinical
 259 judgement of severity made by a psychiatrist who
 260 could ask additional questions (Lewis *et al.* 1992).
 261 Further, the correlation between CIS-R scores obtained
 262 through self-completed computerised assessments and
 263 those obtained from assessments with trained inter-
 264 viewers was 0.91 (Lewis, 1994).

265 Persistence of common mental disorders in ado-
 266 lescent was categorised as: no waves, one wave, or
 267 two or more waves with CIS-R ≥ 12 , the threshold at
 268 which clinical intervention by a family doctor would
 269 be appropriate (Lewis *et al.* 1992).

Disruptive behaviour

270

Disruptive behaviour was assessed at each adolescent
 271 wave using nine items adapted from the Moffitt and
 272 Silva self-report early delinquency scale (Moffitt &
 273 Silva, 1988), which covers interpersonal conflict, theft,
 274 property damage, and graffiti. At each wave, a variable
 275 was derived to identify if a participant had reported
 276 multiple disruptive behaviours. This could be the
 277 same behaviour more than once, or two or more sepa-
 278 rate behaviours. For the adolescent summary measure,
 279 a dichotomous variable was derived to represent per-
 280 sistent disruptive behaviours in adolescence, defined
 281 as multiple disruptive behaviours in two or more ado-
 282 lessent waves. 283

Cannabis use

284

At each adolescent wave, participants were asked to
 285 report their frequency of cannabis use in the previous
 286 6 months. The response options were: never; not in
 287 past 6 months; a few times a year; monthly; weekly;
 288 daily. We derived a dichotomous variable to identify
 289 frequent cannabis use, defined as weekly or daily can-
 290 nabis use at one or more waves. 291

Drinking behaviour

292

Drinking behaviour was measured at each adolescent
 293 wave using a 7-day retrospective alcohol diary. 294
 Participants reported the type, brand, and amount of
 295 alcohol consumed each day in the week before the
 296 questionnaire, from which the daily number of (10 g)
 297 units of alcohol was calculated. At each wave, partici-
 298 pants were classified into one of three levels of drink-
 299 ing behaviour: no drinking; at least one occasion of
 300 drinking but no occasions of heavy binge drinking;
 301 or at least one occasion of heavy binge drinking [20
 302 or more units for males, and 11 or more units for
 303 females on any day over the diary week (Livingston
 304 *et al.* 2008)]. For the adolescent summary measure,
 305 we used each participant's highest level of drinking
 306 behaviour across the adolescent waves. 307

Potential confounders

308

Parental education. Parental education was used as an
 309 indicator of socioeconomic status (Hauser, 1994). At
 310 each wave, participants were asked to report the edu-
 311 cation level of each parent, classified as: did not
 312 finish high school; finished high school or a technical
 313 college; or obtained a degree from a university or col-
 314 lege. We used the information on the parent who
 315 had the highest level of education by the end of the
 316 adolescent waves to form the parental education
 317 variable. 318

319 *Parental divorce or separation.* Participants were asked
 320 about the marital status of their parents at each wave
 321 in adolescence, and at waves 7 and 8. We derived a
 322 dichotomous variable to indicate whether the partici-
 323 pant's parents had divorced or separated prior to
 324 their wave 6 interview.

325 *School location.* Finally, we included a dichotomous
 326 variable to indicate whether the school that partici-
 327 pants were enrolled in at the time of recruitment was
 328 located in a metropolitan area (i.e. Melbourne, Victoria)
 329 or outside this area.

330 Analyses

331 We estimated the prevalence of NEET in young adult-
 332 hood and summarised the adolescent and family back-
 333 ground characteristics, both overall and by gender.
 334 Logistic regression models for being NEET at waves
 335 7 and 8 were fitted using generalised estimating equa-
 336 tions (Liang & Zeger, 1986), assuming an exchangeable
 337 working correlation matrix with robust standard errors
 338 to allow for the repeated outcome measure. A series of
 339 models were fitted to estimate the association between
 340 the adolescent risk factors and the odds of being NEET.
 341 We estimated the effect of each adolescent risk factor
 342 using univariable models (model a), a multivariable
 343 model including the adolescent risk factors only
 344 (model b), and a multivariable model including the
 345 adolescent risk factors with additional adjustment for
 346 gender, parental divorce or separation, level of paren-
 347 tal education, school location, and the wave at which
 348 the outcome was measured (model c). To examine
 349 whether effects were modified by gender or the wave
 350 at which the outcome was measured, we assessed the
 351 inclusion of interaction terms in model c. Main effects
 352 and interactions were assessed using (two-sided)
 353 Wald tests. All analyses were repeated for the second-
 354 ary outcome, NEEPT.

355 Some participants did not respond at all adolescent
 356 and young adult waves. Of the 1938 participants
 357 included in this study, 1031 (53%) took part in all
 358 waves included in the analysis (i.e. waves 2–8), with
 359 349 (18%) not participating in one wave, 216 (11%) in
 360 two waves, and 343 (18%) in three or more waves.
 361 Missing data were handled using multiple imputation
 362 (Rubin, 1987). We generated 100 imputed datasets and
 363 imputed at the wave level, separately for males and
 364 females, using the method of chained equations (van
 365 Buuren, 2007). The adolescent summary variables
 366 were derived after imputation. All estimates were
 367 obtained by averaging results across the 100 imputed
 368 datasets with inferences under multiple imputation
 369 obtained using Rubin's rules (Rubin, 1987). Further
 370 details on the multiple imputation procedure are

provided in the online Supplementary Materials. We
 371 used Stata version 14.1 (StataCorp, 2015) for all
 372 analyses.

Finally, after considering the results obtained from
 374 model c, we used the 'mimrgns' command (Klein,
 375 2016) in Stata to compute the average predicted prob-
 376 ability of being NEET among young people who had
 377 reported all of the adolescent risk factors found to be
 378 associated with NEET status. We also computed the
 379 predicted probability of being NEET for young people
 380 who had none of these risk factors. Predicted probabili-
 381 ties were computed using observed values for the
 382 remaining variables in the model.

Results

As shown in Table 1, 6–10% of males and females were
 385 NEET at waves 7 and 8, with an apparent divergence
 386 between genders at wave 8 due to a slight increase in
 387 the prevalence of NEET among females. This differ-
 388 ence between the genders resolved when the outcome
 389 of NEEPT was used and participants with children
 390 were classified into the same category as those in
 391 employment, education, or training. The prevalence
 392 of common mental disorder in adolescence was higher
 393 for females than males, whereas males had higher rates
 394 of disruptive behaviour and frequent cannabis use,
 395 and tended to report riskier drinking behaviours dur-
 396 ing adolescence.

Table 2 shows the estimated prevalence of NEET sta-
 398 tus at each young adult wave for the adolescent risk
 399 and background factors and Table 3 presents estimates
 400 of the marginal odds ratios (OR) obtained from the ser-
 401 ries of logistic regression models for being NEET in
 402 young adulthood. When modelled separately (model
 403 a), there was strong evidence that persistent common
 404 mental disorders, frequent cannabis use, and persistent
 405 disruptive behaviours in adolescence were each asso-
 406 ciated with NEET status in young adulthood. These
 407 effects were slightly weaker when the risk factors
 408 were mutually adjusted in a multivariable model
 409 (model b). Finally, when we included potential con-
 410 founders and examined whether there was any evi-
 411 dence of effect modification by gender or the wave at
 412 which the outcome was measured (model c), there
 413 was some evidence that the association between gen-
 414 der and NEET status differed by the age at which
 415 NEET status was measured; this interaction was
 416 retained in the final model. In model c, the persistence
 417 of common mental disorders in adolescence was inde-
 418 pendently associated with NEET status in young
 419 adulthood, with participants who experienced two or
 420 more waves of disorder more likely to be NEET than
 421 those with no waves of disorder in adolescence
 422 [adjusted OR (OR_{adj}) = 1.58, 95% CI 1.08–2.33]. The

Table 1. Summary of NEET and NEEPT status and adolescent predictors, by gender and overall

Measures	Male participants (n = 939)		Female participants (n = 999)		Total participants (n = 1938)	
	n (%) ^a	(95% CI)	n (%) ^a	(95% CI)	n (%) ^a	(95% CI)
NEET status						
Wave 7 (mean age 20.7)	77 (8.2)	(6.0–10.4)	88 (8.8)	(6.9–10.8)	165 (8.5)	(7.1–9.9)
Wave 8 (mean age 24.1)	59 (6.3)	(4.3–8.3)	100 (10.0)	(8.0–12.1)	159 (8.2)	(6.8–9.7)
NEEPT status						
Wave 7	75 (8.0)	(5.8–10.2)	66 (6.6)	(4.9–8.4)	141 (7.3)	(5.9–8.7)
Wave 8	54 (5.8)	(3.9–7.8)	52 (5.2)	(3.6–6.8)	106 (5.5)	(4.3–6.8)
<i>Adolescent risk factors</i>						
Persistence of common mental disorder (CIS-R ≥ 12)						
No waves	660 (70.3)	(67.1–73.5)	458 (45.8)	(42.6–49.0)	1118 (57.7)	(55.3–60.0)
1 wave	143 (15.2)	(12.5–18.0)	173 (17.3)	(14.7–19.9)	316 (16.3)	(14.4–18.2)
2+ waves	136 (14.5)	(12.0–16.9)	368 (36.9)	(33.8–40.0)	504 (26.0)	(24.0–28.1)
Any frequent (at least weekly) cannabis use	181 (19.3)	(16.5–22.2)	119 (11.9)	(9.6–14.2)	300 (15.5)	(13.7–17.3)
Drinking behaviour						
No drinking	320 (34.1)	(30.8–37.5)	422 (42.3)	(39.1–45.5)	742 (38.3)	(36.0–40.7)
Any drinking, below heavy binge levels	418 (44.5)	(40.9–48.1)	400 (40.0)	(36.7–43.3)	818 (42.2)	(39.8–44.6)
Any heavy binge drinking	201 (21.4)	(18.4–24.3)	177 (17.7)	(15.2–20.2)	378 (19.5)	(17.6–21.4)
Persistent disruptive behaviour	376 (40.1)	(36.7–43.5)	223 (22.3)	(19.6–25.1)	599 (30.9)	(28.7–33.1)
<i>Background factors</i>						
School located outside metropolitan area	241 (25.7)	(22.9–28.5)	257 (25.7)	(23.1–28.5)	498 (25.7)	(23.8–27.7)
Highest level of education, either parent						
High school not completed	274 (29.2)	(26.2–32.3)	378 (37.8)	(34.8–40.9)	652 (33.7)	(31.5–35.8)
High school completed	338 (36.0)	(32.8–39.2)	323 (32.3)	(29.3–35.2)	661 (34.1)	(31.9–36.3)
University or college degree	326 (34.7)	(31.6–38.0)	299 (29.9)	(27.0–32.8)	625 (32.2)	(30.1–34.4)
Parental divorce or separation	217 (23.1)	(20.4–25.8)	221 (22.1)	(19.6–24.7)	438 (22.6)	(20.8–24.5)

CI, confidence interval; CIS-R, revised Clinical Interview Schedule; NEET, not in employment, education, or training; NEEPT, not in employment, education, parenting or training.

^a Estimated percentage of participants within each category, averaged over 100 imputed datasets.

424 odds of being NEET were also higher for participants
 425 who reported persistent disruptive behaviour in ado-
 426 lescence compared with those who reported no or
 427 low disruptive behaviour ($OR_{adj} = 1.66$, 95% CI 1.13–
 428 2.43). Participants who reported frequent cannabis
 429 use in adolescence had higher odds of being NEET
 430 compared with those who used cannabis infrequently
 431 or not at all ($OR_{adj} = 1.71$, 95% CI 1.09–2.69). There
 432 was little evidence of an association between drinking
 433 behaviour in adolescence and NEET status in young
 434 adulthood, particularly after controlling for other ado-
 435 lessent risk factors.

436 An estimated 4.1% (95% CI 3.1–5.1%) of young peo-
 437 ple had all three adolescent risk factors (i.e. two or
 438 more waves of common mental disorder, persistent
 439 disruptive behaviour, and frequent cannabis use dur-
 440 ing adolescence), while 40.8% (95% CI 38.5–43.1%)
 441 had none of these risk factors. The predicted probabili-
 442 ty of being NEET for young people with none of the
 443 adolescent risk factors was 5.4% (95% CI 4.0–6.8%),

whereas young people with all three risk factors had 444
 a 20.1% (95% CI 13.5–26.8%) probability of being 445
 NEET. 446

The results for the outcome of NEEPT are presented 447
 in the online Supplementary Materials (Tables B1 and 448
 B2). Around 7–8% and 5–6% of participants were 449
 NEEPT at waves 7 and 8, respectively. The associations 450
 between the adolescent risk factors and NEEPT status 451
 reflected the results for NEET, although the effect of 452
 persistent disruptive behaviour was weakened slightly 453
 in the model for NEEPT. 454

Discussion

The transition from school into employment is crucial 456
 to support a young person's development towards a 457
 point at which they can make their own decisions, 458
 accept responsibility, and be financially independent 459
 (Arnett, 2014). Young adults who fail to make this tran- 460
 sition are at risk of long-term unemployment, 461

Table 2. Prevalence of NEET status in young adulthood, by adolescent risk and background factors

Measures	n ^a	Per cent NEET				
		Wave 7 (mean age 20.7)		Wave 8 (mean age 24.1)		
		n (%) ^b	(95% CI)	n (%) ^b	(95% CI)	
<i>Adolescent risk factors</i>						
Persistence of common mental disorder (CIS-R ≥ 12)						
No waves	1118	76 (6.8)	(5.0–8.6)	64 (5.8)	(4.1–7.5)	
1 wave	316	30 (9.5)	(5.5–13.5)	27 (8.5)	(4.5–12.6)	
2+ waves	504	59 (11.7)	(8.5–15.0)	68 (13.5)	(10.0–16.9)	
Cannabis use						
None or infrequent use	1638	113 (6.9)	(5.5–8.4)	121 (7.4)	(5.9–8.9)	
Frequent (at least weekly) use	300	52 (17.4)	(11.8–23.0)	38 (12.8)	(8.2–17.3)	
Drinking behaviour						
No drinking	742	52 (7.1)	(4.9–9.3)	58 (7.9)	(5.6–10.3)	
Any drinking, below heavy binge levels	818	68 (8.3)	(6.0–10.7)	61 (7.4)	(5.3–9.5)	
Any heavy binge drinking	378	45 (11.8)	(7.7–15.9)	40 (10.5)	(6.8–14.1)	
Persistent disruptive behaviour						
No	1339	84 (6.3)	(4.7–7.8)	92 (6.9)	(5.3–8.5)	
Yes	599	81 (13.6)	(10.3–16.8)	67 (11.2)	(8.2–14.2)	
<i>Background factors</i>						
Gender						
Male	939	77 (8.2)	(6.0–10.4)	59 (6.3)	(4.3–8.3)	
Female	999	88 (8.8)	(6.9–10.8)	100 (10.0)	(7.9–12.1)	
School location						
Within metropolitan area	1440	111 (7.7)	(6.1–9.3)	111 (7.7)	(6.1–9.3)	
Outside metropolitan area	498	54 (11.0)	(7.8–14.1)	48 (9.7)	(6.8–12.6)	
Highest level of parental education						
High school not completed	652	73 (11.3)	(8.5–14.0)	61 (9.4)	(6.8–12.0)	
High school completed	661	59 (8.9)	(6.4–11.4)	54 (8.2)	(5.8–10.6)	
University or college degree	625	33 (5.3)	(3.2–7.3)	44 (7.0)	(4.7–9.3)	
Parental divorce or separation						
No	1500	101 (6.7)	(5.3–8.2)	103 (6.9)	(5.4–8.4)	
Yes	438	64 (14.7)	(10.8–18.6)	56 (12.7)	(9.2–16.2)	

CI, confidence interval; CIS-R, revised Clinical Interview Schedule.

^aCalculated using imputed percentage estimates and total number of participants.^bEstimated number and percentage of participants who are NEET (not in employment, education, or training), averaged over 100 imputed datasets.

462 economic disadvantage, and social exclusion (Hale
463 *et al.* 2015; ILO, 2015).
464 A range of social and contextual factors, particularly
465 high unemployment rates, affect a young person's abil-
466 ity to obtain employment (ILO, 2015). The current
467 study has also identified important adolescent risk fac-
468 tors associated with a failure to make a smooth transi-
469 tion from school into employment, or further
470 education or training in young adulthood. Persistent
471 common mental disorders (i.e. reported in two or
472 more adolescent waves), persistent disruptive beha-
473 viours, and frequent cannabis use were each independ-
474 ently associated with being NEET in young adulthood.
475 Although adolescents with all three risk factors

represent a small percentage of the population, their
476 risk of being NEET is around 20%, compared with
477 only a 5% risk for those with no reported episodes of
478 common mental disorder, and little or no disruptive
479 behaviour and cannabis use in adolescence. There
480 was little evidence that drinking behaviour was an
481 independent predictor of NEET status. This result is
482 consistent with studies on unemployment or educa-
483 tional underachievement, which suggest that there is
484 only weak, if any, evidence that alcohol is a risk factor
485 for these separate outcomes (Wells *et al.* 2004; Patton
486 *et al.* 2007).
487 The percentage of young adults who were NEET in
488 this population ranged from 6% to 10%, depending on
489

Table 3. Association between adolescent risk factors and NEET status in young adulthood (waves 7 and 8)

Measures	Model a Risk factors fitted separately		Model b Risk factors mutually adjusted		Model c Adjusted for potential confounders ^a	
	OR (95% CI)	p value	OR _{adj} (95% CI)	p value	OR _{adj} (95% CI)	p value
<i>Adolescent risk factors</i>						
Persistence of common mental disorder (CIS-R ≥ 12)		0.0002 ^b		0.003 ^b		0.07 ^b
No waves	1.00		1.00		1.00	
1 wave	1.47 (0.92–2.36)		1.35 (0.83–2.18)		1.30 (0.79–2.13)	
2+ waves	2.15 (1.50–3.08)		1.86 (1.30–2.71)		1.60 (1.08–2.40)	
Frequent (at least weekly) cannabis use	2.30 (1.58–3.36)	<0.0001	1.81 (1.15–2.85)	0.01	1.74 (1.10–2.75)	0.02
Drinking behaviour		0.09 ^b		0.75 ^b		0.60 ^b
No drinking	1.00		1.00		1.00	
Any drinking, below heavy binge levels	1.05 (0.74–1.51)		0.87 (0.59–1.26)		0.84 (0.58–1.23)	
Any heavy binge drinking	1.54 (1.03–2.31)		0.87 (0.53–1.44)		0.80 (0.48–1.34)	
Persistent disruptive behaviour	2.01 (1.46–2.76)	<0.0001	1.58 (1.08–2.31)	0.02	1.71 (1.15–2.43)	0.01
<i>Potential confounding factors</i>						
School located outside metropolitan area					1.42 (1.02–1.97)	0.04
Highest level of parental education						0.03 ^b
High school not completed					1.00	
High school completed					0.91 (0.64–1.28)	
University or college degree					0.59 (0.40–0.87)	
Parental divorce or separation					1.75 (1.26–2.43)	0.009
Female					1.09 (0.71–1.68)	0.81
Outcome at wave 8 (v. wave 7)					0.75 (0.50–1.11)	0.12
Female × wave 8 interaction					1.54 (0.95–2.49)	0.08

OR, odds ratio; OR_{adj}, adjusted odds ratio; CI, confidence interval; CIS-R, revised Clinical Interview Schedule; NEET, not in employment, education, or training.

Note: ORs were obtained using generalised estimating equations assuming an exchangeable working correlation matrix with robust standard errors to allow for the repeated outcome measure.

^a Also adjusted for wave at which outcome was measured.

^b p value from joint test of significance.

age and gender. While this result is consistent with the OECD estimate for Australians aged 20–24 years, which has been reported to average around 10% over the past decade, it is lower than the average global NEET rate of 18% (OECD, 2015). The rate of young people who are NEET is influenced by country-specific unemployment rates, as well as cultural factors. However, we consider it reasonable to assume that individual risk factors for being NEET may be similar in their relative effects across countries.

The current study involved a large prospective community-based cohort, frequent measurement points, and high rates of participation. It also examined a range of well-measured adolescent risk factors and controlled for an appropriate set of potential confounders. Nevertheless, this study also had some limitations. Data on adolescent risk factors were based on self-report and may have been subject to measurement error. However, the use of laptops for self-administered

health surveys, as done in the current study, has been shown to enhance adolescents' perceptions of privacy and confidentiality, which may reduce the potential for reporting bias and improve response on individual items (Watson *et al.* 2001). NEET status in the young adult waves was based on employment and education activities at the time of the questionnaire and possibly reflected a temporary situation. Counting participants who had only been NEET for a short time would produce more conservative estimates of associations, and it is likely that we correctly classified participants who had been NEET over a longer period. Not all participants responded at every wave in adolescence and young adulthood, which meant we were faced with the problem of missing data. Multiple imputation was used to reduce the potential bias caused by missing data, and the imputation models were carefully built to include predictors of response and predictors of the incomplete variables (Collins *et al.* 2001).

528 Finally, although we considered the sensitivity of
529 results to how participants with children were clas-
530 sified, there may have been other reasons for being
531 NEET that were not considered, such as being in a full-
532 time carer's role, having a physical disability or illness,
533 or choosing to take time off for a holiday (Eurofound,
534 2016).

535 Very few studies on NEET have considered how the
536 classification of participants in a full-time parenting
537 role may affect results. We specified a second outcome
538 measure, NEEPT status, in which we classified young
539 adults who had children into the same category as
540 those in education, employment, or training. The
541 prevalence of NEEPT was slightly lower than that of
542 NEET, particularly for females at 24–25 years of age,
543 whereas the results for the adolescent risk factors
544 were reasonably consistent between the two outcomes.
545 While it did not appear to affect the conclusions for our
546 study, it is possible that the classification of partici-
547 pants with children as NEET (if they are not in employ-
548 ment, education, or training) may begin to introduce
549 unwanted heterogeneity as people move into their
550 late 20s. It is therefore recommended that researchers
551 who examine predictors and consequences of being
552 NEET in adulthood, and policymakers who seek to
553 reduce the NEET rate, carefully consider the compos-
554 ition of the group they define as NEET, provide details
555 on how they have defined this group, and consider
556 similar sensitivity analyses to those conducted for the
557 current study.

558 The association between persistent common mental
559 disorders in adolescence and being NEET in young
560 adulthood may reflect a continuation of disorder into
561 young adulthood. Indeed, although around 50% of
562 adolescents who experience common mental disorders
563 do not have further episodes in young adulthood,
564 those exhibiting longer lasting or recurrent episodes
565 are most at risk of experiencing persisting disorder
566 into young adulthood (Patton *et al.* 2014). The continu-
567 ation of common mental disorder into young adult-
568 hood can directly limit a person's ability to gain
569 employment, for example, by reducing the ability to
570 maintain motivation or cope with stress during the

Q3 571 job application process (Secker *et al.* 2001). The relation-
572 ship between common mental disorder and later NEET
573 status might also be mediated by school-related factors
574 including absenteeism due to anxious school refusal
575 (Heyne *et al.* 2001; Egger *et al.* 2003), although this is
576 beyond the scope of the current manuscript. Further
577 research examining the separate contributions of
578 depression and anxiety may also help to explain the
579 relationship between common mental disorders in
580 adolescence and later NEET status.

581 Disengagement from school is also likely to be par-
582 tially mediating the associations between cannabis

use, disruptive behaviour, and NEET status. Previous
583 studies have shown that heavy cannabis use in adoles-
584 cence reduces the odds of high school completion
585 (Horwood *et al.* 2010; Lynskey *et al.* 2003; Silins *et al.*
586 2014) and is associated with lower degree attainment
587 (Silins *et al.* 2014). In their study focused on peer
588 aggression, Moore *et al.* (2015) found that non-
589 completion of high school explained the relationship
590 between being a perpetrator of peer aggression and
591 being NEET at 20 years of age.
592

Frequent cannabis use and disruptive behaviours in
593 adolescence may also be indicative of a personality
594 type, or peer group affiliations that reject the social
595 norms associated with the levels of compliance,
596 responsibility, and commitment required to engage
597 with study or work (Fergusson & Horwood, 1997).
598 High levels of disruptive, particularly aggressive,
599 behaviour may also reflect problems with managing
600 emotions that are likely to affect one's ability to gain
601 and maintain employment.
602

An increasing amount of evidence suggests that
603 heavy cannabis use impairs cognitive performance
604 (Hall, 2015). Although impairment in cognitive per-
605 formance has mainly been acute, some research has
606 suggested that heavy cannabis use impairs decision-
607 making and planning, even after a period of abstinence
608 (Crean *et al.* 2011). The ability to plan and make deci-
609 sions has an important role in tasks relating to job-
610 seeking and other activities relating to employment
611 and education. Adolescent cannabis users have also
612 reported reduced interest in activities and lower
613 energy levels (Palamar *et al.* 2014). Such reductions in
614 interest and energy have been identified as possible
615 symptoms of cannabis induced 'amotivational syn-
616 drome' (Tennant & Groesbeck, 1972).
617

To the extent that these associations reflect causal
618 pathways, our study reinforces the importance of pre-
619 vention and early clinical intervention for common
620 mental disorders, cannabis use, and disruptive beha-
621 viours in adolescence. A particularly concerning statis-
622 tic from a survey of youth who had presented at a
623 primary mental health service was that only 10% of
624 respondents who were NEET had received any specific
625 vocational support in the previous year (O'Dea *et al.*
626 2016). To reduce the potential for long-term disadvan-
627 tage among young people who are, or at risk of,
628 becoming NEET it is important that evidence-based
629 programmes focused on vocational support be imple-
630 mented. For example, a recent meta-analysis demon-
631 strated that individual placement and support, which
632 adopts a 'place then train' approach to vocational sup-
633 port for people with severe mental illness, was more
634 than twice as likely to lead to competitive employment
635 compared with traditional vocational rehabilitation
636 methods that essentially adopt a 'train then place'
637

638 model (Modini *et al.* 2016). To target the disruptive
 639 behaviours, it is recommended that early interventions
 640 be aimed towards improving adolescents' interpersonal
 641 skills and their ability to manage emotions
 642 (Obsuth *et al.* 2014).

643 The association between frequent cannabis use in
 644 adolescence and the increased risk of being NEET in
 645 young adulthood is particularly relevant given trends
 646 towards the legalisation of cannabis use in some countries.
 647 With the potential for increased availability and
 648 ease of access to cannabis, as well as a possible reduction
 649 in adolescents' perception of the potential harms,
 650 there is a risk that a change in the legal status of cannabis
 651 may increase the rates of adolescent use (Ammerman
 652 *et al.* 2015). In this context, it is important that any
 653 legislation be accompanied by regulatory measures
 654 that minimise recreational adolescent cannabis use.

655 Supplementary Material

656 The supplementary material for this article can be
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667 Declaration of Interest

668 None.

669 Ethics Statement

670 Ethical approval for the study was obtained from the
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 674 comply with the ethical standards of the relevant
 675 national and institutional committees on human
 676 experimentation and with the Helsinki Declaration of
 677 1975, as revised in 2008.

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