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**Chapter 5. Does high school completion mediate the path from  
adolescent mental health to NEET in young adulthood?  
Comparing two cohorts born 10 years apart**

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## **Abstract**

**Background:** Adolescents who have mental health problems are more likely to become disconnected from work and education as young adults (or NEET i.e., not in education, employment, or training). This study examines how high school completion mediates this relationship in two cohorts, born ten years apart (1970-1980 vs. 1981-1990), who became young adults under different macroeconomic circumstances.

**Methods:** The National Longitudinal Survey of Youth 1979 Children/Young Adult (n=5,380) was used. Internalizing and externalizing problems from age 9-15 were measured using the Behavior Problems Index. Respondents' high school completion was assessed using their highest educational level. NEET was measured at age 25-26. Multi-group mediation analysis using the potential outcomes approach was conducted.

**Results:** NEET represented 22.8 to 26.2% of the 1970-1980 and 1981-1990 cohorts. Any internalizing problems between ages 9-15 increased the probability of NEET in the 1981-1990 cohort by 6.0% (95%CI:3.6-8.4%); externalizing problems in the 1970-1980 and 1981-1990 cohorts by 4.6 (95%CI:1.5-7.8) and 5.3% (95%CI:3.0-7.6%). The majority of these effects were not explained by high school non-completion. Yet, in an intervention scenario where everyone completed high school, the effect of adolescent internalizing and externalizing problems on NEET decreased by 0.44-0.62. No cohort differences were observed for indirect effect estimates; however, a direct effect of internalizing problems on NEET was found in the 1981-1990 cohort but not the 1970-1980 cohort.

**Conclusion:** Completing high school can reduce the risk of NEET for adolescents with mental health problems. Macroeconomic circumstances may shape the risk of NEET for those with internalizing problems.

## 5.1. Background

Access to higher education and adequate employment during the transition to young adulthood can seem unattainable for many young people. In 2016, it was estimated that one in nine people in the USA between the ages 16-24 were disconnected from both work and school,<sup>189</sup> described as “disconnected youth”, “opportunity youth”, or NEET (not in education, employment, or training).<sup>94</sup> NEET limits opportunities to acquire formal and informal skills, leaving lifelong scars on future earnings, occupational mobility, and health.<sup>190 191</sup>

Those who experience mental health problems in adolescence are particularly vulnerable to becoming NEET. As a growing body of evidence documents, adolescent internalizing problems (e.g., depressive and anxiety symptoms) and externalizing problems (e.g., behavioral and attention problems) are related to higher rates of high school dropout, and higher incidence and duration of unemployment in adulthood.<sup>51 167 192 193</sup> Those who experience mental health problems may search less actively for work when unemployed; face challenges with job performance and social stigma when employed; and, require workplace accommodations that employers do not provide.<sup>37-39</sup>

The predominant policy response to NEET has been the prevention of high school dropout and educational re-engagement;<sup>94</sup> however, there is little empirical evidence about how high school completion drives the risk of disconnection for adolescents with mental health problems. The limited research has been restricted to the indirect effects of child general health. Studies show that fewer years of education and lower credentials explain 11.5-32.3% of the effect of childhood hospitalization on earnings, years employed, and the receipt of income transfers in early adulthood,<sup>194</sup> and partially explain the effect of poorer self-reported health on adult wages.<sup>195</sup> One study observed that the lower probability of completing high school accounted for 14-28% of the effect of adolescent depression on adult wages.<sup>174</sup> Whether and to what

extent the relationship between adolescent mental health problems and NEET is mediated by high school completion is unclear.

Macroeconomic circumstances may shape the risk of NEET for those with mental health problems. While the evidence is mixed,<sup>196</sup> some studies have found that people with mental health problems experience a heightened risk of unemployment during economic downturns.<sup>50</sup>

<sup>51</sup> While unemployment tends to be less pronounced amongst more educated individuals during recession, studies have shown the benefits of higher education may not generalize to those with mental and other disabilities.<sup>197</sup> In 2007/2009, the USA was hit with its deepest recession since World War II.<sup>83</sup> Between 2008 and 2014, youth unemployment was at historic highs in the USA reaching a high of 19.5% in April of 2010.<sup>198</sup> Young people born between 1981-1990 who became young adults during this period faced worse economic conditions than their counterparts born 10 years prior (1970-1980) at the same age. This study compares how high school completion mediates the relationship between adolescent mental health problems and NEET in young adulthood in these two cohorts.



Figure 5.1 U.S. unemployment rate (16 to 24-year-olds), January 1995-December 2016 as reported in the Current Population Survey (U.S. Bureau of Labor Statistics)

## 5.2. Methods

### 5.2.1. Data and study cohorts

Data came from the National Longitudinal Survey of Youth 1979 Children/Young Adult, a national study of children born to the NLSY79 females (n=11,530), surveyed between 1986 and 2016.<sup>149</sup> From those fielded for the Young Adult questionnaire (n=9,135), two dynamic cohorts followed from approximately ages 9-25 were created: (1) those born between 1970-1980, and (2) 1981-1990.<sup>199</sup> As young adults, the 1970-1980 birth cohort experienced a period of economic recovery and a brief and mild recession in the early 2000's, during which youth unemployment rates did not exceed 13% (Figure 1).<sup>83</sup> In contrast, the 1981-1990 cohort faced

the Great Recession of 2007/2009 and its aftermath as young adults, during which youth unemployment remained over 13% for almost 6 years.

Those born after 1990 were excluded (n=2,585); and, those not followed up to approximately age 25/26 (n=313). Finally, individuals who had missing data on the outcome (n=610), and on the covariates (n=247) were excluded, leaving an analytic sample of 5,380 (1970-1980: n=1,378, 1981-1990: n=4,002). Compared to those in the analytic sample, partial non-responders were more likely to be NEET, less likely to have internalizing or externalizing problems, more likely to be male, less likely to be Black, and more likely to have children. Study procedures were approved by the UBC Behavioural Research Ethics Board (H18-0049).

### **5.2.2. Measures**

#### *5.2.2.1. NEET in young adulthood*

NEET was assessed using respondents' employment and education status at approximately age 25/26. Respondents that were not enrolled in school and not working on the date of interview at this age were considered NEET. All others were considered non-NEET.

#### *5.2.2.2. Adolescent mental health problems*

Mental health problems were assessed using the internalizing and externalizing scores of the behavior problems index (BPI).<sup>92</sup> The BPI comprises mothers' ratings of children in areas including hyperactivity, anxiety, dependency, aggressiveness, and peer conflict. Those in the top decile of scores at each survey cycle were considered to have mental health problems. This cut-off was selected based on previous evidence that scores at this level are related to higher rates of mental health care referrals.<sup>200</sup> For both internalizing and externalizing scores,

individuals were then categorized into two categories: (1) having mental health problems between ages 9-15; and, (2) no mental health problems.

#### *5.2.2.3. High school completion*

Respondents' highest educational level attained was categorized into two levels: (1) high school non-completion, (2) high school completion.

#### *5.2.2.4. Confounders*

Respondent gender (male/female), ethnicity (Black or Hispanic/non-Black and non-Hispanic), household composition (single-parent vs. other), and parental educational attainment (defined as the highest educational level of the mother and/or her partner/spouse) were assessed. Whether respondents had children prior to or concurrently with their assessment of NEET was also considered.

### **5.2.3. Analyses**

First, the sample characteristics by cohort and NEET were described. Group differences were examined using chi-squared tests. Next, the extent that high school completion mediated the effect of adolescent mental health problems on NEET for each cohort was examined, using the potential outcomes or causal mediation framework.<sup>96 97</sup> The potential outcomes framework defines the causal effect of an exposure as the contrast of potential outcomes that would be observed under different exposure and mediator values (possibly counter to the fact). First, path analyses of NEET were performed using a probit link for each of internalizing and externalizing problems, using the weighted least squares mean and variance adjusted estimator. The results of models that accounted for possible exposure-mediator interaction were compared with models that did not include the interaction term. Cohort differences were examined using multiple group analysis.



Next, adjusted model parameters were used to compute the total causal effect (TCE), the natural direct effect (NDE), the natural indirect effect (NIE), the percent mediated, the controlled direct effect (CDE), and the percent eliminated (Table 5.1). The TCE expresses the total effect of adolescent mental health on the probability of NEET, and can be broken down into the NIE and the NDE—the effect attributable to high school completion, and the effect due to all other pathways—assuming no unmeasured confounding of the exposure-mediator, the mediator-outcome, and the exposure-outcome relationship. The ‘proportion mediated’, or the proportion of the TCE accounted for by the NIE (NIE/TCE), was calculated. The CDE expresses the effect of the adolescent mental health on the probability of NEET when the level of the mediator is fixed, which in this study, applied to a hypothetical intervention scenario in which all individuals completed high school. The ‘proportion eliminated’ was then calculated as the proportion of TCE ‘removed’ by the hypothetical intervention ( $([TCE-CDE]/TCE)$ ). Bootstrapping with 1000 replications was used to calculate the 95% confidence interval.

Table 5.1. Counterfactual definition of effects

<b>Effect</b>	<b>Counterfactual definition</b>
Total causal effect (TCE)	$P(Y_{1M_1} = 1) - P(Y_{0M_0} = 1) \times 100\%$
Natural direct effect (NDE)	$P(Y_{1M_0} = 1) - P(Y_{0M_0} = 1) \times 100\%$
Natural indirect effect (NIE)	$P(Y_{1M_1} = 1) - P(Y_{1M_0} = 1) \times 100\%$
Controlled direct effect (CDE)	$P(Y_{1M=1} = 1) - P(Y_{0M=1} = 1) \times 100\%$

Notes:  $P(Y_1)$  denotes the predicted probability of the outcome, NEET, for those with adolescent mental health problems,  $P(Y_0)$  denotes the predicted probability for those without mental health problems.  $M_1$  denotes the rate of the mediator, high school completion, for those with adolescent mental health problems;  $M_0$  denotes the rate of the mediator for those without mental health problems.  $M=1$  indicates that the mediator was held at a constant value of high school completion.

Finally, two sensitivity analyses were conducted. First, because it is not possible to verify the assumption of no unmeasured confounding, Vanderweele’s bias formulas were used to examine the sensitivity of the NIE estimates to a range of plausible values for the conditional

prevalence of an unmeasured confounder and its effect on the outcome.<sup>178</sup> Second the mediation analyses were repeated in a sample that excludes students.

All descriptive analyses were done in Stata version 16.1. All mediation analyses were performed with the *Model Indirect* command in Mplus 8.4.

### **5.3. Results**

#### **5.3.1. Sample characteristics**

The composition of the cohorts differed overall and by NEET (Table 5.2). More young people born in 1970-1980 had adolescent internalizing and externalizing problems than those born in 1981-1990. The cohorts had similar rates of NEET (26.2 and 22.8%, respectively). In both cohorts, those who did not complete high school were more represented amongst NEET, as were those who had externalizing problems. However, there were cohort differences in the distribution of internalizing problems by NEET. Young people who had internalizing problems were more represented amongst those who became NEET in the 1981-1990 cohort, but not in the 1970-1980 cohort

Table 5.2 Characteristics of the sample overall and in cohorts born between 1970–1980 (n=1,378) and 1981–1990 cohorts (n=4,002).

	Overall			Generation X (born 1970-1980) NEET (age 25/26)			Millennial (born 1981-1990) NEET (age 25/26)		
	N	%		Non-NEET	NEET		Non-NEET	NEET	
				N	%	N	%	N	%
<b>NEET (age 25/26)</b>									
Non-NEET	1,017	73.8				3,091	77.2		
NEET	361	26.2				911	22.8		
<b>High school completion</b>									
Did not complete high school	131	9.5		72	7.1	59	16.3	159	5.1
Completed high school	1,247	90.5	***	945	92.9	302	83.7	2,932	94.9
<b>Internalizing problems (age 9-15)</b>									
Yes	464	33.7		331	32.6	133	36.8	737	23.8
No	914	66.3		686	67.4	228	63.1	2,354	76.2
<b>Externalizing problems (age 9-15)</b>									
Yes	506	36.7		342	33.6	164	45.4	823	26.6
No	872	63.3	***	675	66.4	297	54.6	2,268	73.4
<b>Gender</b>									
Male	703	51.0		530	52.1	173	47.9	1,948	51.3
Female	675	49.0		487	47.9	188	52.0	1,606	48.0
<b>Parental education</b>									
Less than high school	338	24.5		210	20.7	128	35.5	477	11.9
High school graduation	695	50.5		536	52.7	159	44.0	1,683	42.1
Some post-secondary or more	345	25.0		271	26.6	74	20.5	1,842	46.0
<b>Ethnicity</b>									
Hispanic	293	21.3		221	21.7	72	19.9	901	22.5
Black	633	45.9		428	42.1	205	56.8	1,326	33.1
Non-Black, non-Hispanic	452	32.8		368	36.2	84	23.3	1,467	44.4
<b>Single parent home</b>									
No	804	58.3		633	62.2	171	47.4	2,664	66.5
Yes	574	41.7	***	384	37.8	190	52.6	1,338	33.5
<b>Had children</b>									
No	516	37.5		426	41.9	90	24.9	2,275	56.9
Yes	862	62.5	***	591	58.1	271	75.1	1,727	43.1

\*\*\* p &lt; 0.001; NEET = not in education, employment, or training

### **5.3.2. High school completion as a mediator**

Figure 5.2 shows the parameter estimates for the relationships between adolescent internalizing and externalizing problems, high school completion, and NEET from the path analyses of both cohorts. Estimates with and without accounting for the exposure-mediator interaction were similar, so only the latter were reported.

Results show that internalizing and externalizing problems were related to a lower risk of high school completion in both cohorts after adjusting for covariates. High school completion was in turn related to a lower risk of NEET in both cohorts. While externalizing problems were related to a higher risk of NEET in both cohorts, internalizing problems were related to NEET in only the 1981-1990 cohort.

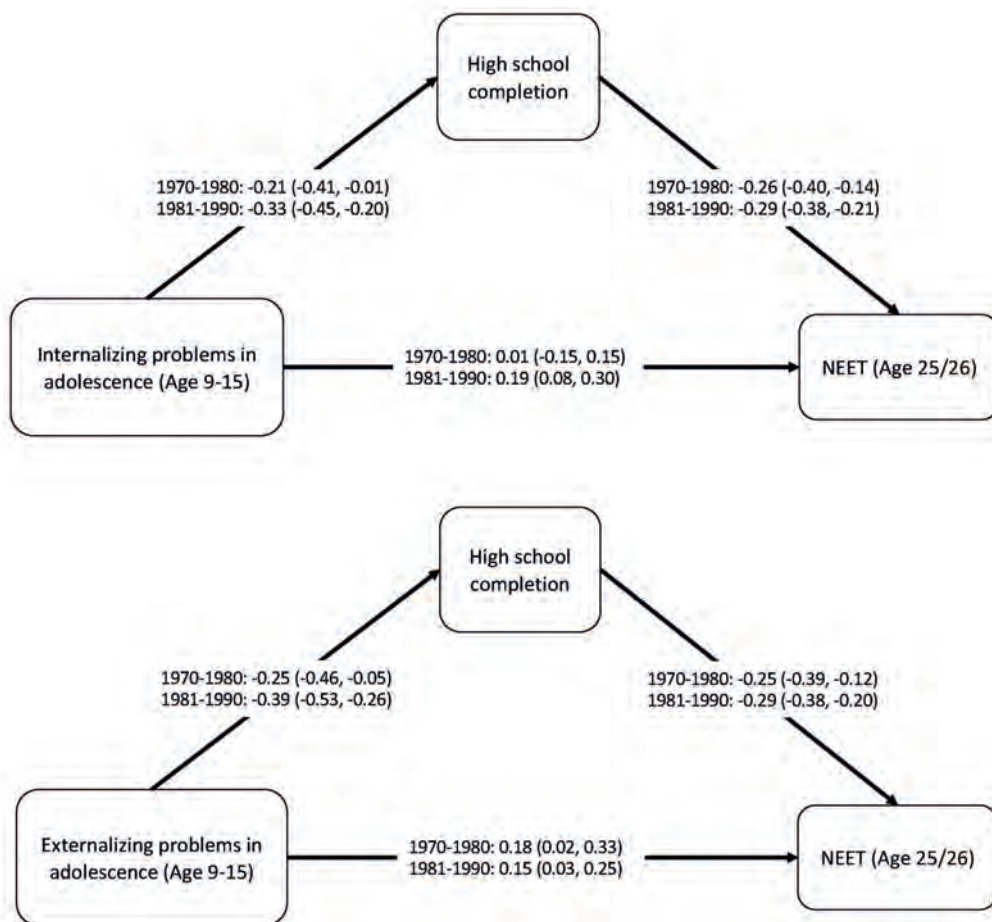


Figure 5.2 Mediation of internalizing (top) and externalizing problems (bottom) through high school completion. Unstandardized parameter estimates and their bootstrapped 95% confidence intervals shown. Respondent gender, ethnicity, parental education, household composition in adolescence, and whether respondent had children were covariates in the model.

Mediation analyses showed cohort differences in the total and direct effects of adolescent internalizing problems on NEET in young adulthood (Table 5.1). Internalizing problems had no significant total or direct effects on the probability of NEET in the 1970-1980 cohort, despite an indirect effect through high school completion (NIE=0.2%, 95%CI:0.0-0.4%). By contrast, internalizing problems increased the probability of NEET in the 1981-1990 by a total of 6.0% (95%CI:3.6-8.4%); the indirect effect through high school non-completion (NIE=0.3%,

95%CI:0.1-0.6%) accounted for 0.056 of this effect. If everyone in the 1981-1990 cohort were to have completed high school, 0.55 of the total effect of internalizing problems on NEET would be eliminated (CDE=2.7%, 95%CI:1.0-4.6%).

Estimates for the total, direct, and indirect effects of adolescent externalizing problems on NEET in young adulthood were similar between the two cohorts. Externalizing problems increased the probability of NEET in the 1970-1980 and 1981-1990 cohorts by 4.6 and 5.3%, with the indirect effect through high school non-completion (1970-1980: NIE=0.2%, 95%CI: 0.0-0.5%; 1981-1990: NIE=0.4%, 95%CI: 0.2-0.6%) accounting for 0.043 and 0.075 of these effects. If everyone in each cohort completed high school, 0.44 and 0.62 of the effect of externalizing problems on disconnection would be eliminated (1970-1980: CDE=2.3%, 95%CI:0.2-4.9; 1981-1990: CDE=2.0%, 95%CI: 0.4-3.7).

*Table 5.3 Direct and indirect effects of adolescent internalizing and externalizing problems on the predicted probability of NEET in young adulthood, expressed as a percentage*

<b>Born 1970-1980</b>	<b>Internalizing problems</b>		<b>Externalizing problems</b>	
	%	95% CI	%	95% CI
Total causal effect (TCE)	1.3	(-1.4, 4.3)	<b>4.6</b>	<b>(1.5, 7.8)</b>
Natural direct effect (NDE)	1.1	(-1.6, 4.1)	<b>4.3</b>	<b>(1.3, 7.6)</b>
Natural indirect effect (NIE)	<b>0.2</b>	<b>(0.0, 0.4)</b>	<b>0.2</b>	<b>(0.0, 0.5)</b>
Controlled direct effect (CDE)	0.2	(-1.6, 2.4)	<b>2.3</b>	<b>(0.2, 4.9)</b>

<b>Born 1981-1990</b>	<b>Internalizing problems</b>		<b>Externalizing problems</b>	
	%	95% CI	%	95% CI
Total causal effect (TCE)	<b>6.0</b>	<b>(3.6, 8.4)</b>	<b>5.3</b>	<b>(3.0, 7.6)</b>
Natural direct effect (NDE)	<b>5.7</b>	<b>(3.4, 8.1)</b>	<b>4.9</b>	<b>(2.7, 7.2)</b>
Natural indirect effect (NIE)	<b>0.3</b>	<b>(0.1, 0.6)</b>	<b>0.4</b>	<b>(0.2, 0.6)</b>
Controlled direct effect (CDE)	<b>2.7</b>	<b>(1.0, 4.6)</b>	<b>2.0</b>	<b>(0.4, 3.7)</b>

### **5.3.3. *Sensitivity analyses***

An analysis of the robustness of the NIE estimates showed that an unmeasured confounder with a difference in prevalence between exposure groups of 0.10 to 0.90, conditional on all covariates, must change the probability of disconnection by between -2.0% to -0.2% to fully explain the NIE of adolescent internalizing and externalizing problems in the 1970-1980 cohort. An unmeasured confounder with difference in the conditional prevalence between exposure groups of 0.10 to 0.90 must change the probability of becoming disconnected by between -3.0 to -0.3%, and -4.0 to -0.4%, to fully explain the NIE of internalizing and externalizing problems in the 1981-1990 cohort.

Mediation analyses on a sample without students did not produce substantially different estimates from the study sample (results not shown).

## **5.4. Discussion**

Across two cohorts born 10 years apart, this study found evidence that adolescent internalizing and externalizing problems increases the probability of NEET in young adulthood by disrupting high school completion. This indirect effect was relatively small. Internalizing problems increased the probability of NEET in the 1981-1990 cohort by 6.0%; high school non-completion accounted for 0.056 of this effect. Externalizing problems increased the probability of NEET in the 1970-1980 and 1981-1990 cohorts by 4.6 and 5.3%, respectively; high school non-completion accounted for 0.043 and 0.075 of these effects. However, it was estimated that if everyone were to complete high school, 0.44-0.62 of the effect of adolescent internalizing and externalizing problems on NEET would be eliminated. Finally, while indirect effects were similar between cohorts, the direct effect of internalizing problems differed such that they increased the probability of NEET among the 1970-1980 cohort but not the 1981-1990 cohort.

The finding of an indirect effect through high school completion is consistent with previous evidence that the lower probability of completing high school partially mediates the relationship between adolescent depression and adult wages in the USA.<sup>174</sup> There are numerous reasons why adolescents with mental health problems face greater risks for high school non-completion. Internalizing and externalizing problems may impair learning and adaptation to the school environment,<sup>201</sup> and lead to greater absences, social exclusion and substance use.<sup>180</sup> Externalizing problems, in particular, are associated with social stigma from teachers and peers, presenting barriers for academic success.<sup>181</sup> This evidence supports the notion that preventing NEET in young adulthood for adolescents with mental health problems must involve addressing challenges during the school years.

Findings show, however, that most of the effect of adolescent mental health problems on NEET was not explained by high school non-completion. Alternative pathways to NEET were beyond the scope of this study, but other research points to potential mediators. Persistent mental health problems between adolescence and young adulthood may present behavioural and social challenges, that affect a young person's ability to apply for and maintain post-secondary education and work.<sup>185</sup> A shortage of integrated health and social services, inadequate connections to early employment supports, and a lack of sustained support over their careers, may also put those with mental health problems at higher risk of disconnection.<sup>184</sup>

Still, it was estimated that adolescent mental health problems would have a smaller effect on NEET if everyone completed high school. This reduction reflects the importance of high school completion for participation in tertiary education and the labour market. The absence of high school credentials limits even those without mental health problems in their ability to find work and puts them at higher risk of job loss.<sup>131 169</sup> Findings reinforce the need for educational retention and re-engagement programs to prevent NEET for adolescents with mental health problems.



Indirect effect estimates did not differ between cohorts, suggesting that within the study period, high school completion was equally important for determining NEET among those with mental health problems. However, there were cohort differences in the direct effect of internalizing problems. This finding may reflect the effect of different macroeconomic contexts on the risk of NEET for those with mental health problems. Those born from 1981-1990 who became young adults in the aftermath of the Great Recession, were exposed to the highest long-term unemployment rates of the three recessions within the study period.<sup>83</sup> While rates of NEET were similarly elevated for young adults born from 1970-1980 following the recession of the 1990s and 2000s,<sup>49</sup> record high employment characterized the recovery that followed.<sup>202</sup> Others have similarly shown that poorer economic circumstances constrain the employment prospects of those with mental health problems compared to more favourable economic conditions.<sup>50 51</sup> High unemployment rates may trigger and exacerbate feelings of helplessness and low self-esteem that young people with adolescent internalizing problems may be prone to, negatively affecting the ability to obtain and maintain job and educational opportunities.<sup>193 203</sup> It should be noted, however, that the findings may also reflect compositional differences between cohorts. For example, more young people in the 1970-1980 cohort were parents; this cohort may thus be more likely to select into NEET due to caretaking responsibilities than because of internalizing problems when compared to the 1981-1990 cohort. Replication of these findings in other samples is needed to better understand how poor labour market and economic conditions shape the risk of NEET for those with internalizing problems.

This study benefits from numerous strengths. This study used a large population-level survey with high longitudinal response rates.<sup>149</sup> This study was also the first to use the potential outcomes approach to examine high school completion as a mediator of the relationship between adolescent mental health and NEET. As such, this study was able to address biases that traditional mediation methods are prone to such as confounding of the mediator-outcome

relationship, and possible interaction between the exposure and mediator. This study used a validated multi-item measure of mental health repeated over multiple time points to ascertain the presence of adolescent mental health problems.

There were some limitations. First, partial non-responders who were excluded from the sample were more likely to be NEET, which suggests that study estimates may be conservative. Second, a formal statistical test of cohort-differences was not conducted. Though multiple methods for testing group differences in indirect effects exist for conventional mediation methods,<sup>204</sup> methods to test group differences in indirect effect estimates obtained using causal mediation methods have yet to be developed. Because qualitatively different results were observed between cohorts however, it may be adequate to assess cohort differences visually. Finally, the results of the sensitivity analyses indicate that the indirect effect estimates are sensitive to plausible levels of unmeasured confounding of the mediator-outcome relationship. This study did not adjust for substance use, for example, which predicts lower educational attainment and unemployment,<sup>187</sup> and is often comorbid with internalizing and externalizing disorders.<sup>188</sup> However, the analytic models included a variety of demographic variables that may partially account for such confounding.

Overall, the findings show that high school non-completion is one mechanism through which adolescent internalizing and externalizing problems confer higher risk of NEET in early adulthood. This evidence supports the importance of programs that provide school-based support for adolescents with mental health problems and prevent early school dropout, including programs that facilitate collaboration between teachers, social workers, and health care providers.<sup>94 205</sup> However, much of the effect of internalizing and externalizing problems on NEET was unexplained. As such, other mechanisms of prevention, such as workplace- and community-based mental health supports need to be studied and leveraged to prevent NEET for those with adolescent mental health problems. Future research may also examine whether

different strategies are needed for internalizing and externalizing problems. Finally, macroeconomic conditions may shape the risk of NEET for those with adolescent internalizing problems. Future studies should investigate the effects of macroeconomic conditions on NEET for those experiencing mental health problems to better understand how to support this population across different contexts.