

University of Groningen

Mental health, education, and work in Canada, the Netherlands, and the United States

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DOI:
[10.33612/diss.171633023](https://doi.org/10.33612/diss.171633023)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2021

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Minh, A. (2021). *Mental health, education, and work in Canada, the Netherlands, and the United States: a comparative, life course investigation*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen. <https://doi.org/10.33612/diss.171633023>

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**Chapter 3. Depressive symptom trajectories and early adult
education and employment: comparing longitudinal cohorts
in Canada and the United States**

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International Journal of Environmental Research and Public Health 2021; 18(8),

4279

Abstract

Adolescent depressive symptoms are risk factors for lower education and unemployment in early adulthood. This study examines how the course of symptoms from ages 16-25 influences early adult education and employment in Canada and the USA. Using data from the National Longitudinal Survey of Children and Youth (n=2348) and the National Longitudinal Survey of Youth 79 Child/Young Adult (n=3961), four trajectories (low-stable, increasing, decreasing, increasing then decreasing i.e., mid-peak) were linked to five outcomes (working with a post-secondary degree, a high school degree, no degree, in school, and NEET i.e., not in employment, education, or training). In both countries, increasing, decreasing, and mid-peak trajectories were associated with higher odds of working with low educational credentials, and/or NEET relative to low-stable trajectories. In Canada, however, all trajectories had a higher predicted probability of either being in school or working with a post-secondary degree than the other outcomes; in the USA, all trajectory groups were most likely to be working with a high school degree. Higher depressive symptom levels at various points between adolescent and adulthood are associated with working with low education and NEET in Canada and the USA, but Canadians are more likely to have better education and employment outcomes.

3.1. Introduction

In the transition from school to work, young people face numerous challenges including obtaining sufficient educational credentials and finding secure full-time employment.¹²⁹⁻¹³¹ Of particular concern are those neither in employment, education, nor training (NEET), and those entering the labour market with lower educational credentials.^{132 133} Both NEET status and low education are associated with poorer long term employment prospects and lifetime earnings,¹³⁴ ¹³⁵ higher levels of psychological distress, and higher rates of mental disorders, suicide, and substance use disorders.^{136 137} In 2018, 32.8% of young people between the ages 25-34 in the Canada and 50.7% in the USA did not have any post-secondary education.¹³⁸ NEET represented 14.8% and 13.4% of young people between the ages 15-29 in 2018, respectively.¹³⁸

Young people with histories of poor mental health may be more likely to become NEET or enter the labour market with low education.³⁶ An estimated 1 in 5 people with major depressive disorder have their first onset before age 25.¹³ A recent systematic review found that adolescent depressive symptoms increase the risk of failure to complete secondary school, welfare receipt, and educational and labour market disengagement.³⁶ Cross-sectional studies of Canadians between ages 15 and 29 have shown that past-year depressive symptoms at a clinical level are related to a higher risk of unemployment and NEET status.^{139 140} Longitudinal evidence from Australia showed that the onset and the persistence of depressive and anxiety problems are related to a higher likelihood of NEET status in early adulthood.¹⁴¹ Early identification and resources to support the transition from school-to-work for young people with mental health problems may therefore be important intervention strategies.

It remains unclear, however, how the course of depressive symptoms, including changes in frequency and severity from adolescence until early adulthood, influences the risk of NEET or entry into the labour market with lower education. An American study found that young people

with mental health trajectories characterized by high levels of internalizing and externalizing problems in either childhood or adolescence had lower educational attainment.¹⁴² A Dutch study found that trajectories characterized by high stable mental health problems in adolescence were associated with NEET or working with low educational credentials at age 20, compared to trajectories of decreasing, or consistently low or moderate symptoms.¹⁰⁰ However, young people in these studies were only assessed until the ages 20-22, before many transitioned into the labour market. Only one study has examined the relationship between depressive symptom trajectories and young adult education and work outcomes. A recent British study, using data from age 11-24, found that those with early adult onset of symptoms and those with persistent symptoms throughout were less likely to have a university education; and, along with those with childhood-limited symptoms, were more likely to be NEET.¹⁴³ This evidence suggests that elevated symptoms at any point in the transition from adolescence to young adulthood, not only early or later symptoms, may lead to worse education and employment outcomes.

Differences in the Canadian and American education and labour market systems may influence the magnitude of the association between depressive symptoms and early adult education and employment. While the two countries share similarities, such as high post-secondary enrolment and high labour force demand for credentials,^{144 145} differences in the level of public funding of education, the range of tuition fees, the presence of private universities, and the presence of post-secondary vocational training, may shape the outcome of young people's school and work trajectories.¹⁴⁶⁻¹⁴⁸ Notably, American post-secondary institutions are more stratified with regards to selectivity and resources while Canadian institutions exhibit less inequality, which may translate into smaller mental health inequalities in the Canadian labour market.¹⁴⁷

This study compared the relationship between depressive symptom trajectories from age 16 to 25 and early adult education and employment in Canada and the USA. Based on the existing

evidence, it was expected that in both countries, trajectories characterized by low-stable symptoms would be associated with a lower likelihood of NEET and working with low educational credentials, relative to trajectories with higher symptom frequency. In Canada, trajectories of higher symptom frequency were expected to have a lower risk of NEET and working with low credentials than their American counterparts.

3.2. Materials and methods

3.2.1. Data sources and sample characteristics

This study used longitudinal cohort data from the Canadian National Longitudinal Survey of Children and Youth (NLSCY; Cycles 4-8, 2002-2009),⁸⁵ and the American National Longitudinal Survey of Youth 1979 Children/Young Adult (NLSY79 Children/YA; 1986-2014), linked to data from the main NLSY79 survey.¹⁴⁹ The target population for the longitudinal cohort of the NLSCY was non-institutionalized children ages 0-11 in 1994 from Canada's 10 provinces. The target population for the NLSY79 Children/YA was American children of the NLSY79 females.

Building on earlier work,¹⁵⁰ dynamic cohorts were created from each dataset following respondents from age 16-17 until age 24-25 (Canada: n=3,357, USA: n=6,434). Individuals with fewer than 3 time-points of depressive symptom data between ages 16 and 25 were excluded (USA: n=754, Canada: n=552); as were individuals whose education and employment outcomes were unknown (Canada: n=457, USA: n=1,711) resulting in a sample size of 2,348 in the Canadian cohort, and 3,961 in the American cohort.

3.2.2. Measures

3.2.2.1. Education and employment outcomes

Five mutually exclusive categories were defined at respondents' last follow-up point at age 24 or 25. Those who were currently attending school (including those simultaneously working) were considered (1) in school. Those who were not in school were then classified as: (2) working with a high school degree, (3) working with a post-secondary degree, (4) working with no degree, and (5) NEET (neither attending school nor working).

3.2.2.2. Depressive symptom trajectories

Four depressive symptom trajectories from age 16-25 were identified in each of the Canadian and American cohorts using growth mixture modeling:¹⁵⁰ (1) low-stable symptoms; (2) increasing symptoms (3) decreasing symptoms; and (4) increasing then decreasing symptoms (*mid-peak*). Details about the procedure have been published in Minh *et al.*¹⁵⁰ In short, depressive symptoms were measured using a composite of items from the Centre for Epidemiological Studies on Depression scale (CES-D). The CES-D captures the past-week frequency of symptoms across multiple diagnostic categories.^{88 89} Five items that appeared in both data sources were used: (1) I did not feel like eating; my appetite was poor; (2) I had trouble keeping my mind on what I was doing; (3) I felt depressed; (4) I felt that everything I did was an effort; (5) My sleep was restless. The number of trajectories was decided on by comparing fit statistics (AIC and adjusted BIC), average posterior probability values, and group size, with *a priori* expectations. Respondents were assigned to a trajectory group, representing subgroups with different average growth curves of depressive symptom frequency between age 16-25, based on respondents' highest probability of group membership determined by the results of the growth mixture models.

3.2.2.3. *Confounders*

Models controlled for variables indicating whether the respondent cohabitated with a spouse/partner, had children, childhood family income (income quartile in the original survey sample), parental education (less than high school/ high school/ more than high school), parental unemployment in childhood, respondent's sex (male/ female), age, ethnicity (USA: Hispanic/ Black/ non-Black, non-Hispanic; Canada: Visible minority/ White), mother's immigration history (American- or Canadian-born/ born outside the USA or Canada), single-parent household in childhood, region of residence (USA: Northeast/ North Central/ South/ West; Canada: British Columbia/ Alberta/ Saskatchewan and Manitoba/ Ontario/ Quebec/ Maritime provinces), urbanicity, and mother's age. See 0 for details on the comparability of the variable derivation across cohorts.

3.2.3. *Analyses*

The characteristics of the Canadian and American cohorts were reported overall, and by outcome category. Chi-squared tests were used to test group differences. Multivariable multinomial logistic regression models were used to estimate the effect of depressive symptom trajectory group membership on education and employment. Using marginal standardization, the adjusted predicted probability of each outcome category were calculated. The resulting predictive probability may be interpreted as the proportion of observations that would have been observed with the outcome if a particular exposure level was imposed on the entire study population.¹⁵¹ All analyses were weighted using sampling probability weights to account for survey design. Analyses were performed in Stata versions 12 (USA) and 13 (Canada).

3.3. Results

3.3.1. *Distribution of depressive symptom trajectories and early adult education and employment in Canada and the USA*

Table 3.1 shows the characteristics of the Canadian and American samples. There were some baseline differences across the two cohorts. In the Canadian cohort, 37.5% of young people came from families whose incomes were in the top quartile compared with 29.0% in the American cohort. In the American cohort, 48.0% of respondents' parents had more than high school education compared with 83.0% in the Canadian cohort.

In the Canadian cohort, 63.5% of young people had a low-stable depressive-symptom trajectory compared to 77.5% in the American cohort. In the Canadian cohort, 11.4% were working with a high school degree, and 39.8% working with a post-secondary degree, compared with 35.6% and 11.4% in the American cohort. NEET represented 4.0% of young people in the Canadian cohort and 5.7% in the American cohort.

In both cohorts, young people's education and employment outcomes differed by trajectory. For descriptive results, the 'working with no degree' and NEET categories were combined in the Canadian cohort to adhere to Statistics Canada reporting guidelines on minimum cell sizes.¹⁵² In both cohorts, there were smaller proportions of the low-stable symptom trajectory and greater proportions of all other trajectories among those working with a high school degree, working with no degree and/or NEET, and in school.

3.3.2. Association between depressive symptom trajectories and early adult education and employment

Results of the multinomial regression show that in both cohorts, the odds of working with a high school degree relative to working with a post-secondary degree, were higher for the increasing (Canada: OR=3.36, 95%CI: 1.74-6.47; USA: OR=2.36, 95%CI: 1.49-3.73) and mid-peak trajectories (Canada: OR=2.74, 95%CI: 1.22-6.12; USA: OR=2.14, 95%CI: 1.26-3.62) than for the low-stable trajectory, even after adjusting for covariates (Table 3.2). In both cohorts, the odds of working with a high school degree were also higher for the decreasing trajectory. However, the 95% confidence interval contains the null in the Canadian cohort (USA: OR=1.59, 95%CI: 1.01-2.49; Canada: OR=1.60, 95%CI: 0.96-2.70).

In both cohorts, the odds of working with no degree were higher for the increasing (Canada: OR=2.94, 95%CI: 1.42-6.06; USA: OR=4.68, 95%CI: 2.60-8.41) and decreasing trajectories (Canada: OR=2.10, 95%CI: 1.22-3.61; USA: OR=2.03, 95%CI: 1.06-3.87). In the American but not the Canadian cohort, the odds of working with no degree were also higher for the mid-peak trajectory (OR=4.88, 95%CI: 2.52-9.47).

In both cohorts, the odds of NEET were higher for the increasing trajectory (Canada: OR=3.88, 95%CI: 1.44-10.44; USA: OR=2.91, 95%CI: 1.56-5.42).

Finally, the odds of being in school were higher for the increasing trajectory (Canada: OR=2.30, 95%CI:1.34-3.93; USA: OR=2.65, 95%CI: 1.66-4.24). In the American but not the Canadian cohort, however, the mid-peak trajectory was associated with higher odds of being in school (OR=1.97, 95%CI: 1.10-3.51).

	Canada Total (n=2,348)				USA Total (n=3,961)				<i>p</i>
	Working, post- secondary degree	Working, high school degree	Working, no degree ^c	NEET ^{a,b} In school	Working, post- secondary degree	Working, high school degree	Working, no degree	NEET In school	<i>p</i>
Single parent status									
No	15.0	10.8	14.0	19.8	4.2	3.7	5.2	2.8	5.3
Yes	85.0	86.5	86.0	80.2	95.8	96.3	94.8	97.2	94.7
Residence in rural area									
No	87.0	82.9	76.9	86.6	74.7	70.6	59.0	65.3	78.5
Yes	13.0	10.8	23.1	13.4	25.3	29.4	41.0	34.7	21.5
No	83.2	80.7	81.9	77.8	76.2	74.4	78.2	75.4	78.6
Yes	16.8	19.3	18.1	22.2	23.8	25.6	21.8	24.6	21.4

^a $p < 0.02$, ^{**} $p < 0.001$, ^{***} $p < 0.0001$ ^a Categories combined in bolded text to comply with Statistics Canada privacy regulation. ^b NEET = not in education, employment, or training

Table 3.2 Odd ratios of education/employment outcomes relative to working with a post-secondary degree (with 95% CIs)

	Model 1 ^a				Model 2			
	Working, high school degree	Working, no degree	NEET ^b	In school	Working, high school degree	Working, no degree	NEET	In school
Canada								
(n=2,348)								
Low-stable (ref)	1.00				1.00			
Mid-peak	2.18 (0.97-2.90)	1.33 (0.59-3.01)	0.62 (0.17-2.26)	1.27 (0.66-2.45)	2.74 (1.22-6.12) *	1.61 (0.68-3.84)	0.29 (0.06-1.41)	1.23 (0.68-2.23)
Increasing	3.39 (1.59-3.25) **	2.67 (1.28-5.57) *	5.71 (2.00-16.34) *	2.44 (1.47-4.06) *	3.36 (1.74-6.47) **	2.94 (1.42-6.06) **	3.88 (1.44-10.44) *	2.30 (1.34-3.93) *
Decreasing	1.57 (0.96-2.54)	1.76 (1.03-3.04) *	1.92 (0.98-3.74)	1.45 (1.00-2.13)	1.60 (0.96-2.70)	2.10 (1.22-3.61) *	1.54 (0.78-3.03)	1.37 (0.92-2.02)
USA								
(n=3,961)								
Low-stable (ref)	1.00				1.00			
Mid-peak	1.99 (1.20-3.32) *	4.58 (2.45-8.56) **	2.15 (0.99-4.67) **	1.71 (0.96-3.05)	2.14 (1.26-3.62) *	4.88 (2.52-9.47) **	2.09 (0.95-4.62)	1.97 (1.10-3.51) *
Increasing	2.67 (1.73-4.12) **	5.62 (3.29-9.62) **	3.55 (1.98-6.47) **	2.88 (1.83-4.55) **	2.36 (1.49-3.73) **	4.68 (2.60-8.41) **	2.91 (1.56-5.42) **	2.65 (1.66-4.24) **
Decreasing	1.78 (1.17-2.69) *	2.56 (1.45-4.49) **	2.21 (1.23-3.98) *	1.43 (0.90-2.26)	1.59 (1.01-2.49) *	2.03 (1.06-3.87) *	1.73 (0.91-3.28)	1.32 (0.83-2.10)

* $p < 0.05$ ** $p < 0.001$ ^a Model 1 controlled for the age in years at which the outcome was assessed; Model 2 additionally controlled for whether respondents cohabitated with a partner or spouse, and whether respondent had children of their own, respondent's sex, race, childhood family income, parental education, household unemployment in childhood, mother's age, mother's immigration history, single-parent status in childhood, rural residence, and region of residence

^b NEET = not in employment, education, or training

Estimates of the predicted probability of the outcomes revealed between-country differences (Figure 3.1). In Canada, the low-stable trajectory group was more likely to be working with a post-secondary degree than any other outcome (44.9%, 95%CI: 40.9-48.9%). The mid-peak and decreasing trajectory groups were about as likely to be working with a post-secondary degree (36.5%, 95%CI: 26.1%-46.9%; and 35.6%, 95%CI: 29.6%-41.6% respectively) as to be in school (33.1%, 95%CI: 22.3-43.9%; and 35.9%, 95%CI: 29.6-42.4%); and, the increasing trajectory was most likely to be in school (40.8%, 95%CI: 31.0-50.6%). In the USA all trajectory groups were more likely to be working with a high school degree than any other outcome.

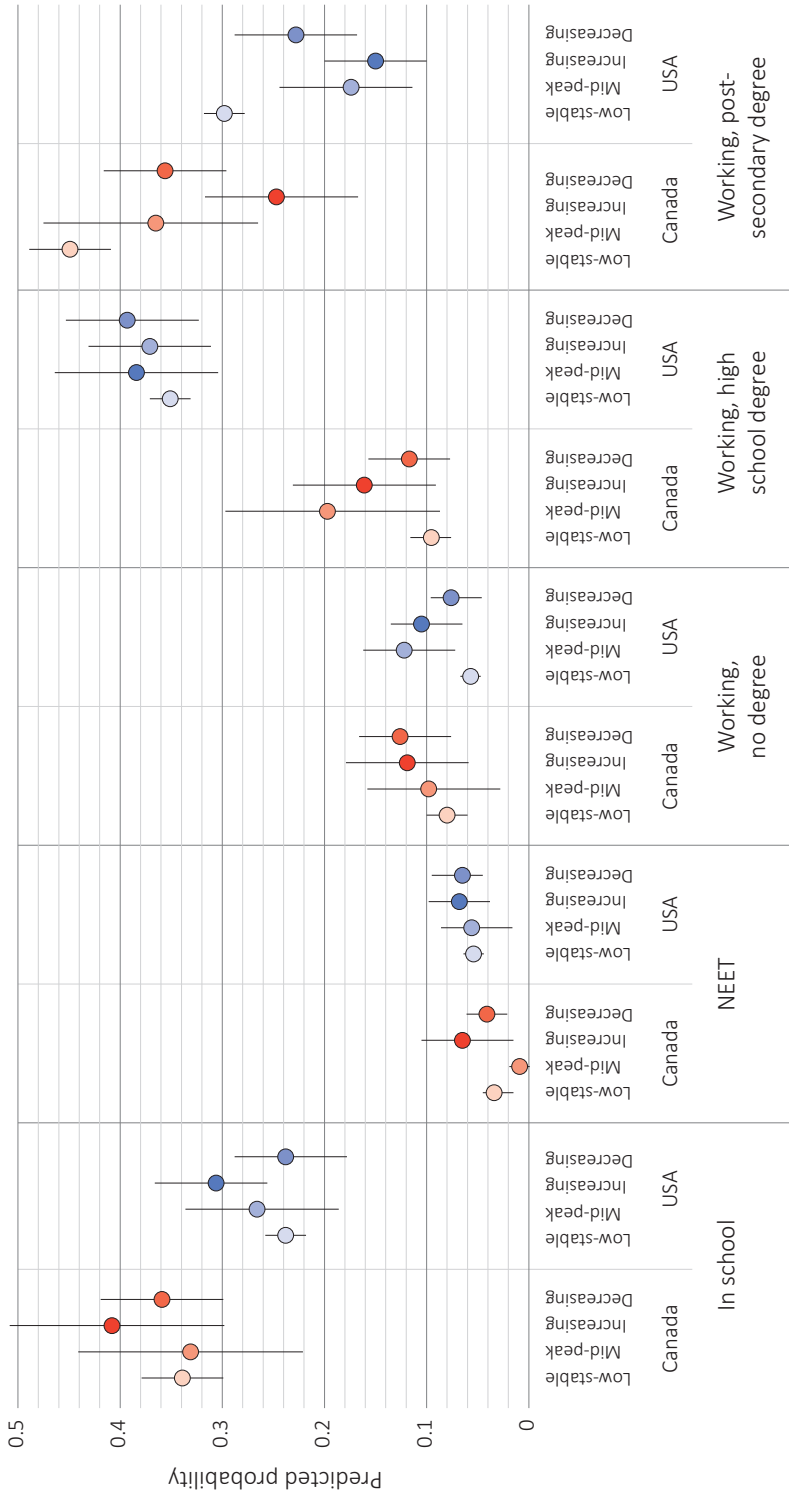


Figure 3.1 Predicted probability of education/employment by depressive symptom trajectory and country, adjusted for all covariates

3.4. Discussion

This study found that young people's depressive symptom trajectories from age 16-25 were associated with their early adult education and employment in both Canada and the USA. In line with the study hypotheses, trajectories characterized by higher symptom frequency – the increasing, decreasing, and mid-peak trajectories – were related to working with a high school degree or no degree, and/or with NEET status in both countries. However, Canadians were more likely to have better early adult education and employment outcomes than Americans, both amongst those with low-stable symptoms and those with trajectories with higher symptom frequency.

Findings showed elevated odds of working with high school credentials for the mid-peak, increasing, and decreasing trajectories, in both countries. Findings also showed higher odds of working with no degree for the increasing and decreasing trajectories in both countries; and, higher odds of NEET for the increasing trajectory. These findings are consistent with previous research showing that depressive symptoms between adolescence and young adulthood increase risks of school drop-out and post-secondary enrolment, and unemployment.^{36 153} In the transition to adulthood, the rise in levels of negative emotions follows a similar trajectory to the rise in the number stressors facing young people, including developmental challenges (e.g., identity formation) and normative difficulties (e.g., peer conflicts, transitioning out of school), that may result in depressive symptoms.¹⁵⁴ Stress from depressive symptoms may subsequently exacerbate problems, disrupt social interactions and compromise academic and work performance,¹⁵⁵ making it less likely that young people will pursue further education and more likely to be unemployed.

This study additionally shows that the timing and course of symptoms may be related to early adult education and employment. For example, findings show a relationship between both the

increasing and mid-peak trajectories, and working with high school or no degree, and NEET. The results likely reflect the negative impact that higher symptom levels between ages 19-25 have on post-secondary completion and employment.^{36 156} As well, findings may reflect the negative mental health effects of school dropout, fewer labour market opportunities, and poorer working conditions.¹⁵⁷

The association between the decreasing trajectory and working with a high school or with no degree, on the other hand, suggests that elevated depressive symptoms in adolescence may have long-term impacts, despite decreasing over time. Similarly, using data from Avon county in the United Kingdom, López-López et al.¹⁴³ found that young people who display symptoms at some point between ages 17-22, regardless of whether or not they improved, had lower odds of attaining a university degree than the low-stable group. Such findings support a sensitive period hypothesis, which suggests that depressive symptoms at a particular developmental stage may have consequences in early adulthood, regardless of the trajectory, because they coincide with key transition periods for education and employment.^{21 158}

While relative differences in education and employment by depressive symptom trajectories were similar between the two countries, absolute estimates of risk suggest better early adult education and employment outcomes for Canadians with higher symptom trajectories. In Canada, those with increasing symptom trajectories were more likely to be in school, whereas the same group in the USA was most likely to be working with high school credentials. As well, in Canada, those with mid-peak and decreasing trajectories were just as likely to be in school as working with a post-secondary degree, while in the USA, the same groups were most likely to be working with a high school degree. Findings are in line with studies showing a stronger link between poor health and lower education in the USA than in Canada.¹⁵⁹ Having depressive symptoms may be an additional barrier to accessing higher education for young people in the USA, where there are comparatively higher costs of post-secondary education

due to higher average tuition, a greater prominence of private universities, fewer public institutions in close proximity to disadvantaged areas, and fewer options for non-university post-secondary education.^{146 160} Considering that returns to higher education (including earnings, lower risk of unemployment) are greater in the USA than in Canada,¹⁶¹ American young people with depressive symptoms may be at a greater disadvantage later in life.

This study used the largest available longitudinal population-level data on young people in Canada and the USA to examine how depressive symptom trajectories relate to early adult education and employment. The study controlled for key confounders and used survey weights to account for the sampling frame of each survey. However, study findings should be considered alongside various limitations. First, self-reported information was used which is subject to reporting bias. Second, estimates of the association between depressive symptom trajectory and early adult education and employment are thus likely to be underestimated in both cohorts due to differential non-response and selection bias. Approximately 17% of the Canadian cohort and 30% of the American cohort were excluded due to missing data on the outcome. In both cohorts, missingness was related to indicators of social disadvantage, including younger mothers and lower parental education; and, in the USA, also amongst the increasing trajectory group, suggesting that estimates may be conservative. As well, both data sources failed to adequately sample young people who are incarcerated and therefore NEET. Third, the Canadian sample is more socioeconomically advantaged than the American sample. Between country differences may thus be overestimated. Replication of this study using matching techniques to improve comparability may be warranted.

3.5. Conclusions

This study has a number of implications. First, findings reinforce the importance of developing interventions for prevention in adolescence as well as interventions for NEET and low-

educated workers in early adulthood. Future research may want to examine when and how to intervene in adolescence and early adulthood, as the former is a sensitive period and the latter is a period during which education, employment, and mental health may have contemporaneous effects. Second, this study used a life course perspective that may be built on by future research. Rather than examine depressive symptoms at one time point, or lifetime depression, future research may examine when symptoms occurred and incorporate measures of change to symptom frequency or severity. Finally, this study points to a context-dependent relationship between the evolution of depressive symptoms and early adult education and employment. Given institutional differences between Canada and the USA, researchers and policy makers may want to examine how specific changes to mental health, education, and labour market policy in each country improves the life chances of young people with histories of poor mental health as they transition into adulthood.