

Université de Montréal

Perinatal Risk Factors for Young Adults to be Not Engaged in Employment, Education or Training (NEET)

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Mémoire présenté en vue de l'obtention du grade de Maîtrise ès Sciences en santé publique,
option recherche

Juin 2023

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Université de Montréal

Unité académique : Département de médecine sociale et préventive

/École de santé publique/Université de Montréal

Ce mémoire intitulé

**Perinatal Risk Factors for Young Adults to be Not Engaged in Employment, Education or
Training (NEET)**

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Résumé

En 2019, 31 % et 14 % des jeunes femmes et hommes mondialement ont déclaré de n'être pas engagé en emploi, en études ou en formation (NEET). Cette étude a examiné les voies de développement menant au statut NEET chez les jeunes adultes en étudiant l'association entre les adversités périnatales et le statut NEET et le rôle médiateur de comportements extériorisés.

Les données proviennent de l'Étude Longitudinale du Développement des Enfants du Québec (ÉLDEQ, n = 974). L'analyse des classes latentes a identifié quatre profils d'exposition: faible adversité; adversité de la croissance fœtale, qui incluent les participants rencontrant des problèmes de croissance in utero et après la naissance ; les complications d'accouchement, qui incluent les participantes qui connaissent des complications pendant l'accouchement ; l'adversité familiale, qui se compose de participants qui ont vécu l'adversité dans leur vie familiale. Les associations entre les profils périnataux, le statut NEET et le rôle médiateur présumé de comportements extériorisés ont été étudiées à l'aide de la modélisation par équation structurelle.

Le risque de devenir NEET était plus élevé pour les enfants ayant subi une adversité familiale (OR = 3,19 [IC 95 % : 2,31-4,40], $p < 0,001$) et de croissance fœtale (2,03 [1,11-3,71], $p = 0,022$). Les problèmes d'extériorisation ont médié l'association entre l'adversité familiale et le statut de NEET (1,03 [1,01-1,06], $p=0,003$).

La prévention du statut NEET devrait englober les facteurs de risque lié à la croissance fœtale et l'adversité familiale, qui peuvent aider les efforts de prévention pendant la période périnatale.

Mots-clés : NEET, psychosocial, longitudinal, périnatal, adversité, symptômes d'extériorisation

Abstract

In 2019, 31% and 14% of young women and men worldwide – respectively – reported being Not engaged in Employment, Education, or Training (NEET), an important indicator of long-term socioeconomic vulnerability. This study examined the developmental pathways leading to NEET status in young adulthood by investigating the association between perinatal adversities and NEET status and the mediating role of externalizing behaviours.

Data were from the Québec Longitudinal Study of Child Development (QLSCD, n = 974). Latent Class Analysis identified four profiles of exposures to 32 perinatal adversities: Low adversity, the reference profile; Fetal growth adversity, which includes participants experiencing adversity related to growth problems in utero and after birth; Delivery complications, which includes participants – or their mothers – who experience complications during birth; Familial adversity, consists of participants who experienced adversity related to their family life. The associations between the perinatal profiles, NEET status which was self-reported at age 21 years old and the putative mediating role of externalizing symptoms that were self-reported at age 15 and 17 were investigated using structural equation modeling.

The risk of becoming NEET was higher for children who experienced perinatal familial (OR = 3.19 [95% CI: 2.31-4.40], $p < 0.001$) and fetal growth (2.03 [1.11-3.71], $p = 0.022$) adversity. Externalizing problems mediated the association between familial adversity and NEET status (1.03 [1.01-1.06], $p=0.003$).

Prevention of NEET status in young adulthood should encompass familial and fetal growth-related risk factors, which can help inform early prevention efforts in the perinatal period.

Keywords: NEET, psychosocial, longitudinal, perinatal, adversity, externalizing symptoms

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List of Acronyms

ADHD: Attention Deficit Hyperactivity Disorder

DSM: Diagnostic and Statistical Manual of Mental Disorder

GED: General Education Diploma

GDP: Gross Domestic Product

LBW: Low Birth Weight

NEET: Not engaged in Employment, Education, or Training

OECD: Organisation for Economic Co-operation and Development

OR: Odds Ratio

QLSCD: Québec Longitudinal Study of Child Development

SES: Socioeconomic Status

VLBW: Very Low Birth Weight

Acknowledgments

We are grateful to the children and parents of the Québec Longitudinal Study of Child Development (QLSCD). The QLSCD was supported by funding from the Ministère de la Santé et des Services Sociaux (Ministry of Health and Social Services), the Ministère de la Famille (Ministry of the Family), the Ministère de l'Éducation et de l'Enseignement Supérieur (Ministry of Education and Higher Education), the Lucie and André Chagnon Foundation, the Institut de Recherche Robert-Sauvé en Santé et en Sécurité du Travail (Robert-Sauvé Research Institute of Health and Security at Work), the Research Centre of the Sainte-Justine University Hospital, the Ministère du Travail, de l'Emploi et de la Solidarité Sociale (Ministry of Work, Employment, and Social Solidarity), and the Institut de la Statistique du Québec (Québec Institute of Statistics). Additional funding was received from the Fonds de Recherche du Québec-Santé (FRQS), the Fonds de Recherche du Québec-Société et Culture (FRQSC), the Social Science and Humanities Research Council of Canada (SSHRC), the Canadian Institutes of Health Research (CIHR), and the Sainte-Justine Research Centre. I would like to thank Dr. Massimiliano Orri, Dr. Michel Boivin and Dr. Richard E. Tremblay for their extensive help on my publication. Additionally, I would like to thank the DEVELOP lab for being such an excellent team to work with. Finally, I would like to thank Dr. Sylvana Côté and Dr. Marilyn N. Ahun for their incredible support over the last two years.

Chapter 1. Introduction

1.1: Organisation of the Dissertation

Chapter 1 presents the prevalence of young adults who are Not engaged in Employment, Education or Training (NEET) as an important and growing public health issue. It also establishes perinatal adversity as a significant precursor to lifelong psychosocial struggles and demonstrates clear associations between perinatal adversity and externalizing mental health symptoms, as well as between externalizing mental health symptoms and NEET status in young adults.

Chapter 2 presents the emergence of NEET status as a concept and explores the long-term consequences to the individual as well as to society in a more in-depth manner. Next, perinatal adversity is explored in detail. Specifically, the three separate adversity profiles (familial adversity, fetal growth adversity, and delivery complications) will be explained extensively, with special attention to the 32 individual risk factors that have been clustered to create these profiles. Furthermore, there will be discussion on how individual risk factors within each profile, as well as between the profiles, can influence and interact with each other. Finally, the chapter will go into depth on the developmental frameworks used to establish the chosen mediator. This will aid in the discussion of the details of what externalizing symptoms are and how they relate to NEET status in young adults.

Chapter 3 provides the aims of the present dissertation and will detail its study design and application to the current work. This chapter will also include an in-depth description of the Québec Longitudinal Study of Child Development (QLSCD). Finally, the key methods used for this research will be presented, including how the data for variables were measured and collected as well as the statistical methods used to analyze this longitudinal data.

Chapter 4 contains a research paper derived from this dissertation entitled “Perinatal Risk Factors for Young Adults to be Not Engaged in Employment, Education or Training (NEET) and its Mediators: Longitudinal Analysis of the QLSCD Cohort Study” that has been submitted for publication in the peer-reviewed journal *Social Psychiatry and Psychiatric Epidemiology*.

Chapter 5 reviews the main results of the research paper and discusses its findings in-depth related to its alignment with previous research and scientific contributions, its implications for interventions, for public health and for future research, as well as its strengths and limitations. Finally, the conclusions will be reported.

1.2: Statement of Problem

1.2.1 NEET status: A Growing Issue

The prevalence of young adults who are NEET is a prominent and growing public health issue. In 2019, 21.8% of young women and men worldwide reported NEET status, which increased to 23.3% in 2020 due to the pandemic (United Nations, 2022). Being NEET in young adulthood has become an important indicator of long-term socioeconomic and social vulnerability, making the reduction of NEET a policy objective for the United Nations' sustainable development goal 8 titled “Decent Work and Economic Growth” (Davidson, 2019; United Nations, 2022).

In Canada in 2018/2019, 12% (ranging from 10% to 17%) of young adults aged 20-24 years old were NEET (Brunet, 2019). In Québec specifically, in 2018/2019, 10% of young adults in this age range were categorized as NEET (Brunet, 2019). Due to the pandemic, the NEET prevalence in 2020 increased to 14% in Canada and 12% in Quebec (Layton, 2022).

Those who are NEET between the ages of 16-24 years old are at a marked increase for long-term unemployment, and those who become employed tend to remain in low-paying jobs (Public Health England, 2014). Many studies have revealed the multiple long-term issues that can arise as a consequence of becoming NEET as a young adult. Some of the social consequences include long-term unemployment, low-paying jobs, social exclusion, isolation, and a lower quality of life (Davidson, 2019; Public Health England, 2014). In terms of health consequences, being NEET has been associated with an increased risk of suicide, premature death, unhealthy coping mechanisms such as illicit drug and alcohol use, and higher levels of depression (Davidson, 2019; Public Health England, 2014). Furthermore, the high prevalence of youth who are NEET also has an important societal-level impact. For example, individuals who are NEET could cost over 3% of the annual GDP (Wu, Maughan, Moreno-Agostino, & Barker, 2021) due to problems such as lost

taxes from lower expenditure, unemployment, housing benefits, and poor health outcomes (Coles, Godfrey, Keung, Parrott, & Bradshaw, 2010)

1.2.2 The Origins of NEET Status: Perinatal Adversity

Although the prevalence of youth who are NEET is exacerbated by social disruptions, such as those brought about by the COVID-19 pandemic (United Nations, 2021, 2022), individuals most at risk are those with a life-long trajectory of psychosocial challenges. This lasting course of psychosocial struggles is often due to adversity experienced early in the life course. Thus, it is important to contextualize NEET status as more than just a state of being unemployed or not in education. Rather than the people who fall into this category being people who just happen to be unemployed or not in education, the people who find themselves being NEET are often from marginalized communities, they are high-risk and often under-educated people who are in that position due to structural barriers (Davidson, 2019; Public Health England, 2014). This is why understanding who becomes NEET must start with perinatal risk factors in order to prevent this from happening at its root. For example, experiencing familial socioeconomic status (SES) struggles and having an unemployed parent at the time of birth can increase the risk of becoming NEET as a young adult (Clark & Lepinteur, 2019; Pitkänen, Remes, Moustgaard, & Martikainen, 2021). Furthermore, brain development in offspring can be impaired by maternal mental health problems, leading to poor cognitive functioning in the child (Salvatore Gentile & Fusco, 2017). There is abundant evidence that cognitive and behavioural problems, which are both important determinants of NEET, are associated with issues expressed during the perinatal period, such as low birth weight (LBW). LBW has been associated with behavioural and psychiatric problems (Hack, 2006; Indredavik et al., 2010; Van Lieshout et al., 2018), which are known risk factors for becoming NEET (Hammerton et al., 2019; Pitkänen et al., 2021). Furthermore, babies born with a very low birth weight (VLBW) can experience cognitive developmental delays during elementary school that persist into adolescence (Taylor, Minich, Klein, & Hack, 2004) and are less likely to achieve their General Education Diploma (GED) or be enrolled in four-year colleges (Hack, 2006). A study followed over 60 000 singletons as part of the Australian Early Developmental Census (AEDC) from birth to school entry in either 2009, 2012 or 2015 with a goal of reporting on developmental vulnerability (Dhamrait, Christian, O'Donnell, & Pereira, 2021).

They found gestational age to be associated with school readiness at five years of age, which has been shown to have downstream effects on NEET status (Dhamrait et al., 2021). A Danish study found that being born pre-term or very pre-term has been shown to increase the risk of having a neuropsychiatric diagnosis in adolescence and adulthood (Xia et al., 2021), which are both found to be associated with becoming NEET (Pitkänen et al., 2021; Wu et al., 2021). Also, the occurrence of perinatal hypoxia and asphyxia during childbirth is associated with lower cognitive scores at an early school age (Dzikiene et al., 2021). The above information points to three broad categories of perinatal adversities: Familial adversity, fetal growth adversity and delivery complications.

1.2.3 An Important Mediator: Externalizing Symptoms

Evidence has demonstrated that externalizing mental health problems during adolescence play a key role in the association between perinatal adversities and NEET status as a young adult (Davidson, 2019; Halmøy, Klungsøyr, Skjærven, & Haavik, 2012; Mallen, Mottram, & Thomas, 2008; Motlagh et al., 2010; Nweze, Ezenwa, Ajaelu, & Okoye, 2023; Public Health England, 2014). Externalizing symptoms refer to outward displays of behaviour that can be disruptive in nature such as hyperactivity, aggression and conduct problems, which have all been found to be related to perinatal adversity as well as long-term difficulties in academic and occupational attainment (McLeod & Fettes, 2007; Plenty, Magnusson, & Låftman, 2021).

A recent study presented a significant association between early-life adversity (e.g. parental separation, illness in the family, poverty) and poor cognitive performance in adolescence, which was mediated by mental health issues measured by the Strengths and Difficulties Questionnaire, including emotional and hyperactivity problems (Nweze et al., 2023). Another study reported that perinatal risk factors such as low offspring birth weight and preeclampsia during childbirth were associated with an increased risk of an Attention Deficit Hyperactivity Disorder (ADHD) diagnosis in childhood and subsequent cognitive difficulties that can persist into adulthood up to 40 years old (Halmøy et al., 2012). Additionally, it has been found that exposure to low SES and adverse childhood experiences in early life were associated with externalizing symptoms between 10-15 years old (Anderson et al., 2022). It has also been indicated that a difficult

temperament in childhood and the expression of externalizing symptoms is associated with NEET status in adulthood (Wu et al., 2021). Furthermore, externalizing symptoms have been found to be very stable over time and have been strongly linked with shortcomings in education and employment in adulthood (Cicchetti & Toth, 2014; Evensen, Lyngstad, Melkevik, & Mykletun, 2016; Veldman, Reijneveld, Almansa Ortiz, Verhulst, & Bültmann, 2015). Given these findings, of consistent associations between externalizing symptoms and NEET status, this research focuses on externalizing symptoms as a potential mediator of the association between perinatal adversities and NEET status in young adulthood.

Other potential mediators could have been considered such as internalizing mental health symptoms, including anxiety and depression, or school performance at a specific age such as track placement or Grade-Point Average. However, this research uses two theoretical frameworks, the *Developmental Origins of Health and Disease hypothesis* and the *Trajectories of Failure framework* that supports the use of externalizing symptoms as its mediator. Furthermore, there is abundant evidence in past literature supporting an association between perinatal adversity, externalizing symptoms, and NEET status in young adults, which has pointed to externalizing symptoms being the most suitable mediator to test. These frameworks, as well as past research will be explored in detail in chapter 2 of this dissertation.

The choice to specifically use externalizing symptoms rather than internalizing symptoms is because we did not find a significant association between any of the perinatal profiles and internalizing symptoms, but we did find a significant association when externalizing symptoms were tested. Furthermore, the choice comes from evidence pointing to externalizing symptoms being more stable over time and having a stronger association with school and career attainment (Cicchetti & Toth, 2014; Evensen et al., 2016; Veldman et al., 2015). The choice to use externalizing symptoms rather than school performance for the mediator comes from the fact that much of the literature consulted posits that various perinatal risk factors can increase the likelihood of experiencing externalizing symptoms, which in turn, can lead to poor school performance since externalizing symptoms can affect how a child behaves in school (Plenty et al., 2021). Therefore, the precise association seems to be between perinatal risk factors and externalizing symptoms, rather than between perinatal risk factors and school performance.

Thus, to focus on the problem at its root, externalizing symptoms was chosen. This choice is also helped by the evidence presented in the two theoretical frameworks that places mental illness at the intersection between perinatal risk factors and long-term shortcomings in education and occupation. Nevertheless, it is clear that there are other variables that could have been considered as mediators and may be considered in future studies. In this analysis, theoretical frameworks and previous research has led us to choose to focus on externalizing symptoms.

1.3: General Objectives of the Current Dissertation

The objectives of this research are to examine the developmental pathways leading to NEET status in young adulthood by investigating (1) the association between distinct perinatal adversity profiles, namely familial adversity, fetal growth adversity, and delivery complications and NEET status at age 21 years and (2) the mediating role of adolescent externalizing mental health problems at 15 and 17 years old in this association. This research is grounded in two important frameworks. The first is the Developmental Origins of Health and Disease hypothesis (O'Donnell & Meaney, 2016), which explains the association between perinatal adversity and mental health issues. The second conceptual framework – the Trajectories of Failure framework by Jane McLeod and Danielle Fettes – describes the downstream consequences of mental health problems in adolescents (McLeod & Fettes, 2007).

This research extends what is currently known from previous research by quantifying the associations between a wide range of perinatal risk factor clusters (e.g., familial adversity, fetal growth adversities, birth complications) and NEET status in young adulthood, as opposed to looking at individual risk factors considered in isolation. The person-centered approach of looking at adversity clusters could help inform the creation of future, more effective, interventions. Furthermore, this study examines the mediating role of externalizing mental health symptoms in the association between perinatal adversity and NEET status, while other studies have simply tested bivariate associations between these variables without formally testing mediation. For this study, we will use data from the QLSCD. The use of longitudinal data from the QLSCD cohort allows us to accomplish our goal to establish a life course trajectory of psychosocial adversities and examine the pathways that lead to becoming NEET. For this research, we focus on three

distinct developmental periods: (a) the perinatal period, from the time of conception to 5 months of age, (b) adolescence, between the ages of 15-17; and (c) young adulthood at 21 years old. These periods were established based on the phases used for data collection in the QLSCD study (Orri et al., 2021), which will be discussed further in the methodology section, in chapter 3, of this dissertation.

Chapter 2. Literature Review

This literature review is separated into four parts. Part one will discuss NEET status as a concept, as well as the consequences of being NEET. Part two will explore existing literature on perinatal adversity and will explain, in-depth, the three perinatal adversity profiles used in this dissertation. Part three will explore externalizing symptoms as a mediator for the perinatal adversity – NEET status relationship. Finally, part four will report on the existing gaps in the current literature.

2.1: NEET Status

2.1.1 An Overview

NEET status as a concept emerged in the 1990s in the United Kingdom when the British government published “Bridging the Gap – New Opportunities for 16– 18-year-olds not in Education, Employment or Training” with the aim to inform policies targeting Britain’s educationally vulnerable young adults to prevent them from becoming further disadvantaged (Mitrou, Haynes, Perales, Zubrick, & Baxter, 2021). The NEET concept was later expanded to 15-29-year-olds when it was picked up by Organisation for Economic Co-operation and Development (OECD) publications that examined this phenomenon in high-income countries (Mitrou et al., 2021). To understand NEET status as a concept, it is important to understand who falls into these categories versus who does not. According to the OECD, those considered to be “in education” includes those in full-time or part-time education, but does not include non-formal education or educational activities that are very short-term (OECD, 2023). Those who are included in the “unemployed” category are those who have not worked at least one hour in the reference week. While it does not change the people included, it is important to note that there are two different kinds of unemployed persons: unemployed and inactive, where the difference is those who are inactive are those who are not in paid work, not looking for paid work, or are unavailable to start work (Powell, 2019). The above definition is what is considered the international standard for categorizing people as NEET vs. non-NEET, however, for this research, it was defined slightly differently based on available data from the QLSCD cohort, which will be detailed further in chapter 3.

NEET status as a concept is mainly concerned with younger adults in the population since they are at a greater increase for becoming socially excluded (Ringbom et al., 2022). While there may be a higher number of elderly people who can be categorized as NEET in a given population, policymakers are less concerned with them as there is less opportunity for intervention which aim to prevent being NEET long-term, and youth who are NEET can cost governments more at an individual level (Mitrou et al., 2021). Studies looking at interventions aimed at young adults who are NEET have found that programs intended to develop their baseline educational attainment had the most success, while programs aimed at older people who are NEET worked best when their goal was to further their existing skill through employment and job training (Mitrou et al., 2021).

It is also interesting to note the sex differences that are apparent in NEET status trends. While both male and female NEET rates are increased in periods of economic instability, they are affected differently (Leitgb, Tamesberger, & Bacher, 2014). NEET rates have historically been higher for women than men, a trend that is still seen today; however, the discrepancy has lessened (Holmes, Murphy, & Mayhew, 2021). Young men are more dependent on the economic situation and labour market policies than young women. This makes it easier for young men to exit NEET status during periods of economic upturn since they rely more heavily on industries affected by economic trends, such as manual labour (Leitgb et al., 2014). This trend can have important implications in the present time due to the economic downturn that is currently being experienced as a result of the Covid-19 pandemic, which has caused one of the worst economic crises in decades (United Nations, 2022). While the economy has started to recover, many people are still struggling, and many more likely will due to the recession that is predicted to occur (Collins, Karunska, & Zahidi, 2023). Since the NEET rate is often seen to increase for women due to increased care responsibilities towards children, the Covid-19 pandemic had major impacts on NEET rates for women specifically (Holmes et al., 2021; Leitgb et al., 2014; United Nations, 2022).

2.1.2 Long-term Consequences of Being NEET

Many studies have revealed the multiple long-term issues that can arise due to becoming NEET as a young adult. An important social consequence of being NEET is long-term unemployment

(Public Health England, 2014). Specifically, those who are NEET between the ages of 16-24 years old are at a marked increase for long-term unemployment, and those who become employed tend to remain in low-paying jobs (Public Health England, 2014). NEET status is also an important indicator of social exclusion and isolation, making those who are NEET more likely to have a lower quality of life (Davidson, 2019; Leitgeb et al., 2014; Public Health England, 2014). There are also important long-term health consequences that are related to being NEET. A Norwegian study specifically showed that half of the Norwegian young adults who are NEET receive health-related benefits (Rasalingam, Brekke, Dahl, & Helseth, 2021). Young adults who were NEET in Canada in 2019 reported lower general health and lower levels of physical activity than young adults who were non-NEET (Davidson, 2019). Being NEET can also lead to worse mental health. The Canadian study also demonstrated that 13.8% of NEET youth reported poor or fair mental health, compared with 7.8% of non-NEET youth (Davidson, 2019). Furthermore, they were more likely to report anxiety disorders (20.1% vs. 10.5% for NEET vs. non-NEET) and mood disorders (16.8% vs. 7.5% for NEET vs. non-NEET) (Davidson, 2019). Likewise, NEET status has been linked to an increased risk of suicide as well as unhealthy coping mechanisms, such as illicit drug and alcohol use (Davidson, 2019; Public Health England, 2014). Since the likelihood of being NEET follows the trends of a social gradient, reducing the percentage of people in a given population who are NEET could have important implications in aiding to reduce health inequalities (Davidson, 2019; Public Health England, 2014).

2.2: Perinatal Adversity Profiles

The next part of this literature review will take an in-depth look at the three perinatal adversity groups, more specifically the 32 perinatal risk factors that make up the three groups, which are used as the exposure variables in this research. This dissertation utilizes a person-centered approach, which focuses on the relationships among people, as opposed to a variable-centered approach, which focuses on the relationships between variables (Muthén & Muthén, 2000). This approach allows the analysis of data as a group, where a given group contains individuals that are similar to each other, and are different from individuals in other groups (Muthén & Muthén, 2000). For this research, the perinatal profile groups were established through latent-class

analysis (Orri et al., 2020). This approach is especially useful when analyzing longitudinal data that represents a heterogenous development trajectory, which in the case of this research, is the developmental trajectory from the perinatal adversity profiles to NEET status in young adulthood (Muthén & Muthén, 2000). This approach has often been used in alcohol and mental health research, thus making it an appropriate approach for this dissertation. While not every risk factor used to create the latent class profiles has been shown to previously be associated with NEET status, there are important associations between the risk factors and an intermediate outcome that has been shown to be related to NEET status. Table 1 lists all 32 perinatal risk factors in their respective perinatal adversity groups.

Table 1

Description of the Perinatal Adversity Measures in the QLSCD

Measure	Description
Fetal growth Adversity	
Short birth length	<47 v. ≥47 cm ^a
Low birth weight	<2500 v. ≥2500 grams ^a
Short head circumference	10th percentile (32 cm) v. ≥10th percentile ^a
Growth restriction	Intrauterine growth retardation suspected during pregnancy before the onset of labor ^a
Prematurity	<37 v. ≥37 weeks of gestational age ^a
Delivery complications	
Mother hemorrhage	Hemorrhage during childbirth (ICD-9 code 641) ^a
Mother hypertension	Hypertension complicating pregnancy (ICD-9 code 642) ^b
Mother diabetes	Diabetes mellitus complicating pregnancy childbirth (ICD-9 code 648.0) ^b
Long hospitalization	Baby discharged from hospital >3 days after birth
Transfer hospital	Transfer to a specialized hospital ^a

Low APGAR	APGAR score 5 min <7 ^a
Birth induction	Induced delivery ^a
Delivery acceleration	Labor augmented ^a
Caesarean section	Method of delivery as Caesarean ^a
Child hypoxia/asphyxia	ICD-9 code 766 ^a
Familial adversity	
Low maternal education	Did not obtain high school diploma at child age 5 months ^b
Low paternal education	Did not obtain high school diploma at child age 5 months ^c
Low socioeconomic status	<25th percentile – measured using a standardized aggregate index of five items relating to parental education, parental occupation, and annual gross income (Willms & Shields, 1996)
Nonintact family	Biological father not living with study child and mother at child age 5 months ^b
Low maternal age	<20 years old at childbirth ^b
Advanced paternal age	>35 years old at childbirth ^c
High birth order	4th or later-born reported at child age 5 months ^b
Maternal smoking	Smoked tobacco during any trimester of pregnancy ^b
Maternal alcohol use	>1 glass per week alcohol during any trimester of pregnancy at child age 5 months ^b
Maternal drug use	Use of any illicit drug during pregnancy at child age 5 months ^b
Maternal medication use	Use of any medication (prescribed and over-the-counter) during any trimester of pregnancy ^b
Maternal depression	CESD short (13-items) version >2.67 ^b

Paternal depression	CESD short version >2.67 ^c
Maternal anxiety	Not available
Paternal anxiety	Not available
Maternal antisocial behavior	≥2 out of 5 conduct problems based on the DSM-IV criteria for conduct and antisocial personality disorders ^b
Paternal antisocial behavior	≥2 out of 5 conduct problems based on the DSM-IV criteria for conduct and antisocial personality disorders ^b

APGAR, Appearance, Pulse, Grimace, Activity, and Respiration; CCEI, Crown Crisp Experiential Index; CESD, Centre for Epidemiological Study Depression Scale; DSM, Diagnostic and Statistical Manual of Mental Disorders; EPDS, Edinburgh Postnatal Depression Scale; GCSE, General Certificate of Secondary Education – age 16; ICD, International Classification of Diseases. Mother and father reports have been collected when the children were 5 months of age in QLSCD (where not otherwise specified).

^aFrom medical records.

^bMother-reported.

^cFather/partner-reported

^dCollected at 32 weeks of gestation.

2.2.1: Fetal Growth Adversity

Low and very low birth weights (LBW & VLBW) have been shown to be an important risk factor for long-term downstream consequences that are related to becoming NEET as a young adult. For instance, LBW has been associated with behavioural and psychiatric problems (Hack, 2006; Indredavik et al., 2010; Van Lieshout et al., 2018), which are known risk factors for becoming NEET (Hammerton et al., 2019; Pitkänen et al., 2021). Babies born at a VLBW can experience cognitive developmental delays during their elementary school years that persist into adolescence (Taylor et al., 2004) and are less likely to achieve their GED or to be enrolled in four-year colleges (Hack, 2006). Birth weight has also been shown to have an important association with long-term employment and earning outcomes (Black, Devereux, & Salvanes, 2007). Additionally, LBW is related to head circumference, where very LBW children have been shown to have an abnormally small head circumference (Peterson, Taylor, Minich, Klein, & Hack, 2006). Head circumference has often been used as a proxy for intrauterine and postnatal brain growth

in children (Peterson et al., 2006). It was found that babies with smaller head circumference had poorer IQ scores and later academic achievement, which are both risk factors for becoming NEET (Hollanders et al., 2019; Peterson et al., 2006). Small head measurements were also found to be a risk factor for having a lower occupation as an adult (Pallotto & Kilbride, 2006). A Dutch longitudinal study demonstrated that there were two times as many young adults who were both premature or born at a VLBW who were poorly educated, and three times as many who were unemployed at 19-years-old (Hille et al., 2007). VLBW is often due to being born prematurely or experiencing intrauterine growth restriction (IUGR) (Hollanders et al., 2019). IUGR has been shown to be a risk factor for developmental delays that can lead to later issues such as lower IQ scores as well as lower school and career achievement (Leitner et al., 2007; Pallotto & Kilbride, 2006). The above evidence suggests that fetal growth issues can have a key role in increasing the likelihood of becoming NEET.

2.2.2: Delivery Complications

Complications that are experienced during the birthing process can introduce trauma to the fetus that can have important long-term downstream outcomes. For example, perinatal hypoxia and asphyxia can lead to significantly lower cognitive assessment scores at an early school age (Dzikienė et al., 2021). Furthermore, experiences such as eclampsia, prolonged delivery, a five-minute APGAR score below 4, and maternal hemorrhage during birth have been shown to be associated with ADHD (Halmøy et al., 2012). Having to induce birth or having a caesarean section are also all risk factors for developing ADHD that can persist into adulthood (Halmøy et al., 2012). Downstream, ADHD, and more broadly, externalizing symptoms have been shown to be associated with an increased risk for becoming NEET as a young adult (Wu et al., 2021). The perinatal risk factor-externalizing symptom-NEET status association will be discussed in more detail in section 3 of this chapter. Moreover, maternal diabetes during pregnancy has also been shown to have critical long-term consequences for the offspring (Weintrob, Karp, & Hod, 1996). Maternal diabetes can lead to a high instance of IUGR, which, as mentioned in the previous section, is associated with worse academic achievements, career prospects and earnings (Leitner et al., 2007; Pallotto & Kilbride, 2006). A study also found that elevated levels of beta-hydroxybutyrate and free-fatty acids, both present when the body is experiencing ketoacidosis,

is correlated with a lower IQ in offspring (Weintrob et al., 1996). Ketoacidosis is a dangerous metabolic state that can occur due to diabetes in which the body experiences high acidic blood levels due to excessive fat breakdown since there is not enough insulin to break down carbohydrates (Ghimire & Dhamoon, 2023). Additionally, babies born at a LBW or VLBW are often admitted for prolonged hospitalization in the NICU (Hollanders et al., 2019), and as previously mentioned, birth weight is an important risk factor for long-term NEET outcomes such as university enrollment and employment (Black et al., 2007; Hack, 2006). Thus, previous research points to delivery complications being a principal risk factor group for becoming NEET as a young adult.

2.2.3: Familial Adversity

Familial adversity encompasses many risk factors that are most often considered to be related to long-term unemployment or lack of education. The list of 17 risk factors that make up the familial adversity profile can be further divided into 3 subgroups: Socioeconomic risk, family characteristics, and parental behaviours. Each subgroup will be discussed in depth in this section.

Previous research has demonstrated a strong association between various socioeconomic risk factors and NEET status. Low levels of familial SES and parental unemployment at birth have been shown to be associated with a higher risk of becoming NEET as a young adult (Clark & Lepinteur, 2019; Pitkänen et al., 2021). A Spanish study found a relationship between low paternal education and obtaining a university degree, where more than two times the amount of children whose fathers had a university degree went on to obtain one as well (Sonego, Llácer, Galán, & Simón, 2013). Parental education has also been shown to be related to childhood mental health outcomes where when both parents had less than a university-level degree, there was a greater reporting of mental health issues in their offspring (Sonego et al., 2013). An Italian study concluded that of students with parents who had low levels of education, only 10% went on to achieve university degrees, which is less than half the European average (Alfieri, Sironi, Marta, Rosina, & Marzana, 2015). However, for this association, maternal education level was a more important factor than paternal education (Sonego et al., 2013).

Family characteristics such as familial composition and parental age are also shown to have important long-term impacts on the child. Studies have shown that adolescents that are from non-intact families are at a risk for lower educational achievement (Park & Lee, 2020). Schools where the population had a higher rate of students from single-parent families had overall lower academic achievement (Park & Lee, 2020). Father absences, specifically, have shown important downstream consequences such as an increased number of behavioural problems and worse academic performance (East, Jackson, & O'Brien, 2006). Furthermore, paternal absence is related to an overall lower psychological well-being for the child, but this was found to be moderated by lower overall SES (East et al., 2006). Birth order is also an interesting risk factor to consider. A study demonstrated that as birth order advanced, lower scores were found in languages, math and science performance (Cheng et al., 2013). Parental age also plays a key part in long-term success where a study demonstrated that older maternal age is associated with higher levels of education and lower levels of behavioural problems for the offspring by being able to provide a perinatal environment that is more conducive to positive outcomes (Duncan, Lee, Rosales-Rueda, & Kalil, 2018). Conversely, higher paternal age is found to be associated with worse academic achievement and more behavioural problems such as ADHD (Nybo Andersen & Urhoj, 2017).

Finally, parents' behaviours are very important for the development of the child. Maternal alcohol and cannabis use during gestation has critical effects on the offspring, such as a higher rate of learning and behavioural disorders, including ADHD and problems relating to academic achievement (Cook, 2020). Prenatal alcohol exposure was found to increase the risk of lower IQ levels in offspring, lower scores on cognitive measures as well as a higher number of perceptual and motor problems (Coles et al., 2010). However, when mothers were educated on the detriments of alcohol use during pregnancy and subsequently stopped drinking, the effects on the offspring were less severe than for children whose mothers continued to drink (Coles et al., 2010). Maternal smoking of tobacco products is also associated with damaging effects to the offspring, such as increasing neurocognitive deficits and externalizing symptoms. It is hypothesized that this is because of the teratogenic properties of tobacco that can lead to hypoxic stress in the fetus (R. H. Palmer et al., 2016). Furthermore, the use of over-the-counter medications by the mother during pregnancy, such as acetaminophen, is related to an increase

in externalizing symptoms and worse developmental outcomes measured at 3 years of age. (Stergiakouli, Thapar, & Davey Smith, 2016). Parental mental health problems are also an important risk factor for detrimental downstream consequences on the child. Maternal depression, through the impaired ability of the mother to parent, can lead to an increased risk of attention, behaviour, and cognitive problems in offspring (Barker, Copeland, Maughan, Jaffee, & Uher, 2012). Maternal depression is also known to be associated with downstream mental health problems for adolescents (Barker et al., 2012; S. Gentile, 2017). Likewise, paternal depression was found to impact the behavioural and emotional development of the child at 4 to 5 years of age, upon entering school, as well as subsequent psychiatric disorders in the child at 7 years of age (Salvatore Gentile & Fusco, 2017). Parental anxiety during gestation is equally important, where prenatal exposure to anxiety can increase the likelihood of behavioural and conduct problems at 1.5 and 5 years of age (Bekkhuis, Lee, Samuelsen, Tsotsi, & Magnus, 2022). Lastly, antisocial behaviour from the mother, which is associated with smoking, has been shown to lead to more aggression and antisocial behaviour in the child (Huijbregts, Séguin, Zoccolillo, Boivin, & Tremblay, 2008). Therefore, the evidence suggests that these familial adversity factors should be intervened on to ensure that the offspring grows up in the most suitable environment in order to guarantee the best pathway to success.

2.3: Externalizing Mental Health Symptoms as a Mediator

2.3.1: Conceptual Frameworks

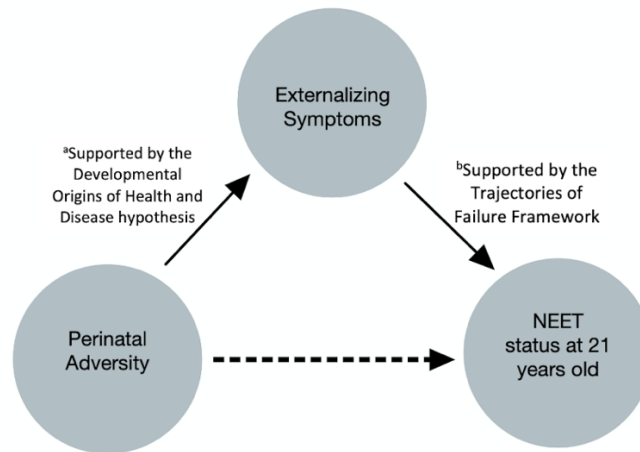
This dissertation has combined two important developmental frameworks to identify a putative mediator through which perinatal risk factors may increase one's likelihood of becoming NEET as a young adult. Firstly, the *Developmental Origins of Health and Disease hypothesis* (O'Donnell & Meaney, 2016), explains the association between perinatal adversity and mental health issues. This conceptual framework posits that the fetus's quality of growth and development can be an important predictor of the risk of developing various non-communicable and chronic diseases, such as mental health issues (O'Donnell & Meaney, 2016). Specifically, it theorizes that signals originating from the uterus during pregnancy can impair fetal development by acting on tissue development. This compromised development subsequently increases the risk of chronic illness

later in life (O'Donnell & Meaney, 2016). Furthermore, this framework puts forth ample evidence on the importance of the postnatal environment, which can include many of the perinatal adversity risk factors explored in this study, in that it has a role in modifying neurodevelopment (O'Donnell & Meaney, 2016). Additionally, they show abundant support for the association between LBW and the subsequent development of lasting behavioural problems, such as ADHD-related symptoms, that begin in childhood (O'Donnell & Meaney, 2016). Thus, this framework is highly relevant to the study done for this dissertation.

The second conceptual framework inspiring this research is the *Trajectories of Failure framework* by Jane McLeod and Danielle Fettes. This theory describes how mental health problems experienced during adolescence can potentially lead to long-term downstream effects (McLeod & Fettes, 2007). The framework hypothesizes that those who experience mental health problems during development in childhood or adolescence are at a greater risk for poorer educational attainment than those who have not experienced similar mental health struggles (McLeod & Fettes, 2007). Specifically, they discuss evidence supporting the fact that youth with mental health issues are much less likely than youth without any mental health issues to graduate from high school and move on to post-secondary education (McLeod & Fettes, 2007). They theorize that the educational disruption and failure that many youths with mental health issues face could be due to the social response that these issues provoke, or rather the lack of adequate response and support to help them attain greater educational achievements. Further evidence used to support this conceptual framework suggests that there is a robust association between externalizing problems and educational attainment (McLeod & Fettes, 2007). Overall, empirical evidence and conceptual models support the putative role of externalizing factors as a potential mediator between perinatal adversities and NEET status.

Figure 1

Conceptual Frameworks



^aDevelopmental Origins of Health and Disease hypothesis explains the link between perinatal adversity and mental health issues in adolescence. ^bTrajectories of Failure framework describes how mental health issues in adolescence have the potential to affect long-term downstream outcomes such as employment and education.

Section 2.3.2 Evidence for Externalizing Symptoms as a Mediator

Many perinatal adversities included in our list have been shown to have important associations with externalizing symptoms in childhood and adolescence. Maternal smoking during pregnancy and prenatal alcohol exposure has been shown to have a high association with hyperactivity and inattention symptoms in offspring at 5 years old (Cook, 2020; R. H. Palmer et al., 2016). Since externalizing symptoms are very stable over time, they have been shown to persist from childhood into adolescence (Cicchetti & Toth, 2014; Evensen et al., 2016; Veldman et al., 2015). Gestational depression, preeclampsia and being born with LBW or VLBW have also been shown to increase the risk of externalizing symptoms in offspring (S. Gentile, 2017; Halmøy et al., 2012).

Downstream, evidence points to the fact that externalizing symptoms are related to becoming NEET (McLeod & Fettes, 2007; Wu et al., 2021). A study demonstrated that for both sexes, externalizing symptoms were important predictors of lower school grades and not completing

high school (Plenty et al., 2021). This could be because externalizing symptoms can affect how a child behaves in school, often leading to an inability to properly engage with the material being taught, an inability to stay on top of their work, and issues with peers, which can all lead to academic failures (Plenty et al., 2021). Results demonstrated that students with multiple externalizing problems had half a standard deviation lower grades than students who did not have these symptoms (Plenty et al., 2021). Given the above information, students who experience externalizing symptoms could be an important point of intervention in the effort to prevent the increase of young adults who are NEET.

2.4: Existing Gaps in the Current Literature

This literature review summarized the current knowledge on NEET status as a concept, how perinatal adversity can influence the likelihood of becoming NEET and how externalizing mental health symptoms play a role in this trajectory. It is clear that youth who become NEET often have a lifelong course of psychosocial struggles and that many people who are NEET experienced previous mental health problems during their adolescence (Barker et al., 2012; Davidson, 2019; Hack, 2006; Halmøy et al., 2012; Hollanders et al., 2019; Leitner et al., 2007; Peterson et al., 2006; Pitkänen et al., 2021; Plenty et al., 2021). However, there are still gaps in our understanding of the mechanisms of these important associations. Some of these gaps are addressed in this dissertation.

Primarily, though many studies explore how different perinatal adversities can have long-term effects on educational and career success, no study has used the person-centered approach of looking at three clusters of risk factors simultaneously that can have important downstream effects on NEET status. Most studies focus only on one or two factors considered in isolation. I address this gap in the first objective of my dissertation where I measure, if, and by how much, each perinatal adversity cluster profile increases the risk of becoming NEET. This is important as it demonstrates which types of adversities are the most detrimental to a child's psychosocial functioning and development. This is useful in order to develop evidence-based interventions to decrease the prevalence of NEET status in future generations.

Additionally, while many studies individually demonstrate an association between some perinatal adversities and externalizing symptoms, as well as between externalizing symptoms and NEET status, respectively, no study has established externalizing symptoms as a mediator of the perinatal adversity-NEET association. This is important to establish since it provides a point of intervention where adolescents in schools can benefit from aid that will help them reduce their chances of becoming NEET. I address this gap in the second objective of my dissertation. I use mediation analysis to show that externalizing symptoms are a partial mediator of the familial adversity-NEET status association. This objective also provides a point of connection for the two frameworks I utilize: the Developmental Origins of Health and Disease hypothesis and the Trajectories of Failure framework.

Chapter 3. Methodology

3.1: Participants and Data

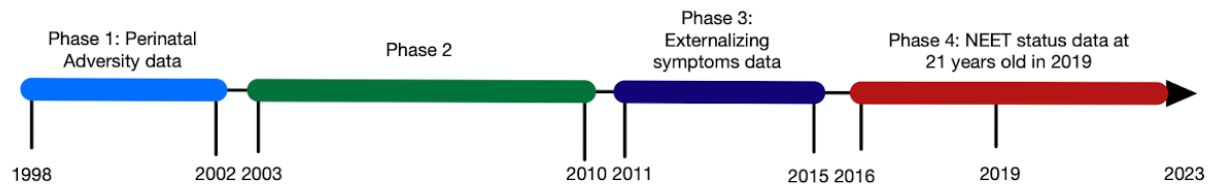
This research is based on data from the QLSCD (Also called the Étude Longitudnal de Développement d'Enfants au Québec – ELDEQ – in French). The QLSCD is a population-based representative sample of children in Québec with the original goal of examining long-term associations of preschool physical, cognitive, social, and emotional development with long-term academic performance and biopsychosocial (i.e., interactions between biological, psychological, and social) development (Orri et al., 2021). This research is in line with the original goal of the cohort.

The cohort recruited singletons (as opposed to twins, triplets, etc.) born between October 1997 and July 1998 in each administrative region of Québec except those born in Northern Québec, Cree Territory, Inuit Territory, and Native reserves, which represent only a small percentage of all births (Orri et al., 2021). Probability-based sampling was used for this study. The 1997–98 Master birth register for the province of Québec was used to create a stratified random sample where the strata were based on living areas and birth rates in those areas (Orri et al., 2021). The original sample included 2120 children (Orri et al., 2021).

Data were collected annually or every 2 years from ages 5 months to 21 years and data collection was divided into 4 phases (Orri et al., 2021). Information from birth records was used to assess perinatal factors. Sociodemographic and family factors were reported between the ages of 5 months and 10 years (Orri et al., 2021). Children's behaviours and cognitions were reported between ages 6 and 12 years (Orri et al., 2021). Participants' psychosocial functioning was reported between ages 14 and 21 years (Orri et al., 2021).

Figure 2

QLSCD Timeline



Assessments were self-reports, reports from parents and teachers, or linked data from hospital records. For the current study, 974 participants with data on externalizing symptoms at either age 15 or 17 and NEET status data at 21 years old were included in the analyses, representing 46% of the original sample.

3.2: Ethical Considerations

The protocol for the QLSCD was approved by the Institute de la Statistique du Québec and St-Justine Hospital Research Centre ethics committees. Ethical approval for this specific study was received from the Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal. Informed consent was obtained from the participants at each assessment, where parents gave consent for their children until the age of 18 years old. After 10 years old, assent was also given by the child.

3.3: Variables

3.3.1 Primary outcome

NEET status at age 21 years was the primary outcome of this study. This was collected in phase 4 of the cohort study where the main goal was to assess participants' transition into adulthood (Orri et al., 2021). NEET status data was assessed based on two questions in the online Questionnaire En Ligne au Jeune (QELJ). The questions were "Are you currently attending a school or educational institution (e.g., high school, college, university, other)?" and "During the past month, have you held at least one paid job (for an employer or for the family business) or

been self-employed (self-employed, consultant, freelancer or entrepreneur)?” (ELDEQ, 2019). The NEET status variable, which is dichotomic, was coded as NEET (=1) if the participant answered no to both, and non-NEET (=0) if the participant answered yes to at least one of the two questions. This differs slightly from the OECD definition of NEET status. For the education category, participants’ education programs did not necessarily have to be long-term and for the employment category, participants answered based on their activity in the last month, rather than in the last week.

3.3.2 Exposure Variable

This study uses the perinatal profiles created by Orri et al (Orri et al., 2020) as the exposure variables. To assess this variable, 32 perinatal factors were considered (Orri et al., 2020). The 32 perinatal factors are the ones listed in Table 1 of chapter 2. This data was taken from the participants' birth records, sociodemographic factors, and family factors (Orri et al., 2021). Family factors were assessed based on questionnaires at participant age 5 months and completed by the mother, father, and interviewer (ELDEQ, 1998a, 1998b, 1998c). These variables were collected during phase one of the QLSCD (Orri et al., 2020). Latent class profile analysis was used to identify groups of participants with distinct patterns of exposure to the 32 perinatal factors. Models with one to six classes were fitted and the ideal number of classes was chosen. Model selection was based on established fit indices (Bayesian Information Criterion, Vuong-Lo-Mendel-Rubin Likelihood Ratio Test), the proportion of participants in each class, and the ability to interpret each model (Orri et al., 2020). After choosing the best model, participants were assigned to a latent class based on their highest posterior probability (Orri et al., 2020). The selected model consisted of four classes: familial adversity, delivery complications, fetal growth adversity, and low adversity, which is the reference group. For analysis, a categorical variable was created where low adversity =1, fetal growth adversity =2, delivery complications =3, and familial adversity =4. These categories are mutually exclusive and have been previously used and validated to estimate the association between perinatal adversity and suicide attempts in adolescents (Orri et al., 2020).

3.3.3 Mediator

Externalizing mental health symptoms is the mediator used in this study. These symptoms were self-reported at 15 years and/or 17 years using five scales (13 items in total) from the Mental Health and Social Inadaptation Assessment for Adolescents (MIA) (Côté et al., 2017). Although several possible age ranges may have been chosen to study externalizing symptoms as a mediator, we chose the age range between 15-17 years. Firstly, we chose a range in order to increase our sample size. Next, this specific age range was chosen since studies used to support the Trajectories of Failure theoretical framework confirm that when mental illness symptoms begin in adolescence, these people are at a greater risk for educational disruption than if it started later in life (McLeod & Fettes, 2007). Furthermore, a recent meta-analysis reported that the peak age of onset for mental illness symptoms is 14.5, thus choosing the two ages closest to, but after, this peak is based in evidence (Solmi et al., 2022). This data was collected in phase three of the study. The MIA provides an evaluation of the symptoms that make up some Diagnostic and Statistical Manual of Mental Disorder-5 (DSM-5) psychiatric disorders, and of related problems of social adaptation (Côté et al., 2017). Overall, it includes 113 questions representing DSM-5 symptoms (Côté et al., 2017). The items on the scales were all answered on a three-point Likert-scale with the options “never true”, “sometimes true”, and “always true”.

A total externalizing score is obtained by the score of 5 scales, with 13 overall items: Average aggression, which has four subscales (proactive aggression, reactive aggression, social aggression, and severe violence), ADHD, which has three subscales (inattention, impulsivity, and hyperactivity), Opposition, Conduct Disorder, which has four subscales (lying, theft, breaking of rules and vandalism) and Delinquency (Côté et al., 2017). A full list of items in the externalizing score scales is shown below in Table 2.

Table 2

Externalizing Symptoms Scale at 15 and 17 Years Assessed with the Mental Health and Social Inadaptation Assessment for Adolescents (MIA).

Scale and Sub-scales	Questions
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Aggression: About your feelings and behaviours over the past 12 months

1) Proactive

I beat up someone who hadn't done anything to me.

I threatened to hit someone to get what I wanted.

I threatened to hit someone in order to steal from them.

I threatened to fight someone to force him to do something that he did not want to do.

2) Reactive

I hit someone who hurt me, even though that person didn't hurt me on purpose.

I hit someone who pushed me, even though that person didn't push me on purpose.

I hit someone who was threatening me.

3) Social Aggression

I made fun of or laughed at someone.

I said hurtful things behind someone's back.

I stopped someone from joining my group when they wanted to.

I called other people names, insulted them or said hurtful things to them.

I extorted something from another young person (forced the person to give me something that belonged to them).

I cyberbullied another young person (insults, threats, bullying, etc.) on the Internet or using a cell phone.

4) Severe violence

I deliberately hurt someone to the point that they had to receive medical care.

I used a weapon (i.e. stick, rock, knife) during a fight.

I got into a fight intending to seriously hurt someone.

I hit people with the intent to make them suffer.

I participated in gang fights.

Attention deficit with or without hyperactivity: About your feelings and behaviours over the past 12 months

5) Impulsiveness

I was impulsive (reacted quickly without thinking).

I said things before thinking them through.

I did or said things without stopping to think.

I had difficulty waiting for my turn in games or group activities.

I often blurted out the answer to a question that hadn't yet been completely asked.

I got into trouble because I did things without thinking.

6) Hyperactivity

I felt very restless, I was constantly on the move.

I often stood up in class or in other situations where I was supposed to remain seated.

I often had trouble staying calm during games or leisure activities.

I moved my hands and feet, I wriggled in my chair.

7) Inattention

I was inattentive, I had difficulty paying attention to what someone was saying or doing.

I completed all of my tasks or homework, I was able to stay focused. (reverse coding)

I had trouble keeping my mind on what I was doing for more than a few minutes.

I forgot what I was supposed to be doing or what I had planned to do.

I avoided doing things where I needed to pay attention for a long time.

I made a lot of mistakes because it was hard for me to do things carefully.

Opposition: About your feelings and behaviours over the past 12 months

8) Opposition

I refused to do what my parents or my teacher were telling me to do.

I felt sorry after doing something wrong. (reverse coding)

I had temper tantrums.

I lost my temper easily.

I was mean to certain people.

I got even with someone by trying to hurt them.

I got even with someone by telling lies about them.

I blamed someone else when I got caught doing something wrong.

I did some things just to annoy people or make them angry.

Conduct Disorder: About your feelings and behaviors over the past 12 months

9) Lying

I cheated in order to succeed at school.

I cheated in order to make some money.

I cheated in order to win a competition.

I told lies in order to get things or favours from others.

I told lies in order to get out of doing things I was supposed to do.

10) Theft

I stole money or objects from home.

I stole money or objects from school or from stores.

I used a weapon in order to steal. (G)

I entered a house, a building or a car without permission in order to steal.

I broke down a door or a window in order to get into a place and take something.

11) Breaking of rules

I stayed out at night much later than I was allowed to.

I stayed out all night without my parents' permission.

I ran away from home.

I skipped school without reason (cut class).

12) Vandalism

I deliberately started a fire.

I deliberately destroyed someone else's property.

Delinquency and Contacts with the police and youth crime: About your feelings and behaviors over the past 12 months

13) Delinquency

I was arrested by the police for doing something wrong.

I appeared before a judge because I did something wrong.

I was convicted of doing something wrong.

I was placed in a youth centre (Centre Jeunesse) because I did something wrong.

I have been questioned by the police about something they thought I did.

For reliability, the internal consistency of each MIA scale was assessed by Cronbach's alpha (Côté et al., 2017). "Excellent" reliability (≥ 0.90) was given for the externalizing score as a whole, average aggression as well as the proactive aggression and severe physical violence subscales (Côté et al., 2017). A "good" reliability (0.80–0.89) was given for ADHD, opposition, and the impulsivity, reactive aggression, and social aggression subscales (Côté et al., 2017). A "fair" reliability (0.70 and 0.79) was given for the hyperactivity and inattention subscales (Côté et al., 2017). Validity was based on correlation analyses to assess both convergent and discriminant internal validity (Côté et al., 2017). For most scales, items belonging to this scale had higher correlations with its total score compared to the total score of the other scales, indicating good differentiation between the scales (Côté et al., 2017).

The externalizing symptom variable, which is continuous, was made from the externalizing factor data at ages 15 and 17. Those who had data at 15 and 17 had their scores averaged. Those who had data at only 15 or 17 only had that score used.

3.3.4 Confounders

Many variables that are commonly considered to be confounders of the associations of perinatal adversities with externalizing symptoms and NEET status, such as SES and parental mental health

problems were included in the exposure variable and are therefore not further controlled for. We selected, among a list of 12 potential confounders, those that correlated with at least two of the perinatal profiles, the mean externalizing symptom score, or the NEET status outcome. The 12 variables considered are: Sex, parental immigration status, if their neighbourhood is good to raise children in, if their neighbourhood is dangerous, presence of social problems in the neighbourhood, presence of groups causing problems in the neighbourhood, presence of burglaries in the neighbourhood, ethnic or religious issues in the neighbourhood, presence of parks and playgrounds in the neighbourhood, ability to walk alone in the neighbourhood, presence of alcohol or drug consumption on the streets of the neighbourhood and presence of drug sales in the neighbourhood. These were all collected when the participant was 5 months old, and the answers were given by the parents/guardians. These variables were chosen because previous evidence suggests that many people who are NEET have spent a significant amount of time living in disadvantaged neighborhoods, thus we chose variables that are common within disadvantaged neighborhoods (Karyda & Jenkins, 2018). Furthermore, past research has shown important associations between immigrant parents and NEET offspring as well as between sex and becoming NEET (Holmes et al., 2021; Jakobsen, 2023). The only one of the potential variables significantly correlated with at least two perinatal profiles, the mean externalizing symptom score, or the NEET status outcome was sex, so this was retained. The other 11 variables did not meet the requirements for inclusion as confounders.

3.4 Inverse Probability Weighting

To reduce the influence of differential attrition on our analyses, we used inverse probability weighting. Using the 32 variables that make up the perinatal profiles, an imputation analysis was run to generate data for the variables with missing data (0.05%-12% missing data). A binary variable was created to identify the participants included in the analytic sample (n=974) from participants not included (n=1146). These two groups were compared on all the imputed perinatal adversity variables to test for significant differences between the participants included in the current study and the participants not included. A variable that indicated the probability of being included in the final analysis sample was created. This probability was transformed into

a weight by dividing 1 by the probability of inclusion. This is necessary, as opposed to the exclusion of missing cases, since there were important differences between the analysis sample and participants lost over time. Participants lost-to-follow-up were more likely to be from lower socioeconomic strata and non-intact families. They also tended to have younger mothers who scored higher on depression and antisocial scales and had induced pregnancies. Finally, those lost to follow-up were more likely to have parents with a lower level of educational achievement. Only the weighted results will be presented. The non-weighted results are presented in Appendix A (Tables S1-S6).

3.5: Statistical Analysis

Descriptive and logistic regression models were estimated using IBM SPSS Statistics 27. This software was chosen over others since it has an easier and more straightforward coding platform than other software's such as Rstudio or MPlus. MPlus version 8.8 was used for mediation analysis. The MPlus software was used since it is specialized for this type of analysis.

3.5.1 Association Between Perinatal Adversity Profiles and NEET Status

Descriptive statistics

Prevalence of each perinatal adversity and sex was calculated within the sample. Cross-tabulations for each perinatal adversity profile and sex by NEET status was also calculated. The chi-squared value was calculated for the NEET status variable by each perinatal adversity. Additionally, the mean of externalizing symptoms for the whole sample, as well as by NEET status was calculated.

Logistic Regression

Sex-adjusted logistic regression was used to quantify the association between each perinatal adversity profile and NEET status.

3.5.2 Mediation Analysis

Structural Equation Modelling (SEM) was used to assess the mediating role of externalizing mental health symptoms in the perinatal adversity-NEET status association. SEM is a statistical

method that allows for testing multiple pathways through which an exposure variable can act on an outcome variable at the same time. In SEM, the exposure variables are called exogenous variables and the mediator variables are called endogenous variables since they are dependent variables regarding the exposure variable and an independent variable regarding the outcome variable (Gunzler, Chen, Wu, & Zhang, 2013). This robust method is preferred as opposed to simply testing the regression associations between all three variables since it allows us to directly estimate the mediation effect of externalizing mental health symptoms without a priori assignment of each variable as a cause and effect as is done when simply using regression (Gunzler et al., 2013). SEM was first used to estimate the logistic regression odds ratio (OR) from the perinatal profiles on NEET status when the externalizing symptoms putative mediator was included. Next, the STDYX standardized coefficients of the regression output were estimated. Finally, SEM was used to estimate the indirect (i.e., the association between perinatal adversity profiles and NEET status via externalizing symptoms) and direct (i.e., the association between perinatal adversity profiles and NEET status independent from – that is, not explained by – externalizing symptoms) effects. Sex was adjusted for in the association between each perinatal adversity group and externalizing symptoms as well as between each perinatal adversity group and the NEET status outcome, and finally between externalizing symptoms and the NEET status outcome. The mediation is significant if the pathway from the exogenous construct to the endogenous construct and the pathway from the endogenous construct to the outcome construct produces significant results (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). To test mediation, we looked at the significance of the indirect effect from the perinatal adversity profiles via the externalizing symptoms to the NEET outcome. Moreover, we calculated the proportion of each perinatal profile-NEET status association that was mediated by externalizing symptoms by using the ratio between the indirect and the total effects.

Chapter 4: Article

Title: Perinatal Risk Factors for Young Adults to be Not Engaged in Employment, Education or Training (NEET) and its Mediators: Longitudinal Analysis of the QLSCD Cohort Study

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All authors contributed to the study's conception and design. Material preparation and analysis were performed by Rebecca Falutz. The first draft of the manuscript was written by Rebecca Falutz and all authors commented on subsequent versions of the manuscript. All authors read and approved the final manuscript.

Statements and Declarations

Funding: This work was supported by the Canadian Institutes of Health Research (CIHR) Master's award (Rebecca Falutz) and a postdoctoral fellowship from the CIHR (Marilyn N Ahun).

Conflicts of interest: The authors have conflicts of interest to declare that are relevant to the content of this article.

Declarations: The protocol for the QLSCD was approved by the Institute de la Statistique du Québec and St-Justine Hospital Research Centre ethics committees. Ethical approval for this study was received from the Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal. Informed consent was obtained from the participants at each

assessment, where parents gave consent for their children until the age of 18 years old. After 10 years old, assent was also given by the child.

Acknowledgments: We would like to thank Dr. Marie-Claude Geoffroy for her review and comments on the manuscript. We are grateful to the children and parents of the Québec Longitudinal Study of Child Development (QLSCD). The QLSCD was supported by funding from the Ministère de la Santé et des Services Sociaux (Ministry of Health and Social Services), the Ministère de la Famille (Ministry of the Family), the Ministère de l'Éducation et de l'Enseignement Supérieur (Ministry of Education and Higher Education), the Lucie and André Chagnon Foundation, the Institut de Recherche Robert-Sauvé en Santé et en Sécurité du Travail (Robert-Sauvé Research Institute of Health and Security at Work), the Research Centre of the Sainte-Justine University Hospital, the Ministère du Travail, de l'Emploi et de la Solidarité Sociale (Ministry of Work, Employment, and Social Solidarity), and the Institut de la Statistique du Québec (Québec Institute of Statistics). Additional funding was received from the Fonds de Recherche du Québec-Santé (FRQS), the Fonds de Recherche du Québec-Société et Culture (FRQSC), the Social Science and Humanities Research Council of Canada (SSHRC), the Canadian Institutes of Health Research (CIHR), and the Sainte-Justine Research Centre.

Abstract

Purpose: In 2019, 31% and 14% of young women and men worldwide – respectively – reported being not engaged in employment, education, or training (NEET), an important indicator of long-term socioeconomic vulnerability. This study examined the developmental pathways leading to NEET status in young adulthood by investigating the association between perinatal adversities and NEET status and the mediating role of adolescent externalizing behaviours. **Methods:** Data were from the Québec Longitudinal Study of Child Development (QLSCD, n = 974). Latent Class Analysis identified four profiles of exposures to 32 perinatal adversities: Low adversity, the reference profile; Fetal growth adversity, which includes participants experiencing adversity related to growth problems in utero and after birth; Delivery complications, which includes participants – or their mothers – who experience complications during birth; Familial adversity, consists of participants who experienced adversity related to their family life. The associations between the perinatal profiles, NEET status which was self-reported at age 21 years old and the putative mediating role of externalizing symptoms that were self-reported at age 15 and 17 were investigated using structural equation modeling. **Results:** The risk of becoming NEET at age 21 was higher for children who experienced perinatal familial (OR = 3.19 [95% CI: 2.31-4.40], $p < 0.001$) and fetal growth (2.03 [1.11-3.71], $p = 0.022$) adversity. Externalizing behaviour problems mediated the association between familial adversity and NEET status (1.03 [1.01-1.06], $p=0.003$). **Conclusion:** Prevention of NEET status in young adulthood should encompass familial and fetal growth-related risk factors, informing early prevention efforts in the perinatal period.

Keywords: NEET, psychosocial, longitudinal, perinatal, adversity, externalizing symptoms.

Abbreviations: Not engaged in Employment, Education, or Training (NEET), Québec Longitudinal Study of Child Development (QLSCD).

Introduction

NEET Status

For young adults (i.e., individuals aged 18-24 years), becoming not engaged in employment, education, or training (NEET) is a risk factor for long-term socioeconomic vulnerability. However, this is more than only an individual-level problem. At a societal level, individuals who are NEET could cost over 3% of the annual GDP due to problems such as lost taxes, unemployment, housing benefits, and poor health outcomes (Coles et al., 2010; Wu et al., 2021). Many studies have reported long-term risks associated with being NEET in young adulthood, including increased risk of long-term unemployment and social exclusion (Davidson, 2019; Public Health England, 2014). In terms of health consequences, being NEET is related to an increased risk of suicide, the use of unhealthy coping mechanisms such as illicit drugs and alcohol, and higher levels of depression (Davidson, 2019; Public Health England, 2014). In Québec specifically, in 2018/2019, 10% of young adults aged 20-24 years old were NEET (Brunet, 2019). Globally, in 2019, 31% and 14% of young women and men – respectively – reported NEET status (United Nations, 2021).

Individuals most at risk of becoming NEET are those with a life-long trajectory of psychosocial challenges beginning early in life. The people who find themselves being NEET are often from marginalized communities, they are high-risk and often under-educated people who are in that position due to structural barriers (Public Health England, 2014). For example, low levels of familial socioeconomic status (SES) and parental unemployment at childbirth are related to a higher risk of becoming NEET as a young adult (Clark & Lepinteur, 2019; Pitkänen et al., 2021). There is also evidence that cognitive and behavioural problems, both important determinants of NEET, are associated with perinatal factors. For instance, LBW has been associated with behavioural and psychiatric problems (Hack, 2006; Indredavik et al., 2010; Van Lieshout et al., 2018), which are known risk factors for becoming NEET (Hammerton et al., 2019; Pitkänen et al., 2021). Babies born at a VLBW can experience cognitive developmental delays during elementary school ages that persist into adolescence (Taylor et al., 2004) and are less likely to achieve their GED and to be enrolled in college (Hack, 2006). Another perinatal risk that has downstream consequences is gestational age, which is associated with school readiness at five years of age

(Dhamrait et al., 2021). Furthermore, being born pre-term has been shown to increase the risk of having a neuropsychiatric diagnosis in adolescence and adulthood (Xia et al., 2021), both found to be associated with becoming NEET (Pitkänen et al., 2021; Wu et al., 2021).

While certain risk factors have been shown to subsequently increase the possibility of becoming NEET, most studies have taken a variable-centered approach and focused on individual risk factors considered in isolation, such as those only concerned with SES or with pregnancy complications (Hack, 2006; Pitkänen et al., 2021). Few studies have examined a wider range of perinatal risk factors, which has the potential to identify the co-occurrence of risk factors within the same individual by taking a person-centered approach. Identifying clusters of risk factors that tend to occur together could help inform more effective interventions. A person-centered approach is especially useful when looking at longitudinal data and analyzing heterogeneous development trajectories, such as those among the individuals that make up the perinatal adversity profiles (Muthén & Muthén, 2000). Given that the perinatal period is a key developmental period, analyzing this stage of life could be an important determinant of later adversity. The present study quantifies the associations between a wide range of perinatal risk factors (e.g., birth complications, fetal growth adversity, familial adversity) and NEET status in young adulthood and explores the potential mechanisms of these associations.

The Importance of Mediators

This study uses two developmental frameworks to identify the potential mechanisms through which perinatal adversities may increase a person's risk of being NEET. The first is the Developmental Origins of Health and Disease hypothesis (O'Donnell & Meaney, 2016), which explains the association between perinatal adversity and mental health issues. The basis of this conceptual framework is that the quality of development experienced by the fetus can predict the risk of developing non-communicable and chronic diseases, including mental health issues (O'Donnell & Meaney, 2016). It posits that signals from the uterus during gestation can compromise the development of the fetus and can subsequently act on tissue development in a way that increases the risk for illness later in life (O'Donnell & Meaney, 2016). A second conceptual framework – the Trajectories of Failure framework by Jane McLeod and Danielle

Fettes – describes the downstream consequences of mental health problems in adolescents (McLeod & Fettes, 2007). That is, those who experience mental health problems in either childhood or adolescence are more likely to experience poorer educational attainment than those unaffected by mental health issues (McLeod & Fettes, 2007). Findings used to support the framework suggest that the association between externalizing problems and educational attainment is strong (McLeod & Fettes, 2007). Thus, empirical evidence and conceptual models support the putative role of externalizing factors as a potential mediator between perinatal adversities and NEET status.

Research has shown that mental health problems during adolescence could play an important role in the association between various perinatal adversities and NEET status (Davidson, 2019; Halmøy et al., 2012; Mallen et al., 2008; Motlagh et al., 2010; Nweze et al., 2023; Public Health England, 2014). A recent study showed a significant association between early-life adversity (e.g. parental separation, illness in the family, poverty) and poor cognitive performance in adolescence, and this was mediated by mental health issues measured by the Strengths and Difficulties Questionnaire, including emotional and hyperactivity problems (Nweze et al., 2023). Another study reported that perinatal risk factors including LBW and preeclampsia during birthing were associated with an increased risk of Attention Deficit Hyperactive Disorder (ADHD) diagnosis in childhood, with cognitive difficulties that can persist into adulthood (Halmøy et al., 2012). Additionally, it has been found that exposure to low SES and adverse childhood experiences in early life were associated with externalizing symptoms between 10-15 years old (Anderson et al., 2022). Downstream, a higher rate of youth with mental health problems are NEET than what is found in the general population (Davidson, 2019; Dea et al., 2014; Goldman-Mellor et al., 2016; Hammerton et al., 2019; Public Health England, 2014). For example, a British cohort study revealed that almost twice the amount of youth who are NEET than non-NEET had experienced at least one mental health issue during their childhood or adolescence (Goldman-Mellor et al., 2016). It has also been shown that a difficult temperament in childhood and the expression of externalizing symptoms is associated with NEET status in adulthood (Wu et al., 2021). Furthermore, externalizing symptoms have been found to be more stable over time and have been strongly linked with shortcomings in education and employment in adulthood

(Cicchetti & Toth, 2014; Evensen et al., 2016; Veldman et al., 2015). Given the consistent associations between externalizing symptoms and NEET status, this study focuses on externalizing symptoms as a potential mediator (Plenty et al., 2021).

This study examines the developmental pathways leading to NEET status in young adulthood by investigating (1) the association between distinct perinatal adversity profiles, namely familial adversity, fetal growth adversity, and delivery complications and NEET status at age 21 years and (2) the mediating role of adolescent externalizing mental health problems at 15 and 17 years old in this association.

Methods

Participants and Data

Data were drawn from the Québec Longitudinal Study of Child Development, a population-based representative sample of 2120 individuals born in 1997/98 in the Canadian province of Québec that is managed by the Institute de la Statistique du Québec. It included children from all regions of Québec except for those born in Northern Québec, Cree Territory, Inuit Territory, and Native Reserves (Orri et al., 2021). Probability-based sampling was used for this study. More details on the cohort can be found in the Cohort Profile (Orri et al., 2021).

Data has been collected annually or every two years from participants ages five months to 23 years (Orri et al., 2021). Assessments were self-reports, reports from parents and teachers, or linked data from hospital records. For the current study, 974 participants with data on externalizing symptoms at either age 15 or 17 and NEET status data at 21 years old were included in the analyses, representing 46% of the original sample. The protocol for the QLSCD was approved by the Institute de la Statistique du Québec and St-Justine Hospital Research Centre ethics committees. Ethical approval for this study was received from the Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal. Informed consent was obtained from the participants at each assessment, where parents gave consent for their children until the age of 18 years old. After 10 years old, assent was also given by the child.

To reduce the influence of differential attrition on our analyses, we used inverse probability weighting. Using the variables that make up the perinatal profiles, an imputation analysis was run to generate data for the variables with missing data (0.05%-12% missing data). A binary variable was created to identify the participants included in the analytic sample (n=974) from participants not included (n=1146). These two groups were compared on all the imputed perinatal adversity variables. A variable that indicated the probability of being included in the final analysis sample was created. This probability was transformed into a weight by dividing 1 by the probability of inclusion. This is necessary, as opposed to the exclusion of missing cases, since there were important differences between the analysis sample and participants lost over time. Participants lost-to-follow-up were more likely to be from lower socioeconomic strata. They

also tended to have younger mothers who scored higher on depression and antisocial scales and had induced pregnancies. Finally, those lost to follow-up were more likely to have parents with a lower level of educational achievement. Only the weighted results will be presented. The non-weighted results are presented in Appendix A (Tables S1-S6).

NEET Status

NEET status at 21 years old was assessed based on participants' responses to two questions: "Are you currently attending a school or educational institution (e.g., high school, college, university, other)?" and "During the past month, have you held at least one paid job (for an employer or for the family business) or been self-employed (self-employed, consultant, freelancer or entrepreneur)?" The NEET status variable, which is dichotomous, was coded as NEET (=1) if the participant answered no to both, and non-NEET (=0) if the participant answered yes to at least one of the questions.

Perinatal Adversity

This study uses the perinatal profiles created by Orri et al., 2020 (Orri et al., 2020). The profiles are created from 32 variables based on data taken from participants' birth records and parent-reported sociodemographic and familial factors when participants were five months old (table S7). Latent class profile analysis was used to identify groups of participants with distinct patterns of exposure to the 32 perinatal factors. Models with one to six classes were fitted and the ideal number of classes was chosen. Model selection was based on established fit indices (Bayesian Information Criterion, Vuong-Lo-Mendel-Rubin Likelihood Ratio Test), the proportion of participants in each class, and the ability to interpret each model (Orri et al., 2020). After choosing the best model, participants were assigned to a latent class based on their highest posterior probability (Orri et al., 2020). The selected model consisted of four classes: familial adversity, delivery complications, fetal growth adversity, and low adversity, which is the reference profile (Orri et al., 2020). The familial adversity profile consists of factors relating to social and economic adversity such as low SES, low parental education levels, and parental drug use. The delivery complications profile includes issues such as instances of long hospitalization during birth, having had a caesarean section, or if the mother was hypertensive during birth. The fetal growth

adversity profile includes factors on birth length, weight, and prematurity. For analysis, a categorical variable was created where low adversity =1, fetal growth adversity =2, delivery complications =3 and familial adversity =4. These categories are mutually exclusive and have been previously used and validated to estimate the association between perinatal adversity and suicide attempts in adolescents (Orri et al., 2020).

Mediators

Externalizing problems in the past year were self-reported at 15 years and/or 17 years using five scales, and their respective subscales, from the Mental Health and Social Inadaptation Assessment for Adolescents (MIA) (Côté et al., 2017), encompassing dimensions of aggression, ADHD, opposition, conduct disorder and delinquency. These were assessed based on a three-point Likert scale with the options “never true”, “sometimes true”, and “always true” (see Table 2 for a full list of items in the externalizing score scales).

For reliability, the internal consistency of each MIA scale was assessed with Cronbach's alpha (Côté et al., 2017). “Excellent” reliability (≥ 0.90) was found for the externalizing score. The validity of each scale was based on correlation analyses to assess both convergent and discriminant internal validity. A good differentiation between the scales was found (Côté et al., 2017).

Confounders

Many variables that are commonly considered to be confounders, such as SES and parental mental health problems were included in the exposure variable and are therefore not further controlled for. We selected from a list of 12 potential confounders, those that were correlated with at least two of the perinatal profiles, the mean externalizing symptom score, or the NEET status outcome. The variables considered were sex, parental immigration status, the suitability of their neighbourhood for a family, the level of safety in their neighbourhood, the presence of social problems in the neighbourhood, the presence of groups causing problems in the neighbourhood, the occurrence of burglaries in the neighbourhood, the availability of parks and playgrounds in the neighbourhood, ethnic or religious issues in the neighbourhood, the ability to walk alone in the neighbourhood, presence of alcohol or drug consumption on the streets of the

neighbourhood, and the occurrence of drug sales in the neighbourhood. These were all collected when the participant was 5 months old, and the answers were given by the parents/guardians. The choice of these potential confounders was based on past research documenting important associations between these variables and NEET status (Holmes et al., 2021; Jakobsen, 2023; Karyda & Jenkins, 2018). Only sex was significantly correlated with at least two perinatal profiles, the mean externalizing symptom score, or the NEET status outcome, so this was retained as a confounder. The other 11 variables did not meet the requirements for inclusion as a confounder.

Statistical Analysis

Descriptive and logistic regression models were estimated using IBM SPSS Statistics 27. Mplus version 8.8 was used for mediation analysis.

Association between perinatal adversity profiles and NEET status

Sex-adjusted logistic regression was used to quantify the association between each perinatal adversity profile and NEET status.

Mediation analysis

Mediation analysis was conducted by performing SEM. SEM was first used to estimate the logistic regression OR from the perinatal profiles on NEET status when the externalizing symptoms putative mediator was included. Next, the STDYX standardized coefficients of the regression outputs were estimated. Finally, the indirect (i.e., the association between perinatal adversity profiles and NEET status via externalizing symptoms) and direct (i.e., the association between perinatal adversity profiles and NEET status independent from – that is, not explained by – externalizing symptoms) effects were estimated. To test mediation, we looked at the significance of the indirect effect from the perinatal adversity profiles via the externalizing symptoms to the NEET outcome. Moreover, we calculated the proportion of each perinatal profile-NEET status association that was mediated by externalizing symptoms by using the ratio between indirect and total effects.

Results

Association of Perinatal Adversity Profiles and NEET Status

Descriptive statistics of the characteristics of the NEET and non-NEET groups can be found in Table 3. The chi-squared analysis between the perinatal profiles and NEET status showed that the familial adversity profile (66.03, $p < 0.001$) and delivery complications profile (11.05, $p < 0.001$) were associated with NEET status.

Table 3

Descriptive Statistics of Perinatal Profiles, Sex, and Mediators by NEET status

Variable	n (%) in the sample or mean	NEET status		P-value
		Yes, n = 90 (9.2%)	No, n = 884 (90.8%)	
Perinatal adversity profile¹				
Familial adversity	177 (18.2%) ^a	38.9% ^b	16.1% ^b	
Fetal growth adversity	45 (4.6%) ^a	5.6% ^b	4.5% ^b	
Delivery complications	231 (23.7%) ^a	15.6% ^b	24.5% ^b	
Reference profile	521 (53.5%) ^a	40.0% ^b	54.9% ^b	<0.001
Sex				
Female	606 (62.2%) ^a	5.9% ^b	56.4% ^b	0.819
Males	368 (37.8%) ^a	3.4% ^b	34.4% ^b	
Mediator				
Externalizing symptoms	1.4 ^c	1.94 ^d	1.35 ^d	<0.001

Data for the QLSCD were compiled from the final master file of the Québec Longitudinal Study of Child Development (1998–2019), ©Gouvernement du Québec, Institut de la Statistique du Québec.

¹Note that this paper uses slightly different names for the perinatal adversity profiles from the original paper by Massi et al. (Orri et al., 2020) Familial adversity is used instead of socioeconomic adversity and fetal growth adversity is used instead of poor fetal growth.

^aPrevalence in the sample

^bCross-tabulation calculations by NEET status

^cMean for the sample

^dMean by NEET status

The sex-adjusted logistic regression showed that participants in the familial adversity profile (OR = 3.19 [95% CI: 2.31-4.40], $p < 0.001$) and the fetal growth adversity profile (2.03 [1.11-3.71], $p = 0.022$) were both more likely to become NEET at 21-years old.

Mediation Analysis for Perinatal Adversity Profiles on NEET Status using SEM

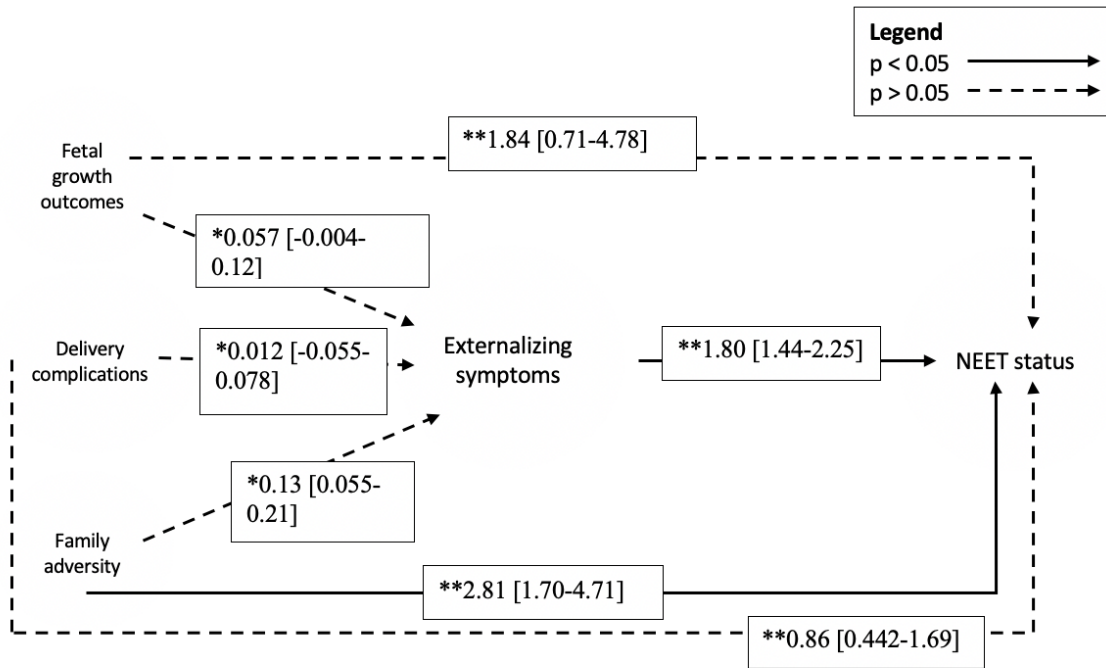
Mediation analysis using SEM explored the proportion of the increased risk of becoming NEET at 21 years old in the perinatal adversity profiles that were explained by the putative mediator of externalizing mental health symptoms at 15 and 17 years old.

The mediation results showed the persisting significance of the logistic regression between the familial adversity profile and NEET status after the mediator was included (OR = 2.81 [1.70-4.71]). The fetal growth adversity profile did not remain significantly associated with NEET status after including the mediator. The logistic regression also showed that adolescents with externalizing symptoms were more likely to be NEET at 21 years old (OR = 1.80 [1.44-2.35]). Next, STDYX standardized coefficients of the regression outputs showed that participants in the familial adversity (*standardized beta coefficient* = 0.13, $p < 0.001$) and fetal growth adversity (0.057, $p = 0.009$) profiles were more likely to experience externalizing symptoms than those in the Low adversity profile. These results can be seen in Figure 3.

Finally, the mediation results show that there is a small but significant indirect effect of the familial adversity perinatal profile on NEET status in young adulthood via adolescent externalizing symptoms (OR = 1.03 [1.01-1.06], $p=0.003$). Externalizing symptoms account for 13% of the association between the familial adversity profile and NEET status. Results from the standardized total indirect and direct effects on NEET analysis can be seen in Table 4.

Figure 3

Diagram Showing the Association Between All Three Variables from SEM Logistic Regression



*STDYX standardization from mediation expressed as a beta value

**Logistic regression OR results from mediation

Table 4

Direct and Indirect Effects of Perinatal Adversity Profiles on NEET Status

Perinatal adversity profile and Mediator	Direct effect OR (95% CI)	Indirect effect OR (95% CI)
Fetal growth adversity	1.07 [0.96-1.19]	1.02 [0.99-1.03]
Delivery complications	0.96 [0.84-1.12]	1.00 [0.98-1.02]
Familial adversity	1.25 [1.12-1.40]*	1.03[1.01-1.06]*

Data for the QLSCD were compiled from the final master file of the Québec Longitudinal Study of Child Development (1998–2019), ©Gouvernement du Québec, Institut de la Statistique du Québec.

Discussion

This was the first study to examine the association between a wide range of perinatal risk factors and NEET status in young adulthood. We found that perinatal risk factors are related to NEET status as a young adult, specifically, the risk of becoming NEET was higher for children who experienced familial adversity in the first five months of life and for children who experienced problems related to fetal growth adversity compared to children with no perinatal adversity. The experience of externalizing symptoms in adolescence mediated the association of familial adversity – but not that of fetal growth adversity – with NEET status.

Our finding on the link between the risk of becoming NEET and the familial adversity perinatal profile builds on what other studies have found. Multiple studies demonstrate that experiencing a singular risk factor that is a part of our familial adversity profile, such as socioeconomic deprivation at birth, low parental education, maternal smoking, and poor maternal mental health, on their own can, increase the likelihood of becoming NEET in adulthood (Bogie, Fleming, Cullen, Mackay, & Pell, 2021; Lambe, Hultman, Torrång, Maccabe, & Cnattingius, 2006; Pitkänen et al., 2021; Rasalingam et al., 2021). We utilize that knowledge, and go beyond it, by clustering these variables into perinatal profiles and demonstrating how they have the ability to co-occur within an individual, therefore possibly compounding the perinatal risk that is experienced. The novelty of our study comes from the fact that we consider all these factors at once in clusters, using a person-centered approach. The positive outcome we found using this design demonstrates the need for future research to consider how risk factors have the potential to co-occur within the same individual. Identifying this co-occurrence can help ensure that interventions are targeting those who experience multiple co-existing risk factors at the same time. Also, it demonstrates that future research focusing only on family-related socioeconomic adversities should expand its classification of socioeconomic adversity to include a wider range of factors to better understand the specific pathways through which these children are more likely to become NEET. This outcome presents a possibly interesting point of intervention to consider. Data from the Nurse-Family Partnership program has shown that interventions aimed at at-risk mothers, who often meet the characteristics of our familial adversity profile, have important downstream results in the children (Harriet Kitzman et al., 2019; D. L. Olds et al., 2007).

The program has shown that at-home nurse visits for these at-risk mothers during the perinatal period can help improve offspring achievement in elementary school and secondary cognitive factors (Harriet Kitzman et al., 2019; D. L. Olds et al., 2007). Some trials with this type of intervention have reported that children who were part of the program had higher rates of graduation with honours, higher math scores and emotional regulation (H. Kitzman et al., 2019). These results demonstrate that interventions targeting the root cause of perinatal risk factors are promising. This could aid in the reduction of future NEET outcomes.

The current study's conclusions on the association between the risk of becoming NEET and our fetal growth adversity profile is also in line with, and builds on, previous research. Past studies demonstrate that experiencing one problem related to growth during the fetal and newborn period, alone, can increase the likelihood of becoming NEET as a young adult (Bynner & Parsons, 2002; Hack, 2006; Kristensen et al., 2021). Examples of these growth problems include being born at a VLBW and being young for gestational age (Dhamrait et al., 2021; Hack, 2006). This could be because these growth problems can delay development, decreasing childhood school readiness and therefore making children overall less likely to achieve success in their academics (Dhamrait et al., 2021). However, by looking at these risk factors in a group, our findings go beyond previous research, and are novel, due to our design of looking at multiple fetal growth adversities in a cluster. This is especially important with fetal growth adversity since past research has shown that these adversities often precede one another (Hollanders et al., 2019; Pallotto & Kilbride, 2006; Peterson et al., 2006). The novelty of our study is also due to our decision to include other, less-studied factors, such as head circumference and growth restriction in our fetal growth adversity profile.

The study found that externalizing mental health symptoms mediate the association between familial adversity and NEET status, but not the association between fetal growth adversity and NEET status. The small strength of the association is surprising since previous research demonstrated a strong association between various perinatal risk factors and the development of externalizing symptoms (Anderson et al., 2022; Halmøy et al., 2012) as well as the association between externalizing symptoms and becoming NEET as a young adult (Evensen et al., 2016; Plenty et al., 2021; Veldman et al., 2015; Wu et al., 2021). Further research is needed to replicate

these findings and determine if externalizing symptoms in adolescence is an important mediator of the perinatal adversity-NEET association. Our findings can potentially be explained by the fact that externalizing symptoms are only a partial mediator. Based on the Trajectories of Failure framework, a wider look at different categories of mental illness in adolescents could be an important aim for future research on possible mediators, as well as examining the role of mental health problems earlier in life, such as in childhood (McLeod & Fettes, 2007). The Developmental Origins of Health and Disease hypothesis suggest that aspects of the postnatal environment, such as mother-infant attachment, could be a potential mediator to consider (O'Donnell & Meaney, 2016). It would also be interesting to consider cognitive outcomes and school attainment as potential mediators since literature has found associations between these and NEET status (Bogie et al., 2021; Davidson, 2019; Hack, 2006). Nevertheless, establishing externalizing mental health symptoms as a mediator of this association is novel since previous research has only shown that an association exists between perinatal risk factors and externalizing symptoms, as well as externalizing symptoms and NEET status, respectively, rather than categorizing it specifically as a mediator. This outcome could inform the development of more precise interventions that are dependent on the risk factor profile the child has experienced. These interventions can target children and adolescents in schools since this is likely where externalizing symptoms are first manifested (Plenty et al., 2021). A study demonstrated that a Cognitive-Behavioral Therapy focused training for teachers helped improve behavioral problems and staying on-task for children with externalizing symptoms (Bloomquist, August, & Ostrander, 1991). Other teacher-led interventions that have shown success include providing children with more notice before evoking change in the classroom, providing the child with choices and alternatives rather than giving commands on behaviors and helping children develop skills for teamwork (Stacks, 2005). Behavioral interventions in the classroom have also shown promising results. For example, with antecedent-based interventions that are used to prevent disruption and inattention from the students (DuPaul, Weyandt, & Janusis, 2011). An example is with reducing the length of assignments, so they are more in-line with the students' attention spans (DuPaul et al., 2011). Once they ace staying on-task for the shorter assignments, the length can be gradually increased (DuPaul et al., 2011). This shapes the students' behavior in a slow and controlled manner. These

interventions can be very effective in targeting externalizing symptoms in school-aged children. Addressing these issues before they become too prominent to deal with, and aiding children in reaching their full academic and social potential through these interventions may help reduce the incidence of young adults who become NEET. Lastly, since externalizing symptoms did not significantly mediate the association between fetal growth adversity and becoming NEET, more research is needed to understand the mechanisms through which fetal growth adversity increases the risk of becoming NEET.

Strengths and Limitations

The current study adds to research demonstrating the link between perinatal risk factors and NEET status by using a person-centered approach to look at clusters of perinatal risk factors at the same time, rather than focusing on one or two isolated risk factors. Since risk factors are often not present in isolation (Orri et al., 2020), this is a strong approach that should be used for further research on the topic. Another important strength of the study is that because it covers a 21-year period, the knowledge gained offers a more accurate lifetime approach to risk factors for becoming NEET as a young adult. This contrasts with many other studies that only look at smaller periods in childhood. An important limitation is that people from the original cohort were lost over time. This means that there is less data on possible outcomes. This can become a concern if the outcome of interest has a lot of missing data, leading to a smaller sample size. The generalizability of the study can also be compromised due to attrition bias if there are significant differences between the remaining study participants and the participants who are lost. In this study, attrition bias was minimized due to the use of inverse probability weighting. Another limitation is that the QLSCD sample comes from a high-income country, therefore it is unknown if these results can be generalized to populations from diverse sociocultural contexts. Although we do investigate a wide range of factors, it is not exhaustive, and other perinatal risk factors could influence the risk of becoming NEET.

Conclusion

This study examined multiple perinatal risks clustered into distinct profiles to account for a broader diversity of factors that could be associated with NEET status in young adulthood. The

results suggest that early life preventative interventions for becoming NEET should focus on elements encompassing familial and growth-related risk factors. The results also suggest that externalizing mental health symptoms in adolescents are a promising intermediate mechanism to target to reduce the risk of NEET status in young adults exposed to a cluster of perinatal familial adversity. To our knowledge, this is the first study to identify profiles of risk factors for becoming NEET at 21 years old and to categorize externalizing mental health symptoms as a partial mediator of the familial adversity-NEET association. Identifying children with multiple risk factors in these two domains and those who specifically have externalizing mental health symptoms may inform the development of prevention efforts and targeted interventions that address the most disadvantaged children.

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Chapter 5. Discussion

5.1: Summary of Main Findings

There were two main objectives of this dissertation: Examine the developmental pathways leading to NEET status in young adulthood by investigating (1) the association between distinct perinatal adversity profiles, namely familial adversity, fetal growth adversity, and delivery complications and NEET status at age 21 years and (2) the mediating role of adolescent externalizing mental health problems at 15 and 17 years old in this association. We observed that familial adversity and fetal growth problems experienced during the perinatal period contributed to an increased risk of becoming NEET at 21 years old, compared to experiencing no perinatal adversity. There was, however, not a significant association between delivery complications and NEET status. Furthermore, we found that externalizing mental health symptoms at 15 or 17 years old mediated the association of familial adversity – but not that of fetal growth adversity – with NEET status.

5.2: Interpretation of the Results with Regards to the Literature

5.2.1 Perinatal Adversities and NEET Status Pathway

The outcome found on the association between the familial adversity profile and NEET status at 21 years old builds on what previous studies have found. Multiple studies demonstrate that experiencing a singular risk factor that is a part of this familial adversity profile, such as growing up in a low SES context or experiencing low parental education, on their own can, increase the likelihood of becoming NEET in adulthood (Bogie et al., 2021; Lambe et al., 2006; Pitkänen et al., 2021; Rasalingam et al., 2021). Research has hypothesized that the increase in the likelihood of becoming NEET, in such cases, is due to the lack of access to opportunities for advancement during childhood or adolescence (Pitkänen et al., 2021). The stress on parents due to lack of income can affect parenting capabilities, which can lead parents to be disengaged from their child's education, as opposed to having highly educated parents who might have access to or knowledge of opportunities that allow for the advancement of their child's education, thus

encouraging their children to pursue higher educational achievement (Alfieri et al., 2015; Pitkänen et al., 2021). Previous research also suggests that perinatal smoke exposure, alone, increases the risk of poor school attainment, which is a predictor of NEET status (Lambe et al., 2006). This is likely due to the teratogenic effects of exposure to tobacco on the fetus leading to altered brain development by causing issues with blood flow to the fetus and modifying protein metabolism (R. H. Palmer et al., 2016). We utilize this knowledge, but go beyond it, by clustering these variables into a perinatal profile and demonstrating that they have the ability to co-occur within an individual. Our findings are novel in that they consider all of these perinatal factors simultaneously as opposed to only reporting on SES struggles or the long-term outcomes of parental tobacco use. Not only do we cluster these individual risk factors into groups, but by looking at multiple groups of risk factors at once, we increase the depth of knowledge gained from a single study. The results found using this clustered design have important implications for future research as well as interventions. Identifying which risk factors are most likely to be experienced concurrently will allow children with the likelihood of experiencing the greatest number of risk factors to be targeted for intervention.

The conclusions found on the association between the risk of becoming NEET and our fetal growth adversity profile is also in line with, and builds on, previous research. Past studies demonstrate that experiencing one problem related to growth during the fetal and newborn period, alone, can increase the likelihood of becoming NEET as a young adult (Bynner & Parsons, 2002; Hack, 2006; Kristensen et al., 2021). For example, it has been found that problems relating to fetal and newborn growth, which in turn affect the later development of the offspring, have important downstream consequences for school attainment and employment outcomes (Bynner & Parsons, 2002; Hack, 2006; Kristensen et al., 2021). LBW is one of the more commonly reported fetal growth adversities that can have severe long-term costs to the offspring. Babies born at a VLBW are less likely to achieve their GED which has important implications for becoming NEET (Hack, 2006). Prematurity, similar to being born V/LBW, indicates a concern for fetal development. For instance, it has been found that there is a dose-dependent relationship between gestational age at birth and school readiness at school entry, with each additional week in gestation leading to increased school readiness (Dhamrait et al., 2021). However, by using the

clustered design and looking at six fetal growth adversities at once, rather than individually, we show the importance of looking at the co-occurrence of these factors within the same person. This is very important in the case of fetal growth since these adversities typically co-occur. As previously mentioned, most babies born prematurely are born at a V/LBW due to IUGR (Hollanders et al., 2019; Pallotto & Kilbride, 2006), and these offspring also tend to have a smaller head circumference (Peterson et al., 2006).

5.2.2 Mediation

As hypothesized, externalizing mental health symptoms were found to be a mediator of the perinatal adversity-NEET association. However, it was only a mediator when familial adversity was the exposure variable, not when fetal growth adversity was implicated. Furthermore, while externalizing symptoms were found to be a mediator, they only mediated 13% of the association. The small strength found in the mediation results was surprising since many studies have documented a particularly strong association between individual familial adversity factors and the development of externalizing symptoms (Anderson et al., 2022; Halmøy et al., 2012) as well as a strong link between externalizing symptoms and becoming NEET as a young adult (Evensen et al., 2016; Plenty et al., 2021; Veldman et al., 2015; Wu et al., 2021). This small percentage of mediation suggests that externalizing symptoms are only a partial mediator of this association.

Nevertheless, establishing externalizing mental health symptoms as a partial mediator of the familial adversity-NEET association presents a novel finding. Previous studies have only shown that an association exists between perinatal risk factors and externalizing symptoms, as well as between externalizing symptoms and NEET status, respectively, rather than formally testing for mediation. This outcome has both clinical and social implications in that it could inform the development of more precise interventions that are dependent on the risk factor profile the child has experienced. Addressing these issues before they become debilitating and too great to deal with, as well as supporting children in ways that allow them to reach their full academic and social potential may help reduce the incidence of young adults who are NEET.

5.3 Implications

5.3.1 Implications for Interventions

Interventions informed by these results can take one of two approaches. Interventions can focus on the root with the perinatal risk factors, or further down the line with the externalizing mental health symptoms. Interventions aimed at the perinatal risk factors have shown to be successful in mitigating the important downstream consequences that have been shown to occur when no intervention is put in place. A prominent example is with the Nurse Family Partnership (NFP), where multiple randomized controlled trials were conducted that intervened at the root with the mother during gestation. The NFP program targeted at-risk mothers, who often possessed many of the characteristics that would put their children into our familial adversity profile, such as low levels of education, using drugs and alcohol during pregnancy, and having a high household poverty index (Harriet Kitzman et al., 2019). They were set up with a nurse who visited them frequently during gestation as well as during the post-partum period. The nurses had multiple tasks, such as promoting beneficial prenatal behaviour, teaching parents about and fostering competent care, encouraging parents to plan for future pregnancies, complete school and find jobs, and finally, helping the families make use of health and social services (Olds et al., 2007). Those in the treatment group who received the at-home nurse visits had offspring that experienced higher achievement in elementary school and secondary cognitive factors (Harriet Kitzman et al., 2019; D. L. Olds et al., 2007). Examination of follow-up studies conducted on children who were part of the treatment group of the NFP program shows encouraging results for the long-term outcomes of perinatal risk factors. Reported results showed that children who were part of the program experienced less arrests and had less antisocial behavior, including drug and alcohol abuse (D. Olds et al., 1998; Sidora-Arcoleo et al., 2010). Some trials with this intervention have also reported that children who were part of the program had higher rates of graduation with honours, higher math scores and emotional regulation (H. Kitzman et al., 2019). These results demonstrate that interventions targeting the root cause of perinatal risk factors are promising to increase academic and social achievement down the line. Therefore, similar interventions have the potential to aid in the prevention of more young adults becoming NEET in

the future. Identifying, in the perinatal period, mothers and offspring who can benefit from these types of interventions is an encouraging avenue to work towards preventing an increase in the prevalence of youth who are NEET.

Interventions aimed at externalizing mental health symptoms can also be a promising approach when the perinatal risk factor profile in question is familial adversity. These interventions can target children and adolescents in schools since this is often where externalizing symptoms are manifested (Plenty et al., 2021). However, in Canada, as in many places around the world, there are important barriers to accessing mental health services (Moroz, Moroz, & D'Angelo, 2020). Therefore, this research can inform policymakers that more funding needs to be put into increasing access to mental health care for disadvantaged children. From a populational perspective, prevention and health promotion strategies should be prioritized, as they can reduce the pressure on specialized mental health services and provide support to youth with subclinical levels of problems. There are many examples of past interventions for children with externalizing symptoms that have shown encouraging outcomes. A study demonstrated that a Cognitive-Behavioral Therapy focused training for teachers helped improve behavioral problems and staying on-task for children with externalizing symptoms (Bloomquist et al., 1991). Other teacher-led interventions include providing children with more notice before evoking change in the classroom, providing the child with choices and alternatives rather than giving commands on behaviors and helping children develop skills for teamwork (Stacks, 2005). A meta-analysis that examined the effectiveness of teacher-led interventions for children with externalizing symptoms found that they led to a significant increase on children's prosocial behavior and a significant decrease in externalizing symptoms (Aldabbagh, Glazebrook, Sayal, & Daley, 2022). Behavioral interventions in the classroom have also shown promising results. For example with antecedent-based interventions that are used to prevent disruption and inattention from the students (DuPaul et al., 2011). The antecedent is used to trigger the occurrence of a specific, in this case, positive, behavior (DuPaul et al., 2011). An example of this kind of intervention is with frequently reviewing classroom rules and providing more frequent praise when students follow the rules (DuPaul et al., 2011). Another example is with reducing the length of assignments, so they are more in-line with the students' attention spans (DuPaul et al., 2011). Once they master

the shorter assignments, the length can be gradually increased (DuPaul et al., 2011). This shapes the students' behavior and combats the externalizing symptom of inattention in a slow and controlled manner. These easily-to-implement, low-cost, interventions can be very effective in targeting externalizing symptoms in school-aged children. They have the potential to help prevent students from falling behind in their academics, which can help prevent them from becoming NEET in the future.

5.3.2 Implications for Public Health

Findings from this study have important implications in the field of public health, specifically in 2023 in the wake of the peak of the Covid-19 pandemic. It is evident that the pandemic has created a great loss in education and employment. The UN reported that 255 million full-time jobs were lost during the pandemic and estimated a major loss in school completion (Bulman & Fairlie, 2022; United Nations, 2021). Those from poorer households were the most vulnerable (United Nations, 2021). Children from poorer households would likely fall into the familial adversity profile, thus emerging information on the impact of the Covid-19 pandemic on NEET status is in line with the results found from this study.

Furthermore, economic trends predict an incoming global recession, meaning even more people will be forced into situations of socioeconomic struggle leading, once again, to an increase in people who are NEET, as occurred with the 2008 recession (Collins et al., 2023; Hult, Kaarakainen, & De Moortel, 2023). Given this prediction, it is important that governments plan ahead to avoid an unprecedented increase in people who are NEET and treat it as a major public health issue. School-based prevention and health-promotive strategies are promising avenues to reduce social inequalities and support children at a high risk of becoming NEET. Their success and cost-effectiveness for educational attainment are well established (Heckman, 2006; Heckman & Masterov, 2007). Prevention studies testing the efficacy and cost-effectiveness of school-based prevention for NEET are needed to understand the best way to foster social and economic engagement by youths with family or behavioural risks.

Studies have found that an important way to mitigate these issues is by increasing government investments in areas such as job creation, education, training, early childhood education, and

mental health care (A. N. Palmer & Small, 2021). These investments are necessary from the government, as well as the creation of more programs aimed at at-risk youth, such as those mentioned in section 5.3.1 of this chapter, in order to help mitigate this issue.

5.3.3 Implications for Future Research

The results from this study contribute greatly to the knowledge base related to perinatal risk factors and its long-term adverse outcomes, however, it also provides knowledge on what future researchers in this field should focus on.

Firstly, in terms of the perinatal risk factors, future research should continue to look at these adversities simultaneously to account for having more than one adversity factor that can lead to added damage to psychosocial development. Furthermore, studies should look at how various risk factors can co-occur within the same individual, and how individual risk factors might be able to influence each other. Additionally, results of our research suggest that future studies creating a similar familial adversities profile should include an equally extensive range of factors, to better identify when during development the interventions should target in order to disrupt the most pathways to becoming NEET as possible.

With regards to mediators, the results found in this study suggests that future research may need to bring in other theoretical frameworks to decipher a larger portion of the mediator of the perinatal adversity-NEET association, or other aspects of the theories need to be explored in further detail. The framework outlined by the Developmental Origins of Health and Disease hypothesis proposes that aspects of the postnatal environment, such as mother-infant attachment, could be a potential mediator to consider (O'Donnell & Meaney, 2016). Parenting quality and the quality of early childhood care, as aspects of the postnatal environment, have been shown to be important indicators of cognitive competencies, academic achievement, and the development of behavioural problems (Belsky et al., 2007). Thus, exploring similar aspects could be an interesting outlet to consider for mediators of the perinatal adversity-NEET status association. The Trajectories of Failure framework suggests that a wider look at different categories of mental illness in adolescents could be an important aim for future research on possible mediators, as well as examining the role of mental health problems earlier in life, such

as in childhood (McLeod & Fettes, 2007). Internalizing mental health issues are more commonly found in girls, than boys, and have been shown to be a predictor of NEET status for girls (Plenty et al., 2021). This suggests that maybe the mediators differ by sex. Moreover, a promising mediator to consider is cognitive outcomes and school attainment since literature has found associations between these and NEET status (Bogie et al., 2021; Davidson, 2019; Hack, 2006). Also, since externalizing symptoms did not significantly mediate the association between fetal growth adversity and becoming NEET, these suggestions can also help future researchers understand the mechanisms through which fetal growth adversity increases the risk of becoming NEET. Furthermore, to get more accurate data on the presence of externalizing mental health symptoms, a sub-sample of future cohorts could be assessed by healthcare professionals. Since it is not feasible to have such a large cohort assessed entirely by healthcare professionals, the whole cohort could still use assessments from teacher and parent reports. This would allow researchers to analyze the different perspectives on participants' symptoms and therefore see if there are meaningful differences in how symptoms are reported.

In general, future studies should also strive to sample a more diverse pool of participants, both in terms of SES and ethnicity. This can be done by starting a new cohort of data collection with this goal specifically in mind, and following these children longitudinally, as the QLSCD did. Finally, since this research had a correlational design, it was not possible to make any causal inferences about the long-term effects of perinatal adversity. To address this, a similar study could be conducted with a more experimental design such as the ones used in the NFP program, where half the cohort receives perinatal nurse-visits to intervene on the perinatal risk factors, then the children are followed until 21-years old when data on NEET status is collected. This would allow researchers to analyze if perinatal risk factors are a cause for becoming NEET in young adulthood.

5.4: Strengths and Limitations

5.4.1 Strengths

This study has several important strengths. First, the current study adds to the growing literature establishing the association between perinatal risk factors and NEET status by looking at clusters

of perinatal risk factors simultaneously. Since risk factors are often not present in isolation, and many of the risk factors that are explored in this research influence each other heavily, this is a convincing approach that should be used in future studies addressing these issues. Finally, the large population-based sample and longitudinal design of the data collection allows us to examine the long-term outcomes of perinatal adversity and the knowledge gained offers a more accurate lifetime approach to risk factors for becoming NEET as a young adult. This contrasts with many other studies that only look at smaller periods in childhood.

5.4.2 Limitations

Despite the important strengths presented, there are key limitations that need to be considered when interpreting these findings in a wider context. Firstly, many people from the original cohort were lost over time. This means that there is less data on possible outcomes, which can become a concern if the outcome of interest has a lot of missing data, leading to a smaller sample size. This is why our number of participants dropped from the original n of 2120 participants to 974 whom had data on all the variables needed. The generalizability of the study to the greater population can also be compromised due to attrition bias if there are significant differences between the remaining study participants and the participants who are lost. Since there were significant differences in those who remained until the end of the study, as mentioned in chapter 3, measures were taken to minimize this bias. Specifically, attrition bias was lessened due to the use of inverse probability weighting, as was explained in detail in chapter 3. Another important limitation is that the QLSCD sample comes from an ethnically homogenous sample in a high-income country, therefore it is unknown if these results can be generalized to populations from diverse sociocultural contexts and in low- and middle-income countries. It would be interesting to use these same measures while investigating children from different contexts to observe if similar results are achieved. Furthermore, since most of the participants were relatively well-off in terms of SES, it would also be important to replicate this study when looking specifically at a disadvantaged population living in a high-income country in order to increase the number of participants in the different adversity groups, relative to the low-adversity group. This limitation is also present since the QLSCD data was not collected specifically for the purposes of this study. Finally, although we do investigate a wide range of factors, it is not exhaustive, and other factors

could influence the risk of becoming NEET. For example, it could have been important to look at exposure to traumatic events such as neglect or violence.

5.5 Conclusion

This study contributed to the growing sphere of knowledge regarding the long-term outcomes of perinatal adversity. Specifically, it examined multiple perinatal risks clustered into distinct profiles to account for a broader diversity of factors that could be associated with NEET status in young adulthood. The positive results suggest that interventions to prevent more young adults from becoming NEET should begin in early life, in order to catch the problem at its roots, and interventions should focus on issues encompassing familial and growth-related risk factors. Furthermore, the results suggest that externalizing mental health symptoms in adolescents are a promising intermediate mechanism to target to reduce the risk of NEET status in young adults exposed to a cluster of perinatal familial adversities. This presents a key option for intervention in schools where externalizing mental health symptoms often surface (Plenty et al., 2021). To our knowledge, this is the first study to identify groups of risk factors for becoming NEET at 21 years old and compare how these clusters increase the likelihood of becoming NEET simultaneously. Also, it is the first study to categorize externalizing mental health symptoms as a partial mediator of the familial adversity-NEET association. Targeting children with clusters of risk factors in these two domains and those who specifically have externalizing mental health symptoms that arise during adolescence may provide a solid starting point to initiate prevention efforts and precise interventions that address the most disadvantaged children.

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Appendix A: Supplementary Tables

Table S1

Correlation Analysis Between the Predictor Variable and NEET Status

	Unweighted chi squared value ^a or Pearson correlation value ^b or Spearman correlation ^c or Cramer's V ^d	P-value	Weighted chi squared value ^a or Pearson correlation value ^b or Spearman correlation ^c or Cramer's V ^d	P-value
Fetal growth outcomes	0.20 ^a 0.014 ^d	0.657	1.075 ^a 0.023 ^d	0.300
Delivery complications	3.65 ^a 0.061 ^d	0.056	11.051 ^a 0.072 ^d	< 0.001
Familial Adversity	28.62 ^a 0.17 ^d	<0.001	66.027 ^a 0.18 ^d	< 0.001
Mean externalizing symptoms	0.20 ^b 0.17 ^c	< 0.001	0.21 ^b 0.18 ^c	< 0.001

* Chi squared critical value is 3.841

Table S2*Logistic Regression Results Between the Predictor Variable and NEET Status*

	Unadjusted exp(B) (OR)	95% CI	P- value	Unweighted, adjusted for sex exp(B) (OR)	95% CI	P-value	Weighted, adjusted for sex exp(B) (OR)	95% CI	P- value
Fetal growth outcomes	1.68	0.63- 4.53	0.302	1.68	0.63- 4.53	0.303	2.028	1.11 - 3.71	0.022
Delivery complications	0.87	0.46- 1.65	0.667	0.87	0.46- 1.65	0.667	0.89	0.58 - 1.35	0.571
Familial Adversity	3.32	2.011- 5.48	< 0.001	3.32	2.010- 5.48	< 0.001	3.19	2.31 - 4.40	< 0.001
Mean externalizing symptoms	1.92	1.54- 2.39	< 0.001	1.92	1.54- 2.39	< 0.001	1.89	0.64 - 2.18	< 0.001

Table S3*Linear Regression Between Externalizing Symptoms and Perinatal Profiles*

	Unadjusted standardized beta value	P-value	Unweighted standardized beta value	P-value	Weighted standardized beta	P- value
Fetal growth outcomes	0.52	0.107	0.51	0.111	0.057	0.009
Delivery complications	0.006	0.868	0.006	0.862	0.012	0.616
Familial Adversity	0.12	< 0.001	0.12	<0.001	0.13	< 0.001

* Unweighted ANOVA F statistic = 4.13, p = 0.003

** Weighted ANOVA F statistic = 10.82 p < 0.001

Table S4*Logistic Regression OR Results from Mediation – Perinatal pn NEET*

	Unadjusted OR	95% CI	Unweighted, adjusted for sex exp(B) (OR)	95% CI	Weighted, adjusted for sex exp(B) (OR)	95% CI
Fetal growth outcomes	1.53	0.58 - 4.04	1.54	0.59- 4.04	1.84	0.71- 4.78
Delivery complications	0.86	0.44- 1.66	0.86	0.44- 1.66	0.86	0.44- 1.69
Familial Adversity	2.92	1.74- 4.90	2.93	1.75- 4.90	2.81	1.70- 4.71
Mean externalizing symptoms	1.83	1.47- 2.27	1.83	1.48- 2.28	1.80	1.44- 2.25

Table S5*STDYX Standardization from Mediation – Perinatal on Mean Externalizing*

	Unadjusted OR	95% CI	P- valu e	Unweighte d, adjusted for sex exp(B) (OR)	95% CI	P- valu e	Weighte d, adjuste d for sex exp(B) (OR)	95% CI	P- valu e
Fetal growth outcomes	0.052	-0.006- 0.11	0.0 8	0.052	-0.007- 0.110	0.08 2	0.057	- 0.004- 0.12	0.06 7
Delivery complicatio ns	0.006	-0.059- 0.070	0.8 66	0.006	-0.059- 0.070	0.86 0	0.012	- 0.055- 0.078	0.73 2
Familial Adversity	0.12	0.052- 0.19	0.0 01	0.12	0.052- 0.19	0.00 1	0.13	0.055- 0.21	0.00 1

Table S6*Direct and Indirect Effects OR on NEET Status*

	Unadjusted direct effects OR	95% CI	P-value	Unadjusted indirect effect OR	95% CI	P-value
Fetal growth outcomes	0.046	-0.058- 0.15	0.386	0.014	-0.002- 0.029	0.087
Delivery complications	-0.034	-0.18- 0.11	0.644	0.001	-0.015- 0.018	0.865
Familial Adversity	0.21	0.11- 0.31	< 0.001	0.032	0.012- 0.052	0.002

	Unweighted, adjusted direct effects OR	95% CI	P-value	Unweighted, adjusted indirect effect OR	95% CI	P-value
Fetal growth outcomes	0.047	-0.057- 0.15	0.378	0.013	-0.002- 0.029	0.088
Delivery complications	-0.034	-0.18- 0.11	0.645	0.002	-0.015- 0.018	0.859
Familial Adversity	0.21	0.11- 0.31	< 0.001	0.032	0.012- 0.051	0.002

	Weighted, adjusted direct effects beta	95% CI	P- value	Weighted , adjusted direct effect OR	Weighted, adjusted indirect effects beta	95% CI	P- value	Weighted , adjusted indirect effect OR
Fetal growth outcomes	0.067	- 0.037- 0.17	0.207	1.069 [0.96- 1.19]	0.015	-0.002- 0.031	0.081	1.02 [0.99- 1.03]
Delivery complicatio ns	-0.032	-0.18- 0.11	0.668	0.96 [0.84- 1.12]	0.003	-0.014- 0.020	0.730	1.00 [0.98- 1.02]
Familial Adversity	0.22	0.12- 0.33	< 0.001	1.25 [1.12- 1.40]	0.034	0.011- 0.057	0.003	1.03[1.01 -1.06]

Appendix B: Parent Consent Forms 1998



2	-	9	8	-		-		-				-						
1		2	3		4		5		6	7		8	9	10	11	12	13	14

« In the year 2002... I'll be 5 years old! » Longitudinal study of the development of children in Québec ELDEQ - Volet 1998

INFORMED CONSENT FORM

I understand that this form is part of the study entitled «In the year 2002... I'll be 5 years old!» being conducted by a group of researchers from 5 Québec universities (Concordia University, University of Montréal, University of Sherbrooke, Laval University, McGill University) in association with Santé Québec, its partners and the ministère de la Santé et des Services sociaux (MSSS, Québec).

I have been advised that the PURPOSE of this study is to collect information about factors influencing child development in Québec.

I understand that my participation in this study is entirely VOLUNTARY, of MY OWN FREE WILL, and that I will not be personally identified in the reporting of the results. I have also been assured that all information that I provide about me, my spouse or my child/children will be treated ANONYMOUSLY and in the STRICTEST OF CONFIDENCE as specified under the provision of the ACCESS TO INFORMATION ACT (Québec).

I understand that an interviewer selected by Santé Québec/BIP will call me at my home and come to my house to complete questionnaires. The interviewer will also leave other questionnaires to be filled out by myself and my spouse (if applicable) all to be returned by mail. I further understand that the interview will last about one hour and a half (1 hr 30 minutes).

I also understand that to confirm my participation in the other parts of this annual study, Santé Québec will be contacting me over the next four years.

I, the undersigned, freely agree to take part in this annual study. I certify that the study has been well explained to me, that all my questions have been answered and that I was given enough time to come to this decision on my own.

I, the undersigned, further understand that I may withdraw my consent to participate at any time without penalty to me in any way.

Signature of Respondent

Date

RESERVED FOR SIGNATURE OF INTERVIEWER

I have explained to the signatory, to the best of my ability, both the purpose and nature of the study at hand. I asked him or her whether he or she had any questions, and then answered them as required. In my opinion, the signatory is perfectly aware of study methodology, the implications of his or her involvement therein, and the VOLUNTARY nature of the consent provided. I have left the original of this consent form with the signatory and shall remit the second original to the authorities conducting the study entitled «In the year 2002... I'll be 5 years old!».

Signature of interviewer

Date

Appendix C: Authorization to Send Information Contained in Medical Records



2	-	9	8	-		-		-											
1		2	3		4		5		6	7		8	9	10	11		12	13	14

AUTHORIZATION TO DIVULGE INFORMATION CONTAINED IN FILES ON MOTHER AND BABY

Surname and first name at birth (baby's mother)

Name currently used (baby's mother)

Current addressee of baby's mother

Baby's RAMQ N° _____ Date of Birth of baby's mother
Y M D

Surname and first name of baby's father _____
Surname and first name of mother (i.e. baby's maternal grandmother)

Surname and first name of baby _____ Sex: Female or male

Baby's RAMQ N° _____ Date of Birth of baby
Y M D

Status of the form	
Completed	1
Non completed	2

Admission Date of childbirth : _____

I, the undersigned, _____
Name and current address of baby's mother

in the capacity of _____
Beneficiary of authorized individual

do hereby authorize the following establishment: _____
Name of the hospital where the delivery took place

to forward to: **Mireille Jetté**, Co-ordinator, **Santé Québec**
 1200 McGill College, suite 1620, Montréal (Québec), H3B 4J8 - Tel: (514) 873-4749

- the following information concerning:
- the Mother:**
 - 1) Complete summary of obstetrics file
 - 2) Results of anatomopathology exam of placenta
 - 3) Summary Sheet - Hospital (short term stay)
 - the Baby:**
 - 1) Complete summary of newborn medical file
 - 2) Results of umbilical cord blood sample

regarding the care and services received during the period from: _____ to _____ as contained in the file of the beneficiaries identified hereinabove.

This authorization shall be valid for a period of ninety (90) days from the date of signing.

_____ Signature of beneficiary or authorized individual	<table border="1"> <tr> <td>Y</td><td>M</td><td>D</td> </tr> <tr> <td></td><td></td><td></td> </tr> </table> Date	Y	M	D			
Y	M	D					
_____ Signature of witness (Santé Québec/BIP Interviewer)	<table border="1"> <tr> <td>Y</td><td>M</td><td>D</td> </tr> <tr> <td></td><td></td><td></td> </tr> </table> Date	Y	M	D			
Y	M	D					

NB: One must ensure that the signatories hereto are authorized to do so under the provisions of applicable legislation.

Appendix D: Parent Consent Form 2013



Québec Longitudinal Study of Child Development
QLSCD (E16) – 2013 Round



Consent Form and Information on the Study for the Parent

1. I authorize the *Institut de la statistique du Québec (Statistique Québec)* to:

- 1.1. Have an interviewer from *l'Institut de la statistique du Québec (Statistique Québec)*, specially trained for the study, to fill out a computerized questionnaire with me with the goal of collecting data on my child's development and environment;
- 1.2. Obtain from the *ministère de l'Éducation, du Loisir et du Sport du Québec (MELS)* (Ministry of Education, Leisure and Sport) my child's permanent code in order to give *Statistique Québec* access to information held by the *MELS* or by the school boards;
- 1.3. Send data collected on me, my child or the people I represent, in an anonymous form (i.e., not revealing my name, address and telephone number) to researchers affiliated with the institutions and organizations listed in Section A of this form.

2. I understand that:

- 2.1. The list of the researchers affiliated with the institutions and organizations appearing Section A of this form can be given to me upon request, and that they will have signed a confidentiality agreement before anonymous data on me or the people I represent are sent to them;
- 2.2. This consent form is part of the study entitled "I am I'll be". I have been advised that the purpose of this study is to collect information that will help gain a better understanding of factors that can influence youth development and success in school in Québec;
- 2.3. To confirm my participation in future rounds of this survey, *Statistique Québec* will contact me in the coming years;
- 2.4. A person employed by *Statistique Québec* will contact me to arrange a time during which an interviewer will fill out a computerized questionnaire with me either in person or by telephone. The average duration of the interview is 30 minutes. The self-administered questionnaire for the mother (or spouse/partner) (duration of approximately 15 minutes) will be given to me by the interviewer or will be mailed to me. The mother (or spouse/partner) should fill it out and give it to the interviewer or send it in by mail;
- 2.5. My child will be asked to fill out an online questionnaire at home by him/herself or with the interviewer present (total duration of 60 to 75 minutes);
- 2.6. My participation in this study is entirely VOLUNTARY, of MY OWN FREE WILL;
- 2.7. I freely consent to take part in this longitudinal study;
- 2.8. I am free to withdraw my consent to participate at any time without penalty to me in any way;
- 2.9. The information I provide will be treated as CONFIDENTIAL, handled and protected in accordance with the ACT RESPECTING THE INSTITUT DE LA STATISTIQUE DU QUÉBEC and the ACT RESPECTING ACCESS TO DOCUMENTS HELD BY PUBLIC BODIES AND THE PROTECTION OF PERSONAL INFORMATION.

Before doing the interview with the interviewer, you should consent verbally to the following clause:

3. I agree :

- 3.1 To freely take part in this longitudinal study. I certify that I was given enough time to come to this decision on my own.

You do not have to mail us back this consent form. However, please keep it in your files for reference.

Section A

The following institutions have researchers who are using the data from the survey:

- Université Laval
- Université de Montréal
- Concordia University
- University of California
- Université du Québec à Montréal
- Université du Québec à Chicoutimi
- Université du Québec à Trois-Rivières
- Université de Sherbrooke
- University of Ottawa
- McGill University
- University of British Columbia
- Ministère de la Santé et des Services sociaux and its affiliated organizations
- Ministère de la Famille
- Ministère de l'Éducation, du Loisir et du Sport
- Institut de recherche Robert-Sauvé en santé et en sécurité du travail
- Lucie and André Chagnon Foundation
- Québec en forme
- Hôpital Laval
- Institut Armand-Frappier
- Cégep de Jonquières
- Centre hospitalier universitaire Sainte-Justine

Appendix E: Teenager Consent Form 2013



Québec Longitudinal Study of Child Development QLSCD (E16) – 2013 Round



Consent and Information Form for the Teenage Participant

1. I authorize the *Institut de la statistique du Québec (Statistique Québec)* to:

- 1.1. Have me fill out a questionnaire (by myself or with an interviewer present from the Institut de la Statistique du Québec [Statistique Québec]), with the goal of collecting data on my development and environment;
- 1.2. Send data collected on me, in an anonymous form (i.e., not revealing my name, address and telephone number) to researchers affiliated with the institutions and organizations listed in Section A of this form.

2. I understand that :

- 2.1. The list of the researchers affiliated with the institutions and organizations appearing on Section A of this form can be given to me upon request, and that they will have signed a confidentiality agreement before anonymous data on me or the people I represent are sent to them;
- 2.2. This consent form is part of the study entitled "I am I'll be". I have been advised that the purpose of this study is to collect information that will help gain a better understanding of factors that can influence youth development and success in school in Québec;
- 2.3. To confirm my participation in future rounds of this study, *Statistique Québec* will contact me in the coming years
- 2.4. *Statistique Québec* will send me an email containing information with which I can access my questionnaire online, or an employee of *Statistique Québec* will contact my parent and me to arrange a visit at home during which I can fill out my questionnaire on a small laptop computer supplied by the interviewer (total duration of the questionnaire: 60 to 75 minutes);
- 2.5. My participation in this study is entirely VOLUNTARY, of MY OWN FREE WILL;
- 2.6. I freely consent to take part in this longitudinal study;
- 2.7. I am free to withdraw my consent to participate at any time without penalty to me in any way;
- 2.8. The information I provide will be treated as CONFIDENTIAL, handled and protected in accordance with the ACT RESPECTING THE INSTITUT DE LA STATISTIQUE DU QUÉBEC and the ACT RESPECTING ACCESS TO DOCUMENTS HELD BY PUBLIC BODIES AND THE PROTECTION OF PERSONAL INFORMATION.

Before filling out your questionnaire, you should consent to the following clause:

3. I agree :

- 3.1 To freely take part in this longitudinal study. I certify that I was given enough time to come to this decision on my own.

You don't have to send us back this form. However, please keep it for your files.

Section A

The following institutions have researchers who are using the data from the study:

- Université Laval
- Université de Montréal
- Concordia University
- University of California
- Université du Québec à Montréal
- Université du Québec à Chicoutimi
- Université du Québec à Trois-Rivières
- Université de Sherbrooke
- University of Ottawa
- McGill University
- University of British Columbia
- Ministère de la Santé et des Services sociaux and its affiliated organizations
- Ministère de la Famille
- Ministère de l'Éducation, du Loisir et du Sport
- Institut de recherche Robert-Sauvé en santé et en sécurité du travail
- Institut Armand-Frappier
- Lucie and André Chagnon Foundation
- Hôpital Laval
- Québec en forme
- Cégep de Jonquières
- Centre hospitalier universitaire Sainte-Justine

TEL-JEUNES
www.teljeunes.com
1 800 263-2266



Appendix F: Parent Consent Form 2015



Québec Longitudinal Study of Child Development QLSCD (E18) – 2015 Round

Consent Form for the Parent

1. I authorize the Institut de la statistique du Québec (Statistique Québec) to:

- 1.1. Have an interviewer from Statistique Québec, specially trained for the study, fill out a computerized questionnaire with me with the goal of collecting data on my teenager's development and environment;
- 1.2. Obtain from the Ministère de l'Éducation, du Loisir et du Sport du Québec (MELS) my teenager's permanent code in order to give Statistique Québec access to information held by the MELS or by school boards;
- 1.3. Send data collected on me, my teenager or the persons I represent, in an anonymous form (i.e., not revealing any name, address or telephone number) to affiliated researchers who will have committed to respecting Statistique Québec's standards regarding the security and confidentiality of information.

2. I understand that:

- 2.1. The list of affiliated researchers can be given to me upon request, and that these researchers will have signed a confidentiality agreement before anonymous data on me or the persons I represent are sent to them;
- 2.2. This consent form is part of the study entitled *I am, I'll be*. I have been advised that the purpose of this study is to collect information that will help gain a better understanding of factors that can influence youth development and success in school in Québec;
- 2.3. To confirm my participation in future rounds of this study, Statistique Québec will contact me in the coming years, if necessary;
- 2.4. A Statistique Québec employee will contact me to arrange a time during which an interviewer will fill out a computerized questionnaire with me either in person or by telephone. The questionnaire takes on average 30 minutes to complete. The self-administered questionnaire for the mother or spouse/partner (duration of approximately 15 minutes) will be given to me by the interviewer or will be mailed to me. The mother or spouse/partner will fill it out and give it back to the interviewer or return it by mail;

Continued on reverse

Appendix F: Teenager Consent Form 2015



Québec Longitudinal Study of Child Development QLSCD (E18) – 2015 Round

Consent Form for the Teenage Participant

1. I authorize the Institut de la statistique du Québec (Statistique Québec) to:

- 1.1. Have me fill out an online questionnaire at home, by myself, with the goal of collecting data on my development and environment;
- 1.2. Send data collected on me, in an anonymous form (i.e., not revealing my name, address and telephone number) to affiliated researchers who will have committed to respecting Statistique Québec's standards regarding the security and confidentiality of information.

2. I understand that :

- 2.1. The list of affiliated researchers can be given to me upon request, and that these researchers will have signed a confidentiality agreement before anonymous data (i.e., not revealing my name, address and telephone number) on me are sent to them;
- 2.2. This consent form is part of the study entitled *I am, I'll be*. I have been advised that the purpose of this study is to collect information that will help gain a better understanding of factors that can influence youth development and success in school in Québec;
- 2.3. To confirm my participation in future rounds of this study, Statistique Québec will contact me in the coming years;
- 2.4. Statistique Québec will send me an email containing the information I need to access my online questionnaire, or a Statistique Québec employee will contact my parent and me to arrange a visit at home during which I can fill out my online questionnaire using a netbook provided by the interviewer. Completing the questionnaire will take 60 to 75 minutes;
- 2.5. My participation in this study is entirely VOLUNTARY, of MY OWN FREE WILL;
- 2.6. I freely consent to take part in this longitudinal study;

Continued on reverse

Appendix G: 21-year-old Consent Form 2019



Québec Longitudinal Study of Child Development (QLSCD) *I am, I'll be* – Round 2019 (E22)

Consent Form



About the study

The objective of the 2019 round of the *I am, I'll be* study is to gather data on the life experiences and well-being of young adults born in Québec. These data will be compared with those collected in earlier rounds. Completing the questionnaire takes about 50 minutes.

1. By participating in this round of the study, I understand that:

- 1.1 The data I provide or that is obtained from other government ministries or agencies will be treated as CONFIDENTIAL, in accordance with the *Act respecting the Institut de la statistique du Québec* (chapter I-13.011) and the *Act respecting Access to documents held by public bodies and the Protection of personal information*;
- 1.2 My participation in the study is voluntary. I can choose not to answer certain questions or not to take part in this round without any prejudice to myself;
- 1.3 Statistique Québec invites me to take part in this round and will invite me to take part in future rounds of the study in the coming years by mail, e-mail, telephone and text message;
- 1.4 Statistique Québec will obtain additional data from the ministries and agencies holding these data in order to:
 - 1.4.1 keep in touch with me. My contact information, including information that can facilitate communication, may be obtained to this end from the ministries and agencies holding this information, such as the Régie de l'assurance maladie du Québec (RAMQ) and the Ministère de l'Éducation et de l'Enseignement supérieur (MEES);
 - 1.4.2 supplement my answers in the study in order to carry out statistical work related to the study's general objective. To do so, certain administrative data will be obtained (e.g. enrolment, certification of studies, student financial aid) and matched with the data gathered about me over the course of this study. This data matching will be done with the approval of the Commission d'accès à l'information and the Statistique Québec ethics committee. It will solely be done on Statistique Québec's premises to carry out methodological or analytical work related to the study's general objective;
 - 1.4.3 To obtain these data, Statistique Québec may provide information that can identify me (e.g. first name, last name, sex, date of birth) to the ministries and agencies holding these data (in particular the RAMQ and the MEES). This information will only be used to confirm my identity with those entities in the scope of this study. It will be destroyed by the RAMQ and the MEES once the data matching has been completed.

2. I authorize Statistique Québec to:

- 2.1 send my information, meaning the responses I will have provided about myself in this round, with identifying data removed (i.e., not revealing any name, address or telephone number), to the partners and affiliated researchers who will have committed to respecting Statistique Québec's data security and confidentiality standards. I can obtain the list of these partners and affiliated researchers upon request.

Appendix H: QLSCD Study Ethics Approval

Montréal, le 10 mars 1998

Monsieur Richard Tremblay
Université de Montréal - GRIP
350, Édouard-Montpetit
C.P. 6128
Montréal (Québec) H3C 3J7

Objet: Enquête Santé Québec «En 2002 j'aurai 5 ans»

Phau!

Cher monsieur Tremblay,

Lors de sa dernière réunion tenue le 12 février dernier, le comité d'éthique de Santé Québec a étudié le projet en titre.

Le comité, après discussion, réserve pour le moment sa décision quant à l'approbation du dit projet et désireait obtenir des précisions supplémentaires. Le comité approuvera le projet dès que les précisions et correctifs seront apportés à sa satisfaction.

Les éléments suivants pourraient être précisés davantage :

- ♦ Simplifier la lettre de consentement éclairé dont les termes apparaissent comme hermétiques et peu accessibles au commun des mortels d'y inclure de l'information simplifiée expliquant la nature du projet.
- ♦ Présenter une procédure claire et finale de transfert et de garde des données.

Veuillez agréer, Cher Monsieur Tremblay, l'expression de nos sentiments distingués.

Pierre Durand
Président du comité d'éthique

c.c. Daniel Tremblay, directeur de Santé Québec
Mireille Jetté, coordonnatrice du projet

Appendix I: QLSCD Study Ethics Approval - Renewal



Le 06 novembre 2017

Docteur Richard E. Tremblay
CHU Sainte-Justine

Objet	Renouvellement de l'approbation éthique - CÉR
	2009-200, 2762 BANQUE DE DONNÉES ÉLDEQ : ÉLDEQ (EN 2002) Étude longitudinale du développement des enfants au Québec Michel BOIVIN; Sylvana Côté, PhD

Docteur,

Ayant reçu les résumés des demandes d'accès aux données GRIP pour analyses exploratoires (DADex) et pour publication (DADpub) pour les périodes de l'année 2016-2017, nous avons le plaisir de vous annoncer que votre projet cité en rubrique a été renouvelé par le comité d'éthique de la recherche en date du 11 octobre 2017. Le document suivant est approuvé :

- Politique de banque modifiée datée du 15 septembre 2017

Il est de votre responsabilité d'aviser le comité dans les plus brefs délais de toute modification au protocole.

Un résumé des demandes d'accès aux banques doit être acheminé au comité du CHU Sainte-Justine 1 fois par année lors du renouvellement.

En vous souhaitant une bonne poursuite de votre projet,

Carolina Martin
Conseillère en éthique,
Comité d'éthique de la recherche

Appendix J: Ethics Approval by the Université de Montréal

Health Research Ethics Committee

Comité d'éthique de la recherche en sciences et en santé (CERSES)

Bureau de la conduite
responsable en recherche



20 juin 2022

Sylvana Côté
Professeure titulaire
École de santé publique - Département de médecine sociale et préventive

Rebecca Falutz
Candidate à la maîtrise

OBJET :	Projet # 2022-1607 - Approbation éthique du projet tel que soumis Perinatal Risk Factors for Young Adults to Not be in Employment, Education or Training (NEET) and its Mediators: Longitudinal Analysis of the ELDEQ Cohort Study Financement : IRSC-Bourses d'études supérieures du Canada au niveau de la maîtrise
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Bonjour,

Le Comité d'éthique de la recherche en sciences et en santé (CERSES) de l'Université de Montréal a évalué votre projet de recherche, jugé à risque minimal, en comité restreint. Les documents suivants ont été examinés :

- Formulaire de demande d'évaluation d'un projet de recherche dûment complété signé et daté (formulaire F11)
- Documents
 - Protocole de recherche - PJ (Protocol_2022-18-05.pdf)
 - Autorisation - PJ (Auto_CHUStJustine_010921.doc)
 - Financement - PJ (Octroi_CIHR_20203718_010522.pdf)
 - Approbation scientifique - PJ (Eval_scien_2022_28_04.pdf)

J'ai le plaisir de vous informer que votre projet de recherche a été approuvé tel que soumis, à l'unanimité par le Comité.

Cette approbation éthique est valide pour un an, à compter du 20 juin 2022 jusqu'au 20 juin 2023. Il est de votre responsabilité de compléter le formulaire de renouvellement (formulaire F9) que nous vous ferons parvenir annuellement via Nagano 1 mois avant l'échéance de votre approbation, à défaut de quoi l'approbation éthique délivrée par le CERSES sera suspendue.

Dans le cadre du suivi éthique continu, le Comité vous demande de vous conformer aux exigences suivantes en utilisant les formulaires Nagano prévus à cet effet :

- Soumettre, pour approbation préalable, toute demande de **modification** au projet de recherche ou à tout autre document approuvé par le Comité pour la réalisation du projet (formulaire F1).