

Childhood Matters: Exploring ACEs and Future Health Outcomes in Adults on the  
Waitlist for Subsidized Housing in New Brunswick

by

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## Abstract

Adverse childhood experiences (ACEs) are said to be the single greatest unaddressed public health threat facing our nation today. This study uses a cross-sectional survey design to measure self-reported ACEs of individuals waiting for subsidized housing in NB (n=205). The relationship between ACEs and self-reported health is also assessed using multilinear regression models; operationalized through depression (CESD-10), psychological distress (Kessler 6), and physical health (EQ VAS, EQ-5D-5L index value). The majority (86.12%) report at least 1 ACE. There are significant inverse associations between ACEs and depression ( $F(7, 197), p < 0.00, R^2 = 0.4$ ) and psychological distress ( $F(7, 197) = 19.18, p < 0.001; R^2 = 0.41$ ). There is also a significant negative relationship between ACEs and EQ VAS score ( $F(7, 197), p < 0.001, R^2 = 0.12$ ) and the EQ-5D ( $F(7, 197) = 6.62, p < 0.001, R^2 = 0.19$ ). The findings indicate a need for additional support for housing-insecure individuals with experienced ACEs.

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## **Chapter One: Introduction**

Adverse childhood experiences (ACEs) are a public health concern that disproportionately impacts individuals with low levels of income. There is a strong correlation between ACEs and economic outcomes in adulthood. Individuals who experience ACEs are more susceptible to financial stress in adulthood (Harter & Harter, 2021). Further, when individuals have histories of multiple ACEs, they become more likely to experience lower educational achievement, financial insecurity, and an increased risk of adult adversities including homelessness (Nurius et al., 2015). Koh and Montgomery (2021) find that in individuals who experience homelessness, prevalence rates for ACEs can be as high as 89.8%. This is of major concern as both homelessness (Oppenheimer et al., 2018)) and ACEs are associated with poor health outcomes (Monnat & Chandler, 2015). This thesis investigates ACEs and their relationship with mental and physical health outcomes in individuals who are waiting for access to publicly subsidized housing in New Brunswick, Canada.

### **Background**

#### *Adverse Childhood Experiences*

ACEs are defined as significant, often traumatic, events such as abuse, neglect, poverty, and household dysfunction, that occur before an individual reaches the age of 18 years old (CDC, 2021b). According to Liao et al. (2022), abuse includes physical, emotional, and sexual harm. They define neglect as parental or caregiver physical and

emotional disregard. Family dysfunction is operationalized to include the early death of parents, parental divorce, witnessing inter-parental violence, abuse of alcohol and drugs, parental mental illness, and crimes committed by family members leading to incarceration (Liao et al., 2022). Abuse and neglect can occur both inside and outside of the family home and can be perpetrated by family members, as well as other community members or caregivers. It should be noted that the ACE list as it was developed in the 90s by Felitti et al. (1998) is likely to underestimate true adversity since it does not include some well-known childhood stressors, such as displacement, racial discrimination, and poverty (Bernard et al, 2020; Ertanir et al., 2023).

ACEs often co-occur with chronic toxic stress (Nelson et al., 2020). Toxic stress refers to the prolonged exposure to stress and the subsequent physiological stress response (Franke, 2014). Children who are exposed to ongoing and/or chronic toxic stress in their environment can experience negative effects on their adult social, emotional, and physical well-being (Hughes et al., 2016; Bellis et al., 2018). A large body of evidence identifies strong relationships between ACEs and behaviours that place one at risk of poor health (Garrido et al., 2017). In addition, research finds that individuals who are exposed to ACEs can subsequently experience enduring impacts on their allostatic loads and systems, constituting the collective burden of chronic stress, which may predispose them to chronic illness in later life (Finlay et al., 2022).

Studies find that ACEs have a strong and cumulative impact on adult health status (Bryan, 2019; Felitti et al., 1998). Exposure to childhood adversity has the potential to profoundly impact the cognitive, social, and neurobiological functioning of

developing brains (Iniquez & Stankowski, 2016). ACEs are most likely to cause developmental risk in individuals aged 10 and younger (Misiak et al., 2022). In other words, ACEs experienced in younger life have a profound impact on future outcomes.

In addition to the age at which ACEs are experienced, the number of ACEs experienced is also correlated with health outcomes. Results of several studies indicate a clear, graded relationship between the number of ACEs reported and health risk behaviours and morbidity (Campbell et al., 2016; Felitti et al., 1998; Hughes et al., 2016; Hughes et al., 2017; Iniquez & Stankowski, 2016). Also, studies find that ACEs tend to cluster; therefore, individuals who experience one ACE are subject to a greater risk of experiencing more (Mersky et al., 2013). For example, Bussemakers et al. (2019) find that while the experience of parental separation or divorce, and parental substance use and/or mental problems are separate adversities, they tend to cluster or co-occur. As ACEs are often associated with dose-related negative outcomes, the possible accumulation or clustering of levels of adversity can result in greater decrements in development and health outcomes (Mersky et al., 2013).

People who experience ACEs are more likely to have physical and mental health problems as adults and a higher mortality rate (Hughes et al., 2017). A report by the CDC (2019) accentuates the importance of preventing ACEs as they reveal that ACEs are linked to at least five of the top 10 leading causes of death including heart disease, cancer, respiratory disease, diabetes, and suicide. These five leading conditions not only shorten lifespans and diminish the quality of life, but they also contribute to significant expenses incurred by Canada's healthcare system. It is estimated that chronic diseases

and illnesses incur a cost of \$190 billion annually (Chronic Disease Prevention Alliance of Canada, 2017). Canada is facing a healthcare crisis (Canadian Medical Association, 2022) and scholars recommend that preventative measures be enacted to reduce future burden on the healthcare system (Dahla & Tepper, 2018). Addressing ACEs may not have an immediate impact on health services provision; however, over time, interventions to limit ACEs and support families could result in significant health system savings.

In addition to the prevalence of physical disease, ACEs impact self-reported health, which is a subjective report of an individual's physical, mental, and emotional well-being (Meeker et al., 2021). Self-reported health measures are frequently used when more objective measures of health status (e.g., administrative data on healthcare use, patient charts, etc.) are not available. However, research demonstrates that self-reported health offers a good approximation of an individual's overall health (Lundberg & Manderbacka, 1996; Vaillant & Wolff, 2012). These self-reports often include disclosures of involvement in potential health risk or health-promoting behaviours, and individual/cultural beliefs on one's health and well-being (Wuorela et al., 2020). For instance, self-reported measures include individuals' reports of their health worries, overall ratings of their health, and their indications of the presence of chronic disease (Jahn et al., 2021; Thompson et al., 2015). A study by Iniquiez and Stankowski (2016) finds all self-reported measures of increased health risk and poor health outcomes are associated with increased ACE scores. Jahn et al. (2020) also conclude that ACEs negatively impact self-reported health status. They note a significant association

between ACEs and self-reported health, with individuals who have four or more ACEs being 2.5 times more likely to rate their health as good, less good or poor, as compared to very good or excellent. These findings infer that ACEs are inversely associated with individuals' perceptions and reports of their physical health.

ACEs also have negative impacts on mental health and well-being and are associated with several mental health disorders (Lee et al., 2020; Elmore & Crouch, 2020; Iniquiez & Stankowski, 2016; Park et al., 2020). The most common disorders that are associated with ACEs are depression, PTSD, anxiety, and suicidality (Meeker et al., 2021). ACE exposure is also associated with problematic use of substances and co-occurring psychopathology (Gu et al., 2022). Co-occurring mental health disorders and problematic substance use are common in populations with histories of trauma, as they seek to self-medicate as a coping mechanism for dealing with the lasting impacts of past stressors (Khoury et al., 2010). Like self-reported health, the relationship between mental health outcomes and ACEs is dose-dependent, as individuals with greater ACE scores report more mental health concerns than those with lower scores (Gondek et al., 2021). These relationships suggest that early experiences, such as trauma, influence later psychosocial outcomes, including mental health and well-being.

The impacts of ACEs on physical and mental health can be explained using the Social Determinants of Health (SDOH) as a conceptual and theoretical approach. For example, Monet and Chandler (2015) find that ACEs are positively correlated with experiencing physical, mental, or emotional limitations, diabetes, and heart attacks. They also find that ACEs are negatively associated with self-reported health; however,

socioeconomic status mediates the relationship between ACE scores and most of these outcomes. Multiple studies indicate that the SDOH, which includes socioeconomic status, are integral moderators in the relationship between ACEs and health (Comacho & Henderson, 2022). The SDOH are discussed later in this thesis. These studies point to the need to better understand the connection between health and ACEs in populations who experience material deprivation and other limitations to the SDOH in order to develop policies and practices which improve support and long-term health outcomes for those with histories of ACEs (Ortiz, 2019; Hampton-Anderson et al., 2021). The next section introduces the SDOH of housing, as the individuals in this study experience housing instability and unaffordability as they wait for access to subsidized accommodations. The concepts that are introduced are discussed further in subsequent chapters.

## **Housing**

### *Housing affordability*

Housing affordability is a key measure of socioeconomic stability (Ezenia & Hoskara, 2019). To be considered affordable, housing should be affordable to all individuals, regardless of income (Shuaiba, 2011). In Canada, those who spend 30% or more of their gross income on housing costs are considered unaffordably housed. Those who spend over 50% of their gross income on housing are in severe need, which is referred to by the Canada Mortgage and Housing Corporation (CMHC, 2022) as “core housing need.” Housing markets across Canada, are unaffordable for low to moderate-

income households. The National Bank of Canada (2022) estimates that an average-income household in Canada needs to devote 67.3% of their after-tax income to shelter. Increases in the cost of home prices, with many would-be first-time homeowners out of the housing market (Drudi, 2022), lead to longer periods of renting in often very unaffordable conditions. Renters in most parts of Canada are faced with soaring rents, utility costs and low vacancy rates (Statistics Canada, 2022d). This leads to conditions wherein renters are unable to own their housing. Current housing is the least affordable housing has been in Canada since 1981 (National Bank of Canada, 2022).

Calculations of housing unaffordability and core housing need include all rent or mortgage payments in addition to other shelter costs, such as utilities and other fees (Statistics Canada, 2022c). Other essential items and services, such as food, clothing, housewares, transportation, childcare, and medication, among others, all require additional income. As such, someone living in unaffordable housing has less money to allocate to their other necessities. Kutty (2005) refers to this as housing-induced poverty. Individuals who experience housing-induced poverty are limited in the amount of money that they can spend on health-promoting goods, such as fresh food, recreation, and services not covered under the Canada Health Act (i.e., prescription medications) (Kriger & Higgins, 2002; Canadian Medical Association Journal, 2020). As housing is the largest monthly expense for most renters (Luciw, 2014), housing unaffordability creates and perpetuates poverty and poor health (Swope & Henandez, 2019).

Canada uses a Market Basked Measure (MBM) to determine poverty rates (Djidjel et al., 2021). The MBM measures poverty by estimating the costs of goods and services that are considered essential to purchase (e.g., food, shelter, clothing, etc.) within a particular geographical region. MBM considers regional variations in costs by calculating costs in designated areas that are comparable to others and using those costs in both the designated areas and those that are comparable to them. These calculations, in tandem with household composition, are used to determine household purchasing power. If a household's income is insufficient to purchase a standard suite of basic goods and services in its region, its residents are labelled as experiencing poverty (Government of Canada, 2022). The MBM is a unique measure as it looks at regional prices for a variety of goods—including housing. According to Randal et al. (2022), households that fall below the MBM are more than three times more likely to spend over 30% of their income on shelter. While people in poverty face greater challenges when it comes to obtaining affordable housing, if they do find affordable housing, it is often insufficient to meet adequacy, accessibility, and suitability standards, as they are often in poor repair, and may not be near employment, childcare, and public transportation (Statistics Canada, 2022; Zamri et al., 2022). This is problematic as poor housing conditions, limited service accessibility, and overcrowding cause a variety of physical and mental health concerns (Pevalin et al., 2017). The following sub-section defines housing suitability and discusses its importance in greater detail.

### *Housing suitability*

Housing suitability exists when a private household resides in housing that meets their needs based on household composition. This is operationalized as housing that has the appropriate number of bedrooms to house all household members as dictated by the National Occupancy Standard (Statistics Canada, 2021b). In practice, housing suitability is achieved when there are enough bedrooms for individuals that reside in the household, with consideration given to appropriate room sharing based on biological sex and/or gender identity, and the relationships between members of the household (Statistics Canada, 2021b). According to Randle et al. (2022), people in poverty (18%) are twice as likely than the total population (8.9%) to live in unsuitable housing. Among people in poverty who live in subsidized housing, 16.3% live in unsuitable housing (Randle et al., 2022). Housing scholars often refer to this as being “under-housed” (Shat et al., 2017). Therefore, although affordability thresholds are met for subsidized housing residents, not all households in subsidized housing meet the criteria to be considered suitably housed.

Several negative consequences of living in overcrowded or unsuitable housing are observed among children and youth. These include aggressive behaviour, property offences, poor school performance, asthma symptoms, and diminished overall health status (Waterson, 2021). Further, research demonstrates that children who have designated quiet or individual space to retreat to in a household are less likely than those who do not to experience behavioural, developmental, and emotional challenges (Solari & Mahr, 2011). Crowded housing is also associated with a wider and quicker spread of communicable diseases and higher psychological distress (World Health

Organization, 2018; Waterson et al., 2021). The impacts of this became highly recognizable at the height of the COVID-19 pandemic. The negative health, educational and wellbeing impacts of unsuitable housing indicate a need to consider suitability, alongside affordability, in housing. Unsuitable housing impacts all individuals regardless of age; however, the risks associated with children's residence in unsuitable housing are particularly profound. The following sub-section discusses the physical conditions experienced in housing and their contribution to well-being.

#### *Housing conditions and inadequate housing*

Housing that provides residents with a safe and secure environment in which to live, and in some cases, to work, is vital to mental and physical well-being (Statistics Canada, 2022a). Housing conditions refer to the habitability of dwellings. To collect data on housing conditions or inadequate shelter, Randle et al. (2022) designates three major classifications: needing regular maintenance only, needing minor repairs, and needing major repairs. Housing that requires major repairs is deemed inadequate (Randle et al., 2022). Those housed inadequately are at increased risk of exposure to health hazards, injury, and environmental toxins, such as lead and radon, which, in turn, increases the risk of developing asthma and other illnesses (Waterson et al., 2021). In 2016, approximately five million people in Canada lived in poverty (Randle et al., 2022). Of these five million, roughly 500,000 lived in housing that was in major need of repair, which indicates that about half a million Canadians experiencing poverty live in unsuitable housing conditions. As a result, these individuals face increased health risks

(Bonneyfoy, 2007). The disproportionate number of people experiencing poverty who live in inadequate housing is demonstrative of how people who are materially deprived experience risks to their health and well-being.

Although subsidized housing in New Brunswick meets affordability standards, units often fail to provide adequate housing. For example, some subsidized housing units in New Brunswick are known to have a high presence of radon. The provincial government recently acknowledged this in their new housing strategy where they state: “To further ensure the safety of our public units, we will test for radon in as many public housing units as possible during this fiscal year, with any required remediation implemented next fiscal year” (Government of New Brunswick, 2023, p. 20). Poor conditions in New Brunswick’s subsidized housing units are largely related to significant underinvestment in subsidized housing construction, repairs, and maintenance (CTV News, 2022). This underinvestment has occurred across Canada since the Federal government devolved the responsibility for social housing to provincial and territorial governments in the 1990s (Suttor, 2016). The devolution of housing responsibility, accompanied by significant underinvestment in affordable housing demonstrates the historical and present-day political will and government spending to provide housing conditions that support well-being. The next sub-section discusses the importance of housing stability to health and well-being.

### *Housing instability*

Housing stability is a critical social determinant of health (Rolfe et al., 2020). Housing instability is defined as living in a household with insecure tenure, which increases the risk of negative mobility (e.g., evictions, renoventions) and homelessness. It is caused by several challenges, including unaffordable rents, overcrowding, frequent moves, and spending more than 30% of household income on rent (Healthy People 2030, n.d.). Low-income renters in historically affordable areas which undergo processes of gentrification are at high risk of renovention which creates feelings of and experiences of instability (Youngbloom et al., 2023; Binet et al., 2021). Renoventions refer to evictions of tenants under the guise of doing major renovations so landlords can increase rents significantly. This often harms those who are low-income, are long-term tenants who pay lower rents, and face other forms of marginalization (Woodhall-Melnik et al., Under Review). When households lose permanent, reliable, affordable residences, they are subject to involuntary residential moves, and are at risk of temporary or hidden homelessness (e.g., staying at temporary shelters, living temporarily with friends and family, and/or couch surfing) or long-term homelessness (Healthy People 2030, n.d.; Kang., 2021; Sims et al., 2020). Further, renoventions often occur in gentrifying neighbourhoods and happen to tenants who are paying the lowest rents, as these rents are the easiest to increase by large amounts. Gentrifying neighbourhoods are physical, social, economic, and environmental changes that are seen when a neighbourhood is shifting to a higher value (Youngbloom et al., 2023; Schnake-Mahl et al., 2020). In addition to the heightened risk of eviction from their housing, individuals who live in gentrifying neighbourhoods also face the risk of being displaced from their

neighbourhoods, as rents increase (Freeman et al., 2023; Schnake-Mahl et al., 2020). Housing in Canada is financialized and is not designed to provide all with access to the right to adequate housing (Martine, 2022). Hence, when people are evicted from affordable tenancies due to renovictions, they are often unable to find available units that they can afford (Canadian Centre for Housing Rights, 2023).

Housing instability has negative impacts on both physical and mental health (Healthy People 2030, n.d.). A study by Baker et al. (2019) finds that increased residential instability as a child —measured by the number of residential moves—is associated with lower health status. This relationship persisted when affordability needs were met through subsidized housing. The authors conclude that the number of moves a household makes is more important to health status than access to subsidized accommodations (Baker et al., 2019). In addition, a study using self-rated physical health indicators finds that each unit increase in housing insecurity is associated with a 46% increase in poor or fair health and a 7% increase in chronic illness (Bhat, 2022). These studies indicate that to improve health status, some focus must be placed on increasing housing stability and permanency in place.

Frequent moves prevent children and families from establishing relationships and attachments to their neighbourhoods (Baker et al., 2019). However, not all moves are bad moves, and some neighbourhood mobility can have positive health impacts. There is evidence that neighbourhood characteristics have a significant impact on health (Mohnen et al., 2019). For example, Kivimaki et al. (2021) find that those living in disadvantaged neighbourhoods, such as those with lower median incomes, lower

education levels, and higher rates of unemployment, have a higher risk of mortality and of experiencing 27 health conditions when compared to residents in more affluent neighbourhoods. Those who moved from disadvantaged to more affluent neighbourhoods have a lower risk of all-cause mortality and 19 specific health conditions (Kivimaki et al., 2021). Although movement out of disadvantaged neighbourhoods may create instability, the research suggests that these moves may improve stability over the long term (Ludwig et al., 2012). However, issues of housing instability are particularly relevant in neighbourhoods where residents may feel insecure due to redevelopment and gentrification, where residents are more likely to live with the reality that their rental units may be sold to speculators and that renoevictions may occur at a moment's notice (Tran et al., 2020). These individuals are often unable to afford more than they are paying and their ability to move to more affluent neighbourhoods where higher rents and homeownership are norms is highly constrained (Tran et al., 2020). Hence, although mobility may have positive effects for some individuals and households, this is not likely the case for households that experience poverty. Multifaceted strategies that promote policies which address housing through affordability, suitability, and instability, as three integral components of housing security, should be continuously explored (Rolfe, 2020).

### **Factors Influencing the Impacts of ACEs on the Individual**

Discussions of resilience, particularly those that include the importance of macro-level systems changes to support vulnerable populations, are integral to

developing services, policies and practices that assist individuals and households that are living with the impacts of ACEs. These discussions are often framed through the presentation of protective and risk factors (Vanderbilt-Adriance, 2008). Protective factors are positive influences or characteristics at the biological, psychological, family, community, or cultural level that improve the lives of an individual or the safety of a community (O'Connell, 2009). Strong support systems reduce the chance that negative social, emotional, economic, and health-related experiences or life outcomes will occur (Government of Canada, 2015). Conversely, risk factors are negative influences or characteristics at the biological, psychological, family, community, or cultural level that increase the likelihood of negative health, behavioural, social, and economic outcomes or contribute to the development of immediate or future problems (CDC, 2021c; Government of Canada, 2021). Risk factors contribute to the increased risk of ACEs (CDC, 2021c) and those with risk factors with little presence of protective factors are more likely to experience childhood maltreatment and abuse, and are at increased risk of developing adolescent or adult depression, anxiety, and attempting or committing suicide than those who are well-supported (Lwin, 2016; Conwell et al., 2002).

Like protective factors, risk factors are present in every aspect of life. Through interactions between life opportunities, exposures, and experiences, risk factors manifest themselves in a static, temporal, and cumulative manner. As a result, just as one exposed to protective factors is more protected from unwanted circumstances, risk factors influence an individual's life by putting them at a greater risk for adverse consequences. Risk factors thus work in tandem with protective factors to influence the

impact of life experiences on well-being (New Brunswick Health Council, 2020). As with protective factors, risk factors can exist within systems, communities, families, households, and individuals. The following sub-sections provide a closer look at protective and risk factors and their relationship with ACEs.

### *Protective factors for ACEs*

ACEs are diverse and so are the protective factors that should be considered to limit childhood exposure to trauma and stress (CDC, 2021c). Individual and family relationships that are safe, stable, and nurturing reduce the risk of ACEs. Children with strong, positive familial attachments are more likely to experience a consistent family life that includes adequate care, mentoring, and support (Franke, 2015). However, families who are less supported, such as those living in poverty, may struggle to achieve this. Families in poverty may endure heightened stress due to economic pressures and have a higher risk of adverse mental health outcomes (Knifton & Inglis, 2020). Poor parental mental health and the presence of familial stress results in fewer opportunities for parents and caregivers to develop strong, nurturing relationships with their children (Kamis, 2020). For instance, low-wage parents who are required to work late or at multiple jobs are less likely to have dedicated, quality time with their children. This can lead to children resenting their parents, which can damage child-caregiver relationships (Milie et al., 2018). Families whose members experience poor mental health may not possess the time, or resources to receive adequate treatment, which leads to unaddressed concerns and worsened health, social and economic outcomes (Stack &

Meredith, 2017). Additionally, poverty-related living conditions, such as overcrowded housing and housing instability, can negatively affect familial relationships (Mayberry et al., 2015). Conversely, steady employment, sufficient education, and consistent adult supervision of children with steady reinforcement of rules are protective factors that can reduce the likelihood that ACEs, and their negative effects, are experienced (Crouch et al., 2019; Franke, 2014; CDC, 2021c). Furthermore, children who are successful in school and maintain positive social connections and friendships contribute to the creation of a social environment that is conducive to positive outcomes, such as mental and physical wellness, as they develop (MacNamara et al., 2015; Kington et al., 2013). These protective factors are more likely to be realized by households that are well-supported by systems and services and who benefit from access to resources (e.g., stable, and sufficient income, housing, good employment, etc.) that are characteristic of having good SDOH (Benzies & Mychasiuk, 2009).

Neighbourhoods and communities can be bolstered to provide the services and support needed to realize the benefits of protective factors. These supports and services include access to affordable housing, high-quality childcare, community-based health and mental health care, and sufficient economic resources. Neighbourhoods that stimulate protective factors are considered safe and opportunistic and provide access to a variety of essential services (CDC, 2021c). The presence of protective factors plays an important role in protecting individuals from exposure to the risk factors that may result in experiencing potentially damaging childhood adversities. The use of such factors is also important not only to protect against the presence of ACEs and/or their

accumulation but also to mitigate their effects and even counteract them. For instance, the presence of PCEs can be attributed to decreases in health-risk behaviours, as they can positively moderate the influence of ACEs on certain behaviours, and thus, outcomes (Baglivio & Wolff, 2020).

### *Risk factors for ACEs*

Children's families and community settings strongly influence their likelihood of encountering adversity and trauma (Daines, 2021). For instance, caregivers who have experienced trauma or ACEs themselves, like abuse or neglect, are more likely to raise children who experience similar trauma (Schickedanz et al., 2018). Additionally, caregivers with less education, lower-paying jobs, or who experience unemployment, face additional parenting and economic stressors that negatively affect their children. Familial factors, which largely stem from historic and current systems failures (National Academy of Science et al., 2017), often operate alongside and/or promote individual risk factors, such as poor mental health and substance use concerns, the ability to manage and/or respond to the presence of intellectual and developmental disorders (e.g. ADHD, autism, etc.), and poor health status to increase the likelihood that ACEs will exist and have negative, intergenerational negative impacts on children and their households (Adaralegbe et al., 2022; Balistreri & Alvira-Hammond, 2016).

Neighbourhoods, communities, and broader social structural considerations (e.g., low levels of income support, gender, and racial inequity, etc.) can place individuals at risk of experiencing poor physical and mental health. Some examples of community risk factors include living in neighbourhoods with high levels of violence and

crime, living in impoverished communities or those with easy access to drugs, and having limited access to high-quality community resources. These risk factors are acknowledged by policymakers, non-profit agencies, some governments, and community leaders who strive to provide services to children and families who live in poorly supported neighbourhoods. For example, in Saint John, a variety of organizations exist to provide support to families and their children, such as the Boys' and Girls' Club, NB Social Pediatrics, Big Brothers and Big Sisters, the Teen Resource Centre, and the Newcomer Centre. These agencies all strive to meet their community members' basic and developmental needs and provide opportunities and resources to children and youth that they would otherwise be unable to access. However, non-profit agencies are often insufficiently funded and struggle to meet high demands in their local communities (Sontag-Padilla et al., 2011). Further, they are often so poorly resourced and funded that they are unable to pay their staff living wages, which places the staff themselves at higher risk of experiencing the negative outcomes discussed throughout this thesis.

Households who live in isolated communities without access to services and supportive community connections are also exposed to greater risk than those living in service-dense areas that are walkable and promote strong connections between community members (CDC, 2021c). The CDC (2021c) reports that children in families that are isolated from friends, family, and/or neighbours experience higher conflict and more negative communication styles, along with less parental supervision and monitoring. Risk factors have negative impacts on childhood development and create

conditions for instability in early life, which contribute to diminished health and socioeconomic opportunities in adulthood (Bethell et al., 2019; CDC, 2021c). As such, it is critical to expand the identification of risk and protective factors and implement interventions such as enhancing services and support, modifying access, barriers, and opportunities, amending policies, and enacting and enforcing laws regarding housing safety, to mitigate contributors to negative life outcomes (CDC, 2021b). This introduction provides a basic outline of the key tenants associated with the SDOH and housing, and ACEs alongside protective and risk factors for health and wellbeing.

### **Purpose & Significance**

The purpose of this study is to explore the prevalence of ACEs in individuals who are on New Brunswick's waiting list for access to subsidized housing as adults. Further, this study investigates the impact of ACEs on adult self-reported health in low-income adults who are on New Brunswick's subsidized housing waitlist.

ACEs are mutually reinforcing. An individual exposed to one ACE may face a 2 to 18-times increase in the likelihood of experiencing another ACE compared to those with no reported ACEs (Dong et al., 2004). Both independently and in combination, each of these events is embedded in multiple dimensions of development and functioning from early life to later adulthood. The consequences of exposure to ACEs have a lasting impact on the trajectory of a person's life (Jones et al., 2018). Therefore, understanding the presence of early adversity and its association with health outcomes in a population who experiences poor SDOH, measured through housing instability as an example of a

poor SDOH in this thesis, is crucial evidence which can be mobilized to direct political will and resources toward addressing ACEs as a major public health and social welfare problem (Metzler et al., 2017).

## **Rationale**

New Brunswick is currently experiencing a housing crisis and a wealth inequity epidemic (Graham, 2023; Statistics Canada, 2022d), wherein individuals, families, and children are living in poverty, and without access to stable housing (Government of Canada, 2017). Populations who are unhoused and individuals suffering from scarce and unaffordable housing are disproportionately affected by ACEs (Koh & Montgomery, 2021). Children who grow up in low-income areas and who display low socioeconomic status are more likely to experience childhood trauma, maltreatment, and/or abuse (Walsh et al., 2019). A person who suffers social and economic deprivation during childhood and adolescence can anticipate lasting consequences. Since income and housing are two of the most pervasive social determinants of health, it is apparent that this is a pressing population health issue (Braveman & Gottlieb, 2014) worth exploring in some of New Brunswick's most unstably and unaffordably housed individuals who are on the subsidized housing waitlist.

Although previous research has examined ACEs and their relationship to low-income populations, no study to date has focused specifically on New Brunswick, a sparsely populated province with rural areas and three mid-sized cities. Further, while existing literature corroborates the association between ACEs and mental and physical

health, most studies are conducted in different countries (Chang et al., 2019; Monnat et al., 2015; Hughes et al., 2016). Considering the current housing and poverty epidemic in New Brunswick, as well as the correlation between ACEs, poverty, and health, “it is timely and imperative to consider the well-being and experiences of a population that is historically under-researched, underserved, and unhealthy” (Woodhall-Melnik et al., 2022). There is an urgent need for insight into the later health experiences of persons who have experienced ACEs and grown up to become housing insecure. This study hopes to gain relevant and valuable knowledge that will inform current and future practices in supporting children and youth who may otherwise grow up to experience an increased risk of poor health and housing outcomes. In the absence of a shift in attention and resources, New Brunswick risks further perpetuating cycles of poverty and poor health.

### **Study Aims & Research Question**

This study measures the prevalence of ACEs among a sample of low-income New Brunswick residents who are currently waiting for access to subsidized housing. Further, it assesses the relationship between ACEs and mental and physical health in this population.

**Primary aim:** To determine the prevalence of Adverse Childhood Experiences in a sample of low-income individuals on the waitlist for publicly ‘subsidized’ housing in New Brunswick.

**Secondary Aim:** To investigate the relationship between psychological distress and depression scores and self-reported physical health (outcomes) and ACEs (explanatory variable) in this sample.

**The research questions that guide this study are as follows:**

1. What is the prevalence of ACEs in a sample of low-income individuals who are waiting for access to subsidized housing in New Brunswick?
2. What is the relationship between ACEs and depression scores in low-income individuals who are waiting for access to subsidized housing in New Brunswick?
3. What is the relationship between ACEs and distress scores in low-income individuals who are waiting for access to subsidized housing in New Brunswick?
4. What is the relationship between ACEs and self-reported physical health in low-income individuals who are waiting for access to subsidized housing in New Brunswick?

**Chapter Overview:** To conclude my introduction chapter, I outline the subsequent chapters of my thesis here before proceeding into my literature/theory chapter. The chapters of my thesis include:

1. Literature: The purpose of this chapter is to highlight literature that is relevant to my research. Specifically, I include an overview of ACEs, their associations with low-income populations, indigenous populations, housing, and mental and physical health.

2. Theory: This chapter overviews theory and relevant theoretical frameworks that accompany this research. I conclude with a discussion of areas for further research on ACEs and health.
3. Methods: This chapter outlines the methods used to facilitate this study, which includes descriptive statistics to assess the prevalence of ACEs and describe the study sample and multilinear regression. The limitations of my research are also discussed.
4. Findings: This chapter presents and interprets the results of the statistical analysis. In doing so, I discuss the prevalence of ACEs within the sample in relation to the general Canadian population and demonstrate the impact of ACEs on health outcomes.
5. Discussion: This chapter contextualizes the findings using previous literature and theory. I also provide recommendations for services, interventions, and future research that I have derived from my research.
6. Conclusion: The concluding chapter of my thesis reiterates my main findings and discusses my plans for knowledge dissemination.

## **Chapter Two: Literature Review**

### **Literature Review**

The former President of the American Academy for Pediatrics, Dr. Robert Block, is quoted as saying that ACEs are “the single greatest unaddressed public health threat facing our nation today” (Burke-Harris, 2014). Although ACEs are known to correlate with adult health outcomes, such as diabetes, heart disease, depression, and anxiety (Chang et al., 2019; Elmore & Crouch, 2019), to date, academic research on the association between health and ACEs in precariously housed populations is still in its infancy. Researchers must explore this relationship in greater depth to gain comprehensive knowledge of contributors to health in groups who experience systemic marginalization. This chapter provides an overview of the present understanding of ACEs in Canada and discusses the literature that connects ACEs, housing, and other social determinants such as socioeconomic status, to mental and physical health. Lastly, this chapter concludes with a discussion of appropriate theoretical frameworks that are useful for understanding ACEs concerning health in individuals who experience housing instability.

### **Literature Review Search Strategy**

The search for peer-reviewed articles was conducted continuously throughout 2021-2023. I began my search using the library database at the University of New Brunswick. Google Scholar was also used to locate open-access articles. The following search terms were used to locate articles for this literature review: *adverse childhood*

*experiences, housing, homelessness, low-income, health, mental health, physical health, self-reported health, trauma, and social determinants of health.* To ensure comprehensive search results, multiple variations of these terms were used. The search results were limited to articles written in English. In addition to database searches, I performed manual scans of reference lists from included authors, which resulted in the inclusion of additional sources. Further, as new studies emerged, I read them and included them if they were deemed relevant to my study.

### **ACEs in Canada**

ACEs are prevalent across many groups, regardless of age, race/ethnicity, gender, socioeconomic status, etc., in Canada; however, they are particularly prevalent in individuals and families that have lower levels of income and social support (Joshi et al., 2021; England-Mason et al., 2018). In their study of 44,817 Canadians aged 45 to 85 years, Joshi et al. (2021) find that 61.6% of participants reported at least one ACE. Of the reported ACEs, physical abuse (25.7%), witnessing intimate partner violence (22.4%), and emotional abuse (21.8%) are the most prevalent. Poor parental mental health (20.6%), parental divorce or separation (between 11% and 17.6%), and sexual abuse (between 7% and 15%) are also commonly reported (Joshi et al., 2021). Although ACEs are present in a large segment of the Canadian population, the number of ACEs experienced is higher in people with household incomes less than \$20,000 (Joshi et al., 2021). Further, the highest reported ACE scores are present in persons without any

post-secondary education, which suggests that early-life adversity may negatively impact education and income later in life (Joshi et al., 2021).

In Canada, Indigenous status is associated with higher-than-average ACE scores (Smith et al., 2021; Toombs et al., 2022). Research by Toombs et al. (2022) assesses the prevalence of ACEs in Indigenous populations. They find that for each ACE category, a minimum of 12.3% of Indigenous persons surveyed indicated exposure. The most prevalent ACEs the study reports are household substance use (87.7%), parental separation or divorce (75.4%), and household member mental illness (75.4%). The mean ACE score in this study population is 5.22, which is approximately five times larger than the mean ACE score obtained in the general population in the Alberta ACE study (McDonald et al., 2015). This study also finds that ACE scores are positively associated with numerous health conditions, including the four most common chronic health diseases that may result in death: cancer, cardiovascular disease, diabetes, and respiratory diseases (Toombs et al., 2022). The prevalence of self-reported mental health diagnoses is higher in Indigenous Persons than in the general population rates in Canada (Toombs et al., 2022). For instance, 50% of Indigenous respondents reported having a diagnosis of an anxiety disorder, which is much higher than the national average of 8% (Toombs et al., 2022).

Rates of ACEs are higher in Indigenous adults who are raised by residential school survivors (Moon-Riley et al., 2019). Residential school survivors experienced significant ACEs themselves as they were torn from their families and cultures (Moon-Riley et al., 2019). They were isolated from their communities and were unable to learn

caregiving and parenting practices from their families and caregivers. Indigenous communities continue to experience unjust impacts of the residential school system, as survivors and their children struggle with trauma, mental illness, and high rates of substance use and suicide (Moon-Riley et al., 2019).

The trauma endured through the residential school system is intergenerational. The residential school system in Canada left a profound and lasting impact on Indigenous communities, with the last residential school opening well into the 1990s. The trauma experienced by Indigenous Peoples after being systematically taken from their families and forced to abandon their cultural teachings is persistent and profound. The last residential school closed in 1996 (Hanson, 2009). The Seven Generations teachings describe the lasting and enduring impacts of these traumas. These teachings note that any decisions or actions we take must be done with the understanding that they will have impacts for seven generations to follow (The Healing of Seven Generations, n.d). In other words, the trauma caused by colonial practices and residential schools will continue to have negative impacts on Indigenous communities for generations to come. This deep-rooted history of trauma continues to have negative health impacts on survivors' children (Bombay et al., 2014), which indicates that exposure to adversity and trauma can create lasting negative effects (e.g., psychosocial, and psychological effects) that can ultimately be passed on to survivors' offspring (Cerdena et al., 2021; Yehuda & Lehner, 2021).

ACEs are a key measure in understanding the mechanisms of intergenerational trauma (Reese et al., 2022). Research indicates that traumatized parents may have less

empathy for their children due to emotional instability and/or a changed perception of the world, which decreases trust and safety between them and their children.

Intergenerational trauma is then perpetuated as their children learn and mirror what their parents have taught them (Reese et al., 2022). In other words, parents with histories of childhood trauma, who suffer from subsequent mental and emotional effects, may approach their relationships with more emotional distance, and with less support. They also may lack parental skills, as these may have not been modelled by their parents. This makes parenting challenging for them and the risk of trauma for their children is high.

ACEs have a negative impact on the health of Canadian adults. Chartier et al.'s (2010) analysis of data from the Ontario Health Survey (n=9,953) finds that 72% of respondents have at least 1 ACE, and 37% report having 2 or more. Further, the study identifies a statistically significant inverse negative association between ACEs and adult health status, with health decreasing as the number of ACEs increases. Notably, this study finds that, compared to those with no ACEs, respondents with six or more have a 172% increase in odds of having multiple health problems (Chartier et al., 2010). This indicates a need to further investigate the effect of ACEs on physical and mental health in Canada.

To gain a more comprehensive understanding of risk factors that exacerbate the negative health impacts of ACEs on the Canadian population, additional research is needed. Research from the United States finds that one-third of older adults who live in subsidized housing have ACE scores of four or higher (Larkin et al., 2017); however,

similar data from Canada are not available. Further, studies have yet to assess the prevalence of ACEs in populations waiting for access to subsidized housing and they have not measured the associations between ACE scores and physical health and healthcare use outcomes. Further research into ACEs in Canada within vulnerable populations, such as those experiencing housing insecurity, is required to gain a comprehensive understanding of the efforts and initiatives that must be taken to promote healing and improve overall health and well-being in these populations.

### **ACEs and Physical Health**

The long-term, detrimental consequences of childhood abuse and trauma are well known (Dye, 2018; Downey & Crummy, 2022; Norman et al., 2012; Springer et al., 2003). The Adverse Childhood Experiences Study includes data from 17,000 adults and finds a strong dose relationship between the amount and severity of ACEs and risk factors for the leading causes of death in adults (Felitti et al., 1998). Felitti et al.'s (1998) study is the first to uncover pathways through which childhood trauma affects health and quality of life over the life span. Specifically, ACEs disrupt neurodevelopment, social, emotional, and cognitive functioning, and increase health risk behaviours that promote disease and disability (Felitti et al., 1998). This disruption is associated with prolonged exposure to chronic toxic stress, which may hinder neurodevelopment and can lead to developmental delays, learning disabilities, depression, mood disorders, and less supportive home environments (Zarei et al., 2021).

Many studies confirm Felitti et al.'s (1998) discovery that ACEs impact health outcomes (Petruccelli et al., 2019; Vig et al., 2020; Chang et al., 2019; Monnat & Chandler, 2015; Hughes et al., 2016 & 2017). For example, Sonu et al. (2019) find that individuals exposed to ACEs are at greater risk of developing chronic diseases such as cancer, diabetes, cardiovascular disease, and chronic obstructive pulmonary disease. For those who have suffered a higher amount of childhood adversity (>six events), the risk of lung cancer increases threefold (Brown et al., 2010). For children who have endured physical and sexual abuse, or emotional and physical neglect, the risk of developing cardiovascular disease is 3.7 times higher than in those who did not experience abuse or neglect (Pretty et al., 2013). These studies generally indicate that ACEs are highly prevalent in individuals who experience illness as they progress through life. Although exposure to all ACEs is associated with negative health outcomes (Monnat & Chandler, 2015), certain ACEs further increase the risk of developing chronic disease in later life. For example, Al-Shawi et al. (2015) find that individuals who are exposed to violence, household dysfunction, and abuse in childhood are almost twice as likely than others with less or no exposure to develop chronic disease. A study of 50,000 participants in the US by Monnat et al. (2015) finds that those who experience physical or sexual abuse or domestic violence have an increased risk of developing diabetes by 23%, 36%, and 22%, respectively. Respondents who experience physical abuse, parental divorce, or live with a person who uses substances or someone who has been incarcerated have substantially greater odds of reporting a heart attack as an adult (Monnat et al., 2015). These findings indicate that the type of ACE may matter when assessing associations

with health outcomes. It is, therefore, possible that different ACEs, or combinations of ACEs, may influence health behaviours in a variety of different ways (Campbell et al., 2015). Hence, researchers may seek to examine associations between health outcomes and ACEs using specific ACEs or categories of ACEs to better understand which types of adversity are most closely associated with health outcomes.

Researchers continue to explore potential mechanisms linking ACEs to chronic disease, cancer, and additional adverse health outcomes. Zarei et al. (2021) find a significant dose-dependent relationship between ACEs and multiple neurodevelopmental and behavioural conditions, such as epilepsy, speech disorder, ASD, ID, developmental delay, ADHD, anxiety problems, learning disability, behaviour/conduct problems, depression, and substance use disorder (Zarei et al., 2021). However, many of these neuro diversities have genetic roots (Parenti et al. 2020; Morris-Rosendhal & Crocq. 2020), which indicates that the presence of ACEs may better explain the outcomes (e.g., symptomology or the severity of behavioural maladaptation) or genetic expression associated with some neurodevelopmental and behavioural conditions. Also, children who reside in high-stress home environments due to conditions associated with living in poverty (e.g., economic hardship, lack of transportation, high-crime neighbourhoods, etc.), familial conflict, and/or untreated caregiver mental illnesses or substance use, are often exposed to ACEs (Crouch et al., 2019). This denotes the importance of furthering research on ACEs to better understand the factors that link certain conditions to the increased prevalence of ACEs. This could be done in future studies by using appropriately matched control groups, which is more

plausible with advances being made to the availability and utility of provincial administrative linked data across Canada.

From a young age, ACEs impact future health outcomes. A study by Soares et al. (2021) finds that, as early as 3 years old, ACEs are associated with biological risk; suggesting that exposure to adversity during childhood can alter biomarkers and cause physiological changes that may be strongly associated with diseases in the future. The question then arises as to what extent ACEs directly contribute to health problems or if ACEs and subsequent toxic stress trigger physiological and neurological factors, such as gene expression, that result in poor health (Herzog et al., 2018). Nevertheless, current literature indicates that ACEs are associated with health risk behaviours (e.g., smoking, drinking, drug use, disordered eating, etc.) which contribute to disease development and morbidity (Shin et al., 2018; Wiss & Brewerton., 2020). For instance, Ford et al. (2011) find that each of the ACEs is significantly associated with smoking status and Crouch et al. (2018) find that almost all reported ACE events are associated with increased odds of binge drinking and heavy alcohol consumption. ACEs are also known to alter food consumption behaviour. A meta-analysis finds a 46% increase in the odds of obesity following exposure to ACEs (Wiss & Brewerton, 2020). Correlations such as these suggest that ACEs, health-risk behaviours, and numerous health conditions may be involved in an indirect and reciprocating cycle that leads to adverse health outcomes.

In addition to increasing the risk for poor health outcomes, ACEs are linked to a heightened risk of premature death. According to Brown et al. (2009), the presence of

six or more ACEs is associated with a 20-year reduction in life expectancy. The researchers measured life expectancy using medical examination, self-reported health behaviours, and ACE results of approximately 18500 patients from a medical clinic in the US. Of the 1539 patients who died between the baseline and the follow-up, 90% of the deaths are resultant of the five leading causes of death (Brown et al., 2009). This indicates a greater need to explore the relationship between ACE scores and particular types of illnesses—namely the five leading causes of death—in populations who are at risk of poor health outcomes.

### **ACEs and Mental Health**

Adversity and trauma in childhood, such as exposure to ACEs, can have lifelong effects on health. ACEs have been consistently linked to an increase in the development, and the worsening of, poor mental health or adverse psychiatric health outcomes (Schilling et al., 2007; Merrick et al., 2017; Venter et al., 2003; Bomysoad & Francis, 2020; Merksy et al., 2013). A longitudinal prospective study with around 8000 individuals finds there to be a dose-response association between reported ACEs and all mental health-related outcomes. Specifically, the presence of 2 or more reported ACEs produces a risk of clinically significant distress that is 2.14 times higher than those with no ACEs (Gondek et al., 2021). Studies have also linked ACE scores to suicidality (Koh & Montgomery, 2021), a current leading cause of death in the United States for all ages (CDC, 2023; Dube et al., 2001). Potential mechanisms that link ACEs to suicide ideation and suicide are sleep quality and increased prevalence of anxious symptomology (Yang

et al., 2020). Individuals with ACEs are more prone to stress, insecurity, and anxiety, which negatively impact sleep quality. Literature links inadequate sleep quality with suicide, as individuals who do not obtain enough quality sleep are more likely to experience emotional disturbances, such as feelings of hopelessness, which are positively associated with suicidal ideation (Bernert et al., 2007). Also, poor sleep quality can lead to physiological brain disturbances (e.g., changes to the hypothalamic, pituitary, and adrenal glands), which lead to an increased risk of suicidal ideation (Yang et al., 2020). A recent systematic review and meta-analysis of 49 studies by Koh and Montgomery (2021) demonstrates consistent positive associations between ACEs and suicidal risk, suicide attempts, and major depressive disorder in individuals experiencing homelessness (Koh & Montgomery, 2021). ACEs are associated with an increased risk of suicide and suicidal ideation in unhoused populations, which indicates that housing status may play an important role in the association between mental health and ACEs.

A large body of evidence suggests ACEs have a significant impact on adulthood mental health status (Hughes et al. 2016). Like the mechanism linking ACEs to physical health outcomes, Herzog and Schmahl. (2018) discuss this association as stemming from an etiological connection between ACEs and childhood brain development. That is, childhood trauma may cause disturbances in the development of cognitive and affective processing. An example of this is heightened attention toward threatening stimuli (i.e., chronic toxic stress), which, in turn, alters key stress and emotion-associated brain regions (Herzog & Schmahl, 2018). This association is supported by the high prevalence of toxic stress among individuals with ACEs, and several unfavourable

mental health outcomes including depression and anxiety (Jones et al., 2018; Johnson et al., 2013).

Depression and anxiety are two of the most frequently diagnosed mental illnesses in Canada (Government of Canada, 2015). Researchers estimate that in individuals diagnosed with depression, there is an average loss of 28.9 years of quality-adjusted life expectancy (Steensma et al., 2016). This indicates that Canadians with depression spend a greater proportion of their lives in an unhealthy state when compared with people without depression; this discrepancy in healthy life expectancy is attributed to declines in quality of life, which is connected to the emotional, cognitive, and pain-related states that often accompany depression (Steensma et al., 2016). The CAMH finds that 1 in 5 Canadians experience mental illness. Further, by the age of 40, 50% of Canadians will have experienced or will have a mental illness. The likelihood of mental illness is much higher (3 to 4 times) for low-income groups compared to the higher-income groups (CAMH, 2021). Given the high prevalence of mental illness in Canada, experts recommend that upstream prevention strategies, such as affordable housing interventions and sufficient economic support programs, be prioritized for those at greater risk of poor mental health (Hughes et al., 2016; Canadian Mental Health Association, 2016). These strategies should be designed to promote equity by providing the most resources to households that require support with various concerns that contribute to poor SDOH and the risk of poor mental health.

### **ACEs and Low-income Populations**

ACEs are higher in groups that experience low-income and poor housing conditions (Koh & Montgomery, 2021). Individuals living in low-income neighbourhoods or those who are members of lower socioeconomic groups are at greater risk of being exposed to ACEs (Blair et al., 2019; Walsh et al., 2019). According to a study by Joshi et al. (2021), except for experiences of parental death, all ACEs are more prevalent among low-income individuals. Similarly, Giano et al. (2020) find that households with annual incomes between \$15 000-\$25 000 have significantly higher mean ACE scores than all other higher-earning groups. Although parental death is the only ACE that isn't associated with income (Joshi et al., 2021), Yao et al. (2021) find losing a parent as a child to be a significant risk factor for poverty in adulthood. Therefore, there may be a delayed impact of parental death on health outcomes, as losing a parent may expose individuals to additional life stressors such as less familial or caregiver support, more responsibility, and prolonged and traumatic grief (Burgman et al., 2017). While in their formative years, the accumulation of stress and adversity may greatly influence children's life and health outcomes (e.g., poor mental health, and less school success) (Luecken & Roubinov, 2012; Burgman et al., 2017).

Individuals who live in poverty are more likely to experience ACEs than others with higher incomes. In analyzing data from the Canadian Longitudinal Study on Aging, Joshi et al. (2021), find that individuals with household incomes of less than \$20,000 per year have prevalence rates of physical, emotional, and sexual abuse that are approximately 10% higher than those in the next income category (\$20,000-\$49,999). Lacey et al. (2020) attribute the association between ACEs and poverty to the stress

experienced by individuals, families, and households who live in poverty. The family stress model is used to explain the experience of socioeconomic disadvantage and its impact on child outcomes through parenting and parents' experiences (Gard et al., 2020). For instance, families who live in poverty and cannot afford the necessary goods and services for their children to be able to meet societal norms and expectations may experience immense amounts of pressure and stress (Ho et al., 2022). These conditions can create interparental and parent-child strain, which often leads to poor mental health, parental separation, and child maltreatment (Gard et al., 2020; Neppl et al., 2017). The relationship between poverty and stress suggests that families living in poverty may be a risk factor for childhood exposure to ACEs. Through poverty-induced stress, children may experience less nurturing and supportive familial relationships, and instead, encounter strain on parent-child relationships, as well as the potential adoption of harsh or abusive parenting practices (Ho et al., 2022).

Although the Centre for Disease Control does not include poverty as an ACE in itself, (CDC, 2021), researchers argue that it is an extremely significant factor that contributes to the accumulation of ACEs (Choi et al., 2019). This association is mediated by multiple factors such as access to safe housing, and neighbourhood factors (e.g., poverty rates, safety, physical and mental healthcare availability etc.). Community stressors are also significant mediators. Community stressors include limited accessibility of services and goods, poor housing conditions, high crime and violence rates, schools with low educational outcomes (Hodgkinson et al., 2017), limited opportunities for positive peer relationships, and low access to transportation, among

other social and economic factors (Wade et al., 2014; Blair et al., 2019; Crouch et al., 2020). For instance, a study by Blair et al. (2019) finds that access to transportation plays a role in protecting individuals and families who live in poverty from ACEs. Access to transportation provides people with greater access to health and social services, employment, leisure activities, and food facilities (Blair et al., 2019). In contrast, living in a neighbourhood with community conditions such as poverty, housing stress, and high availability of illicit drugs and alcohol may increase stress due to an increased fear of crime, creating perceptions of a risky neighbourhood with a lack of neighbourhood networks, informal supports, and increased social disorder; contributing to higher rates of familial household stress, and child maltreatment (Freisthler et al., 2006; Giovanelli et al., 2021; Crouch et al., 2020; Maguire-Jack & Font, 2017). Likewise, living in areas that are perceived as being safer and have accessible services and educational opportunities contributes to greater feelings of security, less parental worry about crime, more access to healthy foods, and more conducive environments for children to play in, all of which serve as protective factors in the pathway to good health and well-being (Crouch et al., 2020). Thus, the literature corroborates that socioeconomic status plays a key role in both the development and mitigation of exposure to childhood adversities. The next section will discuss ACEs in relation to housing status and access, and the associated experiences of mental and physical health.

### **ACEs and Housing**

Housing status has a profound influence on adult social, physical, and mental health outcomes (Barnes et al., 2021). Compared to their housed counterparts, rates of mental illness, infectious disease, injuries, and chronic disease are drastically higher among people experiencing homelessness (Liu et al., 2021; Fazel et al., 2014). Children experiencing housing insecurity are at higher risk of ACE exposure due to overcrowding, multiple moves, and inability to pay rent, which creates stressful circumstances and produces parental stress that may affect caregiving abilities (Barnes et al., 2021; DeCandia et al., 2022). Housing insecure children are more prone to living in unsuitable housing that is, overcrowded, in poor repair, and not conducive to good health (Krieger & Higgins, 2002; Rolfe et al., 2020). Substandard housing can contribute to the development of childhood illnesses and behavioural concerns (Krieger & Higgins, 2002). Studies also find that housing in neighbourhoods with a lot of noise pollution (e.g., being adjacent to busy streets or railway tracks, etc.) is associated with delayed speech and poorer early childhood literacy, which relates to poor sleep and the constant need to filter out external stimuli (Halperin, 2014; Kaltter et al., 2014). These outcomes have long-lasting negative impacts on educational and employment outcomes.

Unstably, unsuitably, or unaffordably housed children are at greater risk of homelessness than children who are securely housed (Parpouchi et al., 2021). A study of adults in South Carolina finds that 68% of those who reported a history of childhood homelessness also reported 4 or more ACEs. Further, only 2.7% of adults who experienced childhood homelessness reported no ACEs (Radcliff et al., 2019). According to the authors, homelessness may serve as both an ACE itself and a moderator by

potentially creating concurrent experiences of adversities. Therefore, children experiencing housing insecurity in conjunction with ACE exposure are subject to poorer health outcomes in the future (Radcliff et al., 2019).

ACEs are associated with future housing outcomes (Koh & Montgomery., 2021; Roos et al., 2013). A study by Cutuli et al. (2017) on family homelessness finds that as ACE scores increase, there is almost a direct proportional increase in the risk of adult homelessness. Moreover, participants' responses revealed that 1.3% of individuals with 1 ACE score reported homelessness, while approximately 33% of respondents with an ACE score of 8 reported homelessness, which indicates a large increase in the risk of homelessness as ACE exposure rises (Cutuli et al., 2017). Some scholars, including Cohen-Cline et al. (2021) explain the association between ACEs and housing outcomes using the youth adversity pathway.

The youth adversity pathway is associated with housing outcomes in later life. The youth adversity pathway proposes that early childhood trauma and adversity contribute to poorer life outcomes, such as homelessness (Cohen-Cline et al., 2021). As early childhood is a prominent period of development, experiences and exposures can significantly alter life success in later years (Webster., 2022; Moore et al., 2015). Furthermore, childhood or youth trauma sets the stage for less familial support, an increased risk of psychiatric disorders, and the normalization of environmental instability, which further perpetuates the link between youth trauma and homelessness (Woodhall-Melnik et al., 2018). As such, youth who experience ACEs and/or additional home and school-life challenges are more likely to leave home early and/or face long-

term or repeat homelessness in adulthood (Anderson., 2001; Parpouchi et al., 2021; Woodhall-Melnik et al., 2018). These findings are consistent with past work that links childhood adversity to adult homelessness and housing insecurity (Cutuli et al., 2017; Nyamathi et al. 2001; Koh & Montgomery, 2021; Roos et al., 2013; Montgomery et al. 2013). As evident by the high prevalence of childhood adversity among homeless and housing-insecure populations, ACEs can leave a lasting impact that drives potential housing issues in adulthood (Lee et al., 2016).

### **Positive Childhood Experiences**

Emerging research has focused on the phenomenon of positive childhood experiences (PCEs) and the potential buffering effects they may have on the adverse health outcomes of ACEs (CDC, 2020). PCEs constitutes nurturing and stable experiences that a child may endure before the age of 18 years old. This can include the presence of emotional and social support through family and peers, community engagement (e.g., access to and participation in activities, programs, and services), school engagement, positive parent-child relationships, and/or living in a safe neighbourhood or community (Bethell et al., 2019; Huang et al., 2023). There is evidence that PCEs are not only associated with good health outcomes in adulthood but also moderate the impact of ACEs on health. Interestingly, Xu et al. (2022) report that PCEs (e.g., relationships and social cohesion) can provide a protective effect on mental health that is independent of ACEs, as well as offer additional impact, moderating the effects of ACE-associated health outcomes. Bethell et al. (2019) support this relationship by confirming the connection

between PCEs and ACEs, both occurring together and independently, and the association of these experiences with adult depression and adverse mental health outcomes. Nonetheless, the study reveals that individuals with the highest ACE burden witnessed more substantial decreases in their risk of depression and poor mental health as their PCE scores increased. According to Huang et al. (2023), the findings indicate that PCEs play a role in fostering resilience, supporting positive outcomes, and providing a safeguard against adverse mental and physical health consequences.

The research indicates that ACEs are associated with housing and socioeconomic status, which are both key determinants of health. Therefore, the next chapter introduces the social determinants of health framework and discusses how it is well-suited to help understand ACEs and their connection with mental and physical health in individuals who are waiting for access to subsidized housing in New Brunswick, Canada.

### **Chapter Three: Theoretical Frameworks for Understanding ACEs**

The preceding chapter discussed prevailing and recent literature on ACEs concerning income, housing status, and health. However, it is important to note that ACEs are not constitutive of a theory (Kalamakis & Chandler, 2014). Rather, they are a concept used to measure the impacts of childhood experiences on a variety of outcomes, including health outcomes, over the life course. In the following section, I present the theoretical framework used for developing my research question and interpreting the findings of my analyses. The framework is the Social Determinants of Health.

#### **The Social Determinants of Health**

Over the past two decades, the influence of social factors on health status has become more evident (Braveman & Gottlieb., 2014; Islam, 2019). While medical and genetic factors influence health, it is the complex interplay between social, environmental, personal, economic, medical, and genetic factors that determine both individual and population health. The relationship between social factors and health is known as the social determinants of health (SDOH) (Hosseini Shokouh et al., 2017; Krieger, 2002). The SDOH acknowledge how social and environmental conditions can affect health, both directly and indirectly based on the distribution, systems, and policies associated with each of the determinants (Braveman & Gotlieb., 2014; Palmer, 2019). In other words, the social, economic, and community conditions that we

experience throughout our lifespan are the fundamental drivers of our lives and health outcomes.

There are currently fourteen recognized SDOH: income and income distribution, education, unemployment and job security, employment and working conditions, early childhood development, food insecurity, housing, social exclusion, social networks, health services, Indigenous status, gender, race, and disability (Canadian Public Health Association, n.d.). Each determinant, both individually and in conjunction with others, plays a significant role in shaping life opportunities, choices, and outcomes. As a result, the SDOH affect a wide range of health-related issues, including social functioning, and quality of life (Canadian Public Health Association, n.d.; World Health Organization (WHO), 2010). Hence, health status varies between groups according to the fourteen factors.

The concept of the social gradient is foundational to understanding the SDOH. The Canadian Public Health Association (n.d.) refers to the social gradient as the life outcomes associated with membership in particular socioeconomic groups. Socioeconomic status and relative income inequality in higher-income countries are the prevailing SDOH (Mackenbach, 2015; Truesdale & Jencks, 2016). The concept of a social gradient denotes that populations in higher socioeconomic strata may experience better health outcomes than those in lower strata (Donkin et al., 2014). The most notable work demonstrating the social gradient is the Whitehall study (Marmot et al., 1984), which follows 17,350 British civil servants over 10 years with varying ranked grades of employment. The study finds a steep inverse association between employment rank and

mortality. Compared to the highest employment grade (top administrators), the second grade (professional executives) mortality rate is 1.6, and the lowest rank (unskilled workers i.e., messengers) is 2.7 (Marmot et al., 1984). Marmot et al. (1987) postulate that the differences in mortality may be due to differences in job support and control. Job-related stress (e.g., tension, lack of clarity, lack of skill utilization) increases blood pressure which may increase the risk of mortality (Marmot et al., 1987). This early research offers support for the social gradient, as findings suggest that employment status and social and economic position influence physical health outcomes through exposure to potential stressors; the effect of which may even be as drastic as a decrease in life expectancy.

At the population level, socioeconomic status is linked to the increased prevalence of disease (Bird et al., 2015; Pincus et al. 1987; Vukovic et al. 2008). Socioeconomic status is often operationalized through measures of income and/or education (Mattsson et al., 2017). Pincus et al. (1987) find a linear increase in the development of disease with decreasing education in 32 of 37 diseases included in the study. They suggest this association may be explained by factors that limit individuals with lower educational levels from participating in health-promoting behaviours, such as taking measures to prevent diseases, eating a healthful diet, and exercising strong problem-solving abilities (Pincus et al., 1987). Further, Bird et al. (2015) find household income to be strongly associated with the prevalence of type 2 diabetes, high blood pressure, and obesity. They argue that this is largely related to the differences in stress levels and the capacity to effectively cope with or manage distress (Bird et al, 2015).

The social gradient not only applies to physical health but also to mental health and wellness outcomes. Allen et al. (2014) find that the largest prevalence of mental disorders is in populations experiencing low income. A systematic review of over 115 studies in low- and middle-income countries finds that over 70% report positive associations between poverty and common mental disorders (Lund et al., 2010). This is largely attributed to socioeconomic variations in opportunities and experiences (e.g., access to healthcare, exposure to environmental risk factors, psychological stress, etc.) (Bonaccio et al., 2020). Additional studies suggest the relationship between poverty and mental health may be partially explained by increased debt loads carried by individuals who are living with low income, as this produces additional individual and household stress (Allen et al., 2014). Studies show that children from lower socioeconomic status are more depressed and anxious than their counterparts, suggesting that the social distribution pattern may start before adulthood (Lemstra et al., 2008). In other words, the experiences of low-income children are influenced by the challenges experienced by their parents.

The association between low childhood socioeconomic status and both childhood (Evans & Kim, 2007; Gupta et al., 2007; Poulain et al., 2019) and adult health (Cohen et al., 2010; Conroy et al., 2010; Lee et al., 2021) is widely established. Income and income distribution are the most extensive and prominent of the SDOH (Mikkonen & Raphael, 2010). Income has a rippling effect on several factors including living conditions, psychological functioning, and health behaviours (Lynch et al., 2000; Zhang & Xiang, 2019). As a result, financial insecurity is not only associated with adverse

physical and mental health outcomes, it also negatively impacts one's ability to fulfill basic needs, such as the need for adequate housing and food, which also contribute to health status (Weida et al., 2020). Likewise, socio-contextual barriers such as personal and social (e.g., income, education, occupation, gender), environmental (e.g., physical, social, and built environment), and cultural (e.g., ethnicity) contribute to large disparities in health (Adler & Newman, 2002). Statistics Canada (2020) finds that life expectancy at age 25 for men in the lowest income quantile is 6.7 years lower than those in the highest income quantile. For women, it is 3.7 years lower (Statistics Canada, 2020). These social determinants have individual and cumulative impacts on both mortality and morbidity.

Inequities and inequalities in health exist within and across countries. Health expenditures as a percentage of Gross Domestic Product (GDP) indicate the proportion of a country's resources allocated to health (WHO, 2018). Household income is particularly important to population health in countries with lower GDPs (Curran & Mahutga, 2018). However, in higher-income countries, such as Canada, the effects of income distribution and inequality on health are particularly notable. The relative income hypothesis states that health outcomes are a result of the ranking of individuals in the income distribution sequence (Cui & Chang, 2021). As such, countries with high relative income inequality are more likely to see the impacts of income on health than countries with more progressive models of income redistribution (e.g., Scandinavian countries) (Aaberge et al., 2003; National Research Council, 2011). For example, a study by Chetty et al. (2016) using 1.4 billion tax records in the US finds a 14.6-year difference

in life expectancy between the richest 1 % and the poorest 1%. This substantial difference in health can be explained by research findings that note when income inequality is greater, the health benefits of the wealthy tend to outweigh the health deficits of the poor (National Research Council, 2011). These findings are particularly pronounced in countries like the United States without overly progressive taxation and limited access to publicly funded health services (McGrail et al., 2009).

Neighbourhoods also contribute significantly to health outcomes (Mohnen et al., 2019; Roux, 2016). It is important to note that health status is not randomly distributed across neighbourhoods. A wide body of research has shown that low-income and minority neighbourhoods are more likely to experience harmful conditions, such as poor housing and environmental hazards (e.g., poor air quality, lead exposure, mold, etc.) (Jacobs, 2011; Ludweig et al., 2012) and lack health-promoting factors, such as access to health and public services (Hood, 2005), access to healthy food, social order, and low crime rates (Edmonds et al., 2019; Cotrona et al., 2008). In Canada, researchers find a 20% decrease in life expectancy for men living in the poorest neighbourhoods compared to men in the richest neighbourhoods (Mikkonen & Raphael, 2010; Statistics Canada, 2023b). The relationship that neighbourhood holds with health status can be explained by differing environmental exposures (e.g., air and water pollution), elements of the physical environment (e.g., walkability and access to services) and the social environment (e.g., social connectedness and violence) (Roux et al., 2016). To understand the impact of neighbourhoods on health, researchers must focus on a variety of different neighbourhood factors and their contributions to health outcomes.

Further, since neighbourhoods are linked to health through multiple factors, a variety of interventions can be considered to offer protective factors to reduce violence, promote physical activity and social connectedness, and manage the distribution of resources and services, such as improving neighbourhoods' physical quality or promoting mixed-income neighbourhoods (Roux et al., 2016).

Neighbourhood environments indirectly impact health through their contribution to or facilitation of health-promoting behaviours (Liu et al., 2022). Neighbourhoods can both facilitate or restrict access to participation in health-promoting behaviours. For example, a more social, safe, and walkable neighbourhood will allow for more physical activity, which, in turn, influences good health. Conversely, a neighbourhood with easily accessible tobacco and alcohol retailers may promote smoking and drinking. Living close to fast-food locations with fewer healthy options may also result in poor dietary habits, which are well-known health risk behaviours (Kwan et al., 2012). Neighbourhood-level stressors, including social disorder, crime, and poverty, can contribute to poor mental health such as depression and anxiety (O'Campo et al., 2015). These stressors are problematic for children, as a lack of safety and/or the existence of unfavourable conditions are particularly harmful during critical periods of development (Rakesh et al., 2021). A combination of hazardous neighbourhood conditions and other adverse experiences can lead to prolonged and persistent chronic stress (e.g., toxic stress), resulting in poor health outcomes in later life (Edmonds et al., 2019; Bucci et al., 2016).

Theories of socialization, such as social learning theory, are used to explain the impacts of childhood environments on future actions. For example, Djik and Norda (2019) find that early social environments are profound and can contribute to later experiences. They describe this as a chain of social learning processes, wherein people's experiences substantially shape their present and future actions. Children's behaviour is influenced by the social norms, expectations, and cultural environments in which they are raised, which are often shaped in primary sites of socialization, which are often made up of family at a young age and peers during adolescence. Several studies have found that children from disadvantaged neighbourhoods lack positive role models, such as those who have achieved academic success, which can lead to less successful life outcomes (Ferguson et al., 2007; Nieuwenhuis et al., 2021; Branden et al., 2022). Contrariwise, children who can rely on positive role models are more likely to succeed later in life in education, work, and social relationships (Djik & Norda, 2019). Hence, childhood environments and the people within them have significant impacts on childhood development and a variety of health, social and economic outcomes in later life.

Food security is an important determinant of health that is related to both income and neighbourhood factors, as access to and the ability to purchase healthy food are largely dictated by one's ability to access food physically and economically. Gundersen and Ziliak (2015) find that food-insecure children are approximately twice as likely to exhibit poor health. Notably, many of the determinants of food insecurity are also determinants of health. Research shows that food insecurity

in children is associated with cognitive problems, behavioural problems, asthma, exhibiting higher levels of aggression and anxiety, higher risk of hospitalization, and poorer overall health (Gundersen & Ziliak, 2015). A Canadian study by Kirkpatrick et al. (2010) finds that among children, those who attested to experiencing hunger have poorer general health. Further, the study finds higher odds of chronic conditions and asthma among youth who experienced multiple episodes of hunger compared with those who never indicated food insecurity. Also, children and families who live in neighbourhoods with poor food sources (e.g., fast food or availability of calorie-dense, low-nutritional value foods) that promote unhealthy eating, may experience adverse health outcomes, compared to individuals living in higher-income communities (Evans et al., 2015). These findings corroborate the connection between food availability and insecurity as markers of vulnerability as they indicate that neighbourhoods' food access, affects health and well-being later in life (Kirkpatrick et al., 2010).

The SDOH are critical throughout the life course. Considering the strong correlation between health and health behaviour from childhood and adolescence to adulthood, understanding how social determinants affect early life predispositions and later life outcomes is crucial to the health and economic development of the population (Viner et al., 2012). The effects of the SDOH on health outcomes across the life course are described using the concepts of latency, cumulative, and pathway effects. These concepts focus on, children's predispositions to either positive or negative adult health trajectories (Raphael, 2010). The latency pathway refers to the relationship between exposure at one point in the life course and health outcomes years later, regardless of

any intervening experiences or exposures. This model holds biological plausibility as the first five years of life is a critical period for emotional control, peer social skills, and language development. As such, without exposure to stimulation, stability (e.g., economic, familial, residential), and security during this period, children are subject to delays and/or receive less access to developmental opportunities, such as exposure to opportunities to develop cognitive, language, and social skills (Hertzman, 2006; Sandstorm & Huerta, 2013). The cumulative pathway is summative and describes the accumulation of advantages or disadvantages over time, such as longer-term exposure to particular socioeconomic circumstances. The effects are based on the duration and intensity of the exposure to a variety of factors. For instance, Power et al. (2000) find occupational class over the first 3 decades of life to be strongly predictive of later health. They find that those raised by adults in the lowest occupational class are four times more likely to report poor health than those raised by adults in the highest class.

The pathway model acknowledges that differences in early life environments can lead children to different life trajectories, and it is these trajectories that influence health outcomes. Hertzman (2006) describes how the environment and social status of the family influence the community in which one grows up. Children are exposed to a variety of social connections, community values, and opportunities that subsequently influence their life trajectories. For example, a child who has not gained adequate cognitive, behavioural, and emotional readiness for school may struggle with school success and social adjustment (Hertzman & Power, 2004). Further, there is evidence that people with less educational attainment practice more health-risk behaviours such

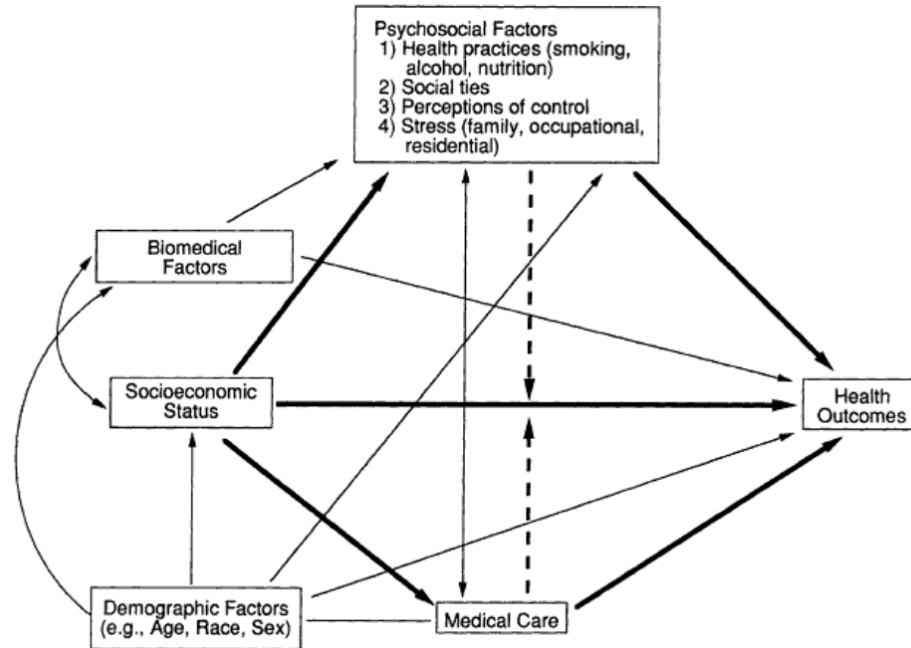
as smoking, bad diet, drinking, and non-use of preventative healthcare. In turn, socioeconomic and educational status influence self-reported health, morbidity, and mortality in adults (Hertzman & Power, 2004; Hertzman, 2006). Likewise, to reduce inequalities and increase population health, interventions must address socioeconomic factors that drive disparities across a variety of conditions (Frieden et al., 2010).

### *Conceptual Models and Frameworks*

Several conceptual models and frameworks exist to explain the SDOH. The oldest model is Williams' (1990) conceptual framework, developed in 1990 (see Figure 1). This framework focuses on socioeconomic status as a crucial determinant of health outcomes. In this model, psychosocial factors (e.g., health practices, social ties, perceptions of control, stress) and medical care mediate the effects of socioeconomic status on health outcomes (Williams, 1990). Williams notes that psychosocial factors and medical care affect health outcomes in both direct additive (solid line) and interactive ways (dotted line). A model such as this is useful in that it incorporates the complex interaction of several determinants and factors that influence health status, considering both demographic (e.g., age, sex, race) and environmental, genetic, and constitutional (biomedical) factors (Williams, 1990).

### **Figure 1**

*Williams Conceptual Framework (1990)*

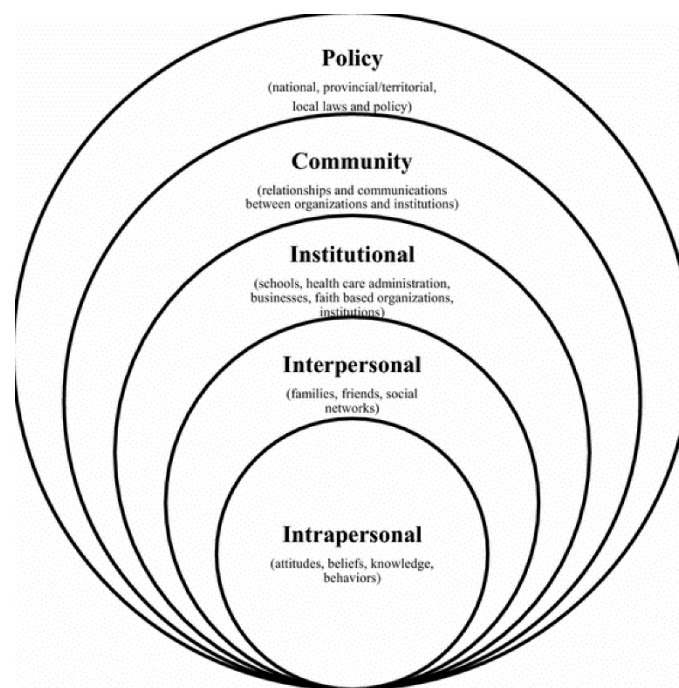


A recent theory-based framework, the Social-Ecological Model (see Figure 2), uses an ecological perspective (Ma et al., 2017). The ecological perspective refers to how people interact with their environment; it emphasizes health through both individual and contextual systems, accounting for the interdependent relations between them (McLaren & Hawe, 2005). As such, the Social-Ecological model considers the relationships between, the influence of, and the complex interplay of the different levels and layers of a person's life (CDC, 2022). Included in the framework are the individual/intrapersonal level, the interpersonal level, the organizational level, the community level, and the policy level (Golden & Earp, 2012). Each plays a significant but distinctive role in children's and families' lives, affecting living, working, and playing conditions. This, in turn, influences social and emotional behaviours, and ultimately health. As the model recognizes the overlap and the reciprocal relationships between

the multiple layers of life, it is useful in understanding the SDOH and subsequent health outcomes. Likewise, proponents of this model argue that public health efforts are most effective when all factors are targeted to meet the specific needs of individuals or groups (CDC, 2022).

**Figure 2**

*The Social-Ecological Model*

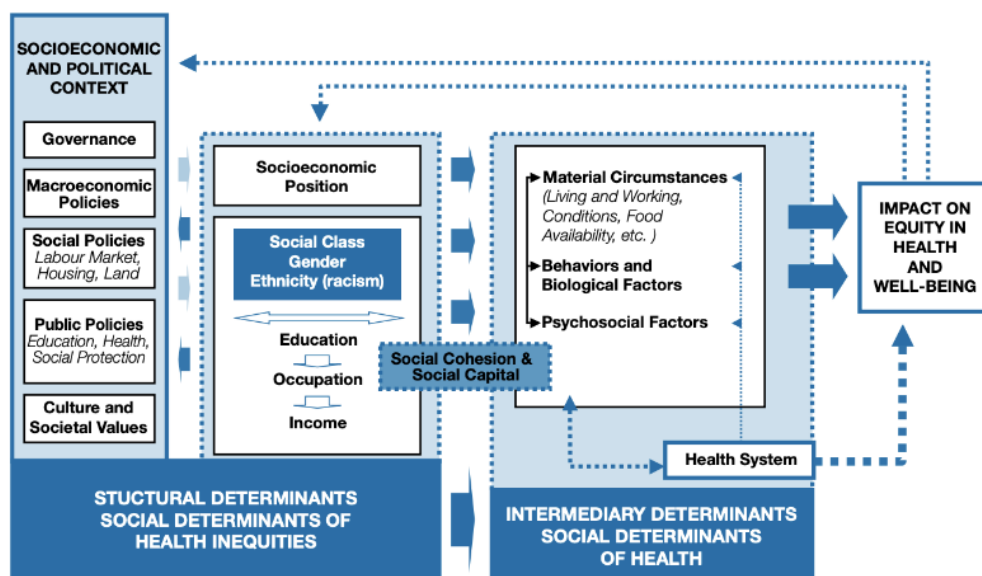


The World Health Organization (2010) commission also published a conceptual framework for action on the SDOH (see Figure 3). The framework is sectioned into structural determinants and intermediary determinants, ultimately impacting, and leading to equity in health and well-being (WHO, 2010). The structural determinants consist of the social, economic, and political contexts of people's lives; these then give rise to a person's socioeconomic position. Socioeconomic position affects material

circumstances which are an intermediary SDOH, that further impact health behaviours. These are compounded with biological and genetic factors, psychosocial factors, and system-level factors (e.g., access to health services). Each of these factors results in differing exposures, environments, and experiences that contribute to health-comprising conditions and diseases (WHO, 2010; National Research Council, 2011). Illnesses that may result from these conditions often lead to worsened outcomes that further contribute to poor socio-structural conditions (Committee on Educating Health Professionals to Address the Social Determinants of Health et al., 2016). For example, populations with poor working conditions have a higher prevalence of workplace injuries which then result in loss of employment or income, which is associated with poor health outcomes (Burgard & Lin, 2013; Committee on Educating Health Professionals to Address the Social Determinants of Health et al., 2016).

**Figure 3**

*World Health Organization CSDH Conceptual Framework (2010)*



### *Connecting ACEs with the SDOH*

Although development continues into early adulthood, childhood represents a particularly critical time for the rapid growth and development of the brain and other organs and biological systems (Tierney & Nelson, 2009; National Research Council et al., 2000). It is during this period that the foundations of critical systems that impact social behaviour and emotions are formed; our experience of social determinants strongly influences this process (Tierney & Nelson, 2009). A significant characteristic of the evolving brain during this time is its receptivity to environmental cues and signals, including stress (Shonkoff et al., 2012). Stress responses may include both positive stress responses, which are temporary and quickly diminished, and tolerable stress responses which are a form of enduring and serious responses to stress. Tolerable stress responses can be eliminated with adequate support such as parent-child comfort, or adult-safe, stable, and nurturing relationships (Garner, 2013). That is, through a process known as “buffered activation” the brain and organs can sufficiently recover from this form of stress (Magalhaes-Barbosa et al., 2022). However, the most dangerous form of stress response results from exposure to toxic stress. Toxic stress is frequent, or repetitive/prolonged activations of the stress response system. In this situation, the level of and duration of the stress response is the result of experiencing adversity without receiving the necessary nurturance or support. (Franke, 2014; Shonkoff et al., 2012). Childhood exposure to ACEs triggers the stress response system. Hence, children who experience several ACEs over time without supportive caregivers and relationships

can experience excessive and extensive stress responses, otherwise known as the toxic stress response (Harvard University, n.d.). When the stress-response system is activated to its extreme, it causes long-term wear and tear on the body and the brain (Harvard University, n.d.). Children who experience early-life toxic stress and adversity are at an elevated risk of adverse physical and mental health outcomes in adulthood, including depressive disorders, PTSD, psychosis, behavioural regulation, alcoholism, COPD, heart disease, cancer, and obesity, among many others (Franke et al., 2014).

Exposure to toxic stress is more prevalent in households that experience the SDOH negatively, such as those with lower incomes, poorer food security, and less access to healthy environments (Francis et al., 2018). Exposure to ACEs is also more common in households where low levels of social, economic, and environmental support exist (Walsh et al., 2019). Hence, one can argue that the presence of ACEs is impacted by the SDOH (Thumm et al., 2022). Children, depending on their environment, may be exposed to protective and/or risk factors during their childhood, which influences the level and duration of stress and subsequent stress responses, which further influence their later life and health outcomes. It is, thus, pertinent to emphasize that the SDOH play an imperative role in determining whether children experience toxic stress while in their formative years (Garner & Shonkoff, 2012). For example, a child living in poverty may face multiple adversities, including parental incarceration, violence, housing instability, racial or economic discrimination, food insecurity, and substance use in the home. Likewise, living in impoverished and unhealthy conditions can overwhelm a child's stress response system, resulting in "toxic stress" (Halfon et al.,

2017). A positive and nurturing relationship between parents/guardians and families can be a powerful buffer against toxic stress, but many children do not have access to this. It is often the case that parents raising children in poverty are also exposed to poverty and chronic adversity themselves. Their trauma and mental illness, and availability of resources also limit their ability to provide a supportive environment for their children (Francis et al., 2018). Further, family stress models indicate that the parental stress produced by living in conditions of deprivation often has negative impacts on children (Francis et al., 2018; Ho et al., 2022). This interplay of childhood exposures, experiences, and health indicates a strong need for robust and collaborative models of care to bridge the gap between the SDOH and healthcare provision (Andermann, 2016).

ACEs include various traumatic events that are empirically linked to negative adult health behaviours, health outcomes and the leading causes of morbidity and mortality (Halfon et al., 2017). Given their impact on chronic disease and illness, ACEs are also associated with greater healthcare utilization (Hargreaves & Mouton, 2019). Nonetheless, ACEs not only affect health and wellness, but also influence adult socioeconomic stability, including housing insecurity, and financial insecurity (Harter & Harter, 2022). The SDOH represent the conditions that influence our childhood and adult lives. Unfavourable social determinants and environments put children at a heightened risk of ACE exposure, thereby making them more vulnerable to poor health and life outcomes (Camacho & Henderson, 2022; Webster et al., 2022). Likewise, compared to their higher-income counterparts, low-income adults are

disproportionately affected by ACEs (Allen et al., 2019; Merrick et al., 2018; Crandall et al., 2021).

In Canada, studies find a high prevalence of ACEs among several groups and populations including general populations of adults, indigenous, and low-income populations (Joshi et al., 2021; McDonald et al., 2015; Toombs et al., 2022). However, there is still a lack of evidence on the prevalence of ACEs in housing-insecure populations and their associated health status. To fill this knowledge gap, the present study measures the prevalence of ACEs and their association with health in an underserved population in New Brunswick. Moreover, since income, housing, ACEs, and health are interrelated, likely, examining ACE prevalence among housing-insecure populations and further health trends among the population sample will yield meaningful results. The methods for conducting this research are discussed in the next chapter.

## **Chapter Four: Methods**

This study used a cross-sectional study design to investigate the prevalence of ACEs and their impacts on self-reported mental and physical health among a sample of low-income residents on the waitlist for publicly subsidized housing in New Brunswick. The data was drawn from the control group of the six-month wave of the NB Housing Study, which is a longitudinal prospective cohort study that tracks the mental and physical health of applicants on the waitlist for subsidized housing in New Brunswick as they wait for and later receive access to subsidized housing. For my thesis, data on ACEs (collected retrospectively) along with demographic indicators from the six-month period of the NB Housing Study were analyzed along with self-reported physical and mental health. This chapter provides a discussion of the survey design along with details on the use of the data. I also discuss the participant recruitment method, the sampling strategy, the outcome measures used, and the method of data analysis. The study analyzed the prevalence of Adverse childhood experiences of waitlist applicants and assessed the association between ACEs and self-reported mental and physical health outcomes. I hypothesized that a significant portion of participants would have experienced at least one ACE. I also hypothesized that ACE scores will predict decreases in mental and physical health.

### **The NB Housing Study**

The data used for this study was taken from the six-month follow-up survey responses from the NB Housing Study (Woodhall-Melnik et al., 2022). This section

describes the procedures for the larger study. Emphasis is placed on the factors that are relevant to the present study. Additional information on the larger longitudinal study design is published elsewhere (see Woodhall-Melnik et al., 2022). This study is conducted in partnership with New Brunswick's Department of Social Development and is funded by the Canadian Institutes of Health Research. Start-up funding for this study was received by Research New Brunswick.

### **Recruitment**

This study collected data from a sample of all residents on the waitlist for publicly subsidized housing in New Brunswick. The total number of applicants on the wait list at the time the study began was 4,750 households. Each household received two mailed letters from the New Brunswick Department of Social Development, with the first letter sent in May 2021 and the second in August 2021. The letters contained information on the study, a link to an online survey, and contact information (both email and telephone) for the study team. Each household was asked to self-select one person to participate in the survey to prevent the receipt of more than one response per household. The Economic and familial household was used; therefore, all participants living in communal households (e.g., single-room occupancies, shelters, etc.) were treated as independent households unless they shared finances with or were family members, by marriage or birth, of other residents in a communal setting. Participants were informed that the study was voluntary and was not affiliated with their ability to receive or access subsidized housing. Although online participation was encouraged

through the provision of a direct link to the survey in French and English, participants were given the option of completing the survey over the phone with a Research Assistant or receiving a mailed survey with a self-addressed, postage-paid envelope for returning the survey to the research team. Further, with the consent of shelter and service managers, Research Assistants went into shelters and agencies mandated to serve extremely low-income populations to conduct in-person surveys with individuals who are on the waitlist while experiencing homelessness in New Brunswick's three largest cities: Moncton, Fredericton, and Saint John. The survey was conducted in both French and English. One request for participation in Arabic was made; however, due to the time and cost of translation, and the time it would have taken to submit an ethics modification to approve the translation, the research team was unable to conduct this survey. Individuals who experienced literacy and technological barriers to completing the survey were able to do so over the phone with a Research Assistant. This option was provided to all who requested it.

Participants' contact information including email addresses, mailing addresses, and phone numbers were recorded during their baseline survey, which was when they accepted the invitation to participate in the study, and during each subsequent survey to prevent study attrition. Participants were provided with the Principal Investigator's institutional and general lab email to provide updates to their contact information and to reach out should they have questions or concerns. For all follow-up surveys, including the 6-month survey, participants were first contacted using their preferred contact method. If attempts to contact participants via their preferred method were

unsuccessful, secondary, and tertiary contact methods were used when available. At baseline, 504 individuals participated in the survey.

## **Ethics**

The NB Housing Study, from which the data for this thesis were drawn, received Research Ethics Board certification (REB 2020-032) from the University of New Brunswick. Consent to participate was mandatory and the consent stressed that participation does not impact participants' position on the waitlist or ability to obtain housing. Individuals who participated online provided electronic consent. Those who participated on the phone provided verbal consent and individuals who were interviewed in person or surveyed by mail provided written consent. In addition to the main consent for the study, participants were also asked to answer a variety of optional consents for 1) data linking with the NB-IRDT; 2) contact for future qualitative research; and 3) providing their name to Social Development to receive updated contact information and/or indications of receipt of subsidized housing. Participants had to complete the main consent for study participation before proceeding with the survey; however, they were allowed to omit responses or answer no to the optional consent and still proceed to complete the survey.

## **Participant Compensation**

As a small thank you for their survey participation, each participant was emailed or mailed a \$10 Tim Hortons coffee shop gift card. Gift cards were sent to all

participants who filled out information on their preferred method of delivery on the last page of the survey. Participants located at shelters were handed their gift cards. Participants' names were also added to a draw for one of three \$500 Visa Gift cards each time they completed a survey. They also received three additional entries per survey when they completed screening questions to indicate whether they moved into housing or received a rent subsidy or housing benefit. This draw was designed to promote study retention, as it encouraged participants to keep their contact information up to date with the study team. The draw will take place upon study completion in 2025. Participants did not receive a gift card for completing screening questions; however, a senior member of the research team contacted individuals who indicated they received subsidized housing to arrange for their first intervention survey six months following the start of their receipt of subsidized housing.

### **Cross-sectional Survey Data with ACEs Collected Retrospectively**

The present study used a segment of survey data collected from the six-month iteration of the NB Housing Study. Since the study sample is comprised of adults aged 19 and over, a one-time retrospective response to the Adverse Childhood Experiences Questionnaire (Oklahoma Department of Mental Health and Substance Abuse Services, 2019) was sufficient for assessing childhood experiences among this cohort, as they are no longer children and, therefore, cannot experience additional childhood trauma. This specific survey retrospectively recorded self-reported ACEs in individuals who are waiting for access to subsidized housing. The ACEs survey was also administered to

individuals who had already received housing and entered the intervention group before their six-month control survey; however, these data were not yet cleaned and available when the present study was conducted. The purpose of a retrospective study is to collect historical data, or the presence of experienced events amongst a cohort of individuals (Klebanoff & Snowden, 2018). Using cross-sectional data from a larger longitudinal study is appropriate for the present study as it allows the researcher to understand past experiences of childhood trauma which should remain unchanged between study waves. -

### **Survey Instruments**

This study uses data from the six-month wave of the NB Housing Study (for more details, see Woodhall-Melnik et al., 2022). The 6-month survey asked a variety of demographic questions and questions pertaining to self-reported mental health, physical health, social, support, financial stress, and substance use. The primary data collected through this wave was used to assess the prevalence of ACEs in those waiting for access to subsidized housing in New Brunswick. In addition to collecting retrospective data on ACEs, the survey was designed to collect a variety of data on subsidized housing applicants and the questions vary slightly between survey waves; however, as the independent variable in the present study is ACEs and data on ACEs were collected in the six-month wave (See Appendix A), participants' six-month responses were used. The following sub-sections present the primary outcome and

potential control variables collected through the NB Housing Study that were used in this study.

## **Study Measures**

This section discusses the measures used to collect data for the 6-month control wave of the NB Housing Study. Emphasis is placed on variables that were used in the analysis for my thesis.

### ***Primary Measures***

**Adverse Childhood Experiences:** This study investigated the effect of ACEs (x) on self-reported measures of mental and physical health (y). ACE scores were collected using the Adverse Childhood Experiences Questionnaire (Oklahoma Department of Mental Health & Substance Abuse Services, 2019). This survey is comprised of 10 items that ask specific questions about a variety of negative experiences in childhood, defined as the first 18 years of life. Experiences include household dysfunction, neglect, alcohol use, parental incarceration, and abuse (for the complete list of questions asked in the ACEs Questionnaire, see Appendix A). ACEs were deemed present when a participant responded yes to one or more questions about adverse experiences. The research team also computed a cumulative ACE score for each participant by assigning one point to each “yes” response and then summing the points for a total score out of 10 (Kostic et al., 2020). ACEs can also be used both as a dichotomous variable (“yes” or no” to the presence of any ACEs) (for example, see Shefler et al., 2019) or as a continuous value ranging from 0-10 (for example, see LaNou et al., 2020). Further, researchers can

categorize ACE scores into groups that encompass a range of ACEs (e.g., 0-2, 3-5, etc.). This is done to compare individuals with different levels of ACEs to one another (for example, see Brown et al., 2009; Felitti et al., 1998). Further, researchers may be interested in specific ACEs or combinations thereof and may explore ACEs as individual items (Bellis et al., 2023) or in distinct groupings (Felitti et al., 2002). To perform multiple linear regressions, this study used ACEs as a continuous variable for the study's model.

**Mental health:** One of the two main outcome variables in this study was mental health. Specifically, the NB housing study collected self-reported data on psychological distress and depression, using two standardized scales. The presence of depressive symptomology was assessed in participants using the Centre for Epidemiological Studies Depression Scale Short Form (CESD-10). The CESD-10 has been proven to be consistently internally reliable and shows accuracy in classifying depressed individuals (Williams et al., 2020). The CESD-10 was scored using a specified algorithm that was designed by Andresen et al. (1994) to assign each of the 10 items a value. The values from each of the 10 questions were summed to provide a score that ranged from 0-30. The documentation that accompanied the CESD-10 noted that scores equal to or greater than 10 indicated the presence of depression. Individuals with scores below 10 were considered not depressed (Andresen et al., 1994). Researchers have argued that when conducting non-clinical research, CESD-10 scores may be best used as continuous (Andresen et al., 2013). This usage has allowed researchers to observe discrete changes in depressive symptomology within large samples, that otherwise would have remained

unobservable when categorical change from depressed to not depressed and vice-versa are not observed. Hence, for this thesis research, the CESD-10 scores were treated as continuous.

Distress symptoms were also used as a dependent variable in my thesis research. These were assessed using the Kessler-6 (K-6) (Kessler et al., 2002). The K-6 was originally designed for the U.S. National Health Interview Survey and was used to collect data on the last 30 days. The K-6 was derived from the K-10 and contained six items instead of 10 (Kessler et al., 2002). The K-6 is deemed reliable and valid (Umucu et al., 2021).

**Physical health:** The second outcome of interest in this study was self-reported physical health. To gauge participants' self-assessments of their physical health, the EQ-5D-5L and EQ-VAS were administered. The EQ-5D-5L was written to assess five dimensions that relate to quality of life (Hernandez et al., 2019). The respondents describe their health in terms of the severity (e.g., via a scale) of each assessed dimension. Using the EQ-5D-5L, the responses are converted into an index value (See Euroqol Research Foundation, 2019). Based on the five dimensions of the EQ-5D-5L, a summary index value is derived from an applied formula that attaches weights to each dimension. The index is then created by subtracting the weights from one, which is the full health value. The health index value sets are then created that include all possible EQ-5D health states reflecting the health of a specific country or region. For Canada, this scale ranges from -0.148 to 0.949 (Xie et al., 2016), with low scores indicating very poor health (described as a state of death) and high scores indicating full health (Euroqol Research

Foundation, 2019). The EQ-VAS used a visual analog scale that asked respondents to rate their overall health on a scale from 0 (the worst imaginable health) to 100 (the best imaginable health). This produced a single value for each participant with a possible range of 0-100 (Feng et al., 2013). The EQ-5D-5L index value, as well as the EQ VAS, have been deemed valid (Jankowska et al., 2021).

### **Demographic and Potential Confounding Variables**

The NB Housing Study collected a variety of demographic indicators during the baseline and the six-month survey wave. These included gender (male, female, transgender, non-binary and other), age (determined using the difference between the date of survey completion and the participant's date of birth), marital status (married, common law, single, divorced/separated, widowed and other), highest completed level of education (grade school or less, enrolled in high school/GED, post-secondary diploma) some high school, high school diploma or GED, some post-secondary, and post-secondary), employment status (employed, unemployed, outside of labour force), and the number of other individuals that resided in their household. Participants were asked to report their net monthly income, which was then multiplied by 12 to provide an estimated annual income. Participants were asked not to provide their monthly Canada Child Benefit payments in their monthly income; however, these were captured separately which allowed the researchers to determine the presence of dependents in participants' households. Ethnicity was measured using categories derived from Statistics Canada

(Statistics Canada, 2021a) and participants were asked to provide their place of birth. As the frequency of substance use was found to be correlated with other illnesses (Schulte & Hser, 2014), some data was collected on the use of legal substances. The research team chose to focus on legal substances as prior research indicated that participants are less likely to truthfully report their use of illicit substances (Steinhoff et al., 2023). Housing and neighbourhood satisfaction and quality have been shown to contribute to mental health (Bond et al., 2012; Bashier et al., 2002). As such, for this survey, a short version of the Residential Environmental Satisfaction Scale (RESS) was used for the survey, which has a strong correlation with the total RESS scale (0.96). This scale measures both housing and neighbourhood satisfaction. Housing type (e.g., detached, high-rise apartment, etc.), tenure, and the number of people living at the primary residence were asked, as these factors are known to have an impact on mental health. Social support was measured using the Oslo Social Support Scale (OSS-3). Three questions are used to assess the level of social support people perceive they receive. This measure was included as social support has a strong correlation with both physical and mental health (Cheong et al., 2017). After running a correlation matrix including all variables from Table 1, variables with relevant significant associations were noted and included in my analyses. As such, my analyses used data collected on, age, gender, income, the frequency of cannabis use (never, monthly, weekly or more than daily, or almost daily), education level, social support, and housing satisfaction.

### **Statistical analysis**

Two methods were used to determine the prevalence of ACEs and their associations with physical and mental health. Descriptive statistics were used to assess the prevalence of ACEs. This was done by running summary statistics (e.g., mean, median, mode, range, frequency) to assess the distribution of the independent variable as well as to indicate the prevalence of ACEs in the sample. Summary statistics were also run for the other indicators noted above. Correlation matrices were then conducted to test for significant associations between any potential confounding variables and ACE scores.

The associations between ACEs and each of the dependent variables were assessed using multiple linear regression models. The multiple linear regression models used in my thesis take the standard form of:  $Y = b_0 + b_1X_1 + b_2X_2 + \dots$ . Also, to be thorough, using logistic regression, the impact of ACEs on EQ-VAS Health Score, EQ-5D-5L index value, psychological distress, and depression was assessed. EQ-VAS was dichotomized into above and below 60 out of 100 (the population samples median), the EQ-5D-5L index value was dichotomized into above and below 0.6 (the population samples median as well as the approximate median of Canada's index value), psychological distress dichotomized into above and below 13 (the cut-off for the presence of psychological distress symptoms), and depression was dichotomized into above and below 10 (the used cut-off for depression). Significant risk for the above outcomes were found for those with the presence of ACEs.

The independent variable (ACEs) was continuous and consisted of reported events of ACE exposures during the participant's first 18 years of life. The dependent

variables were the self-reported mental and physical health scores derived from the K-6, the CESD-10, and the EQ-VAS. The EQ-5D-5L index value was also used as a dependent variable, as it measures quality of life which is often associated with physical and mental health (Zare et al., 2020). ACEs were regressed on each variable independently. Doing separate regressions produced a more accurate and precise understanding of the associations of each variable with ACEs. As such, for assessing relationships there were four models.

- The impact of ACEs on psychological distress
- The impact of ACEs on depression
- The impact of ACEs on the health profile index value
- The impact of ACEs on total health score

### **Hypotheses**

H<sub>0</sub>= There is no effect of ACEs on adult mental and physical health; H<sub>A</sub>= There is an effect of ACEs on adult mental and physical health.

I hypothesized that ACE scores would be associated with a decrease in both mental and physical health scores. As such, there would be a significant relationship between ACEs and health, whereas increasing ACEs will predict poor self-reported mental and physical health. This would be evident by identifying a relatively high mean of ACEs, and a relatively high mean score of psychological distress and depression, indicating increased symptomology in the sample. Using a multiple linear regression

model, I predicted that there would be inverse relationships, as judged by the beta coefficients, for ACEs and each mental and physical health metric.

### **Data Analysis**

Data analysis was performed using Stata version 17.0 (Stata Corp, 2017). A descriptive analysis categorized by gender was performed for all variables. A correlation matrix was also run to identify potential correlations between the study variables. While controlling for confounding variables, multiple linear regression models were used to assess the associations between ACE scores and mental and physical health outcomes in adults.

### **Strengths and limitations of methods**

Retrospective studies have both strengths and limitations as a research methodology and as a data collection method. Retrospective studies offer a wealth of information regarding surveillance, evaluation, and causation (Mann, 2003). Analysis of previous events can provide insight into whether prospective studies are necessary to conduct in the future. Additionally, identifying past events related to the onset of occurrences can help determine their effect and significance. However, as the ACE questionnaire is administered in adulthood, we ran the risk of increased recall bias as participants may not remember their childhood experiences (Song & Chung, 2010). The results of retrospective surveys often reflect participant memories of past events, resulting in responses that may be inaccurate (Althubaiti, 2016), as memories tend to change or be forgotten as time passes (Moreno-Serra et al., 2022). However, one may

still argue that ACEs are significant past life events that are often the cause of significant individual-level trauma (Tabb et al., 2022); therefore, memories of ACEs may change over time, but they are not likely to be forgotten (Reuben et al., 2017).

Previous studies found that data on ACEs collected from adults do not often result in recall bias (Hardt et al., 2010). For example, Reuben et al. (2017) found that retrospective-recalled ACE records were agreeable with the prospectively recorded ACEs throughout the childhood of study members. Further, through the repeat administration of the Childhood Trauma Questionnaire over time, several studies found strong support for both the reliability and validity of the retrospective questionnaire (Bernstein et al., 1994; Dube et al., 2004; Hardt et al., 2006). This may be because the ACEs survey asks participants yes and no questions, rather than to recall specific details of past events. To experience recall bias, participants would have to completely forget or reinterpret experiences of traumatic events (Hardt et al., 2010; Reuban et al., 2017). Therefore, one could argue that recall bias is less problematic when using the ACE survey.

Although the larger NB Housing study is longitudinal, this thesis only looks at data from one point in time. Although useful in establishing correlations between phenomena, cross-sectional data are not usually useful for establishing causation (Setia et al., 2016). Cross-sectional studies do not establish a temporal order; therefore, one cannot attribute an event to another (Song & Chung, 2011). The exposure, or the event of reported ACEs is not allocated randomly. There is thus a possibility that any associations found between ACEs and health outcomes can be explained by other

variables. However, the first objective of this study was to establish the prevalence of ACEs and prevalence is easily obtainable in cross-sectional research (Capili et al., 2021). Further, for this study, causal associations are not required to depict a statistically significant correlation between low-income, housing-insecure populations and ACEs, nor between ACEs and health. Confounding variables which are described in detail below were adjusted to establish appropriate relationships.

### *ACE Screening*

There were psychological and emotional risks to administering the ACEs survey to participants. The ACEs survey asked participants to recall traumatic events, and although details were not asked about these events, simply asking about them may create distress for participants (Austin, 2021; Rariden et al., 2020). Participants may experience discomfort during the survey, and they may feel as if the questions are intrusive (Finkelhor, 2018). They may also experience anxiety, distress, or re-traumatization (Finkelhor, 2018). Further, they may feel stigma or shame from reporting on their past trauma (Finkelhor, 2018). The research team was aware of the potential for distress and discomfort during this part of the survey; therefore, when administering phone or in-person surveys, the research team explained the rationale for administering the questionnaire and reminded participants that they could skip any question(s) that they do not wish to answer. For these interactions, Research Assistants were trained to actively listen to participant's stories and responses which often accompanied their yes

or no responses. They were also provided with a list of community resources for participants who experienced distress.

During the screening process, the ACE questionnaire required disclosure of personal and trauma-related experiences, raising the question of whether the screening benefit would outweigh the risks or discomfort of the individual (Austin, 2021). To create benefits, screening efforts must be followed up with direct interventions. Interventions may include referrals, resources, information, and/or recommendations regarding current or future policies, programs, and practices (Rariden et al., 2020). For example, as will be done succeeding this study, following up with information and educating adults screened for ACEs can validate and empower individuals, contribute to improved family health, and reduce intergenerational transmission of risk for toxic stress (Bhusdan et al., 2020). Educating individuals about how their childhood experiences may impact their physical, mental, and behavioural health is important. This wealth of information can help validate their experiences and build on their strengths, which is particularly important in improving their health and providing means for stopping the intergenerational transmission of risk for toxic stress (Bhushan et al., 2020).

Further, although there was the risk of discomfort or distress, responding to the ACEs survey may have beneficial impacts on research participants. For example, they may find disclosing past experiences to be cathartic or therapeutic (Larkin et al., 2020). Research participants may also benefit from hearing about the research findings, which will be ensured following the NB Housing Study's completion. They may find it validating

or less isolating to know that other individuals have had similar experiences (Larkin et al., 2020). Further, as significant associations were found between ACEs and health outcomes, it may validate their current experiences (Bhushan et al., 2020). There is still debate on harm associated with screening for ACEs and more research is needed to determine the implications of administering the ACEs survey; however, it is promising that some emerging studies found the use of the tool to be beneficial.

### **Positionality and Reflexivity**

As a researcher investigating adverse childhood experiences within a low-income, housing-insecure population, it is crucial to acknowledge and articulate my positionality and remain reflexive. I am a white, educated woman who did not grow up in poverty. I have a background in Health Sciences, possess an undergraduate degree, and am completing my master's studies at the University of New Brunswick. These identities afford me certain socio-structural and economic advantages that are not available to all individuals and are quantitatively lacking, in general, in my research sample. In undertaking this research, I was motivated to understand more about the experiences of the New Brunswick housing waitlist community and how childhood experiences have shaped and impacted their social, economic, and health outcomes. Further, I was motivated by the desire to conduct research that significantly contributes to local policy and interventions. I wanted to do research that mattered, and I was confident that this topic, in tandem with the knowledge mobilization plan outlined in my thesis, would make a significant impact for master's level work.

Reflexivity involves an ongoing process of self-awareness and the critical examination of one's own biases, assumptions, and values (Berger, 2015; Reid et al., 2018; Watt, 2007). In their studies of midwifery practice, Kingdon (2005) argues that reflexivity must not be isolated for use in qualitative studies alone. Rather, there are important benefits to engaging in reflexive practices while contemplating, doing, and reporting on quantitative work that involves analysis of data that examine the realities of real-life people who struggle with socioeconomic deprivation, trauma, and housing insecurity. I recognize the potential for cultural and socioeconomic biases to influence my interpretation and presentation of data. Further, I recognize that my biases may impact my selection of research topic. As such, I am committed to acknowledging my socioeconomic position and biases. Further, I commit to an inclusive approach to data analysis and interpretation to ensure the findings accurately reflect the realities of my research participants who experience low-income, and housing insecurity in New Brunswick.

I am privileged as a white, educated woman and I benefited from a childhood without trauma, homelessness, or severe material deprivation. As such, as I am an outsider and not a member of a population living with poverty and housing insecurity, one motivation for studying ACEs in individuals who experience housing precarity may be questioned. Nonetheless, I possess a passion for social justice and equity and am acutely aware of how health is deeply rooted in the social, economic, and environmental determinants. As an aspiring physician, I believe that work that recognizes and attempts to assist with limiting the impacts of upstream determinants of

health is imperative to helping individuals who experience poor health in New Brunswick.

## Chapter Five: Results

### Participant Characteristics

This study analyzed data from a sample of 205 individuals on New Brunswick's social housing waitlist. To be included in the study, participants had to have responded to the ACE's questions in the six-month follow-up survey of the NB Housing Study (see Table A for a breakdown of participant characteristics). The majority of participants were female (N=150; 73.17 %) female and 63 (30.73%) were male. The mean age was 57.96 ( $SD=14.25$ ) for females, and 56.25 ( $SD=11.67$ ) for males (see Table A). Almost all the participants identified as North American (92.2%) and spoke English as a first language (87.80%). Most of the participants were unemployed (76.10%) and the most common level of education completed was high school/GED (54.63%). Although, some (32.20%) attended post-secondary institutions. The mean annual income in this sample was \$14,486.5 ( $SD=7547.5$ ). Notably, 82.52% of participants reported an income below the federal poverty line (Gustajtis & Heisz, 2023). Participants' mean housing satisfaction score was 46.60 ( $SD=13.14$ ) on a scale from 16 to a maximum of 76, where higher scores indicate greater *dissatisfaction*. This means that, in general, participants were somewhat satisfied with their housing, and housing environments. The sample's mean social support score was considered moderate to poor at 8.11 ( $SD=2.78$ ) (Kocalevent et al., 2018). The mean ACE score was 3.85 ( $SD=2.77$ ). The mean depression score was 14.52 ( $SD=7.93$ ). Using the CESD-10, the clinical cut-off for significant depressive symptoms is 10 (Zhang et al., 2012). This indicates the presence of depression in this sample. For the K-6, the clinical cut-off for serious psychological

distress is 13 (Kessler et al., 2003) In this sample, the mean psychological distress score was 9.82 ( $SD=6.97$ ); indicating some psychological distress.

Self-reported health was measured using the EQ-VAS scale, which asks individuals to rate their health from 0 to 100, with 100 representing perfect health. The mean in the sample was 58.42 ( $SD=24.65$ ). When compared with other studies that measure EQ VAS scores in the general Canadian population, this score was considered very low (Janssen et al., 2018). The EQ-5D-5L health profile index was also used, which produces a value ranging from 0 to 1. The mean EQ-5D-5L index value was 0.65 ( $SD=0.21$ ). Poder et al.'s (2020) use of this measure in the general population found the mean EQ-5D-5L score to be 0.824, which is significantly higher than the score in this study, which is indicative of poor health in the present sample.

There were significant differences between genders for annual income and cannabis use. Females reported a significantly higher income than males, while significantly more males reported using cannabis. Considering the widely discussed gender pay gap, wherein males are expected to earn more than their female counterparts, this sample deviated from the norm (Moyser, 2022). Conversely, the gender differences in cannabis use were consistent with previous findings (Greaves & Hemsing, 2020). The characteristics of the sample are shown in *Table A*.

**Table A: Sample Characteristics (N=205)**

<b>Variables</b>	<b>Total</b>	<b>Female</b>	<b>Male</b>
	<b>M/SD or %</b>	<b>M/SD or %</b>	<b>M/SD or %</b>
<b>Age</b>	57.44/13.54	57.96/14.25	56.25/11.67
<b>Education Level</b>			
Grade school or less	13.17%	12.68%	14.29%
Enrolled in high school /GED	54.63%	57.04%	49.21%
Secondary diploma	32.20%	30.28%	36.51%
<b>Employment status</b>			
Employed	15.61%	14.08%	19.05%
Unemployed	76.10%	78.87%	69.84%
Outside of labour	8.29%	7.04%	11.11%
<b>Annual household net income</b>	14,486.5/7547.50	15,311.9/7155.66	12,626.0/8106.61
<b>Cultural/ethnic group</b>			
North American	92.20%	93.66%	88.89%
Ethnic Minority	7.80%	6.34%	11.11%
<b>Language</b>			
English	87.80%	83.80%	96.83%
French	12.20%	16.20%	3.17%

<b>Smoker</b>			
Yes	40.49%	35.21%	52.38%
No	59.51%	65.79%	47.62%
<b>Alcohol use frequency</b>			
Never	49.76%	49.30%	50.79%
Monthly	36.59%	37.32%	25.40%
Weekly or more	13.66%	13.38%	14.29%
<b>Cannabis use frequency</b>			
Never	68.78%	76.76%	50.79%
Recreational user	18.05%	14.79%	25.50%
Daily	13.17%	8.45%	23.81%
<b>Housing satisfaction score</b>	46.60/13.14	45.33/12.70	49.45/13.68
<b>Depression score</b>	14.52/7.93	14.21/7.83	15.21/8.02
<b>Psych. distress score</b>	9.82/6.97	9.56/6.79	10.41/7.31
<b>Diagnosed mental health condition</b>			
Yes	44.39%	45.77%	41.27%

No	50.24%	50.70%	49.21%
Unsure	5.37%	3.52%	9.52%
<b>EQ 5D 5L profile</b>	0.65/0.21	0.66/0.21	0.63/0.22
<b>index value</b>			
<b>Health score</b>	58.42/24.65	58.39/25.8	58.48/22.01
<b>Social support</b>	8.11/2.78	8.28/2.78	7.71/2.77
<b>score</b>			
<b>ACE score</b>	3.85/2.77	3.83/2.80	3.90/2.70

To assess the associations between all potential contributors to the model, a correlation matrix was run (see Table B). The table identified moderate relationships between some of the potential model contributors. Age was observed to be correlated with ethnicity (-0.31), annual income (-0.24), cannabis use (-0.25), ACE score (-0.22), psychological distress (-0.24), and depression (-0.21). While we would expect annual income to increase with age, the present sample exemplified an inverse association. The observed relationship may be explained by the high average age in this sample, and the idea that income follows a pattern that suggests it begins to decline after middle age (Luong & Hebert, 2009). Annual income was moderately correlated with cannabis use (-0.20), mental distress (-0.26), and depression (0.23). The associations found between income and cannabis use corroborated findings from other studies that find lower-income earners to have rates of higher cannabis use (Hango & LaRochelle-Cote, 2018). The relationship between income and mental distress is in line with previous findings that linked higher income with decreased feelings of anxiety (Shields-Zeeman & Smit, 2022).

Cannabis use was correlated with mental distress (0.20). Previous research identified a decrease in anxiety with cannabis use (Sharpe et al., 2020); however, in this sample, we saw the opposite. Social support was moderately correlated with mental distress (-0.37), depression (-0.38), EQ-5D-5L health profile index value (0.26), EQ-VAS health score (0.23), and housing satisfaction (-0.26). Housing satisfaction was correlated with mental distress (0.27), and depression (0.27), indicating that higher dissatisfaction with housing and neighbourhood characteristics was associated with an increase in

mental distress and depression. The largest correlations were observed between two dependent variables: mental distress and depression (0.81). This was expected as anxiety and depression are highly comorbid conditions (Kalin, 2020). The EQ VAS and the EQ-5D-5L health profile index value were also correlated, which indicated that the measures used for physical health were capturing health adequately (Feng et al., 2013).

### **ACE scores**

There were 205 valid responses to the ACE Questionnaire. The mean total ACE score was 3.85 (2.77). The scores were not significantly different between males (3.90) and females (3.83). At least 86.12% of participants reported having at least one ACE, and 48.78% had four or more. The question with the highest prevalence of yes responses is ACE item one which asked about emotional abuse. This was highest for both females and males (51.43% and 56.45%). The least prevalent ACE item for females was ACE item 10 which asked about a household member being incarcerated (9.12%). For males, the least frequently reported ACE was item five, which pertains to neglect (24.19%). There are only slight differences ( $p < 0.1$ ) between genders for ACE item three and ACE item six. The ACE responses categorized by gender are reported in *Table C*.

**Table B:** Summary of Correlations Between Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
<b>1. Age</b>	1.00											
<b>2. Gender</b>	0.03	1.00										
<b>3. Ethnicity*</b>	0.31	0.01	1.00									
<b>4. Income</b>	0.23	0.12	0.01	1.00								
<b>5. Cannabis</b>	0.25	0.17	0.02	0.20	1.00							
<b>6. Social Support</b>	0.15	0.07	0.13	0.13	0.04	1.00						
<b>7. H. Sat**</b>	0.10	0.07	0.00	0.01	0.11	0.26	1.00					
<b>8. ACE score</b>	0.22	0.03	0.00	0.15	0.17	0.17	0.16	1.00				
<b>9. Health score</b>	0.03	0.04	0.02	0.18	0.12	0.23	0.08	0.16	1.00			
<b>10. Anxiety</b>	0.24	0.05	0.01	0.26	0.20	0.36	0.27	0.34	0.43	1.00		
<b>11. Depression</b>	0.21	0.01	0.01	0.23	0.18	0.38	0.27	0.32	0.50	0.81	1.00	
<b>12. Health ind***</b>	0.02	0.03	0.12	0.18	0.14	0.26	0.13	0.23	0.60	0.53	-0.54	1.00

*\*Cultural/ethnic background; \*\*Neighbourhood & residential satisfaction; \*\*\*Health ind. = Health index score.*

**Table C: Responses to Each Individual ACE Item by Gender (N=205)**

<b>ACE Item</b>	<b>Total</b>	<b>Female</b>	<b>Male</b>
	<b>%</b>	<b>%</b>	<b>%</b>
<b>1. Emotional Abuse</b>			
Yes	52.97%	51.43%	56.45%
No	47.03%	48.57%	43.55%
<b>2. Physical Abuse</b>			
Yes	42.57%	42.25%	43.33%
No	57.43%	57.75%	56.67%
<b>3. Sexual Abuse</b>			
Yes	37.81%	41.73%	29.03%
No	62.19%	58.27%	70.97%
<b>4. Emotional Neglect</b>			
Yes	50.00%	52.17%	45.16%
No	50.00%	47.83%	54.84%
<b>5. Physical Neglect</b>			
Yes	24.51%	24.65%	24.19%
No	75.49%	75.35%	75.81%
<b>6. Parental Separation</b>			
Yes	41.58%	37.41%	50.79%
No	58.42%	62.59%	49.21%
<b>7. Mother treated violently</b>			
Yes	26.67%	25.37%	29.51%
No	73.33%	74.63%	70.49%
<b>8. Substance Abuse</b>			
Yes	52.94%	53.52%	51.61%
No	47.06%	46.48%	48.39%
<b>9. Mental Illness</b>			
Yes	42.29%	42.14%	42.62%
No	57.71%	57.86%	57.38%
<b>10. Incarcerated Household Member</b>			
Yes	19.12%	16.31%	25.40%
No	80.88%	83.69%	74.60%

## Regression Results

Tests for normality were performed to determine if linear regression was appropriate to use in the present study. To assess the normal distribution of the residuals, a quantile-quantile plot and a histogram were used. The residuals follow a normal distribution. Multicollinearity was also not detected as the variable inflation factors were below 10. Using the breush-pagen test, the presence of homoscedasticity was identified.

### *Psychological Distress*

The first multiple linear regression analysis was conducted to examine the association between ACEs and mental distress. The variations in mental distress were predicted by the included variables,  $F(7, 197) = 19.18, p < 0.001; R^2 = 0.41$ ). In agreement with the hypothesis, the model found that ACE scores were predictive of an increase in psychological distress,  $B = 0.60, p < 0.001$ . Age was negatively associated with a decrease in mental distress,  $B = -0.065, p < 0.05$ . Both annual income,  $B = -3.30, p < 0.001$ , and social support,  $B = -0.72, p < 0.001$ , also predicted a decrease in mental distress. Housing dissatisfaction was associated with an increase in psychological distress,  $B = 0.10, p < 0.01$ .

**Table D:** Multiple Linear Regression of Covariates and ACEs Predicting Mental Distress (N=205)

Variables	<i>B/SE</i>
ACE score	0.60/0.14***

Age	-0.06/0.03*
Gender (1=female 2=male)	-1.24/0.88
Annual income	-3.35/0.82***
Cannabis use	0.84/0.57
Housing satisfaction	0.10/0.03**
Social support	-0.66/0.15***
$R^2$	0.41***

Note:  $\beta$  = standardized regression coefficient; SE = standard error; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*

$p < .001$

### Depression

The second multiple linear regression analysis was conducted to examine the association between ACEs and depression,  $F(7, 197)$ ,  $p < 0.00$ ,  $R^2 = 0.42$ . ACE score was positively associated with depression,  $B= 0.68$ ,  $p < 0.001$ . Annual income,  $B=-3.22$ ,  $p < 0.01$ , and social support,  $B=-0.93$ ,  $p < 0.001$ , were both negatively associated with depression. Higher housing dissatisfaction was predictive of greater depressive symptoms,  $B= 0.12$ ,  $p < 0.01$ ).

**Table E: Multiple Linear Regression of Covariates and ACEs Predicting Depression (N=205)**

	<b><math>B/SE</math></b>
<b>ACE score</b>	0.68/0.16***
<b>Age</b>	-0.05/0.04
<b>Gender (1=female 2=male)</b>	-1.03/0.99

<b>Annual income</b>	-3.22/0.93**
<b>Cannabis use</b>	0.24/0.65
<b>Housing satisfaction</b>	0.12/0.036**
<b>Social support</b>	-0.93/0.17***
<b>R<sup>2</sup></b>	0.41***

Note:  $\beta$  = standardized regression coefficient; SE = standard error; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*

$p < .001$

#### *EQ VAS Health score*

The third multiple linear regression analysis was conducted to examine the association between ACEs and self-reported health score,  $F(7, 197)$ ,  $p < 0.001$ ,  $R^2 = 0.12$ . ACE score was negatively associated with health score,  $B = -1.49$ ,  $p < 0.05$ . Annual income predicted an increase in health score,  $B = 10.3$ ,  $p < 0.01$ .

**Table F: Multiple Linear Regression of Covariates and ACEs Predicting Health Score (N=205)**

	<b><i>B/SE</i></b>
<b>ACE score</b>	-1.49/0.62*
<b>Age</b>	-0.19/0.13
<b>Gender (1=female 2=male)</b>	4.25/3.80
<b>Annual income</b>	10.34/3.54**
<b>Cannabis use</b>	-1.21/2.48
<b>Housing satisfaction</b>	-0.16/0.14
<b>Social support</b>	1.3/0.67
<b>R<sup>2</sup></b>	0.12***

Note:  $\beta$  = standardized regression coefficient; SE = standard error; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

*EQ-5D-5L Health profile Index value*

The fourth multiple linear regression analysis was conducted to examine the association between ACEs and the EQ-5D-5L health profile index value,  $F(7, 197)=6.62$ ,  $p < 0.001$ ,  $R^2 = 0.19$ . Higher ACE scores were negatively associated with the health profile index,  $B=-0.17$ ,  $p < 0.001$ . Annual income,  $B=0.072$ ,  $p < 0.05$ , and social support,  $B= 0.02$ ,  $p < 0.001$ , were positively associated with the health profile index value. An increase in cannabis use predicted a decrease in the health profile index value,  $B=-0.04$ ,  $p < 0.05$ .

**Table G: Multiple Linear Regression of Covariates and ACEs Predicting Health Profile Index Value (N=205)**

	<i><b><math>\beta</math>/SE</b></i>
<b>ACE score</b>	-0.17/0.1**
<b>Age</b>	-0.00/0.00
<b>Gender (1=female 2=male)</b>	0.02/0.31
<b>Annual income</b>	0.08/0.03**
<b>Cannabis use</b>	-0.04/0.02*
<b>Housing satisfaction</b>	-0.00/0.00**
<b>Social support</b>	0.02/0.01**
<b><math>R^2</math></b>	0.19***

Note:  $\beta$  = standardized regression coefficient; SE = standard error; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

All four main outcome variables were significantly associated with ACE scores, which provided evidence for rejecting my null hypothesis and accepting my alternative hypothesis. The next chapter elaborates on these findings and discusses them within the context of my study objectives and the literature.

## Chapter Six: Discussion

This study investigated the prevalence of ACEs in a sample of individuals on the waitlist for publicly subsidized housing in New Brunswick and assessed whether the presence of ACEs is associated with self-reported mental and physical health status. As hypothesized, descriptive statistics showed a relatively high mean of ACEs in the sample for both men and women. Multiple linear regressions were used to establish associations between ACEs and mental and physical health. These analyses identified that ACEs are associated with all dependent variables. These findings are consistent with the study's hypothesized outcomes.

The social and economic characteristics of the study sample (n=205) indicate that they experience a variety of vulnerabilities that influence health and well-being. The majority, 82.52%, of participants reported an annual income that is below New Brunswick's 2016 poverty threshold of \$20,890 (Gustajtis & Heisz, 2023). This finding is unanticipated, as in 2020, the total poverty rate in New Brunswick fell to 8.1% of residents (Statistics Canada, 2022b). However, assessments of poverty from the recent census iteration are based on income from 2020 when many low-to-moderate-income households had access to the Canada Emergency Response Benefit (CERB). Hence, recent poverty rate estimates do not likely represent actual needs, as CERB provided additional household income for many low-wage workers (Morissette, 2021). Unemployment rates were high (76.10%) in the study sample. Comparatively, the general unemployment rate in New Brunswick is 6.6%. This data confirmed the adverse economic life outcomes that the population sample experiences.

Interestingly, 49.76% of the present sample reported not drinking alcohol, and 68.78% reported never using cannabis. This is interesting as other studies find that housing-insecure populations (Johnson & Chamberlain, 2008; Fazel et al., 2008; Pan et al., 2020) and low-income populations (Baptiste-Roberts & Hossain, 2018) typically have high rates of substance use. This study's sample veered from these previous findings. This may be tied to the social-desirability effect, where participants may misrepresent substance use to avoid any negative appraisal (Groh et al., 2009). Further, as the sample population consists of low-income individuals, participants may not drink alcohol or consume cannabis because they cannot afford to purchase these substances. A follow-up qualitative study would be useful to explore substance consumption in greater depth.

This sample consisted of predominantly female participants (73.17%) which deviated from existing studies on ACEs and housing insecure populations (Liu et al., 2021). In NB Housing Study, households on the waitlist were contacted for participation and were asked to self-select a member of the household to participate. This was done to limit study representation of a household unit to one within the study (see Woodhall-Melnik et al., 2022). Participants were asked to self-select to enroll individuals who were more likely to want to participate actively in the study, hence limiting potential for study attrition due to lack of motivation to complete surveys. In their research on gender differences and motivation to participate in clinical trials, Lobato et al. (2014) found that females participants are more likely to be motivated by altruistic considerations (e.g., research participation benefits society at large) than men. In the NB Housing Study,

participants were offered a small \$10 gift card incentive and raffle entries, but they were also informed that their participation would not impact their ability to receive access to housing or their position on the housing waitlist. Thus, it is possible that more women from each household chose to participate because of their desire to help others.

Further, Canadian research finds that females experience the most severe housing need and that this demographic is often under-represented in populations that are counted as homeless and/or housing insecure (Schwan et al., 2020). This is attributed to the propensity of women to be in a state of hidden homelessness rather than being visibly homeless (Schwan et al., 2020). Hidden homelessness is understood as people temporarily residing with others without a long-term or assured commitment, or additional prospects of permanent housing (Statistics Canada, 2016). Schwan et al. (2020) find that hidden homelessness is prominent among women, as they are less likely to attend common shelters, drop-in spaces, or access homeless-specific services and they instead rely on relational support. These individuals are often harder to find in studies that work with housing insecure populations, as they are not visible and are therefore harder to count and include in research. However, this study specifically recruited housing wait list members who are often, although not always, housed. Therefore, finding more women in this population may be justified by the fact that women often experience more, yet less visible, housing precarity.

The average age reported is relatively high compared to other studies on ACEs in housing insecure Canadian populations (Edaliti et al., 2020; Patterson et al., 2014; Torchella et al., 2014). Research from the Canadian Mortgage and Housing Corporation

(2023) finds that housing instability, characterized by frequent moves, is most prevalent in the age group of 25-44. Further, homelessness research from Gaetz et al. (2016) finds that men in Canada aged 25-55 have the highest rate of reported homelessness and less than 4% of men experiencing homelessness are age 65 or older (Gaetz et al., 2016). This sample had a mean age that was slightly higher than the reported statistical range (57.96 for females, and 56.25 for males). However, research shows that the fastest growing population of shelter clients are those between the ages of 50 and 64 (Gaetz et al, 2016). Although, more recent research on age trends is not available. However, a “greying” of housing unaffordability may contribute to this study's older sample. Individuals who are retired often lived on fixed incomes consisting of any private pension contributions and the Canadian Pension Plan, where applicable, and Old Age Security and the Guaranteed Income Supplement (Statistics Canada, 2010). These programs are often critiqued for not providing sufficient incomes on which individuals and households can live (Statistics Canada, 2010) and may render retired households and individuals in greater need of access to subsidized housing. Lastly, New Brunswick’s mean population age is higher than the average age in Canada (Statistics Canada, 2019). This may mean that the older age in this study is shaped by the overall demographics of the province. Considering that this study’s participant characteristics consist of mostly older housing-insecure adults who identify as female, the literature, the findings, and the interpretation of findings may be more applicable to this demographic group

## **ACEs**

The data supported my hypothesis that there was a significant number of respondents who had experienced at least one ACE. In the sample, 86.34% of participants reported at least 1 ACE. Commonly, the categorization of four or more ACEs is associated with poor physical health outcomes (Brown et al., 2009; Felitti et al., 1998; Webster. 2022). In the present study, 48.78% of respondents reported having 4 or more ACEs, which is substantially higher than what is reported by Joshi et al. (2021) in their cross-sectional analysis of Canadian individuals aged 45-85 years which finds that 61.6% of participants have at least 1 ACE, and 13.4% of females, and 8.2% of men report four or more ACEs. Other studies highlight emotional abuse as one of the most common ACEs, while familial incarceration is among the least prevalent (Giano et al., 2020; Soares et al., 2016). The sample in this study reflected these patterns, with familial incarceration being the least prevalent ACE (19.12%) and emotional abuse being the most prevalent (52.97%). There were only slight differences ( $p < 0.1$ ) between genders for ACE item three and ACE item six. Item three referred to sexual abuse as a child and significantly more females (41.73%) experienced this than males (29.03%). This is consistent with the literature that reports that females experience higher rates of sexual abuse (Finkelhor et al., 2014; Pinto et al., 2014). Item six asked whether the respondents' parents were separated or divorced. More males (50.79%) than females (37.41%) reported having this ACE. Existing literature on ACEs finds no explanation for gender differences in parental divorce; though, in a Canadian national study, the prevalence is similar between genders with 9.9% females and 10.3% of males reporting parental divorce (Joshi et al., 2021).

Little research has been done on how each individual ACE may influence health outcomes. However, another Canadian study focuses specifically on sexual and physical abuse and exposure to intimate partner violence in association with multiple co-morbidities in adults. In this study, England-Mason et al. (2018) find that the prevalence of mental health and chronic physical health conditions varies based on the ACE(s) experienced. For example, sexual abuse is found to have the strongest association with physical and mental health (England-Mason et al., 2018). This raises the question as to how each ACE influences adult mental and physical health outcomes, and to what extent. Future research should consider how individual ACEs uniquely influence health outcomes later in life, and the influence that potential associated mediators have on these interactions.

### **Mental Health and ACEs**

My research found an association between mental health and ACEs in individuals who are waiting for access to subsidized housing. In other words, increases in ACE scores were associated with increased depression and mental distress. These findings are consistent with previous research that finds a dose-dependent relationship between ACEs and the presence of poor mental health (Felitti et al., 1998; Merrick et al., 2017; Tan & Mao, 2023). My study confirmed this dose-dependent relationship in individuals waiting for subsidized housing in New Brunswick.

### *Psychological distress*

Mental distress was assessed using the Kessler Psychological Distress Scale (K-6). The standard cut-off score for individuals expressing serious psychological distress (defined as those with a high likelihood of possessing a severe enough mental illness that results in functional limitations and use of potential treatment), is 13 (Kim et al., 2015). In this study, the mean K-6 was 9.82, a much higher score than portrayed in previous studies in the general population. For example, a study looking at the U.S. National Health Interview Survey over 20 years, finds the average K-6 score to be 2.5, with an exponential decrease in psychological distress over time in the population (Tomitaka et al., 2019). As such, the mean K-6 score in this study highlights the severity of mental distress among the sample. Likewise, the study findings indicate that there is an association between childhood trauma and the mental distress score of the participants. A previous study which also tests the relationship between ACEs and anxiety using the Kessler 10 psychological distress scale (K10), with a comparable sample size (n=330), finds that ACEs are associated with anxiety in post-secondary students (Agbaje et al., 2021). While the current study uses an abbreviated version of the Kessler 10 psychological distress scale (K-6), Agjbae et al. (202) also find significant associations between ACEs and the K-10 score. Interestingly, 42.9% of respondents report living with someone mentally unstable during their childhood. Individuals who grow up in households with family members who have mental health concerns are more likely to experience mental health concerns, including anxiety, in adulthood (Brummelhuist et al., 2022). Although there are genetic bases for many mental health conditions, environmental exposure and caregiver socialization are related to mental

health (Munsell et al., 2013; Dahal et al., 2018). In addition to increased risk of poor mental health, being raised in a household with adults with mental health challenges is also associated with other challenges in adulthood, such as experiencing financial problems, which further exacerbates experiences of psychological distress (Brummelhuist et al., 2022). This was confirmed in the present study, wherein the participants experience low income and poverty, along with a relatively high mean ACE score, and poor mental health.

### *Depression*

As noted above, this study assessed depression as a measurement of mental health using the Center for Epidemiologic Studies Depression Scale (CESD-10). The CESD-10 has a specified standard cut-off score of 10 for depression. This study's sample had a mean score of 14.52, which is indicative of significant depressive symptoms (Zhang et al., 2012). A study of Montreal residents, conducted by Bassett and Moore (2013), that also uses the CESD-10 finds a general prevalence of 17.3% for clinical depression. The present study's sample experiences a much higher incidence of depression than Bassett and Moore's sample of adults in Montreal. As age, income, social support, cannabis use, housing satisfaction, and mental and physical health, correlate with CESD-10 scores in our study, our findings suggested that the high incidence of depression in our study can be partially explained by these factors.

The findings of the present study showed that ACE scores are associated with depression, which is indicated by an increase in ACE scores correlating with an increase

in depressive symptomology scores. A study by Li et al. (2022) uses the CESD-10 in a longitudinal cohort study to assess the associations between ACE scores and depression. They find that groups with higher ACE scores displayed higher risk of incident depressive symptoms than those with fewer ACEs. This supports the theory that ACEs have a considerable influence on the development of depression in adulthood. In comparison, Giovanelli et al. (2016) examine the association between ACEs and adult well-being in a low-income cohort. Using odds ratios, the data shows an increased risk for depression, with the odds ratio being around 3 times higher than portrayed in this study's data; further exemplifying the effect of ACEs on economic outcomes, as well as mental health in adulthood.

#### *Mental health: Connections to theoretical frameworks*

The social determinants of health (SDOH) provide an understanding of how life opportunities, interactions, and experiences influence mental health (Scott-Storey et al., 2022). These determinants impact every aspect of our environment, and thus, individual living circumstances (Moore et al., 2015). Considering the current study population and considering that income and housing are fundamental determinants of health (Hu et al., 2022; Krieger & Higgins, 2022), it is important to also note that housing insecurity and income are related to other concerns, such as food insecurity and unemployment, which are also social determinants of health (Carrere et al., 2022). This can produce a rippling effect, wherein one determinant, such as lack of income, can affect others, such as food security, creating a form of chronic distress, which further results in adverse mental

health outcomes (Carter et al., 2022). In individuals with ACEs, this rippling effect is similar, as those who experience ACEs, are found to have had a higher likelihood of toxic stress in childhood, resulting in the development of anxiety symptoms as an adult (Hughes et al., 2017). This is observed in the present study. Individuals with low income, who are also unaffordably housed or unhoused, experience a high prevalence of ACEs in childhood. As adults, they experience significant distress and depression, alongside poor health. Hence, this study's findings corroborate the findings of other studies (Carter et al., 2022, Rolfe et al., 2020; Hughes et al., 2017), in that children who experienced adversities, including potential negative social determinants, often have poorer life course outcomes, as well as poorer health as adults.

The framework of the SDOH includes the concept of the social gradient. The lower social gradient groups--such as low-income and housing-insecure populations--(Ellina et al., 2021; Rolfe et al., 2020), have limited access to services, resources, and life opportunities, which can lead to worsened mental health outcomes over time (Alegria et al., 2018; Kosteniuk & Dickinson, 2003). The association may be attributed to social status influencing the accumulation of poor SDOH, creating stressful circumstances, such as lack of transportation, food insecurity, and inadequate housing and/or housing conditions (Alegria et al., 2018; Allen et al., 2014). Likewise, the potentially precarious conditions that comprise one's life, including adverse SDOH, are connected to greater rates of depression and anxiety (Prokosch et al., 2022; Yang et al., 2022). As the majority of this study's sample reported living in poverty, and many also reported experiencing distress and depressive symptoms, the concept of the social gradient and health holds

true. As seen in the findings, a correlation exists between income and depression and mental distress: as income decreases, depression, and mental distress increase. The correlation matrix also showed a positively correlated relationship between housing satisfaction, depression, and mental distress. This means that as housing dissatisfaction increases, so would depressive symptomology and mental distress. Indicating that in this sample, lower income and higher housing dissatisfaction may be predictive of poor mental health.

### **Physical Health and ACEs**

The hypothesis that ACE scores would predict a decrease in self-reported physical health was supported. The data indicated that an increase in ACE scores was associated with decreased self-reported overall health scores and health profile index scores. This is consistent with past work that links ACEs to poor self-reported health (Monnat & Chandler, 2015; Son, 2016).

#### *Health Profile index value*

Self-reported physical health was assessed using the EQ-5D-5L calculated health profile index value. The mean EQ-5D-5L value in this study's sample was 0.65. Considering Canada's preferred value set, created by Xie et al. (2016), ranges from - 0.148 (being considered the worst level of health) to 0.949 (the best level of health), this value is above the intermediate health status. However, compared to general population norms in Canada, this score is extremely low. According to a Quebec study

assessing the population's EQ-5D-5L index value, the mean is 0.82. However, the mean score for individuals who report having a similar income as the mean of our sample (\$14,486.5) is 0.67. The study also shows that those with incomes greater than \$55,000 (none of this study's participants had an income equivalent to this), report a mean index value of 0.85 (Poder et al., 2020). This shows a clear pattern between low income and poor physical health.

My findings also indicated an association between ACEs and the EQ-5D-5L index value. Those with higher ACE scores have a predicted decrease in health index scores; supporting the idea that ACEs also influence physical health outcomes later in life (Monnat & Chandler, 2015). No previous studies assessing ACEs and physical health using the EQ-5D-5L index value could be found, but this study's findings are similar to previous ones that link ACEs to poor health profiles (Karatekin et al., 2018; Mersky et al., 2014).

### *Self-rated Health score*

This study used the EQ-VAS self-reported health score as a dimension of physical health. The EQ-VAS has a range of 0-100, where 0 is the worst health you can imagine, and 100 is the best health you can imagine. The current study's sample had a mean health score of 58.42. In comparison with the general population in a Canadian province, this score is particularly low. A study by Poder et al. (2019), finds the mean health score to be 75.9. Similarly, another Canadian study using a sample from the general population across several provinces report the mean health score to be 82.3;

notably, those with higher annual household incomes had significantly higher scores (Yan et al., 2023). Regarding ACEs and health scores, one increase in ACE score predicted a 1.49 decrease in self-rated health score and a -0.79 decrease in the EQ-VAS index value. Thus, the data showed that a higher ACE score is associated with a lower self-rated health score, further supporting the hypothesis and existing evidence tied to ACEs as a predictor of poorer health scores (Huang et al., 2020; Krinner et al., 2020).

#### *Physical health: Connection to theoretical frameworks*

Through analyzing survey data from a sample of low-income, housing-insecure individuals, this study found relatively low reported physical health. As housing is a SDOH itself (Rolfe et al., 2020), and the means for housing dissatisfaction scores were high, an association can be made between housing environments and physical health outcomes, specifically between housing satisfaction and the health profile index value ( $p < 0.001$ ). Literature shows that the impact of housing on poor physical health may be due to tangible housing defects including toxins in the home, temperatures, overcrowding, and safety factors (Rolfe et al., 2020). The effects of the non-tangible or psychosocial aspects of housing on physical health, are more complex and are less cited (Rolfe et al., 2020). Further, previous research identifies strong links between housing insecurity and poor self-rated health and health conditions (Bhat et al., 2022). This may be attributed to individuals facing increased stress levels that affect physiological aspects and/or health behaviours and result in poor physical health (Bhat et al., 2022).

The associations found between ACEs and both physical health dimensions (EQ-VAS and EQ-5D-5L index value) can be described by the interaction and/or interplay between childhood experiences, adult social determinants, and the long-term consequences of ACEs (Monnat & Chandler, 2015). The mechanisms that link ACEs and adult health are multifaceted and complex. For instance, children who have experienced ACEs may expect social and economic consequences as an adult. A study by Currie & Widom (2010) finds that adults who report childhood abuse and/or neglect have less educational attainment, employment, and earnings as adults when compared to the control group. Such economic disadvantages, which are most prevalent among individuals with ACEs, can contribute to inferior health outcomes (Monnat & Chandler, 2015). This is seen in this study's sample as the data showed a positive correlation between low income and physical health. Also, lower income was correlated with a decrease in both measures of physical health. Research also identifies links between ACEs and health-risk behaviours, and/or maladaptive coping mechanisms. Compared to those who did not experience adversities during childhood, individuals with ACEs possess greater stress levels as adults (Mosley-Johnson et al., 2021). These individuals are more likely to engage with coping mechanisms that are associated with psychological problems may lead the individual to adopt risky behaviours such as smoking, drug abuse, poor diet, and unsafe sexual behaviours which, further contribute to reduced adult health (Monnat & Chandler, 2015). This study's data supported the observation through cannabis use, but not through alcohol consumption. Cannabis is seen as a predictor for a lower health profile index value; whereas, as cannabis use

increased, the index value decreased. High and/or frequent alcohol consumption is also expected to be a common predictor for poor physical health (Gomez et al., 2023). However, this sample's data reported a low level of alcohol use. As well, there was no found correlation between alcohol and the health profile index value, or self-rated health score. Future research should assess varying health-risk behaviours and their associations to adult health and well-being.

ACEs may also become biologically embedded during the critical period of development for children (Monnat & Chandler, 2015; Berens et al., 2017). Research identifies a relationship between childhood adversities and developmental pathways that shape who we are as adults, particularly, the experiences of chronic stress during the highly sensitive periods of a child's development (Soares et al., 2021). Direct physiological disruptions of stress-responsive regulatory pathways can lead to disease onset later in life. As stress systems are increasingly activated, a cascade of physiological processes occurs, which accelerates the development of chronic disease (Soares et al., 2021). This study retrospectively analyzed the presence of reported ACEs and the associations with the participants' self-reported adult health. Future research should consider examining longitudinal childhood development at a biological level to determine specific biomarkers and regulatory pathways that may result in poor adult health.

## **Chapter Seven: Concluding Chapter**

Childhood is a period of life that has major implications on future life and health outcomes. Considering the vast connections between ACEs and social and economic outcomes, employment, education, housing, income, and adult mental and physical well-being, these links should be considered a vital determinant of health and a public health priority (Walsh et al., 2019; Felitti et al., 2002). Early interventions that target early childhood origins of population-level health disparities (e.g., social policies such as family, welfare, education, and housing policies) could be a viable strategy to reduce future disparities, considering that ACEs may subject children to disadvantaged health and socioeconomic life-course trajectories (Monnat & Chandler, 2015; Jones et al., 2019). This chapter provides recommendations that emerge from my work, literature review, and discusses initiatives in New Brunswick that are presently operating to limit ACEs. This is followed by a discussion of study limitations and a review of my knowledge dissemination plan.

### **Recommendations**

It is important to note that since the current study assesses the mental and physical health experiences in a sample of housing insecure individuals in New Brunswick, recommendations will be tailored to the specific population. As stated throughout this study, ACEs are forms of traumatic experiences that a child might endure. As such, it is imperative to highlight that ACEs and the potentially traumatic events that cause them are preventable (Anderson et al., 2022). An avenue that can

support healthy development for children and potentially diminish the risk of negative life and health outcomes includes introducing positive childhood experiences (PCEs). PCEs are advantageous childhood experiences, or counter-ACEs (Daines et al., 2021). To help children learn, develop, and thrive, PCEs incorporate nurturing, safe, and stable environments. PCEs can have a direct influence on positive well-being, and possibly alleviate the health effects of ACEs (Anderson et al., 2022). As such, upstream preventative measures may aid as effective interventions.

The *Early Years 2 Study* in Canada offered convincing evidence that supports integrated childhood development programs to improve outcomes for children (McCain et al., 2007). As such, using the evidence from the *Early Years 2 Study* and collecting insights and ideas from fellow New Brunswickers, the Government of New Brunswick (2008) created *Be Ready for Success- A 10-year Early Childhood Strategy for New Brunswick* in June 2008. The strategy incorporates targeted initiatives to support young children, including seven commitments and 39 action items. This strategy announced investments to establish four new early-childhood development centres, hire more early-learning specialists, enhance support for at-risk children, and implement French and English early-learning and child-care curricula in regulated childcare facilities (Council of Ministers of Education, n.d.). This strategy is currently being revised by Social Development and a new set of recommendations should be released in 2024.

Further, the Department of Health's Addiction and Mental Health Services released the *New Brunswick Youth Engagement Initiative* in February of 2009, to incorporate community-based activities that contribute to the development of

protective and/or preventative factors in attempt to minimize problems, increase resiliency, and grow positive mental health among youth (Government of New Brunswick, 2008). The strategy includes fostering connectedness among youth, their families, and the community. A notable strategy mentioned in the initiative incorporates youth-led, adult-supported discussions to produce relevant community action aimed at creating safer and healthier environments (Government of New Brunswick, 2008). Morris et al. (2011) suggest that it takes an average of 17 years for research evidence to reach practice. As such, while there has yet to be an official updated report on the progress of the above initiatives, accountability should be maintained to ensure that support and action-based efforts are enhanced for children so the creation of positive childhood experiences can continue to emerge.

As portrayed in this study, as well as in an array of previous literature, adults with reported ACEs often suffer from poor social, economic, and health-related disadvantages. In this population sample, ACEs are correlated with housing insecurity and poverty in adulthood. Likewise, current efforts should incorporate programs that create PCEs for people with experienced trauma and increase support for accessing adequate housing for people with trauma, and/or for those actively experiencing poverty. Recently, New Brunswick released an action plan under the *National Housing Strategy* (Government of New Brunswick, 2018). These initiatives have a target year of 2027-2028 intending to address housing needs in over 15,000 households by using a Housing First approach to respond to chronic and episodic homelessness (see Woodhall-Melnik & Dunn, 2016 for an explanation of this approach), increasing publicly subsidized

housing supply, and repairing existing subsidized housing units. The target for the first year included providing almost 1,500 homes to individuals in need.

The findings of my study indicate that New Brunswick should also consider adopting a trauma-informed approach (Substance Abuse and Mental Health Services Administration, 2022) to housing accessibility, and aim to incorporate a Rapid Re-Housing initiative (RHI) for those in need. The RHI launched in 2020 for Canadians, with plans to quickly develop 3,000 permanent, new, and affordable housing units. The RHI is a part of the plan to support economic recovery and eliminate chronic homelessness in Canada. (Canadian Mortgage and Housing Cooperation, 2023). Funding is currently provided in the Saint John region, though other areas of New Brunswick are not included in the plan.

As adult health is largely shaped by various social determinants, toxic stress, and trauma in childhood (Braveman et al., 2014; Franke et al., 2014), social pediatric programs, which integrate the disciplines of medicine and sociology to comprehensively understand disease, may be extremely beneficial to long-term individual and population health. Currently, the NB social pediatrics program utilizes research initiatives to create and subsequently assess child and familial programs that are designed to provide positive childhood experiences and alleviate potential childhood adversities (New Brunswick Social Pediatrics, 2023). The programs offer community pediatric clinics for children and their families to use their voices to discuss socioeconomic barriers to health, and other barriers they experience that influence their access to care. Saint John also has the parent-child assistance program (PCAP) and New Brunswickers have access

to the Strengthening Families program. PCAP incorporates advocacy for birthing people who use substances and offers a three-year paired advocate to assist in navigating complex systems (e.g., accessing and utilizing community resources) and build the patient's autonomy. The strengthening family's program is centred around parents and children who are at risk for substance use; providing family skill training to create positive familial relationships and decrease health risk-behaviours (NB Social Pediatrics, 2023). Also, initiatives such as Saint John's *Self-Healing Community Model* (SHCM) should continue to operate and expand in other areas of New Brunswick. The SHCM is an evidence-based model that has been proven to decrease ACE prevalence and associated impacts across generations. Through affordable changes surrounding community engagement, such as hosting workshops on healthcare, early childhood interventions, schools, research, and non-profits, the SHCM aims to reduce problems related to economic issues, as well as mental and physical health outcomes (Connors, 2020). By using data to decide where and how to focus efforts, the SHCM empowers and nurtures local leaders to think about whole systems, not just their part. In addition to building community capacity, the model generates new cultural norms that reflect the values and aspirations of community members.

### **Study Limitations**

This study, although valuable and significant, possessed some limitations. The survey data collection on ACEs and physical and mental health entailed self-reports from participants. The assumption then was made that participants are honest and

forthcoming with responses and/or provided information and that they entirely understand each question and the implication of their responses. For instance, response bias is widely discussed in behavioural and health-related research studies when self-reported data is used (Rossman et al., 2011). A form of this is social-desirability bias. Data collection using surveys or questionnaires may involve asking private or sensitive questions--such as the ACE questionnaire, the K-6, or the CESD-10. Considering this, participants may want to be looked on favourably, be socially desirable, and/or approved of, which would influence their responses. This phenomenon is particularly applicable when anonymity cannot be assured at the point of collection. Areas where social desirability could influence the results of this study include determining drug or alcohol use and the presence of ACEs; the analyzed results could underestimate the true usage, or prevalence of ACEs in the participants (Althubaiti, 2016). Measures were taken to reduce bias including adequate research assistant training on the study's purpose the confidentiality of the responses, and how to compassionately respond to and actively listen to participants when conducting a survey. Online surveys were also provided which can increase feelings of anonymity. Following each completed survey, each participant was thanked with a personalized message along with a gift card. Participants noted that the personalized messages made them feel valued and heard which increased their trust in the research process and the researchers. While this study utilizes self-reported ACEs and associated health and well-being, future studies may control for response biases according to the variables being analyzed (i.e., when testing for substance use, alternate data collection methods such as laboratory measurements

could be used or assessing mental and physical health through medical records) (Althubaiti, 2016).

This study utilized a sample from the population of individuals who are on the waitlist for public subsidized housing in New Brunswick. The sample size consisted of 205 adults. At the time recruitment occurred for this study the sample population was 505. Some of these participants moved into our intervention group and their ACE surveys will be ready for use in 2024; however, we did experience attrition and non-response on the outcome variables which contributed to a small sample size. Further, since 2021, the population of those who were on the waitlist in New Brunswick has increased. Thus, generalizability to the full population may not be entirely applicable. To account for this bias, future studies could utilize a larger sample size to analyze the prevalence of ACEs and the associated mental and physical health outcomes in low-income and housing-insecure populations in New Brunswick. Also, most of the sample consisted of white respondents, and respondents with binary genders (male or female), so additional research should consider the impact of ACEs on differing racial/ethnic groups and ensure that these groups are accurately represented.

The ACE questionnaire used in this study is derived from the original ACEs study conducted in 1998 (Felitti et al., 1998). While this remains the most current scale for measuring childhood adversities, it is dated and may not include all the factors that are experienced as traumatic by modern children and their families. Further, the sample on which the scale was built is largely white and middle-classed, which means that the original questions may not account for the myriad of true adversities that today children

face. This can include racial trauma, gender and sexuality-based trauma, poverty, immigration, war trauma, and pandemics. However, as the present sample consisted of current adults, their childhood experiences may be adequately captured by a tool that was designed to measure experiences in the 1990s. Further, our study sample was largely white, and this reflects the racial composition of New Brunswick, which is slowly becoming more racially diverse (Statistics Canada, 2023a). It is not likely, however, that all of our participants grew up in middle-class homes and the development of a tool that focuses on generational poverty or experiences of poverty in childhood as direct ACEs would have been useful for this study. Refined tools may emerge that assess additional complexities experienced by the population. However, at present, the only tool that exists is Felitti et al.'s (1998) scale. I advocate for an updated version of this measure to capture the diverse realities of children today.

### **Dissemination**

Findings from this study will be disseminated to key stakeholders in hopes of creating policies and interventions to alleviate the effects of trauma on mental and physical wellness. The current ongoing study is a branch of the NB Housing Study. This study will conclude in the Spring of 2025 and the findings will be shared with interested study participants. A mid-term report will be sent to participants along with a thank you letter once the intervention group has closed for new participants in Fall 2023. Participants will be mailed or emailed--according to their stated preference--informing them that significant results have been found and providing them with the option of

viewing those results. Once the NB housing study is finalized, a team of researchers will be travelling through the province to host informative workshops highlighting the study findings, their significance, and future recommendations and plans. This thesis will be condensed and made available for discussion in the workshops. While knowledge dissemination is only a preliminary measure, it is important to provide information to study participants to allow them to gain a comprehensive understanding of their childhood experiences and the associated potential implications that these experiences may have had on their future social, economic, and health-related outcomes. This step is particularly valuable as education and awareness can empower affected individuals and motivate them to seek available support (Domingo et al., 2023).

The NB housing study is conducted in partnership with the Department of Social Development. As such, when this thesis concludes, the study's findings will be summarized and provided to the Department of Social Development. This process will help inform the department of the prevalence of ACEs in the population and emphasize the critical importance of the associations between ACEs and adult mental and physical health. This wealth of information may assist the department in determining which services and supports need to be provided to individuals who are waiting for and receive access to subsidized housing in New Brunswick. Considering the implications of ACEs, the department should also consider current child welfare policies and identify any potential changes and/or additions that might assist in the life outcomes of the population. My supervisor will facilitate contact between myself and a team member working on the new Child and Youth Strategy for New Brunswick (expected release date

in late 2023) to provide them with the findings from this research. Further, HOME-RL's contacts with NB Housing Corporation and the Department of Social Development's Child Welfare branch will be contacted to ensure that the findings from this thesis are available for them as they make decisions on policy and programs. See Appendix B for a summary report that will be distributed to these stakeholders.

NB Social Pediatrics uses a community-centred approach to improve care for children and families. By using evidence-based research findings and methods, the NB Social Pediatrics team aims to enhance long-term mental and physical health outcomes for children and families who experience socioeconomic and health disparities. As such, the findings from the current study will be presented to the head of the Social Pediatrics team, Dr. Sarah Gander. These findings can assist the team with knowledge of ACEs and the health implications related to a focused population of housing-insecure individuals in New Brunswick. Using this study's significant findings, the team may incorporate housing insecurity as a prominent determinant in assessing and formulating target programs and initiatives.

This study assessed participants' ACEs and self-reported mental and physical health status. While the results were informative and meaningful, further research could enhance the significance of these results by assessing mental and physical health outcomes and associated healthcare use for participants. Using administrative data on healthcare use and diagnoses, we can gain a better understanding of how these individuals interact with the health system and avoid potential errors related to self-reports of health status. The NB housing study, in coordination with the New Brunswick

Institute of Data Research and Training (NB-IRDT), has successfully linked administrative data with the healthcare records, or the Discharge Abstract Data (DAD), of the study's participants. Located in a secured and restricted Research Data Center, the NB-IRDT provides researchers with deidentified data on health, education, social services, and employment (UNB, 2022). With the participants received consent, the names, and dates of birth of the survey respondents have been linked to their matching records in the NB-IRDT database. As such, additional analyses will take place to measure the relationship between the participant's ACEs and healthcare utilization and diagnoses. By using the real-value amount of healthcare use via the study's participants, a more comprehensive and valuable picture can be painted to show patterns and associations within the population.

## **Conclusion**

This study increases the understanding of ACEs and how they influence later life outcomes. Through survey-based data collection, an association is found between ACEs and adult mental and physical health status for individuals who are on the waitlist for subsidized housing in New Brunswick. Along with the concerning high average ACE score, the presence of depressive symptomology and psychological distress is high in this sample, and self-reported physical health is low. These findings indicate the need for investment in programs and initiatives to support and create positive experiences for individuals who have experienced trauma. Also, support systems such as housing benefits and/or financial assistance, supportive housing programs, and shelter

enhancements should be provided for vulnerable populations in need of housing. Future work with the data from my study may investigate the contribution of each unique ACE to health outcomes. This would provide specific direction on which ACEs to attempt to prevent first. Although good interventions should aim to unilaterally decrease all ACEs. Upstream, evidence-based interventions that create nurturing environments for children and a supportive future for adults who have been impacted by trauma be available for all households in New Brunswick.

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## Appendix A

### Adverse Childhood Experiences Questionnaire

When you were growing up, during the first 18 years of life:

1. Did a parent or other adult in the household often swear at you, insult you, put you down, or humiliate you OR act in any way that made you afraid that you might be physically hurt?
2. Did a parent or other adult in the household often push, grab, slap, or throw something at you OR ever hit you so hard that you had marks or ever injured?
3. Did an adult person at least five years older than you ever touch or fondle you or have you touch their body in a sexual way OR try to or actually have oral, anal, or vaginal sex with you?
4. Did you often feel that no one in your family loved you or thought you were important or special OR your family didn't look out for each other, feel close to each other, or support each other?
5. Did you often feel that you didn't have enough to eat, had to wear dirty clothes, and had no one to protect you OR your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
6. Were your parents ever separated or divorced?
7. Was your mother or stepmother often pushed, grabbed, slapped, or had something thrown at her OR sometimes or often kicked, bitten, hit with a fist, or hit with something hard? OR ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
8. Did you live with anyone who was a problem drinker or alcoholic OR who used street drugs?
9. Was a household member depressed or mentally ill or did a household member attempt suicide?
10. Did a household member go to prison?

Response to each ACE item will be recorded as a yes or no. This modified Felitti et al.'s (1998) questionnaire includes three expanded questions about household dysfunction (family support, separation, and divorce) with the same yes/no response option.

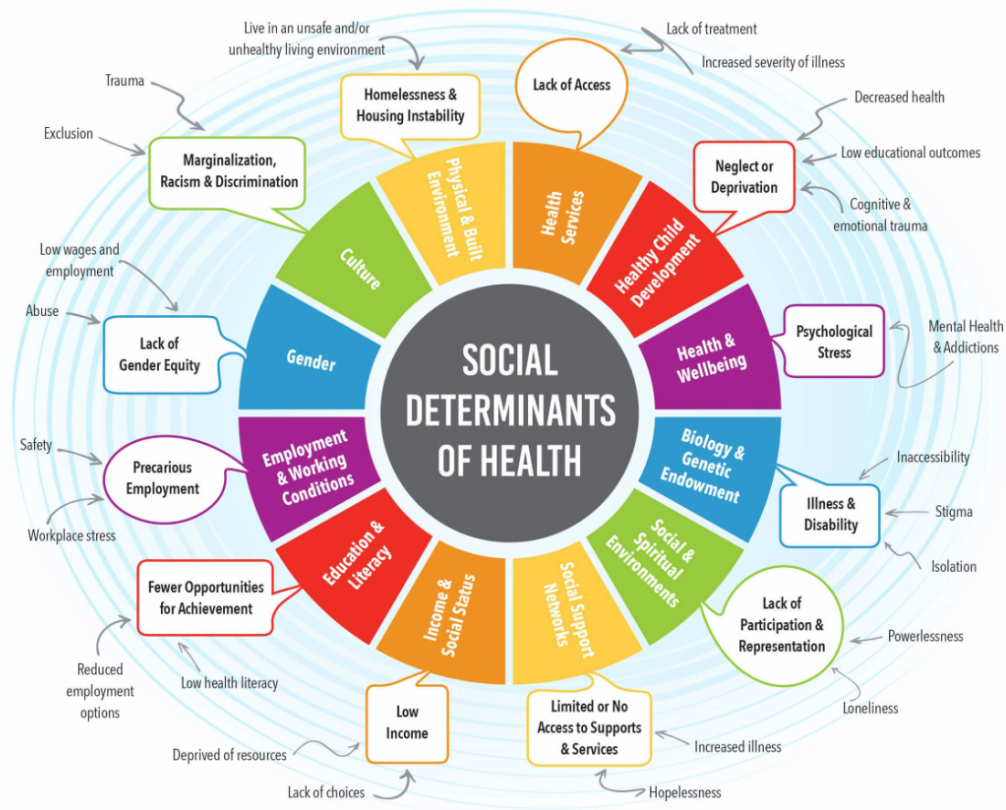
## Appendix B

### Summary Infographic for Stakeholders



## Appendix C

### The Social Determinants of Health



## Curriculum Vitae

**Candidates Name:** Julia Pappas

### **Universities Attended:**

St. Francis Xavier University – Bachelor of Health Sciences. (2017-2021)

University of New Brunswick – Master of Applied Health Services Research. (2021-Ongoing)

### **Publications:**

Woodhall-Melnik, J., Dunn, J.R., Dweik, I. *et al.* NB housing study protocol: investigating the relationship between subsidized housing, mental health, physical health and healthcare use in New Brunswick, Canada. *BMC Public Health* **22**, 2448 (2022).

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