The Effects of Economic Conditions on Adolescents' Mental Health; Evidence from Canada

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Abstract

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The relationship between socioeconomic factors and mental health has garnered significant attention, revealing complex connections between economic conditions and psychological well-being. This paper studies the impact of family economic conditions on the mental health of Canadian adolescents using data from the 2017-2018 wave of the Canadian Community Health Survey. To analyze this relationship, a latent variable indicative of economic conditions is created from several indicators of households' living standard. This latent variable, along with demographic and behavioral factors, is used in an ordinal logistic regression model to evaluate its effect on mental health outcomes. The findings highlight that older adolescents and females experience notably worse mental health. Behaviors such as smoking and alcohol consumption, negatively impact mental well-being, while physical activity is positively associated. Although economic factors significantly influence mental health, they are not the primary determinants of mental well-being among Canadian adolescents.

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1 Introduction

The relationship between socioeconomic factors and individual well-being has been extensively explored, revealing significant impacts on overall health. Research by Fryers et al. (2005), Weyers et al. (2010), and Senn, Walsh, and Carey (2014) highlights how income, education, and employment status are interconnected with physical and mental health outcomes. For instance, Fryers et al. (2005) demonstrate a positive correlation in Europe between lower socioeconomic status and increased frequencies of mental disorders such as depression and anxiety. Similarly, Weyers et al. (2010) find that in Germany, adverse social environments and socioeconomic conditions contribute to negative health behaviors like smoking, physical inactivity, and poor diet. In the United States, Senn, Walsh, and Carey (2014) observe that both individual and neighborhood-level socioeconomic disadvantages adversely affect perceived health and stress levels among adults.

Beyond long-term socioeconomic influences, sudden financial changes also affect well-being. McInerney, Mellor, and Nicholas (2013) and Apouey and Clark (2015) investigate the effects of rapid wealth fluctuations in the U.S. and U.K., respectively. The 2008 recession, as examined by McInerney, Mellor, and Nicholas (2013), led to a sharp decline in mental health among U.S. adults due to sudden wealth loss. Conversely, Apouey and Clark (2015) find that lottery winners in Britain experienced improvements in mental health, illustrating the potential positive effects of sudden financial gains.

While many studies have focused on adults, it is important to recognize the potential influence of socioeconomic circumstances on children and adolescents. Reiss (2013) conducts a systematic review of studies primarily from North America, Europe, and Australia, concluding that there is a strong inverse relationship between socioeconomic status (SES) and mental health, with socioeconomically disadvantaged children and adolescents being two to three times more likely to develop mental health problems. Elgar et al. (2015) study school-aged children in 34 North American and European countries and find that rising income inequality is linked to poorer overall health and greater health disparities among adolescents. Golberstein, Gonzales, and Meara (2019) investigate the effects of economic conditions, measured by unemployment rates and housing price index, on children aged 4-17 in the U.S., concluding that worsening economic conditions, such as higher unemployment rates and lower housing prices, are significantly associated with deteriorating mental health.

Additionally, Reiss et al. (2019) examine German children aged 7-17 years and the association between SES indicators, such as household income, parental education, and parental unemployment, with the number of stressful life situations and parent-reported mental health problems. They find that children with higher educated parents show fewer mental health

problems in stressful life situations.

The relationship between socio-economic factors and mental health has been extensively explored on a global scale. However, there remains a significant gap in such analyses within the Canadian context. While studies like that of Vanzella-Yang and Veenstra (2021) have begun to uncover the causal relationships between socio-economic resources and mental health among Canadian adults, demonstrating that higher educational attainment can significantly reduce psychological distress, much remains to be explored, especially among younger demographics. Similarly, the study by Guhn et al. (2020) in British Columbia has shown that children from lower-income quintiles face increasingly severe mental health challenges.

This study aims to bridge this gap by examining how different levels of household's economic conditions affect the perceived mental health of Canadian adolescents, using data from the 2017-2018 wave of the Canadian Community Health Survey (CCHS). The paper examines critical variables such as age, gender, province of residence, and highest household education level—a recognized proxy for socio-economic status. The relevance of educational attainment has been highlighted in other Canadian studies which investigates its relationship with health outcomes such as injuries (Mo et al. 2006) and chronic depression prevalence (Satyanarayana et al. 2009).

Additionally, this paper constructs a latent variable representing economic conditions, integrating indicators like household income distribution, main income sources, food security, and dwelling ownership. In addition, lifestyle factors such as smoking, alcohol consumption, and physical activity levels are considered, building on findings from previous research (Mo et al. 2006) that emphasises their significant impacts on health outcomes.

Employing ordered logistic regression to analyze the effects of these variables on perceived mental health, findings indicate that older youth and females report lower levels of mental health. Lifestyle choices such as smoking and alcohol consumption negatively affect mental well-being, while physical activity appears beneficial. Also, improved economic conditions are weakly linked to better mental health outcomes among adolescents.

Focusing on children and adolescents in research on the impact of economic conditions on mental health offers a significant advantage due to the exogenous nature of these influences. Unlike adults, where the relationship between economic circumstances and mental health can be endogenous. For adults, mental health issues can negatively impact their economic status by reducing productivity or leading to other complications associated with mental disorders. This can, in turn, intensify their economic difficulties, creating a feedback loop where poor mental health and economic struggles reinforce each other. While children and adolescents are typically not income earners and are thus less likely to directly influence the economic conditions of their households. This makes their situation ideal for studying

the pure effects of economic conditions on mental health. Consequently, examining these dynamics in children can provide clearer insights into how socio-economic factors shape mental health outcomes, free from the mutual impacts that complicate adult studies. This distinct approach enhances the understanding of the basic effects of economic conditions on mental well-being and can inform more targeted and effective interventions.

This paper is organized as follows: In section 2 the existing literature, highlighting the importance of studying mental health and its ties to economic contexts is reviewed. Section 3 and 4 discuss the data used and research methodology. Section 5 presents and discusses results, and finally section 6 summarizes the paper, addresses limitations, and suggests paths for future research.

2 Literature Review

The interplay between socioeconomic factors and mental health is a topic of growing interest, with research shedding light on the intricate connections between various economic conditions and individuals' physical and psychological well-being. Prior to the 1980s, the lack of standardized and validated tools in population surveys made it challenging to accurately assess and understand mental health issues. Since then, the development of systematic instruments has significantly enhanced the ability to diagnose and classify psychiatric conditions. Fryers et al. (2005)'s study offers a comprehensive examination of the link between socioeconomic status and the prevalence of common mental disorders in Europe, using data from major population surveys conducted during the 1980s and 1990s. This systematic review reveals that adults of lower socio-economic status, as measured by factors such as education level, employment status, and material circumstances, consistently report higher frequencies of mental disorders, particularly non-psychotic depression and anxiety. These findings emphasizes the persistent impact of socio-economic disadvantages, including poor education, material deprivation, and unemployment, on mental health.

Another study by Weyers et al. (2010) investigates the relationship between poor social relations, adverse health behaviors, and socio-economic position (SEP) by using a cross-sectional data from the Heinz Nixdorf Recall (HNR) Study, involving 4,814 German participants aged 45-75. SEP is measured through household income and education levels, while social relations are assessed via social networks and support. The study finds that social isolation correlates with adverse health behaviors such as smoking, poor nutrition, and physical inactivity. The combination of poor social relations and low SEP exhibits stronger additive effects on these health behaviors than each factor alone. Notably, poor social relations and low SEP are independently associated with increased odds of adverse health behaviors, with

physical inactivity showing the strongest association.

Senn, Walsh, and Carey (2014) explores how different types of socioeconomic status (SES) influence perceived health through perceived stress and health behaviors. Using data from 508 patients, ages 16 and older. They focus on three types of SES, namely objective SES (income, education, employment), subjective SES (individuals' perceptions of their social status), and neighborhood SES (derived from census data on income, education, and employment in the participants' areas). The main results show that lower objective and subjective SES are directly associated with poorer perceived health and higher perceived stress. Perceived stress mediates the relationship between SES and health, with significant indirect effects of SES on health through stress and health-compromising behaviors (HCBs) such as smoking, poor diet, and lack of physical activity.

In exploring the impact of socioeconomic conditions on psychological distress, a recent study by Vanzella-Yang and Veenstra (2021) provides critical insights into the causal effects of family income and education on adult mental health in British Columbia, Canada. Utilizing data from the Longitudinal and International Study of Adults (LISA) across three waves—from 2012 to 2016—this research specifically assessed how changes in socioeconomic resources impact psychological distress. The findings reveal that obtaining a postsecondary degree significantly reduces psychological distress, with the effect being more pronounced among adults who remained married throughout the study period. The analysis, which controlled for age, marital status, household size, and employment status, as well as all time-invariant confounders, highlights that the timing of postsecondary education completion plays a different role in reducing distress for men and women. Vanzella-Yang and Veenstra (2021) concludes that postsecondary education has a delayed but potent impact on reducing psychological distress, highlighting the importance of socioeconomic factors in mental health interventions.

Beyond the well-documented impact of long-term socioeconomic conditions, sudden financial changes also play a significant role in influencing individual well-being. These abrupt shifts in one's economic status, whether positive or negative, can have immediate and profound effects on mental health. For instance, a research done by McInerney, Mellor, and Nicholas (2013) investigates the effect of the 2008 recession on the mental health of U.S. adults by exploring the 2008 wave of the Health and Retirement Study (HRS) before and after October 2008 and links the wealth and mental health status of affected people. By doing so, they find that sudden wealth loss leads to an immediate reduction in subjective measures of mental health, as a 20 percent decrease in the likelihood of reporting excellent or very good health by most affected respondents, who lost about 250,000 dollars, has been observed. The authors also claim that although the probability of using antidepressants

increased by 30 percent, there is no association between the loss from the 2008 market crash and the clinically-validated measures of depression in American adults.

Conversely, Apouey and Clark (2015) claim that winning a lottery, a notable example of an unexpected increase in financial resources, improves individual's mental health. Authors aim to explore the relationship between income and health by leveraging data from the British Household Panel Survey (BHPS) from waves 6 to 18 (1996–2008). This survey includes a comprehensive range of variables such as individual and household demographics, health indicators, labor-force status, and lottery winnings. The key variables analyzed include self-assessed health, mental health (measured via the General Health Questionnaire), physical health problems, and health behaviors such as smoking and drinking. The study uses lottery winnings as an exogenous shock to income and found that while lottery winnings do not significantly impact general health, they are positively associated with subjective well-being and negatively correlated with mental health, as well as increased smoking and drinking behaviors. This suggests that sudden income increases may lead to lifestyle changes that do not necessarily translate into better health outcomes and might even exacerbate some negative health behaviors.

While studies have focused on investigating the association between economic circumstances and the mental health of adults, it is important to recognize that these economic fluctuations can reach even further. This includes their potential influence on children and adolescents. A systematic review has by Reiss (2013) examines the relationship between socioeconomic status (SES) and mental health outcomes in children and adolescents. Using data from 55 studies published between 1990 and 2011, the review includes various markers of SES such as household income, parental education, and parental occupation status. The authors conclude that there exist a strong inverse relationship between SES and mental health, with socioeconomically disadvantaged children and adolescents being two to three times more likely to develop mental health problems. The review highlights that persistent low SES is highly associated with higher rates of mental health issues, while improvements in SES can lead to a reduction in these problems. The findings emphasize the need for early childhood interventions and societal efforts to reduce socioeconomic inequalities to improve mental health outcomes for children and adolescents.

Another study in this field has been done by Elgar et al. (2015). They investigate the relationship between socioeconomic inequalities in adolescents' health, national wealth, and income inequality. This paper observes the effect of income equality on socioeconomic differences in five different health domains including days of physical activity per week, Body Mass Index, frequency of physical and psychological symptoms, and life satisfaction. Their results are obtained by conducting a time-series analysis of 492,788 school-aged children from

34 North American, and European countries from 2002 to 2010. They conclude that physical activity of the poor groups was reduced more than the rich group. Regarding BMI and the frequency of physical and psychological symptoms, it was found that more affluent groups exhibited a comparatively lesser increase when compared to the other groups. However, an exception emerged within this analysis, particularly in the domain of life satisfaction, where a more balanced pattern was observed across various socioeconomic groups. Elgar et al. (2015) also examine the influence of income inequality and income per person on health outcomes. They report that higher income per person leads to better and more equal health of individuals while an increase in income inequality leads to more pronounced health disparities among populations.

In the United States Golberstein, Gonzales, and Meara (2019) examine the relationship between the economy and children's mental health. The article studies American children and adolescents and their mental health, using annual cross-sectional data from 2001 to 2013 conducted by the National Center of Health Statistics (NCHS) that measures mental health using Child Strengths and Difficulties Questionaire (SDQ) which has been first introduced by Bourdon et al. (2005). The authors linked this dataset with the quarterly unemployment rate and Housing Price Index (HPI) as indicators of economic conditions to navigate the effect of the economy on children's mental well-being. By doing so, they find that as increasing HPI and decreasing unemployment rate, which can be representatives of a growing economy, improve SDQ score and result in mentally healthier children. Golberstein, Gonzales, and Meara (2019) also assess whether these effects are heterogeneous along different gender and ages. As a result, by looking within each gender group and each age group (4 to 11 versus 12 to 17), they conclude that poor economic conditions affect both boys and girls and younger children and adolescents in the same way.

Another paper by Reiss et al. (2019), implements a cohort study of nearly 2000 German children aged 7-17 years to investigate the relationship between socioeconomic status of children and whether experiencing stressful life situations is associated with mental health difficulties. The research collected data concerning the incidence of stressful life events, including severe parental illness, alterations in parental marital status (such as divorce or separation), significant financial crises, and other relevant factors. The article observes that the socioeconomic level of families has an impact on the number of stressful situations in a 2-year follow-up, and that situations lead to mental health difficulties. Unsurprisingly, individuals with low socio-economic status, experience challenging events more than individuals with high status. As Reiss et al. (2019) state, among the socioeconomic indicators, parental employment and family income do not have any significant effect on mental health, while the education level of parents is highly related to the mental well-being of children

and adolescents. They also argue that children of educated families experience fewer mental health problems in case of stressful life events.

In the field of child mental health research, the focus has been mostly oriented towards European countries and, to some extent, the United States and North America. However, research specifically targeting the Canadian context remains relatively scarce. A significant contribution to the limited Canadian research is a study by Guhn et al. (2020) conducted in British Columbia, Canada. This comprehensive study analyzed data from vital statistics, administrative health records, census data, and child surveys, covering 134,094 children born between 1993 and 2005. The research investigated various factors including biological birth characteristics, socio-demographic factors, and socio-economic status. The findings revealed that lower socio-economic status at birth is significantly associated with increased risks of adverse mental health outcomes like anxiety, aggression, and ADHD in children.

The extensive literature as disscussed, examines the association between socioeconomic factors and mental health among different segments of society. The negative impacts of economic downturns on mental health are noticeable, particularly on children and adolescents. These studies not only emphasize the importance of the interaction between the socioeconomic status of individuals and their mental health but also highlight the need for holistic approaches that tackle the complex connection between Macroeconomic conditions and overall well-being across diverse populations.

3 Data

This section details the dataset used to explore the impact of demographic and socioeconomic factors on the mental well-being of Canadian adolescents. The primary data source is the 2017-2018 Canadian Community Health Survey, a cross-sectional survey administered by Statistics Canada. This survey gathers comprehensive data on health status, healthcare utilization, and health determinants, focusing on individuals aged 12 years and older across all 10 provinces and 3 territories.

The sampling strategy specifically targets adolescents, acknowledging the unique health challenges and developmental changes during this period. The analysis includes individuals aged 12-19 years living in a household with at least one parent.

In this study, perceived mental health (GENDVMHI), serves as the outcome variable. This variable categorizes mental health status into five levels—poor, fair, good, very good, and excellent—based on respondents' self-assessment.

Key variables in the analysis include demographic characteristics such as age (DHH-AGE), divided into three categories (ages 12-14, 15-17, and 18-19 years), and gender (DHH-

SEX), with males as category 0 and females as category 1. The province variable (GEO-PRV) accounts for geographical differences across Canada's provinces and territories. Another variable included in the analysis is highest household educational attainment (EHG2DVH), classified into three levels (less than secondary school graduation, secondary school graduation, and post-secondary graduation).

A descriptive analysis of the demographic variables is presented in Table 1. The sample consists of 10,468 individuals with the majority of individuals fall within the younger age groups, with the largest proportion being in the 12-14 age group, accounting for 42.78% of the sample. This is followed by the 15-17 age group with 39.85%, and the smallest group is the 18-19 year olds, making up 17.37% of the sample. The distribution between male and female is relatively balanced, with a slight majority being male at 51.31% compared to females at 48.69%. A significant majority, 83.57%, comes from a household where at least one member has completed higher education. Only a small fraction, 12.61%, have only secondary school graduation, and an even smaller 3.82% have less than secondary school education. The distribution across provinces shows that the majority reside in Ontario (29.17%) and Quebec (19.89%), which are the two largest provinces in terms of population in Canada. From this data, we can generalize that a typical individual in this dataset is likely a young teenager (around 12-14 years old), possibly male, from a household where at least one member has a post-secondary education, and residing in Ontario. This profile helps in understanding the demographic backdrop against which further analyses on mental health and socio-economic factors are conducted.

Behavioral factors such as alcohol consumption, smoking, and physical activity, which could potentially impact mental health, are also examined. These elements are critical in understanding how lifestyle choices influence overall psychological well-being among adolescents. Alcohol consumption is assessed via (ALC-015), asking respondents, "During the past 12 months, how often did you drink alcoholic beverages?" with responses ranging over six categories from less than once a month to everyday. A zero-consumption category is derived for those indicating no alcohol intake in the past year or ever (ALC-010, ALC-005). Smoking status is captured by SMK-005, categorizing respondents into non-smokers, occasional smokers, and daily smokers, with a zero-smoking category derived for those who have never smoked a whole cigarette (SMK-025). Physical activity variable combines data from two separate variables for youth aged 12-17 (PAYDVPAI) and adults aged 18+ (PAADVACV), and include 3 categories, namely, no activity, activity below recommended level, and activity above recommended level.

Based on Table 2, which presents the distribution of behavioral characteristics, a significant majority of individuals, 88.04%, have never smoked a whole cigarette, and only a small

minority are current smokers: 3.62% smoke occasionally, and 2.71% are daily smokers. Most of the population, 62.33%, reports zero consumption of alcohol. The remaining percentages suggest moderate alcohol consumption, with 17.53% consuming alcohol less than once a month and smaller fractions consuming more frequently. Daily consumption is very low, at just 0.15%. The low prevalence of smoking and alcohol aligns with the younger demographic of the sample. For physical activity, a substantial portion of the population, 53.92%, engages in physical activity below the recommended level. However, a notable 26.84% are active above the recommended level, suggesting a significant segment of the population adheres to or exceeds health guidelines for physical activity. Only 19.24% report no activity. From these findings, a typical person in this dataset can be characterized as someone who has never smoked a cigarette, does not consume alcohol, and engages in some level of physical activity, though possibly below the recommended level. This profile suggests a relatively healthy lifestyle with a strong aversion to smoking and limited alcohol intake.

Since the primary objective of this study is to explore the impact of household economic conditions on the mental health of youth, a latent variable for economic status has been constructed using several indicators, including the number of adults and kids in the household, food insecurity, income decile, income source, and dwelling ownership.

Table 3 displays the distribution of economic-related variables. Household income is presented in deciles, with 1,088 of the sample in the poorest 10% (decile 1), and 803 in the richest 10% (decile 10). The majority of the population is food secure (81.12%), and home owner (80.87%). The predominant source of income is wages and salaries, with 89.14% of the population earning through employment.

To determine the family composition, the number of adults (earners) is derived from the family arrangement variable (DHHDGLVG). Since the focus of this study is to examine the effect of economic conditions on adolecents who are not earning a leaving, unattached respondants living alone or with others (n=328) have been excluded from the analysis. Then, number of kids (non-earners) is calculated by subtracting the number of adults from the total household size (DHHDGHSZ). Another key factor considered is the household's food security status (FSCDVHF2), which includes four categories: food secure, marginally food secure, moderately food insecure, and severely food insecure. This variable, based on a set of 18 questions, assesses the food security situation over the previous 12 months and captures various levels of food access difficulties. For analytical purposes, the initial categories have been reversed to illustrate progression from insecure to secure levels, aligning more effectively with the analytical framework.

Income-related variables include the distribution of household income ratio at the national level (INCDVRCA), a derived variable categorizing households into income deciles from 1

to 10. Additionally, the main source of total household income (INCG015) is classified into four categories: wages/salaries or self-employment, employment insurance or worker's compensation or social assistance/welfare, benefits from Canada or Quebec Pension Plan or job-related retirement pensions, superannuation and annuities or RRSP/RRIF of Old Age Security and Guaranteed Income Supplement, and dividends/interest or child tax benefit or child support or alimony or other or no income. The final component of the latent variable is dwelling ownership (DHH-OWN), indicating whether respondents live in rented or owned properties. Further details about the construction and use of this latent variable will be discussed in the methodology section.

4 Methodology

This paper adopts a two-stage approach to examine the effect of socioeconomic conditions on adolecents mental health. First a latent variable indicative of economic condition is built. Second, using an ordinal logistic regression, the impacts of the economic latent variable along with other variables such as age, sex, province of residence, household education level, and life style variables (namely physical activity level, smoking and alcohol consumption) on perceived mental health of respondants is investigated. The descriptive summaries of variables were presented without incorporating survey weights; however, these weights are utilized in the subsequent analytical estimations.

4.1 Latent Variable

Most social concepts are complex and multi-faceted. Economic conditions of individuals are not an exception and considering single factors will not adequately cover the full conceptual map. To address this issue, a latent variable of economic is conducted. This approach offers a robust solution by capturing the multifaceted nature of economic conditions into a single, comprehensive measure. This method not only overcomes the limitations posed by categorical variables but also enables the examination of interactions between various economic indicators. Such interactions might remain hidden if these indicators were analyzed independently in a regression model. Moreover, when these variables are included individually in the analysis, they often prove to be statistically insignificant.

In this study, the latent variable for economic condition is estimated by using Generalized structural equation model (GSEM) following the steps below:

Suppose we have k observable variables which we want to summarize by a latent variable Z. We have n observations for each variable denoted by $Y_{1i}, Y_{2i}, \ldots, Y_{ki}$ for $i = 1, 2, 3, \ldots, n$.

To infer Z from observables, the GSEM method assumes that

1. All $Y_1, Y_2, \ldots, Y_k$ are independently distributed,
2. $Z \sim N(\mu, \sigma^2)$

Denote the probability density function of Y_j given Z by $f_j(Y \mid Z; \theta_j)$ where θ_j is a parameter vector.
Then the likelihood function of observing $Y_{1i}, \ldots, Y_{ki}$, given $Z \sim N(\mu, \sigma^2)$ is

$$L = \int \prod_{i=1}^{n} f(Y_{1i}, Y_{2i}, \ldots, Y_{ki} \mid Z; \theta) \phi(\frac{Z-\mu}{\sigma}) dZ \tag{1}$$

where $\theta = (\theta_1, \theta_2, \ldots, \theta_k)$, and $\phi(.)$ is the normal probability density function.

Since all $Y_1, Y_2, \ldots, Y_k$ are independent, L can be written as

$$L = \int \prod_{i=1}^{n} f(Y_{1i} \mid Z; \theta_1) f(Y_{2i} \mid Z; \theta_2) \ldots f(Y_{ki} \mid Z; \theta_l) \phi(\frac{Z-\mu}{\sigma}) dZ \tag{2}$$

In our analysis, the latent variable for household economic condition has been created based on the number of adults and number of kids in the household, food insecurity, household income deciles, income source, and dwelling ownership.(i.e., $k = 7$). We need to specify each probability density function in (2) based on the nature of each variable Y_k considered.

For the ordinal variables, number of adults, number of kids, food security, and household income deciles, the ordinal logistic function is chosen

$$f(Y_{ki} = j) = \frac{1}{1 + e^{(-\alpha_j + \beta Z_i)}} - \frac{1}{1 + e^{(-\alpha_{j-1} + \beta Z_i)}} \tag{3}$$

where α_j are the thresholds or cutpoints separating J categories.

For the binary variable, dwelling ownership, the probability of living in an owned versus rented property, the probability density function is

$$f(Y_{ki} = 1 \mid Z; \theta_k) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 Z_i)}} \tag{4}$$

where β_0 is the intercept, and β_1 is the coefficient for the latent variable.

For the province of residence and source of income which are categorical variables without order, the multinomial logistic regression is used to model the probability of each category relative to a reference category:

$$f(Y_{ki} = j \mid Z; \theta_k) = \frac{e^{(\beta_0^j + \beta_1^j Z_i)}}{1 + \sum_{l=2}^{J} e^{(\beta_0^l + \beta_1^l Z_i)}} \tag{5}$$

where J is the number of categories, and β^l are the coefficients for each category.

The next step is to maximize the likelihood in (2), given the probability density functions (3) to (5) with respect to θ, μ, and σ using GSEM algorithm. Then using $\hat{\theta}$, $\hat{\mu}$, and $\hat{\sigma}$, the latent variable $\hat{Z}_i$, i.e., economic condition in this study, is predicted as the most likely value of Z_i given $Y_{1i}, Y_{2i}, \ldots, Y_{ki}$ for $i = 1, 2, \ldots, n$.

4.2 Logistic Regression

The study implements an ordered logistic regression to properly account for the ordinality of the perceived mental health categories. In this model, an underlying score is estimated as a linear function of the independent variables along with a set of cutpoints. The probability of observing a particular outcome i corresponds to the probability that the estimated linear function, plus a random error, falls within the range defined by the cutpoints for that outcome. This can be mathematically expressed as

$$Pr(\text{MH}_i = j) = \Pr(\kappa_{j-1} < \sum_k \beta_k X_{ki} + \beta_z \hat{Z}_i + u_i \leq \kappa_j) \tag{6}$$

for $j = 1, 2, \ldots, J$ and where:

- MH_i is the the dependant variable of percieved mental health.
- X_i are demographic and lifestyle variables, namely age, sex, province, household education level, smoking, physical activity, and alcohol consumption.
- $\hat{Z}_i$ is the predicted value of the latent variable Z.
- $\beta_1, \beta_2, \ldots, \beta_k$ are model coefficients.
- β_z is coefficient of the Economic latent variable.
- $\kappa_1, \kappa_2, \ldots, \kappa_{J-1}$ are the cutpoints.
- u_i is the error term and assumed to be logistically distributed.

Parameter estimates are obtained by maximizing the weighted log likelihood calculated using (6).

5 Results

5.1 Household Economic Conditions

The estimation results for the GSEM Model are summarized in Table 4. These coefficient estimates offer insights into the direct relationships between several household variables and the overall economic condition of households. The analysis indicates a significant positive relationship between food security and economic status, with a coefficient of 0.5273. This suggests that increased food security within a household is associated with better economic conditions. Higher levels of food security likely contribute to fewer economic burdens related to basic sustenance, thus improving overall economic stability. The number of children in the household, representing non-earners, shows a statiscally significant negative association with economic conditions, as indicated by a coefficient of -0.1295. This finding implies that a greater number of dependents, who do not contribute financially, can strain household resources, thereby worsening economic conditions. Conversely, the presence of more adults, typically earners, in the household positively affects economic conditions, with a coefficient of 0.4747. This highlights the positive impact of having more income earners on enhancing the household's economic status.

Ownership of a dwelling emerged as a strong positive predictor of better economic conditions, with a coefficient of 0.8684. This relationship indicates the role of property ownership in providing financial security and stability. This finding aligns with the research conducted by Golberstein, Gonzales, and Meara (2019), which explores the connection between housing and children's mental health. In their study, the housing price index is utilized as a proxy for economic conditions, further supporting the link between secure housing and overall well-being of children.

The primary sources of income, with respect to wage and salary, also significantly influenced economic conditions. A notable finding is the negative coefficient for government support, indicating that reliance on government assistance is typically higher in poorer economic conditions. Similarly, income from pensions and retirement benefits also negatively correlated with economic conditions, suggesting that households primarily dependent on these sources may experience lower economic stability.

The distribution of the latent variable Z, representing economic conditions, is illustrated in the histogram shown in Figure 1. This distribution is derived from the empirical Bayes estimates calculated as part of the GSEM analysis. The figure shows a distribution that is largely symmetric and appears to approximate a normal distribution, centering slightly above zero. Notably, the median of the economic conditions stands at approximately 0.35, indicating that half of the observed values fall below this point. Despite the general symme-

try, the distribution shows a slight skew towards the right and truncated around 4.2. The skewness can be seen by the median's placement (0.35) above the mean (0.16). This wide spread indicates a diverse array of economic environments experienced by the participants, from considerably low to high economic conditions. The distribution's slight negative skewness, evidenced by a tail extending towards the left side of the histogram, suggests that while the majority of the youth experience moderate to high economic conditions, a substantial minority face notably lower economic situations

5.2 Determinants of Mental Health

In an effort to explore the determinants influencing mental health status among youth, an ordered logistic regression is employed. The results, as depicted in Table 5, reveal several key insights into the factors significantly associated with mental health outcomes. Age proves to be a critical determinant, with older youth (ages 15-17 and 18-19) exhibiting lower levels of perceived mental health compared to younger adolescents (the reference category being age 12-14), as indicated by the negative coefficients of -0.3091 and -0.5580 respectively, both highly significant at the 5% level or beyond the 5% level. This trend suggests that older adolescents may face increased mental health challenges, or alternatively, they may develop a more critical self-assessment of their mental health as they age.

Gender also emerges as a significant factor, with females reporting worse mental health compared to their male counterparts, evidenced by a coefficient of -0.5113.

Considering those who have never smoked a whole cigarette as the reference category, all other levels—'Not a smoker at present', 'Occasionally smoker', and 'Daily smoker'—show increasingly negative associations with mental health. Notably, daily smokers have the most negative impact on mental health with a coefficient of -1.1969, suggesting that frequent smoking is strongly correlated with poorer mental health outcomes. However, it is important to consider that this may not necessarily indicate causation; individuals experiencing poorer mental health might also be more likely to engage in frequent smoking.

With 'no activity' as the reference, engaging in activity above the recommended level has a positive effect on mental health. This highlights the beneficial effects of physical activity on mental well-being, supporting the idea that physical activity not only improves physical health but also serves as a protective factor against mental health issues. However, the relationship might be bidirectional. Individuals with better mental health may be more inclined to participate in physical activites. Therefore, while the correlation is evident, the direction of causality cannot be definitively established from this analysis alone.

Alcohol consumption has also a statistically significant negative impact on the mental

health of young individuals, with a coefficient of -0.0978. This outcome suggests that increased alcohol intake is associated with a decrease in the likelihood of experiencing better mental health states.

Interestingly, economic condition, as measured by the latent variable, is positively associated with better mental health, with a coefficient of 0.0522. This suggests that improvements in the economic environment of youth can lead to better self-perceived mental health.

The results from other variables, such as province, and education, while included in the analysis, did not show consistent significant effects across the categories. The only province that has statistically significant coefficient, is the province of Quebec with the coefficient of 0.4540, which indicates that youth in Quebec report better mental health compare to other regions. This could reflect cultural, socioeconomic, or policy differences that impact mental health assessments or actual mental health outcomes. Further research could explore the causes behind this result. Additionally, the educational level of parents did not show a significant impact on adolescents' mental health outcomes. It appears that the influence of parental education may primarily operate through economic status, as higher educational attainment typically correlates with higher income.

To provide a comprehensive understanding of how the study variables influence the various levels of perceived mental health, detailed marginal effects analysis is conducted. The results of these are presented as a series of figures (Figures 2 to 4) in the appendix. Figure 2 illustrates the average marginal effects of age on various categories of perceived mental health among adolescents, segmented from 'Poor' to 'Excellent'. Each line indicates how the probability of being categorized under a specific mental health level shifts as adolescents age, using the youngest group (12-14 years) as the baseline. The probability of adolescents reporting good mental health increases with age, with the oldest adolescents exhibiting higher probabilities compared to the youngest. Conversely, the likelihood of reporting 'Excellent' mental health declines noticeably with age. This decrease is approximately 0.07 when moving from the 12-14 age group to the 15-17 age group and becomes even more pronounced in the 18-19 age group. The probabilities of reporting 'Poor', 'Fair', and 'Very good' mental health remain relatively stable across age groups.

Figure 3 shows the average marginal effects of gender on various categories of perceived mental health. Each line represents the shift in probability for each mental health status as gender varies. The graph clearly illustrates a significant decline in the probability of reporting 'Excellent' mental health by about 0.11 when comparing males to females. Conversely, there is a notable increase in the probability of reporting 'Good' mental health by approximately 0.06. This redistribution of probabilities among the categories indicates that while fewer females report excellent mental health compared to males, a greater proportion of females

are likely to report good mental health. The probabilities for 'Poor', 'Fair', and 'Very Good' mental health show smaller changes with gender, indicating less impact.

Figure 4 demonstrates the average marginal effects of economic condition on mental health outcome. From the figure it can be observed that as economic condition improves, there is a statistically significant rise in the probability of reporting 'Excellent' mental health, increasing by approximately 0.011. Considering movement across the full economic spectrum—from the poorest 1% to the wealthiest 1%—indicates a total increase in probability by 0.095, which is the maximum potential increase. This calculation is derived by multiplying the marginal effect (0.011) by the span of economic conditions (8.6), as depicted in Figure 1. Although this relationship is statistically significant, the overall impact remains modest. The shifts in probability for the 'Poor,' 'Fair', 'Good', and 'Very Good' categories are minimal and statistically indistinguishable, as evidenced by overlapping confidence intervals.

6 Conclusion

This study seeks to address the question of how household economic conditions influence adolescents aged 12-19 in Canada. To explore this, a two-stage approach is employed. Initially, a latent variable representing economic conditions is constructed. Subsequently, an ordinal logistic regression is used to examine the impact of this economic latent variable, along with other factors including age, gender, province of residence, household education level, and lifestyle variables such as physical activity levels, smoking habits, and alcohol consumption.

The findings highlight the role of the socio-economic status on mental well-being of Canadian Adolescents. Older adolescents and females generally report lower mental health levels. Negative health behaviors like smoking and excessive alcohol consumption are linked to poorer mental health, whereas higher physical activity levels correspond with better mental health outcomes. This results supports the findings of Weyers et al. (2010), which indicated an inverse relationship between low socio-economic status combined with social isolation and negative health behaviors like smoking and physical inactivity. Consistent with Reiss (2013) research, results confirms that socio-economic disadvantages considerably strain adolescents' mental health.

Through detailed marginal effects analysis, the research reveals that economic improvements do correlate with enhanced mental well-being among adolescents. While there is a statistically significant, albeit small, increase in the likelihood of adolescents reporting better mental health as economic conditions improve, the overall influence remains limited across

the economic spectrum—from the lowest to the highest percentiles. This suggests that while economic factors play an important role, they are not the dominant determinants in shaping mental health outcomes.

As with most health surveys, there are inherent limitations in self-reported data. Respondents may underreport negative health behaviors like smoking and alcohol consumption. Additionally, the study relies on perceived mental health levels, which may differ from clinically validated mental health disorders. These limitations suggest caution in interpreting the findings as definitive indicators of mental health status.

Future studies should consider incorporating other mental health variables such as clinical reports on distress, and depression to provide a more comprehensive view of mental health. Moreover, utilizing different waves of the Canadian Community Health Survey (CCHS) to compare changes over time could yield insights into trends and shifts in mental health correlates, leveraging the cross-sectional nature of the survey data for longitudinal analyses.

These paper provides valuable insights for targeted socio-economic and health interventions aimed at enhancing adolescent well-being in Canada, emphasizing the need for policies that improve economic conditions and reduce negative health behaviors.

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Appendix

Table 1: Demographic Profile of the Study Sample

Category	Percentage (%)	Total (n)
Age Group		
12-14	42.78	4,478
15-17	39.85	4,172
18-19	17.37	1,818
Gender		
Male	51.31	5,371
Female	48.69	5,097
Highest Household Education Level		
Less than secondary school	3.82	385
Secondary school graduation	12.61	1,271
Post-secondary graduation	83.57	8,423
Province of Residence		
Newfoundland and Labrador	3.30	345
Prince Edward Island	1.72	180
Nova Scotia	3.68	385
New Brunswick	3.27	342
Quebec	19.89	2,082
Ontario	29.17	3,053
Manitoba	5.35	560
Saskatchewan	4.55	476
Alberta	12.29	1,286
British Columbia	13.12	1,373
Yukon	1.36	142
Northwest Territories	1.18	123
Nunavut	1.16	121

Note: The numbers presented in this table are unweighted.

Table 2: Prevalence of the Behavioral Characteristics among Canadian Youth

Category	Percentage (%)	Total (n)
Smoking		
Never smoked a whole cigarette	88.04	9,205
Not a smoker at the present time	5.63	589
Occasionally smoker	3.62	378
Daily smoker	2.71	283
Alcohol Consumption		
Zero consumption	62.33	6,496
Less than once a month	17.53	1,827
Once a month	7.25	756
2-3 times a month	6.52	679
Once a week	3.58	373
2-3 times a week	2.27	237
4-6 times a week	0.36	38
Everyday	0.15	16
Physical Activity		
No activity	19.24	2,014
Activity below recommended level	53.92	5,644
Active above recommended level	26.84	2,810

Note: The numbers presented in this table are unweighted.

Table 3: Distribution of Economic-Related Variables

Category	Percentage (%)	Total (n)
Household Income Distribution		
Decile 1	10.85	1,088
Decile 2	8.93	895
Decile 3	9.89	992
Decile 4	9.62	965
Decile 5	9.75	978
Decile 6	10.78	1,081
Decile 7	10.61	1,064
Decile 8	11.15	1,118
Decile 9	10.41	1,044
Decile 10	8.01	803
Food Insecurity		
Severely Food Insecure	3.42	348
Moderately Food Insecure	8.71	887
Marginally Food Secure	6.76	688
Food Secure	81.12	8,261
Dwelling		
Rent	19.13	1,957
Own	80.87	8,272
Household Income Source		
Wages/salaries	89.14	8,959
Government Support	3.54	356
Pension and Retirement Benefits	1.58	159
Investment, Child Benefits and Other Income	5.73	576

Note: The numbers presented in this table are unweighted.

Table 4: Estimation Results of Generalized Structural Equation Model (GSEM)

Variable	**Coef**	**Std. Err.**	**t**
Household Income Distribution	1	(constrained)	
Food Security	0.5273*	0.0521	10.13
Number of Kids	-0.1295*	0.0175	-7.42
Number of Adults	0.4747*	0.0569	8.35
Dwelling	0.8684*	0.0964	9.01
constant	1.9938*	0.0962	20.72
Income Sources			
Wages/salaries (base outcome)			
Government Support	-1.2789*	0.1414	-9.05
constant	-5.9914*	0.4257	-14.07
Pension and Retirement Benefits	-0.4450*	0.0572	-7.78
constant	-4.4049*	0.1322	-33.32
Investment, and Other Income	-0.3085*	0.0589	-5.24
constant	-2.7716*	0.0823	-33.68

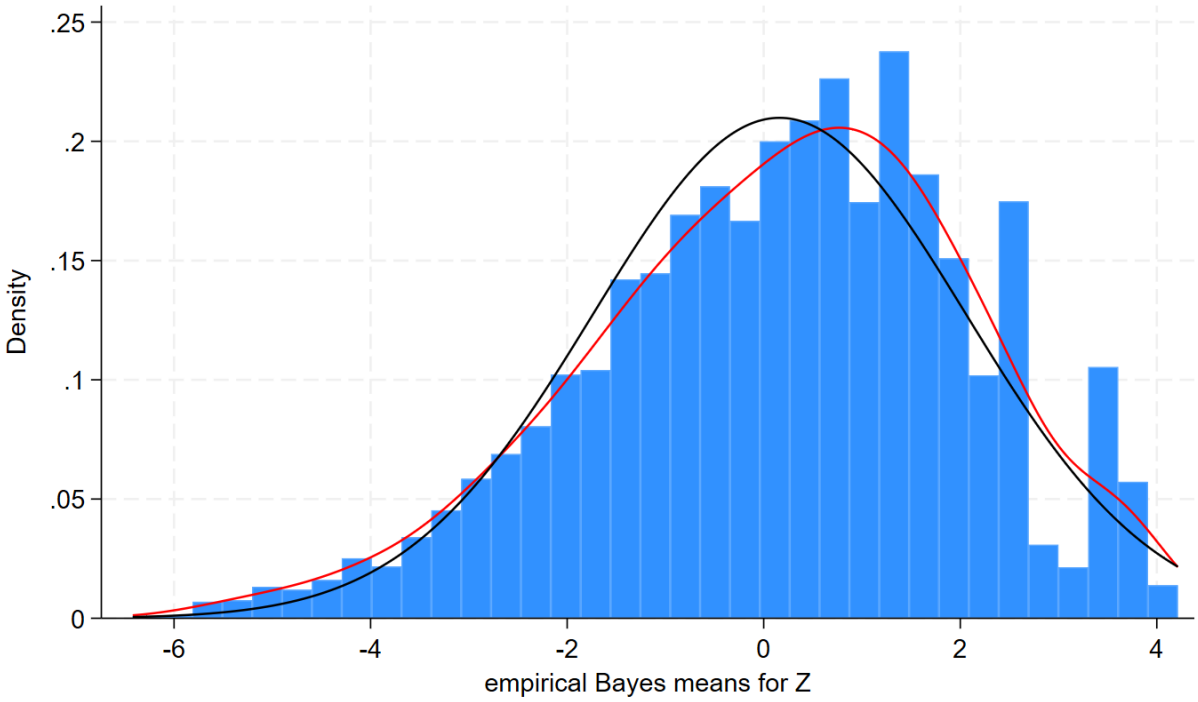
Note: Parameter estimated for provincial dummy variables have been ommited for simplicity.
* p <0.05

Table 5: Ordered Logistic Regression Analysis of Mental Health

Variable	Coef	Std. Err.	t
Age Group			
12-14 (base outcome)			
15-17	-.3091*	.0701	-4.41
18-19	-.5580*	.1153	-4.84
Gender			
Male (base outcome)			
Female	-.5113*	.0630	-8.12
Province of Residence			
Newfoundland and Labrador (base outcome)			
Prince Edward Island	-.1912	.2141	-0.89
Nova Scotia	-.1579	.1889	-0.84
New Brunswick	-.0075	.1857	-0.04
Quebec	.4540*	.1495	3.04
Ontario	-.0742	.1453	-0.51
Manitoba	.1420	.1704	0.83
Saskatchewan	.0026	.1812	0.01
Alberta	.0560	.1531	0.37
British Columbia	.0990	.1535	0.65
Yukon	.0012	.2003	0.01
Northwest Territories	-.3914	.2379	-1.65
Nunavut	-.0486	.2558	-0.19
Education			
Less than secondary school (base outcome)			
Secondary school graduation	-.0444	.1745	-0.25
Post-secondary graduation	-.0672	.1563	-0.43
Smoking			
Never smoked (base outcome)			
Not a smoker at present	-.6595*	.1563	-4.22
Occasionally smoker	-.9453*	.1820	-5.19
Daily smoker	-1.1969*	.2122	-5.64
Physical Activity			
No activity (base outcome)			
Below recommended level	-.0047	.0841	-0.06
Above recommended level	.3647*	.1016	3.59
Alcohol Consumption			
Alcohol consumption	-.0978*	.0315	-3.11
Economic Condition (econc)	.0522*	.0177	2.95

* $p < 0.05$

Figure 1: Distributaion the Economic Latent Variable Z



Note: The black line represents the normal probability density function and the red line indicates the Gaussian kernel density estimate, corresponding to the latent variable Z.

Figure 2: Marginal Effects of the Age on Mental Health Outcomes.

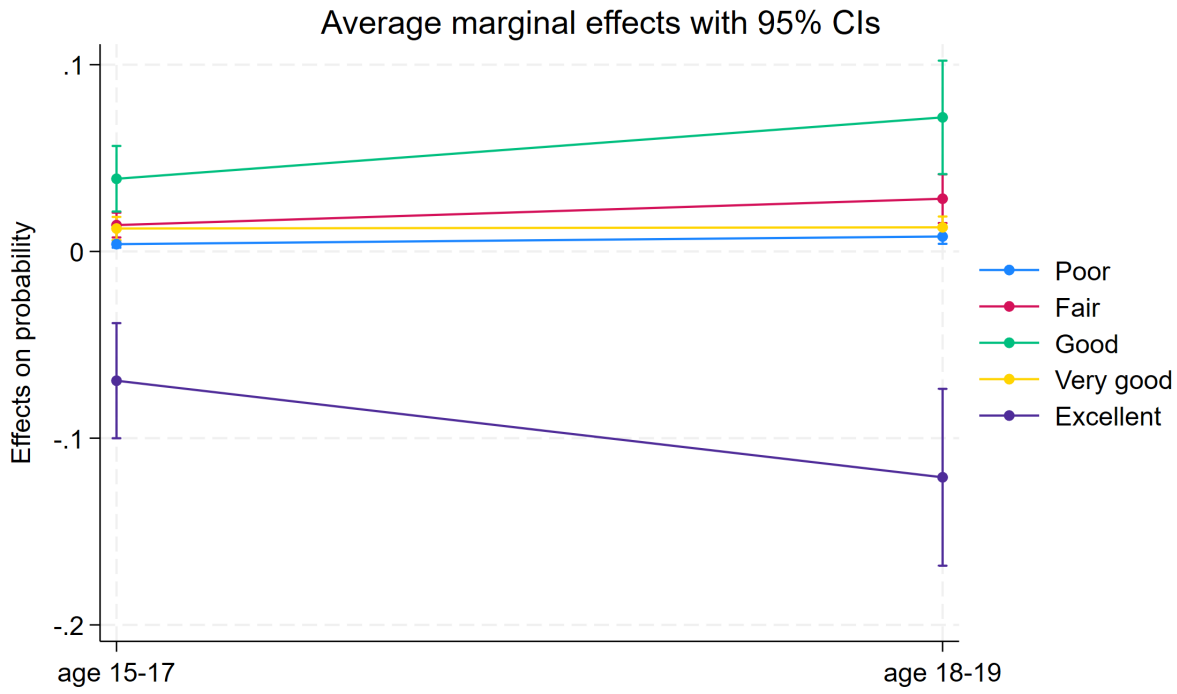


Figure 3: Marginal Effects of the Gender on Mental Health Outcomes.

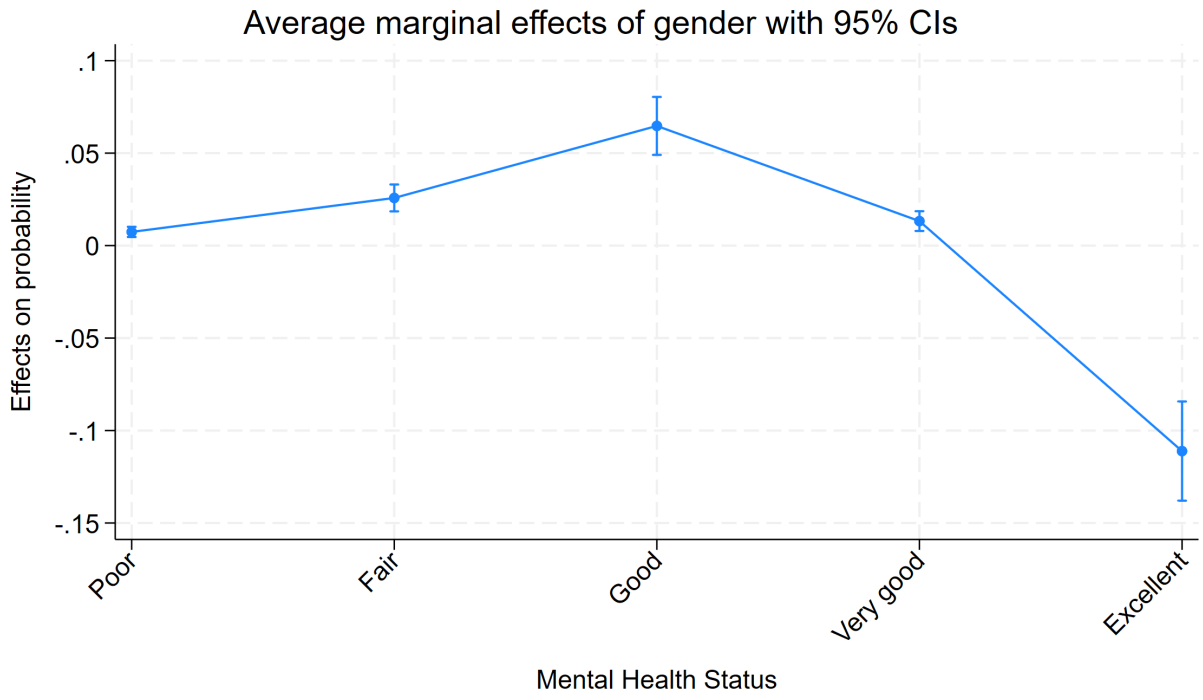


Figure 4: Marginal Effects of the Household Economic Condition on Mental Health Outcomes.