

**INDIVIDUAL AND ECOLOGICAL DETERMINANTS OF ACCESS TO
MENTAL HEALTH SERVICES AMONG YOUTH: AN ANALYSIS OF SURVEY
AND CENSUS DATA**

by

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ABSTRACT

Mental disorders disproportionately affect adolescents and young adults, especially when one considers that the onset of most lifetime mental disorders occurs before the age of 24 (De Girolamo, Dagani, Purcell, Cocchi, & McGorry, 2012; Kessler et al., 2007). In particular, recent findings from the Canadian Community Health Survey (2012) revealed that depressive (8.2%) and substance use disorders (11.9%) were the most prevalent disorders among youth aged 15 to 24 (Pearson, Janz, & Ali, 2013). Despite high prevalence of mental disorders and a wide range of health and social problems associated with these conditions, service utilization among youth is low, with only 20 to 25% of youth who need services accessing them (Cheung & Dewa, 2007; Lyon, Ludwig, Stoep, Gudmundsen, & McCauley, 2013). In the current study, an analysis of survey (CCHS, 2012; CCHS, 2011-2012) and census (PCCF+) data was conducted to examine individual and ecological determinants to access mental health services among youth. The results indicate that individual determinants, such as having a high level of education and income, perceiving a need for care, and having a social support system are associated with greater access to services among youth, and ecological determinants, such as living in urban communities enable access to services among youth. The results from this study provide information on estimates of access to mental health care following individual and ecological variables. Implications and future directions are discussed.

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Introduction

Statement of the Problem

Mental health disorders are highly prevalent among youth, and are often chronic through the lifespan. Indeed, research indicates that more than three quarters of adults with mental illness first receive a diagnosis between the ages of 11 and 24 years (Kessler et al., 2006; Kim-Cohen et al., 2003). A systematic review of research reporting lifetime rates of mental disorders separately for childhood, adolescence, and early adulthood found that rates of depression, drug abuse, and panic disorder increased as children moved into adolescence, and were persistent during the transition from adolescence to adulthood (Baldessarini et al., 2010; Costello, Copeland, & Angold, 2011; Kessler et al., 2006). Research has also indicated that levels of continuity of depressive disorders and substance use disorders are related to high prevalence rates of these disorders in youth aged 15 to 24 years (Patton et al., 2014).

Based on the Canadian Community Health Survey, 2012: Mental Health Component (CCHS, 2012 – MH), depressive disorders (8.2%), including major depressive episode, bipolar I, and bipolar II, were the most common disorders among Canadian youth aged 15 to 24 in a 12-month period (Pearson, Janz, & Ali, 2013). Furthermore, findings indicated that substance use disorders, including alcohol, stimulants, opioids, and hallucinogens are prevalent (11.9%) among youth (Pearson et al., 2013). Overall, some studies have found that youth 15 to 24 years old report higher rates of depressive disorders (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015; Blanco et al., 2015; Kessler et al., 2007), and substance use disorders (Copeland,

Shanahan, Costello, & Angold, 2011; Costello et al., 2011; Mangerud, Bjerkeset, Holmen, Lydersen, & Indredavik, 2014) than do individuals in other age groups.

Mental disorders in youth populations are associated with a host of social and health problems. In particular depressive disorders have been associated with educational underachievement, unemployment, welfare dependence (Fergusson, Boden, & Horwood, 2007), chronic insomnia, low levels of social support and physical health, high levels of self-perceived stress, migraine headaches (Naicker, Galambos, Zeng, Senthilselvan, & Colman, 2013), comorbid physical illness (e.g., obesity), and externalizing (e.g., drug abuse) and internalizing problems (e.g., suicide ideation, anxiety disorders; Moffitt et al., 2007). In addition, substance use disorders have been associated with psychosocial and health problems, including cognitive impairment (Hall & Degenhardt, 2009), low educational attainment (MacLeod et al., 2004), memory and learning deficiencies (Solowij et al., 2011), problems at school (e.g., low grades), school drop-out, increased risk of injuries (Hall, 2006; Hall & Degenhardt, 2009), externalizing problems (e.g., delinquent and aggressive behaviors; Monshouwer et al., 2006), internalizing problems (e.g., depression, anxiety, and suicidal ideation; Moore et al., 2007), and increased risk for psychotic disorders (e.g., schizophrenia; Hall, 2006; Hall & Degenhardt, 2009; Moore et al., 2007). Given the high prevalence and chronicity of mental disorders, it is imperative to focus on providing youth with adequate access to mental health services.

Although research has consistently indicated that prevalence rates of mental illness are associated with a wide range of psychosocial and health problems among youth, access to mental health services (i.e., contact with and consultation of mental health professionals) remains low. Only 20 to 25% of

youth who need services obtain them (Bergeron, Poirier, Fournier, Roberge, & Barrette, 2005; Cheung & Dewa, 2007; Lyon, Ludwig, Vander Stoep, Gudmundsen, & McCauley, 2013). In a recent study using data from the CCHS, 2012 – MH, only 12% of youth aged 15 to 24 with a mental illness had seen or talked on the phone with a health professional (Findlay & Sunderland, 2014). Thus, it is imperative to examine factors linked to youth accessing mental health services. Research has shown that rates of mental illness among youth and related consequences decrease when mental health services are available and youth access and utilize these services (Fournier, DeRubeis, Amsterdam, Shelton, & Hollon, 2015; Lam et al., 2013; Raven, Jörg, Visser, Oldehinke, & Schoevers, 2016).

There are several models of health care utilization that have been applied to examine determinants of access to mental health services. The most commonly used model is the Behavioral Model of Health Care Utilization, created by Andersen in the late 1960s, which divides determinants in predisposing, enabling, and need factors. Other models examine perceived benefits of behavior change and perceived barriers to taking action, like the Health Belief Model, created by Rosenstock in 1952. This study applied the Social Determinants of Health Model (CSDH; Solar & Irwin, 2010), which divides determinants based on their impact on social and economic status (e.g., income, education), and psychosocial factors (mental illness, social support) that influence help-seeking behaviors. Determinants in the CSDH can be measured at the individual and ecological levels.

The most commonly reported factors to examine access to mental health services are individual determinants including age, sex, education, household income, perceived need for care, having a mental illness, comorbid physical and mental illness, and self-

reported physical status (Bergeron et al., 2005; Cheung & Dewa, 2007; Chen et al., 2013; Kaufmann, Chen, Crum, & Mojtabai, 2014). While some factors (e.g., ethnic background) are often considered determinants (i.e., enable access to mental health care) to access services, other factors (e.g., income, education, and geographic location) are considered determinants as well as risk factors (i.e., hinder access to mental health care) to access services (Bergeron et al., 2005; Chen et al., 2013; Sareen et al., 2005).

Another feature found in the literature has been the inconsistency regarding individual factors as determinants or risk factors of youth access to mental health care. For example, while research has found living arrangements (e.g., living alone, living with parents or partner) to be a predictor of youth access to services (Vasiliadis, Lesage, Adair, Wang, & Kessler, 2007), other studies found no such association (Bergeron et al., 2005; Fleury, Grenier, Bamvita, & Caron, 2011). Similar inconsistencies have been found for age and sex (e.g., adolescents vs. young adults, females vs. males; Essau, 2005; Kekkonen et al., 2015; Mackenzie et al., 2012). These inconsistencies could be associated with methodological differences. While Bergeron et al. (2005) and Vasiliadis et al. (2007) used community survey data, Essau (2005) and Kekkonen et al. (2015) used primary and administrative data.

Although household income is often examined as a determinant to access mental health services, research is not conclusive on the role of income in help-seeking behaviors. Some studies indicate that household income is not related to accessing services for youth with mental illness (Roy-Byrne, Joesch, Wang, &

Kessler, 2009; Steele, Dewa, Lin, & Lee, 2007). Roy-Byrne et al. (2009) examined access to mental health care among respondents of the National Comorbidity Survey Replication (NCS-R) and found that education and income were not related to accessing services either from general practitioners or mental health specialists. Other studies indicate that household income in public health care systems is a useful measure of determinants of youth access to mental health services (Bergeron et al., 2005; Slaunwhite, 2015). Starkes, Poulin, and Kisely (2005) examined youth access to mental health services among respondents of the Canadian Community Health Survey (2002) and found that low household income was a risk factor for accessing services.

In contrast to individual-level determinants (e.g., sex, age, perceived need for care) that have been widely examined in access to mental health care, ecological determinants (e.g., neighborhood and region-level factors) have been partially examined in relation to access services. Some studies indicate that adolescents and young adults with mental illness who live in neighborhoods with high income and education levels are more likely to access mental health services than youth living in economically deprived neighborhoods (Drukker, Driessen, Krabbendam, & van Os, 2014; Ivert et al., 2013; Steele et al., 2006).

Due to high prevalence rates of mental illness and low rates of access to mental health care among youth, research has examined the differences in service use by specific types of mental illness (e.g., depression vs. alcohol abuse). Although research assessing differences in adult access to mental health care between mental illnesses is common (Chen et al., 2013; Kaufmann et al., 2014; Mojtabai, Chen, Kaufmann, & Crum, 2014), this is not the case for youth. The lack of youth-specific studies addressing access to

mental health services creates a gap in knowledge regarding determinants of access to mental health care. In particular, research on service utilization among Canadian youth has focused on prevalent mental disorders (e.g., depressive disorders) using data from the Canadian Community Health Survey (CCHS, Cycle 1.2), 2002 (Nguyen, Fournier, Bergeron, Roberge, & Barrette, 2005; Bergeron et al., 2005; Cheung & Dewa, 2007; Marshall, 2011), which might provide outdated information to explore determinants of access to services.

Studies on determinants of youth access to mental health services have focused on one type of service provider (e.g., general practitioners or psychiatrists; Bergeron et al., 2005; Cheung & Dewa, 2007; Vasiliadis, Tempier, Lesage, & Kates, 2009). However, the increasing trend towards joint treatment by general practitioners and mental health care specialists (e.g., psychiatrists, psychologists) highlights the need to understand the factors associated with the use of these two types of providers. This also will contribute to understanding determinants of youth access to services in general.

The high prevalence of depressive and substance use disorders among youth, resulting in negative outcomes necessitates rapid action to increase the markedly low rates of access to mental health services. A first step in addressing this issue is to understand the determinants shaping access to mental health services among youth. Given the inconsistencies found in the literature regarding individual and area-level factors associated with access to mental health care among youth, it is critical to understand the influence of each determinant,

following an ecological approach, including individual, neighborhood, and region-level determinants.

Purpose and Hypotheses of the Present Study

The purpose of this study was to identify determinants of youth-reported access to professional mental health services. Consistent with ecological frameworks (Bronfenbrenner, 1979; Solar & Irwin, 2010), this study examined the contribution of individual, neighborhood, and region-level variables to explain reported access to mental health services. This study has two hypotheses:

1. Individual-level variables (age, sex, ethnicity, household type, education, income, perceived need, social support, and physical health) and ecological variables, measured at neighborhood and health region levels (neighborhood level of income and immigration; regional levels of income, and having a family doctor), will act as determinants of access to mental health services among youth with depressive disorders (Chen & Bustamante, 2011; Cheung & Dewa, 2007; Hardy, Kelly, & Voaklander, 2011; Meredith et al., 2009; Steele et al., 2006; Thomas et al., 2011) and youth with substance use disorders (Chen et al., 2013; Ilgen et al., 2011; Mason et al., 2013; Mericle et al., 2015; Steele et al., 2006; Winstanley et al., 2008).
2. Youth with comorbid disorders (both depressive and substance use disorders) will have consulted more hours of professional mental health services and more types of professional services (general practitioners or psychiatrists, psychologists, and nurses) than youth who meet criteria for a single diagnosis (Kaufmann et al., 2014; Mojtabai et al., 2014; Sareen et al., 2005; Tempier et al., 2009; Vasiliadis et al., 2005; Vasiliadis et al., 2009).

Significance of This Study

This study adds to the scholarly literature on youth access to mental health services by identifying individual and ecological determinants of access to professional services among adolescents and young adults with depressive and substance use disorders. As the literature demonstrates, previous research focused mainly on general practitioners, and in either individual or ecological factors as determinants to access such services. While determinants (e.g., age, sex, perceived need for care) to access mental health care were examined in this study, so were risk factors (e.g., low levels of income and education) that might hinder youth from accessing services. In addition, this study examined access to general practitioners as well as mental health specialists.

Literature Review

Foundations of Access to Mental Health Services

There are several foundations that should be considered in order to examine youth access to mental health services. Understanding what mental health services comprise is particularly relevant. These typically include professional services of psychiatrists, general practitioners, psychologists, and social workers in outpatient (e.g., private offices) or inpatient (e.g., hospitals) facilities. Mental health services are usually grouped according to providers: (1) specialty mental health services, which often include work of psychiatrists and psychologists; (2) general medical services, which include those of general practitioners or family doctors; and (3) other professionals include nurses, social workers, or counsellors (Vasiliadis, Lesage, Adair & Boyer, 2005; Vasiliadis, Tempier, Lesage, & Kates, 2009).

In addition to the components of mental health services, it is also relevant to mention the organization of the health care system. Across Canada, universal health care insurance was established to ensure equitable access to health care (Steele, Glazier, & Lin, 2006); while there is variation across provinces in health care delivery, some generalizations can be made. Health ministries pay for psychiatrists' services in outpatient and inpatient care (Jacobs et al., 2010). Health regions and local area networks, which are directly funded by provincial governments, provide inpatient, emergency, and community mental health services, including psychologist services (Jacobs et al., 2010). Although psychologists are often employed in hospitals or other specialized programs, almost 80% of consultations with psychologists occur within the private rather than the public system (Steele, Dewa, Lin, & Lee, 2007). Social service departments fund a range of services including income and housing support (Jacobs et al., 2010). Social workers are primarily employed by public institutions, with only a minority working in private practice (Steele et al., 2007). Moreover, non-profit organizations offer mental health services, mostly under government contracts (Jacobs et al., 2010).

Another key aspect of access to mental health services is perceived need for care, which is typically a key criterion for accessing mental health services (Starkes et al., 2005; Sunderland & Findlay, 2013; Urbanoski, Cairney, Bassani, & Rush, 2008). Need for mental health care has been operationalized as meeting diagnostic criteria for mental disorders (e.g., DSM; Sareen, Stein, Campbell, Hassard, & Menec, 2005) or on the basis of self-reported perceived need (e.g., Perceived Need for Care Questionnaire; Rabinowitz, Gross, & Feldman, 1999). Furthermore, the types of care that are perceived as being needed can be divided into three types: (a) counseling or treatment, (b)

information, and (c) medication (Edlund, Unützer, & Curran, 2006; Sunderland & Findlay, 2013).

Mojtabai, Olfson, and Mechanic (2002) examined perceived need for care in the National Comorbidity Survey for youth and adults diagnosed with DSM-III-R anxiety, depressive, or substance disorders, and found that perception of need was not only associated with mental disorders, but also with socio-demographic and attitudinal factors. Individuals who have mental health problems and do not perceive need for care often believe symptoms are temporary or not serious, do not know appropriate help is available, do not find services accessible, believe treatment will be ineffective, or fear stigmatization (Mojtabai, Olfson, & Mechanic, 2002; Sareen, Cox, Afifi, Clara, & Yu, 2005). In short, the perception of need for care is influenced by social context and by the decisions people make in response to symptoms.

In order to examine access to mental health services, it is important to clarify how access has been defined in the literature. Measuring access to mental health services is a central component of the design and evaluation of health services delivery. However, the task of measuring access to health care is often complicated by the imprecise use of terms with similar connotations (e.g., consultation, utilization) and by a lack of agreement regarding what constitutes access to health services. The term *access* in health services research is often used as a synonym for *utilization* of health care; studies that have examined access to mental health services often apply both terms interchangeably (Eisenberg, Golberstein, & Gollust, 2007; Klaufus, Fassaert, & de Wit, 2014; Samargia, Saewyc, & Elliot, 2006). However, in some studies *access* and *utilization* are considered

unique constructs. For example, Thomas and Penchansky (1984) note that the efforts to improve access should lead to more appropriate utilization of health services. This distinction suggests not only that access should take place before utilization, but also that access factors are useful in explaining variations in utilization of health care (Penchansky & Thomas, 1981).

Although there are a number of studies that define and measure access to health care (Andersen, 1995; Andersen, Davidson, & Baumeister, 2014; Karikari-Martin, 2010; Norris & Aitken, 2006; Ricketts & Goldsmith, 2005; Shengelia, Tandon, Adams, & Murray, 2005), there is no consensus on how to delineate access. Penchansky and Thomas (1981) define it as the degree of fit between the clients and the system, whereas Millman and The Institute of Medicine (1993) define access as the timely use of personal health services to achieve the best possible health outcomes. Descriptions of access to health care usually serve different policy and research objectives, making comparisons among studies with varying definitions difficult, and creating limitations to applying certain classifications in research (Karikari-Martin, 2010). The lack of a consistent and measurable definition for access to health care results in the fragmentation of efforts to develop policies and programs directed towards increasing access to health care, reducing healthcare costs, and enhancing positive health outcomes (McFall & Yoder, 2012).

Nevertheless, consistent with published classifications (e.g., Andersen, 1995; Millman & The Institute of Medicine, 1993), the current study defined access as the timely contact and consultation of professional mental health services, given perceived need for care, and the elements that facilitate or impede its use to achieve better health outcomes. Considering the foundations of access to mental health care, it is necessary to

establish the importance of examining access to services. Monitoring and evaluating access to mental health services among youth allows us to: (1) measure use of services, (2) identify determinants of service use, (3) promote equity in service utilization, and (4) promote effectiveness and efficiency of mental health service delivery.

Consistent with published reviews of access to care (Eden, 1998; Ricketts & Goldsmith, 2005), this study examines hours of consultation with mental health professionals (e.g., general practitioners, psychiatrists, psychologists, nurses) and types of professionals consulted as proxies for access to mental health care. The process of seeking care and resolution of perceived needs involves interactions with mental health professionals. Mental health professionals are viewed as agents in the process of seeking care (McFall & Yoder, 2012), but their role is not understood in relation to youth access to mental health services. Therefore, in this study, mental health professionals were considered the main point of contact in the help-seeking process for youth, in which the interaction with such professionals can be decisive to start treatment for mental disorders.

Theoretical Frameworks of Access to Mental Health Services

Along with foundations of access to mental health care, it is important to understand principal theoretical frameworks and potential factors associated with access to mental health services. Theoretical frameworks offer useful information to identify key factors associated with access to mental health services. Although there is not a comprehensive model to examine access to mental health care, some frameworks offer elements that have been found to be associated with service use. For example, the Behavioral Model of Health Care Utilization (Andersen, 1995), and the Health Belief

Model (Abraham & Sheeran, 2005) are usually applied to examine access to mental health services.

The Behavioral Model of Health Care Utilization stresses that improving access to care is best accomplished by focusing on contextual and individual factors (Andersen et al., 2014). Contextual factors include circumstances of health care access, health organization, and community characteristics, whereas individual factors include family characteristics, socio-economic status, and geographic location (Andersen et al., 2014). Although the Behavioral Model of Health Care Utilization has been widely used in health services research since its inception in the late 1960s, its application to examine access to mental health care is limited. Among the studies that have applied the Behavioral Model to examine access to mental health services, Marshall (2011) and Starkes, Poulin, and Kisely (2005) found that the model only partially explained mental health care utilization and that single variables (e.g., income, age, gender, mental disorders) were more useful in explaining access to services.

While the Behavioral Model of Health Care Utilization focuses on contextual and individual factors, the Health Belief Model (HBM) focuses on how an individual *internalizes* a health problem and whether or not it has become a problem that warrants immediate action (Cornelius & Bankins, 2009). Specifically, the HBM emphasizes threat perception (i.e., perceived susceptibility and severity of symptoms) and health-related behavioral evaluation (i.e., perceived benefits and barriers) as the primary aspects for understanding how individuals represent health actions and seek medical care (Abraham & Sheeran, 2005). Despite its wide use to test health behaviors, such as smoking cessation (Schmitz, Spiga, Rhoades, Fuentes, & Grabowski, 1999), few studies (Henshaw

& Freedman-Doan, 2009; Ogden, 2003) have used the Health Belief Model to examine access to mental health care. One of the reasons for the lack of studies addressing access to mental health care using the Health Belief Model might be that some components of the model have not been psychometrically validated; moreover, cultural factors (e.g., cultural background, cultural beliefs towards help-seeking) are not included in the model (Cornelius & Bankins, 2009).

Together, the Behavioral Model and the Health Belief Model show the dimensions of access to health care that are typically examined in research. Each model offers a different, yet valid approach to examine access to mental health services. Although these frameworks are useful in identifying potential determinants to access mental health services, their application is limited in explaining youth help-seeking behaviors (Abraham and Sheeran, 2005; Marshall, 2011).

The Commission on the Social Determinants of Health Conceptual Framework (CSDH)

The lack of a framework to examine access to mental health care indicates the need to take an exploratory approach based on a theoretical framework that suggests potential determinants of youth access to mental health services. Therefore, this study applied the World Health Organization (WHO) Commission on the Social Determinants of Health (CSDH) framework, created by Solar and Irwin in 2007 and updated in 2010. The CSDH framework offers a theoretical approach for understanding and addressing the conditions in which people are born, grow, and live (Davis & Chapa, 2015; Raphael, 2009). The growing literature on the social determinants has established that social, psychological, and biological factors have an impact on mental and physical health

(Fisher & Baum, 2010). The Public Health Agency of Canada (2016), indicates that individual (health status, problematic substance use), family (e.g., household composition, household income), community (e.g., social networks, neighborhoods social environment), and social (e.g., inequality, discrimination) factors are contributors to the development of either positive mental health or mental health problems for children, adolescents, and young adults. Research indicates that the strongest determinants of health for youth are structural factors, such as national wealth, income inequality, and access to education (Marmot, 2005; Viner et al., 2012). In a study examining the association between socio-economic position and emotional and behavioral problems in youth, results showed that lower socio-economic position predicted cumulative prevalence rates of behavioral problems (Van Oort et al., 2011).

The main feature of the CSDH resides in its socio-ecological organization providing a framework for the development of multi-level interpretations that can explain change at various levels of an individual's environment (Fitzgibbon, Kong, & Tussing-Humphreys, 2014). Socio-ecological frameworks can be viewed, in part, as a reaction to the limited explanatory influence of earlier behavioral and cognitive models of behavior change (e.g., Health Belief Model) that focused on the individual as the unit of analysis and did not produce a profound or sustained explanation of the context that influence health care utilization (Glanz, Rimer, & Lewis, 2002).

The Commission on the Social Determinants of Health (CSDH) framework incorporates three approaches of social epidemiology to generate its structure. The first approach suggests that psychosocial factors (e.g., individuals' perceptions and experiences of personal status) are associated with high stress levels and poor health

status (Solar & Irwin, 2010). The second approach refers to the social production of disease, articulated as the association between inequalities of structural factors (e.g., income, education, health services, food, housing) within a society and their effects on health status (Solar & Irwin, 2010). The final approach follows an ecological perspective, suggested as the integration of biological and social factors to examine determinants of social inequalities in health and disease (Solar & Irwin, 2010).

The three approaches in the Commission on the Social Determinants of Health (CSDH) framework contribute to the formation of the key components in the framework: (a) socio-political context, (b) structural determinants, and (c) intermediary determinants. The first component of the model encompasses cultural and functional aspects of social systems that influence patterns of social stratification (e.g., labour market opportunities, educational system organization; Solar & Irwin, 2010). The second element of the framework encompasses structural determinants, referring to the socioeconomic position of individuals (Solar & Irwin, 2010). The third element includes intermediary determinants, which regulate differences in risk and vulnerability to health-threatening conditions (Ponce & Ko, 2014; Solar & Irwin, 2010)

While the first element of the CSDH framework offers useful information about the social context and public policies that govern societies, the second and third elements of the framework are of crucial importance to the hypotheses of this study, namely its ecological organization allowing the incorporation of area-level and individual-level factors as structural or intermediary determinants to examine access to mental health services (see Figure 1 in Appendix D). Structural determinants offer information on measures of socioeconomic position. Educational attainment, occupation, and income are

the most utilized indicators of socioeconomic position in studies on access to mental health care (Alegria, Bijl, Lin, Walters, & Kessler, 2000; Steele, Dewa, & Lee, 2007; Steele, Dewa, Lin, & Lee, 2007).

Socioeconomic position can be measured at individual, household, neighborhood, and region levels (Solar & Irwin, 2010). For example, area-level factors (e.g., neighborhood level of income and education) have been linked to accessing mental health care (Ivert, Levander, & Merlo, 2013; Steele et al., 2006) and were integrated as structural determinants in this study. Furthermore, socioeconomic position can be measured at different points in the lifespan (e.g., adolescence, adulthood; Solar & Irwin, 2010). Research has shown that socioeconomic position measured at household and neighborhood levels is linked with access to mental health services among youth and adults (Steele et al., 2006). In addition, the Commission in the Social Determinants of Health (CSDH) framework recognizes age, sex, and ethnicity as structural determinants, due to their relation with socioeconomic position (Solar & Irwin, 2010).

The third element of the Commission on the Social Determinants of Health (CSDH) framework, intermediary determinants, include material circumstances (e.g., living and working conditions), psychosocial factors (e.g., negative life events, social support, coping styles), behavioral/biological factors (e.g., lifestyle, alcohol consumption, mental illness), and the health care system (e.g., organization of health care delivery; Ponce & Ko, 2014; Solar & Irwin, 2010). Research has found that psychosocial factors (e.g., social support; Gagné, Vasiliadis, & Prévile, 2014) and behavioral factors (e.g., alcohol and tobacco consumption) are associated with youth access to mental health care (Vanheusden et al., 2008).

Although the Commission on the Social Determinants of Health framework has not been widely applied to examine access to mental health services, unlike other frameworks (e.g., Behavioral Model of Health Care Utilization, or Health Belief Model), its organization follows an ecological approach. In this, regional, neighborhood, and individual-level variables are analyzed to provide useful information to examine determinants for accessing mental health services. Research suggests that studies trying to reach the policy sphere should consider not only individual variables, but also regional information in their analyses, because public health and health care programs are often implemented at the organizational and regional levels rather than at the individual level (Okoumunne et al., 1999). Thus, the application of the CSDH framework offers information about individuals that can be combined with the social context in which access to mental health services occurs.

Overall, the organization of the CSDH framework allows the incorporation of specific factors that have been shown to be relevant to access to mental health services. For example, geographic location (e.g., urban, rural), which has been associated with youth access to mental health care (Borders, Booth, Stewart, Cheney, & Curran, 2015; Jackson et al., 2007), was incorporated under structural determinants in this study. Given that perceived need for care, a key criterion of access to mental health care that is often influenced by social context and by decisions individuals make in response to symptoms (Marshall, 2011; Mojtabai et al., 2002), was subsumed under intermediary determinants within the Commission of the Social Determinants of Health framework.

Individual Determinants to Access Mental Health Services for Youth

Individual-level variables (e.g., age, gender, cultural background, socioeconomic position) are usually the most examined indicators on access to mental health services (Bergeron et al., 2005; Chen et al., 2013; Cheung & Dewa, 2007; Kaufmann, Chen, Crum, & Mojtabai, 2014). In this study, key individual determinants were selected based on their relevance to adolescents' and young adults' developmental process, as well as on the literature review. Individual determinants are divided in structural (demographic information and socioeconomic position) and intermediary (psychosocial elements) factors. In this study, the contribution of individual structural and intermediary determinants was considered before ecological variables (regional socioeconomic position, and neighborhood income) were examined.

Research that has examined individual and ecological determinants to access mental health services suggests that age, sex, immigrant status, and marital status are related to accessing services (Diaz-Granados et al., 2010). In particular, individuals aged 15 to 29 years, with low income, and diagnosed with depressive disorders are at risk of not receiving services from general practitioners or psychiatrists (Diaz-Granados et al., 2010). In contrast, a study found that among adolescents with depressive disorders, services from psychiatrists were more commonly consulted (Mendenhall, 2012).

Structural determinants. Key individual determinants and risk factors related to socioeconomic position are age, sex, cultural background, household type, marital status, education, and income.

Age and sex. Studies that have examined individual structural determinants and access to mental health care among youth, usually analyze age and sex as demographic

variables that might be related to youth accessing services (Boyd et al., 2011, Lyon et al., 2013). Although some studies have found that adolescents and young adults with depressive disorders are more likely to access services from general practitioners, psychiatrists, or psychologists than do individuals from older age groups (Bergeron et al., 2005; Starkes et al., 2005; Lyon et al., 2013), other studies found the opposite (Hardy, Kelly, & Voaklander, 2011; Zuvekas & Fleishman, 2008). In addition, research has indicated that young adults with depression are more likely than adolescents to seek help from a general practitioner (Boyd et al., 2011; Vanheusden et al., 2008).

Similarly, research has found that adolescents with substance use disorders received care from a general practitioner or school counsellor rather than from mental health specialists (Winstanley, Steinwachs, Stitzer, & Fishman, 2012). In contrast, a study found that young adults with substance use disorders were less likely than adolescents to access mental health care (Vanheusden et al., 2008). It seems that research is not conclusive on whether age is a determinant or risk factor of access to mental health care for youth with depressive disorders; thus, age should be considered along with other factors (e.g., sex, education, income, attitudes, beliefs about health care).

One of the reasons to include sex as a determinant of access to mental health care resides in the difference of prevalence rates of depressive and substance use disorders between male and female youth. Depressive disorders have been found to be more prevalent among female youth (Avenevoli et al., 2015), while substance use disorders have been found to be more common among

male youth (Copeland et al., 2011). This difference is apparent in access to mental health services; studies have found that females are more likely than males to access professional mental health services (Bergeron et al., 2005; Broman, 2012, Lo & Cheng, 2011; Mason, Keyser-Marcus, Snipes, Benotsch, & Sood, 2013; Vanheusden et al., 2008). In particular, a study found that while females are more likely than males to access specialty mental health care, males are more likely than females to access care from general practitioners (Lo & Cheng, 2011).

Ethnicity. Some studies found that youth who identified themselves as Asian, Hispanic, Black, or other visible minorities are less likely to access general and specialty mental health services than youth who identified themselves as White or Caucasian (Broman, 2012; Lyon et al., 2013; Mason et al., 2013; Thomas, Temple, Perez, & Rupp, 2011; Winstanley et al., 2012). However, research has found that minority groups are more likely to consult services from general practitioners than from psychiatrists or psychologists (Lo & Cheng, 2011). In addition, studies have indicated that ethnic differences in access to mental health care should be examined in combination with sex, age, and socioeconomic position (Broman, 2012; Lyon et al., 2013; Thomas et al., 2011). Similar to studies that use immigrant variables as a proxy to indicate ethnicity, research has used cultural background as an indicator of ethnicity (Diaz-Granados et al., 2010).

Household type and marital status. Studies that have examined structural determinants associated with access to mental health services among youth have indicated the importance of including household type and marital status as factors related to consulting services, due to family or partner organization, which might influence youth help-seeking behaviors. Research that has included household type among other

determinants (e.g., age, sex, ethnicity) has found that adolescents living in one-parent families are more likely to access any type of professional service than those who live with two parents (Winstanley et al., 2012). In contrast, studies found that young adults who live alone are more likely than those living with a partner, family, or child to access services (Bergeron et al., 2005; Hämäläinen, Isometsä, Sihvo, Pirkola, & Kiviruusu, 2008).

Education and income. The most commonly examined variables to measure socioeconomic position in studies on access to mental health services are education level and household income. Most studies indicate that adolescents aged 15 to 18 years should have from 8 to 10 years of education, hence being high school students or high school graduates (Hardy et al., 2011; Steele et al., 2006; Zuvekas & Fleishman, 2008). Young adults aged 19 to 24 should have from 10 to 12 years or more of formal education, hence being high school graduates, college or university students, or university graduates (Hardy et al., 2011; Steele et al., 2006). Studies that have examined level of education and access to mental health services indicate that having more than 10 to 12 years of education is a determinant of consulting services among youth with depressive and substance use disorders (Hardy et al., 2011; Steele et al., 2006; Zuvekas & Fleishman, 2008). In contrast, education level of less than 10 years has been found to be a risk factor for limited access to mental health services (Broman, 2012; Thomas et al., 2011).

The other indicator commonly used to measure socioeconomic position is household income. Studies that have examined access to professional services for

youth with depressive and substance use disorders have concluded that adolescents and young adults who live in households with low income (less than \$30,000 per year) are less likely to seek services, either from general practitioners or psychiatrists, and psychologists (Chen et al., 2013; Cheng & Lo, 2011; Mason et al, 2013; Meredith et al., 2009; Wang, 2006). In a study conducted in 2006, Steele, Glazier, and Lin examined access to mental health care under universal health care coverage and concluded that even in countries where mental health services are public, low household income should be considered a risk factor for access to mental health services.

Conversely, high household income has been found to be a determinant to access mental health services, especially from psychiatrists and psychologists (Chen et al., 2013; Steele, Glazier, & Lin, 2006; Wang, 2006). Given that most services from psychiatrists and psychologists are not included in provincial public health care insurance, high household income could facilitate out-of-pocket spending for private services that might not be included in provincial insurance. It is relevant to mention that some studies have found no association between socioeconomic position and access to mental health services among youth (Roy-Byrne, Joesch, Wang, & Kessler, 2009; Steele, Dewa, Lin, & Lee, 2007).

Intermediary determinants. Psychosocial factors included in this study were depressive and substance use disorders, perceived need for care, social support, and self-rated physical health status.

Depressive disorders. Due to high prevalence rates of depressive disorders (8.2%) among youth (Pearson et al., 2013), research has examined diagnosis of depressive disorders (major depressive episode, bipolar I, and bipolar II) related to accessing mental

health services. Although research has found that diagnosis of depressive disorders is a predictor of access to mental health services among adolescents and young adults (Avenevoli et al., 2015), other studies have found that diagnosis of depressive disorders should be examined along with other indicators (e.g., sex, age, socioeconomic position; Black et al., 2012; Broman, 2012; Gulliver, Griffiths, Christensen, & Brewer, 2012).

Substance use disorders. Along with depressive disorders, substance use disorders have been found to be prevalent among youth (11.9%; Pearson et al., 2013) and have been considered predictors of access to mental health services. For example, studies have indicated that substance use disorders diagnosis as well as other indicators (e.g., age, sex, socioeconomic position) are associated with access to mental health services among youth (Mason et al., 2013; Mericle et al., 2015; Winstanley et al., 2008). Research has also examined comorbid disorders (both depressive and substance use disorders) as predictors to access mental health services among youth. A study found that adolescents with comorbid depressive and substance use disorders are more likely to seek help from a school counsellor, family doctor, or psychiatrist than from any other health care professional (Winstanley, Steinwachs, Stitzer, & Fishman, 2012). Similarly, research has found that comorbid disorders are associated with greater access to mental health services than single diagnosis (Mojtabai et al., 2014; Sareen et al., 2005)

Perceived need for care. In the first section of this chapter, *Foundations of Access to Mental Health Services*, perceived need for care and its association with

access to mental health services was explained as a key criterion to seek help for mental health reasons. It is widely accepted that youth with mental illness who perceive a need for care are more likely to access mental health services, than those who do not perceive a need for treatment (Kim, Lim, Chung, Noh & Shin, 2014; Mojtabai et al., 2002; Sunderland & Findlay, 2013; Urbanoski et al., 2008). Some studies argue that the perception of need for care is influenced by the severity of mental illness and by availability of services (Mojtabai et al., 2002; Urbanoski et al., 2008).

Social support. Among individual intermediary determinants, the presence of social support (e.g., affection, positive social interactions, emotional support) has been found to be associated with access to mental health care among youth (Edlund, Unützer, & Curran, 2006; Gagne et al., 2014; Gulliver et al., 2012; Nelson & Park, 2006).

Research has examined social support in combination with perceived need for care. For example, because research has found that the presence of social support (i.e., having someone listen and advise them, and someone that gives information and understands mental health problems) can be considered informal treatment for youth with mental illness, some youth do not perceive a need to seek formal services (Edlund, Unützer, & Curran, 2006).

Self-rated physical health. Studies that have examined self-rated physical health and its association with access to mental health services indicate that adolescents and young adults who report fair to poor health were more likely to seek help from general practitioners, psychiatrists, or psychologists (Burnett-Zeigler et al., 2012; Cheng & Lo, 2011; Sareen, Cox, Afifi, Yu, & Stein, 2005). Conversely, youth who report good to excellent health were less likely to seek specialty and non-specialty services, even those

who have been diagnosed with a mental illness (Burnett-Zeigler et al., 2012; Cheng & Lo, 2011; Sareen et al., 2005). Furthermore, self-rated physical health is usually examined along with other intermediary and structural determinants, such as perceived need for care, social support, mental illness, education, and income (Edlund, Booth, & Feldman, 2009; Marshall, 2011; Sunderland & Findlay, 2013).

Overall, studies that have examined individual structural and intermediary factors as determinants of access to mental health services among youth have found that being female, having a White/Caucasian ethnic background, having more than 10 -12 years of education, living in households with mid- to high-range incomes, perceiving a need for care, and having a social support system promote access to services (Broman, 2012; Cheng & Lo, 2011; Cheung & Dewa, 2007; Gagné et al., 2014; Hämmäläinen et al., 2008; Ilgen et al., 2011; Kekkonen et al., 2015; Mason et al., 2013; Thomas et al., 2011). In contrast, education level of less than 8 years, low household income, failure to perceive a need for care, and lack of a social support system, have been found to be risk factors of access to mental health services for youth (Cheng & Lo, 2011; Gagné et al., 2006; Mason et al., 2013; Meredith et al., 2009; Mojtabai et al., 2002; Nelson & Park, 2006; Sunderland & Findlay, 2013).

Ecological Determinants to Access Mental Health Services for Youth

Regional and neighborhood-level factors, such as income inequality, unemployment, and immigrant concentration have been found to influence health status and health service utilization either in addition to or in interaction with individual-level characteristics (e.g., age, sex, gender, education; Pickett & Pearl,

2001; van Kamp et al., 2004). Although research has examined area-level determinants and their association with specialty health care utilization (Chaix, Boëlle, Guilbert, & Chauvin, 2005), other studies have examined neighborhood-level socioeconomic position, psychosocial stressors (e.g., experience of crime, drug misuse), and risk of mental illness associated with self-rated health status (Agyemang et al., 2007; Alegria, Molina, & Chen, 2014; Pickett & Pearl, 2001). However, with few exceptions (Diaz-Granados, Georgiades, & Boyle, 2010; Weich, Twigg, Holt, Lewis, & Jones, 2003; White, Matheson, Moineddin, Dunn, & Glazier, 2011), studies have not examined individual, neighborhood, and region-level variables related to health status and mental health services utilization.

Neighborhood determinants to access mental health services. Given the growing concern about high prevalence rates of mental illness, research has also examined neighborhood-level factors and their association with mental illness. For example, research indicated that living in neighborhoods with high levels of economic deprivation is a risk factor for depressive and anxiety disorders (Alegria et al., 2014). In addition, unlike research on regional variables, studies on neighborhood structural (e.g., income, education, employment) and intermediary (e.g., drug misuse, nuisance from neighbors) determinants and risk factors are usually examined in combination with regional or individual variables (Matheson et al., 2006; Sugiyama et al., 2016; White et al., 2011). For example, research on neighborhood and regional determinants has indicated that mental illness (e.g., depression, anxiety, substance use disorders), stress, and self-rated mental health status are negatively associated with education level, income, ethnicity, employment, and household type (Agyemang et al., 2007; Alegria et al., 2014;

Matheson et al., 2006; Ross & Mirowsky, 2001; Silver, Mulvey, & Swanson, 2002; Sugiyama et al., 2016; White et al., 2011).

Although studies on neighborhood determinants and mental illness are common, this is not the case for studies that examine neighborhood determinants and access to mental health services. Among the studies that have examined neighborhood determinants, results have shown that youth with mental illness who reside in neighborhoods with high income and education are more likely to access mental health services than youth living in economically deprived neighborhoods (Drukker, Driessen, Krabbendam, & van Os, 2014; Ivert et al., 2013; Steele et al., 2006). These studies also indicate that youth who reside in neighborhoods with high proportions of immigrants are less likely to seek help for mental health reasons (Drukker et al., 2014; Ivert et al., 2013; Steele et al., 2006). The examination of proportion of immigrants relative to proportion of income and education can reveal particular areas in which rates of access to services might be lower; research has indicated relatively lower use of mental health services by immigrants (Diaz-Granados et al., 2010). It seems that studies examining neighborhood-level determinants use immigration variables as a proxy to indicate cultural background, and thus reveal similar patterns as variables measured at the individual level (e.g., ethnicity).

Studies that have examined geographic location as a determinant or risk factor of access to professional mental health care for youth are not conclusive. Some studies affirm that youth who live in rural areas are less likely to consult specialized professional services (e.g., psychiatrists, psychologists), due to lack of

services and distance to services (Borders et al., 2015; Jackson et al., 2007; Starkes et al., 2005). However, research has found that urban location is not associated with greater access to mental health services (Dolja-Gore et al., 2014). In contrast, the results from a longitudinal study indicated that after controlling for other individual variables (i.e., sex, ethnicity) youth with substance use disorders who lived in rural areas were more likely to access mental health services than adolescents living in urban and suburban areas (Ilgen et al., 2011).

Given that research on geographic location as a determinant or risk factor of access to mental health care is not conclusive, and the definition of geographic location varies across studies (e.g., urban versus rural, counties, provinces, health regions), this study examined community size as a proxy for geographic location. By examining community size, this study was able to differentiate between rural and urban communities.

Regional determinants to access mental health services. Although research has examined structural (e.g., gender, socioeconomic position, occupation) and intermediary (e.g., mental illness, physical health) determinants associated with health status and health services utilization, with few exceptions (Diaz-Granados et al., 2010; Ilgen et al., 2011; Ivert, Levander, & Merlo, 2013), studies have not have focused on the effects of regional determinants in combination with other area-level variables and individual determinants to examine access to mental health services. For example, a study in France examined regional determinants of specialty health care utilization and its relation with structural determinants (Chaix et al., 2005). They found that specialty care utilization among males increased with area-level density of specialists; however, specialty care

utilization among females increased with the area-level percentage of highly educated individuals.

Research on the effect of regional determinants and risk factors of access to mental health care is not conclusive, and according to some studies (Granados et al., 2010; Ilgen et al., 2011; Ivert et al., 2013), individual variables should be examined as well. It seems that regional-level factors can offer contextual information to explain the effects of other area-level variables (e.g., neighborhood-level factors) and individual-level variables when examining access to mental health services. For example, research has utilized regional variables (e.g., regional income inequality, health regions) to offer information about the environment in which access to health services and out-of-pocket spending occurs (Chu, Liu, Chen, Tsai, & Chiu, 2005; Sibley & Weiner, 2011).

Methods

A secondary analysis of combined data from the Canadian Community Health Survey– Mental Health Component (CCHS– MH, 2012), the Postal Code Conversion File Plus (PCCF+), and the Canadian Community Health Survey (CCHS) Annual Component, 2011-2012 was conducted to address the objective (i.e., examine the contribution of individual and ecological determinants of access to mental health services) of this study. This study examined the contribution of ecological variables measured at regional and neighborhood levels and individual-level variables to explain access to mental health services among youth.

The CCHS Annual Component collects information related to health status, health care utilization and health determinants (Statistics Canada, 2013a).

The CCHS - MH was designed to assess the mental health status of Canadians and measure access and utilization of mental health services (Statistics Canada, 2013a). The PCCF+ provides a method to link Postal Codes, standard Census geographic areas (i.e., dissemination areas, census subdivisions, and census tracts), and supplementary administrative areas, along with ecological variables of immigrant terciles and income quintiles (Statistics Canada, 2013d). Linking survey (CCHS-MH, CCHS, 2011-2012) and census (PCCF+) data allowed the analysis of ecological and individual variables in this study. The data linkage was conducted to include selected variables from PCCF+ and from CCHS Annual Component into the CCHS-MH dataset.

Participants

The CCHS – MH is a cross-sectional survey of 27,500 respondents aged 15 and over, who were selected from the noninstitutionalized household population from across the 10 Canadian provinces. Due to high prevalence rates of depressive and substance use disorders among youth, and low rates of access to mental health services, this study focused on the youngest age group of respondents (15 to 24 years old) in CCHS-MH. The number of respondents between the ages of 15 and 24 years old who answered the survey was 4,013, representing a weighted total of 4 million individuals.

Procedures

Recruitment. The CCHS – MH covers the population 15 years of age and older across the 10 provinces; excluded are residents from the three territories, persons living on reserves or other Aboriginal settlements, full-time members of the Canadian Forces, and institutionalized populations (Statistics Canada, 2013a). In all selected dwellings, a knowledgeable adult household member was asked to provide basic demographic

information on all residents of the dwelling, then one member of the household aged 15 or older was randomly selected for a more in-depth interview (Statistics Canada, 2013a).

Sampling methods. The sampling strategy used in the CCHS - MH was a multistage-stratified cluster design in which the dwelling is the final sampling unit (Statistics Canada, 2013a). Data collection for the CCHS-MH resulted in a total of 25,113 interviews conducted using computer-assisted personal interviewing (CAPI) (Statistics Canada, 2013a). Overall, the response rate was 68.9%, from which 87% of the interviews were conducted in person, while 13% were conducted by telephone (Statistics Canada, 2013a). The response rate for adolescents and young adults was 77.9% (Statistics Canada, 2013a).

Measures

Outcome measures. For the current study, the outcome measures selected from the CCHS – MH were: 1) reported consultation of professional mental health services, 2) reported number of types of professionals consulted, and 3) reported hours of consultation with all professionals. The selected outcome measures are derived variables (DV) in CCHS – MH, which are created from three sets of questions (Statistics Canada, 2013b): (1) *reported consultation and utilization of mental health services* was derived from three questions (see Table 1 in Appendix A), resulting in a categorical dichotomous variable (consulted professionals services vs. did not consult professional services); (2) *number of types of professionals consulted* was summed from responses to five questions regarding the types of professionals consulted (Table A1); (3) *hours of consultation with*

professionals, also derived from five questions (Table A1), indicating the total number of hours spent in consultation with all professionals.

Predictor measures. The predictor measures were organized according to the Commission on the Social Determinants of Health (CSDH) framework, following an ecological approach, divided on three steps: (1) individual-level determinants, included age, sex, ethnic background, living arrangements, marital status, education, income, depressive disorders, substance use disorders, perceived need for care, social support, and self-rated physical health; (2) area-level determinants measured at the regional level included income and regular source of care; and (3) area-level determinants measured at the neighborhood-level included income, immigration, and community size.

Individual-level determinants. The first group of predictors for this study was selected from CCHS-MH. Seven questions were selected from CCHS-MH as structural determinants: (1) age, (2) sex, (3) cultural background, (4) living arrangements of respondent, (5) marital status, (6) level of education of respondent, and (7) household income. CCHS-MH asked respondents to provide demographic information, such as age (measured in years), sex, and country of origin. This study used country of origin as a proxy for ethnicity. In addition, respondents were asked to provide information about living arrangements and marital status, which identify the family relationships between the selected respondent and the rest of the household (Statistics Canada, 2013c). In CCHS-MH, education level of respondent is divided in 4 categories, from less than secondary school graduation to post-secondary certificate/diploma or university degree (Statistics Canada, 2013b). Similarly, household income is divided in 15 categories, from no income to \$150,000 or more (Statistics Canada, 2013b).

Six variables were selected from CCHS-MH as intermediary determinants: (1) presence of depressive disorders in the past 12 months, (2) presence of substance use disorders in the past 12 months, (3) perceived need for care, (4) social support, (5) use of mental health care by relatives, and (6) self-rated physical health. In the CCHS-MH, the questions and derived variables on depressive disorders, anxiety disorders, and substance use disorders are based on a World Health Organization version of the Composite International Diagnostic Interview (WHO-CIDI) modified for the needs of CCHS-MH (Statistics Canada, 2013b; WHO, 2004). Studies addressing the validity of the CIDI diagnostic assessments found that the CIDI yields diagnoses that are consistent with those obtained on independent semi-structured diagnostic interviews carried out by experienced clinicians (Brugha, Jenkins, Taub, Meltzer, & Bebbington, 2001; Kessler, Haro, Heeringa, Pennell, & Üstün, 2006). In addition, test-retest reliability estimates (over 9 days) of the CIDI Substance Abuse and Dependence modules have been found to be adequate to good (Reed et al., 1998; Rubio-Stipec, Peters & Andrews, 1990).

The adapted WHO-CIDI version of depressive disorders for the CCHS-MH comprises 67 questions about major depressive episode, suicide ideation, and bipolar disorders (Statistics Canada, 2013c). In CCHS-MH, a total of 86 questions assessed alcohol abuse, alcohol dependence, and substance use disorders (Statistics Canada, 2013c). The selection of variables of depressive and substance use disorders for the 12-month period prior to the survey interview is consistent

with previous studies that used data from the CCHS-MH (Findlay & Sunderland, 2014; Pearson et al., 2013; Sunderland & Findlay, 2013).

CCHS-MH also asked respondents about perceived need for care in the past 12 months and divided perception of need in 4 categories from no perceived need to needs unmet (Statistics Canada, 2013c). Among the selected intermediary determinants, an index (i.e., derived variable) of social provisions is the sum of 40 items, with total scores ranging from 10 to 40, and higher scores reflecting greater perceived social support (Statistics Canada, 2013b). Reliability of the individual social provision subscales were found to be adequate, with coefficient alphas ranging from .65 to .76 (Cutrona & Russell, 1987). Reliability of the total Social Provisions score (Cronbach's alpha = .92; Cutrona & Russell, 1987). Use of mental health care by relatives in the past 12 months and self-rated physical health were also included as questions in CCHS-MH (Statistics Canada, 2013b). For a description of all the selected ecological and individual predictors refer to Table A2.

Neighborhood-level determinants. The second group of predictors for this study are ecological determinants drawn from the Postal Code Conversion Files+ (PCCF+). The PCCF+ is a SAS-control program derived from the Postal Code Conversion Files (PCCF), the 2011 Postal Code population weight file, the Geographical Attribute File, Health Region boundary files, and other supplementary data (Statistics Canada, 2013d). The PCCF+ automatically assigns a range of Statistics Canada's standard geographical areas and other geographic identifiers based on postal codes (Statistics Canada, 2013d). This study used ecological variables calculated at the Dissemination Area (DA) level, which consists of one or more urban city blocks or rural areas with a population of 400 to

700 (Peters, Olivier, & Carrière, 2012). Similar to previous research, the DA was selected because it covers all the territory of Canada and is the smallest geographic unit that contains census population (Peters et al., 2012).

Three variables were selected from PCCF+: (1) community size, (2) income quintiles, and (3) immigration terciles. The first predictor, community size, classifies each census metropolitan area into 5 categories, from rural and urban areas with a population less than 10,000 to urban areas with a population of 1,500,000 or greater. The second predictor, income quintiles is a household size-adjusted measure of income (Statistics Canada, 2013d). The quintiles were defined within each census metropolitan/agglomeration area in order to better reflect the relative nature of income, minimize the effect on household welfare, and ensure that each area would have an equal percentage of the population in each income quintile (James, Wilkins, Detsky, Tugwell, & Manuel, 2007). The third predictor, immigrant terciles, divides the area-based proportion of the total Canadian immigrant population into three approximately equal parts, with roughly two million immigrants in each tercile (Carrière, Peters, & SanMartin, 2012). For a description of each predictor, see Table A2.

Regional-level determinants. The third group of predictors for this study are ecological determinants drawn from the Canadian Community Health Survey (CCHS) Annual Component. The CCHS Annual Component is a cross-sectional survey designed to provide information about determinants of health and health care utilization at the health region level (Statistics Canada, 2013e). Health regions are administrative areas defined by the provincial ministries of health to

administrate and deliver public health care (Statistics Canada, 2016). Selected variables from CCHS were aggregated at the health region level, then a subset of two variables were selected from CCHS Annual Component: (1) income, and (2) regular source of care.

Ethical Considerations

Data from CCHS - MH was anonymized and direct identifiers (e.g., name, social insurance number, personal health number) were removed from the sample. Consistent with the Tri-Council Policy Statement (TCPS 2) Chapter 5: Privacy and Confidentiality, this study follows the guidelines established in section B., “The ethical duty of confidentiality”, and in section C., “Safeguarding information” (Government of Canada, 2014). Furthermore, this study was approved by the Ethics Committee of the University of New Brunswick, Fredericton.

In order to access data from the CCHS – MH, a request was made to Statistics Canada and permission was obtained to use the Master File at the University of New Brunswick’s Research Data Centre. Since the CCHS Annual Component and PCCF+ files are in the public domain, a request was made to the Research Data Centre at the University of New Brunswick to merge the CCHS Annual Component and PCCF+ into the dataset proposed in the previously approved application. Permission was granted to use the datasets at the Research Data Centre.

Data Preparation

Data linkage from the PCCF+ to the CCHS-MH. This study combined data from the PCCF+ with data from the CCHS, 2012 – MH in two steps. First, CCHS-MH data was geocoded with PCCF+ Version 6C provided by Statistics Canada to assign

ecological variables (income quintiles and immigration terciles). Second, these ecological variables were included in the file containing the selected CCHS – MH variables (individual determinants).

Data linkage from CCHS Annual Component to CCHS-MH. This study combined variables from CCHS Annual Component with data from CCHS-MH in three steps. First, selected variables from CCHS Annual Component (sex, education, income, mental illness) were aggregated at the health region level. Second, the aggregated dataset from CCHS Annual Component was geocoded with PCCF+ Version 6C to assign ecological variables (health regions). Third, these ecological variables were included in the file containing the selected CCHS – MH and PCCF+ variables (individual and neighborhood-level variables).

Results

The data were examined through sequential binary logistic regression and sequential multinomial logistic regressions. Analyses were conducted in SPSS v. 20 and in STATA v. 20. The analyses were weighted to ensure that the sample was representative of the Canadian population ages 15 to 24. To address the complexity of the CCHS-MH design, bootstrapping was applied to all analyses as a variance estimation technique. The application of bootstrap coefficients is consistent with other studies that used the CCHS-MH (Afifi et al., 2014; Afifi et al., 2016) and is recommended by Statistics Canada (2013a).

Data Screening

Data were checked and screened for missing values and univariate and multivariate outliers. Missing values were examined with frequency tables, and all

variables had less than 5% of missing values. Univariate outliers were examined for age, education, income, perceived need for care, social support, self-rated physical health, and neighborhood income quintiles. The variables were transformed into Z-scores; any Z-score was considered an outlier if it was outside the range of -3 or $+3$ standard deviations. No univariate outliers were detected. Multivariate outliers were assessed using Mahalanobis' distance. No multivariate outliers were detected.

Frequency tables, histograms, skewness, and kurtosis were also examined. Only two variables were positively skewed: (1) hours of consultation with all professionals and (2) number of types of professionals. This occurred because of the high frequency of zeros for each variable. Although these variables were log-transformed, they were still skewed. Thus, after careful consideration and consistent with the recommendations of Farrington & Loeber (2000) hours of consultation with all professionals and number of types of professionals consulted were transformed into categorical variables, each variable with three categories.

Multicollinearity was examined with VIF statistics, and any value over 10 indicated multicollinearity (Fields, 2012). Tolerance values were also examined, and any value less than 0.1 indicated multicollinearity (Fields, 2012). No multicollinearity was detected for age, education, income, perceived need, social support, self-rated physical health, neighborhood income, having a family doctor, and income at the health region level. Multicollinearity for categorical variables was examined with chi-square tests. No multicollinearity was detected for these variables.

Multicollinearity among the three outcome variables was examined with chi-square tests. The relation between reported consultation with professionals and hours of

consultation was significant $\chi^2_{(2)} = 1570.18, p < .001$, as well as the relation between reported consultation with professionals and number of types of professionals consulted $\chi^2_{(4)} = 1919.19, p < .001$. The relation between hours of consultation and number of types of professionals consulted was also significant $\chi^2_{(2)} = 1714.62, p < .001$.

Descriptive Analyses

Table 4 shows percentages for each individual, neighborhood, and region-level predictors. The sample for this study included adolescents (15 to 19 years) and young adults (20 to 24 years), from which 47% were males, and 53% were females. The majority (74%) of the sample identified themselves as White, compared to 24% who identified themselves as visible minorities (e.g., Asian, Hispanic). Almost half of the sample, (49%), reported living with their parents at the time of the survey. Similarly, 89% chose single as marital status. Approximately one third of the sample, (35%) were high school students at the time of the survey, while 26% were high school graduates, and 26% had graduated from college or university. In terms of income, 44% of youth lived in households with mid and high income (\$80,000 or more), while 18 % lived in households with mid income (\$40,000 to \$59,000), and 7% lived in households with income lower than \$20,000.

Diagnosis of depressive disorders in the 12-month prior the survey was found in 8% of the sample; similarly, 12% of the sample reported a substance use disorder in the 12 -months prior to the survey. Most of the sample (79%) did not perceive a need for care. Nearly a third of the sample, (32%) had the highest score (40) in the social support

scale. The majority (79%) of the sample considered their physical status as good or very good.

In regards to neighborhood-level variables, the majority (76%) of the sample lived in communities with a population of 100,000 or more habitants. The majority (86%) of the sample lived in neighborhoods with low immigrant population, while 57% of the sample lived in neighborhoods with mid-to high-income quintiles. In regards to region-level variables, only 25% of the sample did not have a regular source of care (e.g., family doctor or general practitioner), and 27% of the sample lived in households with income lower than \$40,000.

Table 3 shows percentages of the three outcome variables divided by adolescents and young adults. Only 12% of adolescents and young adults consulted professional mental health services. Among adolescents with depressive disorders, 49% consulted services. Among adolescents with substance use disorders, 48% consulted services in the 12-month prior the survey. Among adolescents with comorbid depressive and substance use disorders, 56% of consulted professional mental health services. Similarly, 93% of adolescents had zero hours of consultation with professionals in the 12 months prior to the survey.

Among young adults with depressive disorders, 48% consulted services. Among young adults with substance use disorders, 25% consulted services in the 12- months prior to the survey. Among young adults with comorbid depressive and substance use disorders, 52% consulted professional mental health services. The majority (87%) of young adults did not consult any type of professionals. Similarly, 94% of young adults had zero hours of consultation with professionals in the 12- months prior to the survey

Sequential Binary Logistic Regression

Two binary logistic regressions were conducted to examine reported consultation with professionals in the past 12 months using individual and ecological indicators. The first binary logistic regression was conducted using the weight variable provided by Statistics Canada (2013). The second binary logistic regression was conducted using the weight variable and bootstrap coefficients provided by Statistics Canada. On step 1, individual-level variables (i.e., age, sex, cultural background, marital status, living arrangements, education, income, presence of depressive disorders, presence of substance use disorders, perceived need for care, social support, and self-rated physical health) were entered into the model. On step 2, neighborhood-level variables (i.e., community size, immigrant terciles, and neighborhood income quintiles) were entered. On step 3, regional-level variables (i.e., no family doctor, and income below \$40,000) were entered.

Consultation with professionals (model with weight variable). A (three-step) sequential logistic regression analysis was performed through SPSS LOGISTIC to assess prediction of membership in one of two categories of outcome (i.e., consulted professional mental health services versus did not consult mental health services), (1) on the basis of individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. Categorical variables (i.e., marital status, living arrangements, community size, and immigrant tercile) were dummy coded to conduct the logistic regressions. In the first step, individual-level predictors (i.e., age, sex, marital status, living arrangements, education, income, mental illness, perceived need, social support, physical health) were included. A test of the full model with all 13 predictors against a constant- only model was statistically significant, $\chi^2_{(17)} =$

959251.17, $p < .001$, indicating that the predictors, as a set, significantly distinguished between those who consulted professional mental health services and those who did not consult such services. Classification indicates 91% of those who did not consult services and 70% of those who consulted services correctly predicted, for an overall success rate of 88%.

Table 5 shows odds ratios and 95% confidence intervals for each of the 13 predictors. All individual predictors were significant ($p < .001$). Among the individual structural determinants, the odds ratio of age was OR= 1.02, 95% CI [1.02, 1.03]. For each one-year increase in age, the odds of consulting mental health services increased. Compared to males, females were 2 times more likely to consult mental health services. Compared to youth who identified themselves as White, youth who identified themselves as visible minorities were less likely to consult mental health services, CI [0.77, 0.78].

Following with individual structural determinants, the odds ratio of youth living with parents was OR= 0.88, 95% CI [0.77, 0.80]. Thus, the odds of consulting services increased if youth lived alone than if they lived with their parents. Similarly, the odds of consulting services increased if youth lived alone than if they lived in a common-law union, 95% CI [0.65, 0.67]. For each one-level decrease in education (e.g., from university student to high school graduate) the odds of consulting services increased, 95% CI [0.87, 0.88]. However, for each one-level increase in household income (e.g., \$25,000 to \$35,000), the odds of consulting mental health services increased, 95% CI [1.03, 1.03].

The odds ratio of having a depressive disorder was OR= 0.07, 95% CI [0.07, 0.07]. As such, compared to those who reported depressive disorders, youth who did not report a diagnosis of depressive disorders were less likely to consult mental health

services. Compared to those who reported substance use disorders, youth who did not report a diagnosis of substance use disorders were less likely to consult services, 95% CI [0.25, 0.26]. For each one-level increase in perceived need (e.g., from no perceived need to perceived needs partially met), the odds of consulting services increased, 95% CI [1.06, 1.09]. For each one-unit decrease in social support (e.g., from 20 to 19 points in the scale), the odds of consulting services increased, 95% CI [0.94, 0.94]. For each one-unit decrease in self-rated physical health (e.g., from good to fair), the odds of consulting professional mental health services increased, 95% CI [0.66, 0.67].

The interaction between diagnosis of depressive disorders and substance use disorders was significant, with an odds ratio of OR= 1.81, 95% CI [1.77, 1.85]. Youth with a diagnosis of comorbid mental illness (both depressive disorders and substance use disorders) were less likely to consult professional mental health services than do youth who were not diagnosed with either disorder. The interaction of depressive disorders and perceived need for care was also significant, indicating that youth who did not report a diagnosis of depressive disorders and perceived need for care were more likely to access mental health care than youth who reported a diagnosis of depressive disorders and who did not perceive a need for care, 95% CI [2.06, 2.08].

Similarly, the odds ratio of the interaction between substance use disorders and perceived need for care was OR= 1.27, 95% CI [1.26, 1.27]. This interaction indicated that youth who did not report a diagnosis of substance use disorders and perceived a need for care were more likely to access mental health care than youth who reported a diagnosis of substance use disorders and did not perceive a need for care. The interaction between perceived need for care and social support scale indicated that for each one-level

increase in the social support scale (e.g., from 10 to 11 points) and in perceived need (e.g., from no perceived need to perceived needs partially met), the odds of consulting professional mental health services increased, 95% CI [1.27, 1.28].

In the second step, neighborhood-level variables (i.e., community size, immigrant terciles, income quintiles) were added to the model. This model was also significant $\chi^2_{(4)} = 8703.79, p < .001$. When individual-level variables were included, the model correctly classified 88% of the cases, but now, with the inclusion of neighborhood-level variables, this rose to 89%. All predictors in the second step were significant ($p < .001$).

Among structural determinants, neighborhood immigrant terciles were included as a proxy for ethnicity. The odds ratio of neighborhoods with middle foreign-born population was OR= 0.73, 95% CI [0.72, 0.74]. Compared to youth who lived in neighborhoods with the lowest foreign-born population, youth who lived in neighborhoods with middle foreign-born population were less likely to access professional mental health services. Youth were less likely to access services, 95% CI [0.62, 0.64], if they lived in neighborhoods with high foreign-born population than if they lived in neighborhoods with low foreign-born population. Compared to youth who lived in communities with a population of less than 10,000 to 99,999 habitants, youth who lived in communities with a population of 100,000 to 1,500,000 or more habitants were more likely to consult services, 95% CI [1.29, 1.32]. For each one-level increase in neighborhood income quintile (e.g., from middle-high quintile to high quintile), the odds of consulting professional mental health services increased, 95% CI [1.08, 1.09].

Table 5 shows odds ratios and 95% confidence intervals for each of the 18 predictors. In the third step of the model, health region-level variables (i.e., no family

doctor and income below \$40,000) were included. This model was significant $\chi^2_{(2)} = 769.25, p < .001$. Classification did not change when region-level variables were added to the model, as the model still correctly classified 89% of the cases. The odds ratio of having a family doctor was OR= 0.71, 95% CI [0.67, 0.75]. Having a family doctor increased the likelihood of consulting professional mental health services. The odds ratio of income at the health region level indicated that youth who lived in households with income higher than \$40,000 at the health region level were 8 times more likely to consult professional mental health services than those who lived in households with income of \$40,000 or lower, 95% CI [7.03, 9.45].

Consultation with professionals (model with weight variable and bootstrap procedure). A (three-step) sequential logistic regression analysis was performed through STATA SVY: LOGIT to assess prediction of membership in one of two categories of outcome (i.e., consulted professional mental health services versus did not consult mental health services): (1) on the basis of 12 individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. The overall model with individual, neighborhood, and regional-level variables was not significant $\chi^2_{(23)} = 12.93, p = 0.935$; see Table 6 in Appendix C.

Sequential Multinomial Logistic Regressions

Two multinomial logistic regressions were conducted to predict number of types of professionals consulted and hours of consultation with all professionals using individual and ecological indicators. First, multinomial logistic regressions were conducted using the weight variable provided by Statistics Canada. Second, multinomial

logistic regressions were conducted using the weight variable and the bootstraps provided by Statistics Canada.

Types of professionals consulted (model with weight variable). A (three-step) sequential logistic regression analysis was performed through SPSS NOMREG to assess prediction of membership in one of three categories of outcome (0 types of professionals consulted, 1 type of professionals consulted, and 2 to 5 types of professionals consulted): (1) on the basis of 12 individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. Categorical variables (i.e., marital status, living arrangements, community size, and immigrant tercile) were dummy coded to conduct the logistic regressions. No violation of linearity in the logit was observed. In the first step, individual-level predictors (i.e., age, sex, marital status, living arrangements, education, income, mental illness, perceived need, social support) were included. In the second step, neighborhood-level variables (i.e., community size, immigrant terciles, and neighborhood income quintiles) were entered into the model. In the third step, regional-level variables (i.e., no family doctor, and income below \$40,000) were entered into the model. There was a good model fit (discrimination among groups) on the basis of the 18 individual, neighborhood, and region-level predictors, $\chi^2_{(30)} = 699.17, p > .001$.

Table 7 shows odds ratios and 95% confidence intervals for each of the 18 predictors. The base category for this model was zero types of mental health professionals (i.e., general practitioners or psychiatrists, psychologists, social workers, nurses) consulted compared to the second category of one type of professionals consulted. Almost all predictors were significant ($p < .001$), with the exception of age.

Females were more likely to consult services from one type of professional than males, OR= 1.89, 95% CI [1.87, 1.91]. Youth who identified themselves as visible minorities were less likely to consult services from one type of professional than youth who identified themselves as White, 95% CI [0.89, 0.91]. Youth who lived with their parents were more likely to consult one type of professional than youth who live alone, 95% CI [1.40, 1.40]. Compared to youth who lived in a common-law union, youth who lived alone were more likely to consult one type of professional, 95% CI [0.68, 0.70].

The odds ratio of education was OR= 0.94, 95% CI [0.93, 0.94]. Thus, for each one-level decrease in education (e.g., from university student to high school graduate), the odds of consulting one type of professional increased. For each one-unit increase in household income, the odds of consulting one type of professional increased. Youth who did not report a diagnosis of depressive disorders were less likely to consult one type of professional than youth who reported depressive disorders. Youth who did not report a diagnosis of substance use disorders were less likely to consult one type of professional services than did youth who reported substance use disorders. For each one-level increase in perceived need for care, the odds of consulting one type of professional increased, 95% CI [1.13, 1.16]. For each one-unit decrease in the social support scale (e.g., from 20 to 25 points), the odds of consulting one type of professional increased, 95% CI [0.92, 0.92].

All the interactions were significant ($p < .001$). The interaction between diagnosis of depressive and substance use disorders indicated that youth who did not have depressive or substance use disorders were more likely to consult one type of professional than youth with comorbid depressive and substance use disorders. The odds ratio of the interaction between perceived need for care and substance use disorders was

OR= 2.09, 95% CI [2.07, 2.10]. This interaction indicated that youth who did not report a diagnosis of substance use disorders and perceived a need for care were 2 times more likely to consult one type of service than youth who reported a diagnosis of substance use disorders and did not perceive a need for care. The interaction between perceived need for care and depressive disorders indicated that youth who did not report a diagnosis of depressive disorders and perceived a need for care were more likely, 95% CI [1.21, 1.23], to consult one type of services than youth who reported a diagnosis of depressive disorders and did not perceive a need for care. The interaction between perceived need for care and social support scale indicated that for each one-level increase in social support scale (e.g., from 10 to 11 points) and in perceived need (e.g., from no perceived need to perceived needs partially met) the odds of consulting one type of services increased, 95% CI [1.30, 1.31].

Among neighborhood-level predictors, the odds ratio of community size was OR= 1.41, 95% CI [1.39, 1.42], indicating that youth who lived in communities with a population of less than 10,000 to 99,999 habitants were more likely to consult one type of service, than youth who lived in communities with a population of 100,000 to 1,500,000 or more persons. Compared to youth who lived in neighborhoods with the lowest foreign-born population, youth who lived in neighborhoods with middle foreign-born population were less likely to consult one type of service, 95% CI [0.67, 0.69]. Youth were less likely to consult one type of service, if they lived in neighborhoods with high foreign-born population than if they lived in neighborhoods with low foreign-born population, 95% CI [0.89, 0.92]. For each one-level increase in neighborhood income quintiles, the odds of consulting one type of services increased, 95% CI [1.06, 1.06].

Among region-level variables, the odds ratio of having a family doctor was OR= 1.47, 95% CI [1.39, 1.56]. Having a family doctor increases the likelihood of consulting one type of service. Youth living in households with income higher than \$40,000 at the health region level were 3 times more likely to consult one type of professional than those who lived in households with income of \$40,000 or lower.

In the second part of the model, the base category 0 types of professionals consulted was compared to the third category outcome, 2 to 5 types of professionals consulted (general practitioners, psychiatrists, psychologists, social workers, or nurses). Table 7 shows odds ratios and 95% confidence intervals for each of the 18 predictors. All predictors were significant ($p < .001$). The odds ratio of age was OR= 1.17, 95% CI [1.17, 1.18], indicating that for each one-unit increase in age, the odds of consulting 2 to 5 types of professionals increased. Females were 3 times more likely to consult services from 2 to 5 types of professionals (e.g., family doctor and psychiatrist) than males. Youth who identified themselves as visible minorities were less likely to consult services from 2 to 5 types of professionals than youth who identified themselves as White. Youth who lived alone were more likely to consult 2 to 5 types of professionals than youth who lived with their parents. Youth who lived alone more less likely to consult 2 to 5 types of professionals than youth who lived in a common-law union.

The odds ratio of education was OR= 0.703, 95% CI [0.70, 0.71]. For each one-level decrease in education (e.g., from university student to high school graduate), the odds of consulting 2 to 5 types of professionals increased. For each one-unit increase in household income, the odds of consulting 2 to 5 types of professionals increased, 95% CI [1.02, 1.02].

The odds ratio of depressive disorders was $OR = 0.03$, 95% CI [0.02, 0.02]. Youth who did not report a diagnosis of depressive disorders were less likely to consult 2 to 5 types of professionals than youth who reported depressive disorders. Youth who did not report a diagnosis of substance use disorders were less likely to consult 2 to 5 types of professionals than youth who reported depressive disorders. For each one-level increase in perceived need for care, the odds of consulting 2 to 5 types of professionals increased 95% CI [1.46, 1.51]. For each one-unit decrease in the social support scale (e.g., from 20 to 25 points), the odds of consulting 2 to 5 types of professionals increased.

All the interactions were significant ($p < .001$). The odds ratio of the interaction between perceived need for care and substance use disorders was $OR = 1.08$, 95% CI [1.07, 1.09]. This interaction indicated that youth who did not report a diagnosis of substance use disorders and perceived a need for care were more likely to consult 2 to 5 types of services than youth who reported substance use disorders and did not perceive a need for care. The interaction between perceived need for care and depressive disorders indicated that youth who did not report a diagnosis of depressive disorders and perceived a need for care were more likely to consult 2 to 5 types of services than youth who reported depressive disorders and did not perceive a need for care. The interaction between perceived need for care and social support scale indicated that for each one-level increase in social support scale (e.g., from 10 to 11 points) and in perceived need (e.g., from no perceived need to perceived needs partially met) the odds of consulting 2 to 5 types of professionals increased.

Among neighborhood-level predictors, the odds ratio of community size was $OR = 1.06$, 95% CI [1.04, 1.08], indicating that youth who lived in communities with a

population of less than 10,000 to 99,000 habitants were more likely to consult 2 to 5 types of services, than youth who lived in communities with a population of 100,000 to 1,500,000 or more habitants. Compared to youth who lived in neighborhoods with middle foreign-born population, youth who lived in neighborhoods with low foreign-born population were less likely to consult 2 to 5 types of services. Youth were less likely to consult 2 to 5 types of services if they lived in neighborhoods with low foreign-born population than if they lived in neighborhoods with high foreign-born population. For each one-level increase in neighborhood income quintiles, the odds of consulting 2 to 5 types of services increased.

Among region-level variables, the odds ratio of having a family doctor was OR= 0.28, 95% CI [0.26, 0.31]. Having a family doctor increased the likelihood of consulting 2 to 5 types of services. Youth who lived in households with income lower than \$40,000 at the health region level were less likely to consult 2 to 5 types of professionals than those who live in households with income of \$40,000 or higher.

Types of professionals consulted (model with weight variable and bootstrap procedure). A (three-step) sequential logistic regression analysis was performed through STATA SVY: MLOGIT to assess prediction of membership in one of three categories of outcome (0 types of professionals consulted, 1 type of professionals consulted, and 2 to 5 types of professionals consulted): (1) on the basis of 13 individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. The overall model with individual, neighborhood, and region-level variables was not significant $\chi^2_{(46)} = 16.38, p > .05$. (see Table 8).

Hours of consultation (model with weight variable). A (three-step) sequential logistic regression analysis was performed through SPSS NOMREG to assess prediction of membership in one of three categories of outcome (0 hours of consultation, 1 to 10 hours of consultation, and 11 or more hours of consultation): (1) on the basis of 13 individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. Categorical variables (i.e., marital status, living arrangements, community size, and immigrant tercile) were dummy coded to conduct the logistic regressions. No violation of linearity in the logit was observed. In the first step, individual-level predictors (i.e., age, sex, marital status, living arrangements, education, income, mental illness, perceived need, social support, physical health) were included. In the second step, neighborhood-level variables (i.e., community size, immigrant terciles, and neighborhood income quintiles) were included. In the third step, regional-level variables (i.e., having a family doctor, and income below 40,000) were included. There was a good model fit (discrimination among groups) on the basis of the 18 individual, neighborhood, and region- level predictors $\chi^2_{(30)} = 994.36, p > .001$.

Table 9 shows odds ratios and 95% confidence intervals for each of the 18 predictors. The base category for this model was zero hours of consultation compared to the second category of 1 to 10 hours of consultation with professionals. Almost all predictors were significant in the 3 steps ($p < .001$), with the exception of community size. The odds ratio of age was OR= 1.11, 95% CI [1.14, 1.16], indicating that for each one-year increase in age, the odds of having 1 to 10 hours of consultation increased. Females were more likely to access 1 to 10 hours of consultation than males. Youth who identified themselves as visible minorities, 95% CI [0.60, 0.62] were less likely to have 1

to 10 hours of consultation than youth who identified themselves as White. Youth who lived alone were more likely to have 1 to 10 hours of consultation than youth who lived with their parents. Youth who lived alone were more likely to have 1 to 10 hours of consultation than youth who lived in a common-law union.

The odds ratio of education was $OR= 0.96$, 95% CI [0.95, 0.96]. For each one-level decrease in education (e.g., from university student to high school graduate), the odds of having 1 to 10 hours of consultation increased. For each one-unit increase in household income, the odds of having 1 to 10 hours of consultation increased, 95% CI [1.03, 1.04]. Youth who did not report a diagnosis of depressive disorders were less likely to access 1 to 10 hours of consultation than youth who reported depressive disorders. Youth who did not have a diagnosis of substance use disorders were less likely to access 1 to 10 hours of consultation than youth with substance use disorders. For each one-level increase in perceived need for care (e.g., from needs partially met to needs not meet), the odds of having 1 to 10 hours of consultation increased. For each one-unit decrease in the social support scale (e.g., from 20 to 25 points), the odds of having 1 to 10 hours of consultation increased, 95% CI [0.93, 0.93].

All the interactions were significant ($p < .001$). The odds ratio of the interaction between depressive and substance use disorders was $OR= 0.76$, 95% CI [0.74, 0.78]. This indicated that youth who did not have a comorbid diagnosis were less likely to access 1 to 10 hours of consultation than youth who reported a comorbid diagnosis. Youth who did not have a diagnosis of substance use disorders and perceived a need for care were more likely to access 1 to 10 hours of consultation than youth who reported a diagnosis of substance use disorders and did not perceive a need for care. Youth who did not have a

diagnosis of depressive disorders and perceived a need for care were more likely to access 1 to 10 hours of consultation than youth who reported a diagnosis of depressive disorders and did not perceive a need for care. For each one-level increase in social support scale (e.g., from 10 to 11 points) and in perceived need (e.g., from no perceived need to perceived needs partially met) the odds of having 1 to 10 hours of consultation increased.

Among neighborhood-level predictors, the odds ratio of neighborhoods with middle foreign-born population was OR= 0.56, 95% CI [0.55 0.56]. Compared to youth who lived in neighborhoods with lowest foreign-born population, youth who lived in neighborhoods with middle foreign-born population were less likely to access 1 to 10 hours of consultation. Youth were less likely to access 1 to 10 hours of consultation if they lived in neighborhoods with high foreign-born population than if they lived in neighborhoods with low foreign-born population. For each one-level increase in neighborhood income quintiles, the odds of having 1 to 10 hours of consultation increased, 95% CI [1.10, 1.1].

Among region-level variables, the odds ratio of having a family doctor was OR= 2.17, 95% CI [2.03, 2.31]. Youth who had a family doctor were more likely to access 1 to 10 hours of consultation than youth who did not have a family doctor. Youth who lived in households with income higher than \$40,000 at the health region level were 15 times more likely to access 1 to 10 hours of consultation than those who lived in households with income of \$40,000 or lower.

In the second part of the model, the base category was 0 hours of consultation compared to the third category 11 or more hours of consultation with all professionals

(general practitioners, psychiatrists, psychologists, social workers, or nurses). Table 9 shows odds ratios and 95% confidence intervals for each of the 16 predictors. All predictors were significant ($p < .001$). The odds ratio of age was OR= 0.92, 95% CI [0.92, 0.92], indicating that for each one-year decrease in age, the odds of having 11 or more hours of consultation increased. Females were 3 times more likely to access 11 or more hours of consultation than males. Youth who identified themselves as visible minorities were less likely to access 11 or more hours of consultation than youth who identified themselves as White. Youth who lived in a common-law union were less likely to access 11 or more hours of consultation than youth who lived alone. Youth who lived with their parents were less likely to access 11 or more hours of consultation than youth who lived alone.

The odds ratio of education was OR= 0.89, 95% CI [0.88, 0.89]. For each one-level decrease in education (e.g., from university student to high school graduate), the odds of having 11 or more hours of consultation increased. For each one-unit increase in household income, the odds of having 11 or more hours of consultation increased, 95% CI [1.03, 1.04]. Youth who did not have a diagnosis of depressive disorders were less likely to access 11 or more hours of consultation than youth who reported a diagnosis of depressive disorders. Youth who did not have a diagnosis of substance use disorders were less likely to access 11 or more hours of consultation than youth who had a diagnosis of depressive disorders. For each one-level increase in perceived need for care (e.g., from needs partially met to needs not met), the odds of having 11 or more hours of consultation increased. For each one-unit decrease in the social support scale (e.g., from

20 to 25 points), the odds of having 11 or more hours of consultation increased, 95% CI [0.88, 0.88].

All the interactions were significant ($p < .001$). The odds ratio of the interaction between diagnosis of depressive and substance use disorders was $OR = 1.65$, 95% CI [1.60, 1.70]. Youth who did not have a diagnosis of either depressive or substance use disorders were more likely to access 11 or more hours of consultation than youth with a comorbid diagnosis. The interaction between perceived need for care and substance use disorders indicated that youth who did not have a diagnosis of substance use disorders and perceived a need for care were more likely to access 11 or more hours of consultation than youth who had a diagnosis of substance use disorders and did not perceive a need for care, 95% CI [1.12, 1.14]. Youth who did not have a diagnosis of depressive disorders and perceived a need for care were more likely to access 11 or more hours of consultation than youth who had a diagnosis of depressive disorders and did not perceive a need for care, 95% CI [1.93, 1.97]. For each one-level increase in social support scale (e.g., from 10 to 11 points) and in perceived need (e.g., from no perceived need to perceived needs partially met) the odds of having 11 or more hours of consultation increased, 95% CI [1.30, 1.31].

Among neighborhood-level predictors, the odds ratio of community size was $OR = 1.01$, 95% CI [1.0, 1.0]. This indicated that youth who lived in neighborhoods with a population of less than 10,000 to 99,999 habitants were more likely to access 11 or more hours of consultation than youth who lived in communities with a population of 100,000 to 1,500,000 or more. Compared to youth who lived in neighborhoods with middle foreign-born population, youth who lived in neighborhoods with low foreign-born

population were more likely to access 11 or more hours of consultation. Youth were less likely to access 11 or more hours of consultation, if they lived in neighborhoods with low foreign-born population than if they lived in neighborhoods with high foreign-born population, 95% CI [0.95, 1.00]. For each one-level increase in neighborhood income quintiles, the odds of having 11 or more hours of consultation increased, 95% CI [0.95, 0.98].

Among region-level variables, the odds ratio of having a family doctor was OR= 0.08, 95% CI [0.07, 0.09]. Youth who did not have a family doctor were less likely to access 11 or more hours of consultation than youth who had a family doctor. Youth who lived in households with income lower than \$40,000 at the health region level were less likely to access 11 or more hours of consultation than those who lived in households with income of \$40,000 or higher, 95% CI [0.39, 0.65].

Hours of consultation (model with weight variable and bootstrap procedure).

A (three step) sequential logistic regression analysis was performed through STATA SVY: MLOGIT to assess prediction of membership in one of three categories of outcome (0 hours of consultation with professionals, 1 to 10 hours of consultation with professionals, and 11 or more hours of consultation with professionals): (1) on the basis of 13 individual-level predictors, (2) after addition of 4 neighborhood-level predictors, and (3) after addition of 2 region-level predictors. The overall model with individual, neighborhood, and regional-level variables was not significant $\chi^2_{(23)} = 16.96, p = 0.934$ (see Table 10 in Appendix C).

Discussion

This study examined individual and ecological determinants of access to professional mental health services among youth using secondary data from three sources, the Canadian Community Health Survey (CCHS)-Mental Health Component, the Postal Code Conversion Files + (PCCF+), and the Canadian Community Health Survey-Annual Component, 2011-2012. The Commission on the Social Determinants of Health (CSDH) framework was found to be an appropriate format for organizing and identifying potential determinants of youth access to mental health services.

The results from this study showed that in 2011 only 12% of adolescents and young adults in Canada consulted professional mental health services from family doctors, psychiatrists, psychologists, nurses, and social workers. These results are consistent with other studies that found low rates of access to mental health services among youth (Bergeron, Poirier, Fournier, Roberge, & Barrette, 2005; Cheung & Dewa, 2007). Research has found similar percentages among youth with mental disorders (Lyon et al., 2013), however, in this study almost 50% of youth with depressive disorders and 22% with substance use disorders consulted professional mental health services.

To provide information about the context in which access to mental health services occurs, aggregated data at the health region-level were analyzed. The findings indicate that 53% of the population are males, with few visible minorities (12%) in most regions. It is worth mentioning that the majority (65%) of the Canadian population is represented by adults aged 44 and over, with adolescents and young adults corresponding to 13% of the total population. Due to the fact that most of the population is comprised by adults, it is possible that mental health services are focused to supply the needs of the

majority of the population. With respect to chronic physical illnesses, such as diabetes and asthma the majority of the health regions have low percentages (8% to 9%) of chronic illnesses. In terms of physical health, obesity (22%) is more common than diabetes and asthma.

Similarly, diagnosis of depressive disorders is low (7%) at the health region level. Although low rates of depressive disorders were found at the health region level for all age groups, these results indicate that depressive disorders might be concentrated among the youth population, which is only 13% of the total Canadian population. This confirms what was found in other studies in which depressive disorders are prevalent among adolescents and young adults in Canada (Bergeron et al., 2005; Pearson et al., 2013). This study also considered socioeconomic indicators at the health region level. The findings indicate that most individuals have high school and university degrees. With respect to household income, 8% of individuals were living in households with income of less than \$40,000 per year. Based on level of education, income, and employment at the health region level, the majority of Canadians have a middle or high socioeconomic position.

Individual-level Determinants

Key individual determinants were selected based on their relevance to adolescents' and young adults' developmental process, as well as on the literature review. The contribution of individual determinants on access to mental health services was considered before ecological variables (e.g., regional socioeconomic position, neighborhood income) were examined.

One of the most consistent findings from the previous research is related to the influence of gender on access to mental health care (Broman, 2012; Lo & Cheng, 2011;

Mason et al., 2013; Vanheusden et al., 2008). Results from this study indicate that female adolescents and young adults are 3 times more likely to consult professional mental health services than males. These findings might be related to the difference in prevalence rates of depressive and substance use disorders between male and female youth. Depressive disorders have been found to be more prevalent among females (Avenevoli et al., 2015), while substance use disorders have been found to be more common among males (Copeland et al., 2011). Although there is a sex difference in prevalence rates, the results from this study indicate that females with depressive and substance use disorders are more likely than males with these conditions to access professional mental health services.

The results from this study also confirmed that ethnicity is associated with consulting professional mental health services. Youth who identified themselves as White are more likely than youth who identified themselves as visible minorities to access services. These results remained statistically significant after controlling for other individual (e.g., income, education) and ecological (e.g., community size) variables. Other studies also have found that visible minorities are less likely to access professional mental health services (Mason et al., 2013; Thomas et al., 2011; Winstanley et al., 2012). This might be due to treatment receptiveness, culturally distinct beliefs about mental disorders and mental health interventions, preferences for alternative treatments, stigma, discrimination, or sociocultural norms around help-seeking.

The results from this study indicate that youth who are high school students or high school graduates are more likely to seek professional mental health services. It is possible that high school students might also live with their parents, thus benefitting from

living in households with more resources (e.g., income, transportation, insurance coverage) to access services than living alone. These results are counterintuitive and do not confirm what other studies have found, higher education level enables access to services (Hardy et al., 2011; Steele et al., 2006; Zuvekas & Fleishman, 2008). In addition, young adults who are university students might be able to access mental health services in their institutions. However, research using university samples have found that unawareness of available services on campus and stigma are considered barriers to access services (Zuvekas & Fleishman, 2008).

An important finding from this study concerns the impact of income on access to services. The results from this study indicate that mid- to- high-household income should be considered a determinant of access to mental health services for youth with depressive and substance use disorders. In addition, mid- and- high-household income is related to consultation with general practitioners as well as with mental health specialists. The strong relationship between income and access to mental health services remained significant after the inclusion of other individual variables, such as perceived need for care. Further, living in households with high income could enable out-of-pocket spending to access professional services that are not covered by provincial insurance, such as higher number of consultations or receiving treatment from psychologists or counsellors.

This study hypothesized that youth with comorbid depressive and substance use disorders were more likely to seek help from more types of professionals and to access more hours of consultation than youth with single diagnosis. The results from this study indicate that 25% of youth with comorbid disorders consulted 2 to 5 types of professionals and received more than 11 hours of consultation, compared to 9% of youth

with substance use disorders, thus, confirming this study's hypothesis. Research has also concluded that diagnosis of comorbid mental disorders is related to higher consumption of mental health services (Mojtabai et al., 2014; Sareen et al., 2005).

Although the findings from this study indicate that youth with comorbid disorders are more likely to access services than those with a single diagnosis, it is possible that comorbidity along with other indicators such as sex, education, and income are necessary to determine greater access to mental health services. Consistent with previous findings (Avenevoli et al., 2015; Mericle et al., 2015), findings from this study confirm that having a diagnosis of depressive or substance use disorders is related to consulting services from any professional. However, when perceived need for care was included in the model, the effect of depressive and substance use disorders was reduced. It seems that perceiving a need for care has a greater impact on consulting professional mental health services than having a mental disorder diagnosis. These results are consistent with previous studies that have demonstrated that perception of need for care is a decisive determinant of youth access to services (Kim et al., 2014; Mojtabai et al., 2002). It is possible that perceiving a need for care increases awareness of the efficacy of mental health interventions for youth.

The perception of need for care has been found to be associated with social support among youth (Edlund et al., 2006). The results from this study indicate that having a cohesive social support network and perceiving a need for care is related to consulting more types of professional services and to receiving more hours of consultation. It is possible that social support from family and friends provides information, raising the perception of need for care, thus encouraging youth to seek

services. Having a cohesive social support network might also be related to the development of coping mechanisms that allow youth to handle stigma, thus enabling access to services. However, research has found that youth who have someone to advise them, and someone that gives information and understands mental health problems might act as protective factor in the presence of mental illness, reducing perceived need for professional care (Edlund et al., 2006).

Neighborhood-Level Determinants

Research on geographic location as a determinant to access professional mental health care for youth is not conclusive. In this study community size was used to examine geographic location. The results from this study indicate that living in urban centres (1,000,000 or more persons) can be considered a determinant to seek care for mental health reasons. It is possible that living in urban areas enable access to services due to more availability of services (family doctors, mental health clinics, psychology centres) and different types of service providers (mental health specialists). However, the findings from this study also suggest that in order to receive 11 or more hours of consultation with professionals, living in rural areas enables access to such services. It seems that individual-level variables have a greater impact on access to mental health services than the effect of community size on access to services.

This study hypothesized that youth who live in neighborhoods with low population of visible minorities would be more likely to access services. This study examined foreign-born population at the neighborhood-level as a proxy for ethnicity. Studies have found that compared to Caucasian youth, visible minorities

are less likely to access services (Broman, 2012; Diaz-Granados et al., 2010; Lyon et al., 2013; Mason et al., 2013). The results from this study support that hypothesis. Youth who live in neighborhoods with low population of immigrants are more likely to access services from 2 or more types of service providers, and to receive 1 to 10 hours of consultation than youth who live in neighborhoods with high population of immigrants. However, the results from this study also indicate that youth who live in neighborhoods with high foreign-born population are more likely to receive 11 or more hours of consultation than youth who live in communities with low foreign-born population. It is possible that cultural background as well as other individual-level variables (i.e., sex, education, income) have a greater impact on access to mental health services than neighborhood level of immigration.

Income at the neighborhood level was also examined in this study. The findings indicate that living in neighborhoods with high income quintiles contribute to consulting services from general practitioners, psychiatrists and psychologists by 6%. Similar to what was found for household income, neighborhood income is associated with consulting more types of services and receiving more hours of consultation. It is possible that living in neighborhoods with high income quintiles enables access to more types of services (e.g., counsellors, psychologists) that might not be covered under provincial insurance plans.

Region-Level Determinants

The findings from this study indicate that having a regular doctor increases the likelihood of consulting general practitioners and mental health specialists by 71%. Similarly, youth who had family doctor are 2 times more likely to access 1 to 10 hours of

consultation than youth who do not have a family doctor or a regular source of care. It is possible that having a regular doctor enables access to care if most consultations with mental health specialists need a referral from a general practitioner. Youth living in households with income higher than \$40,000 at the health region level are 15 times more likely to access 1 to 10 hours of consultation than those who live in households with lower income. These results confirm that even in public health care systems income plays an important role in access to services, confirming what was found for household and neighborhood-level income.

It is important to mention that ecological determinants measured at the neighborhood and region-level are usually not examined as predictors to access mental health services. The lack of studies including ecological determinants of access to services creates a gap in knowledge and makes comparison among studies difficult.

Overall, this study found that being female, being a high school student, living in households with income higher than \$40,000, perceiving a need for care, living in urban centres, living in neighborhoods with high income, and having a regular source of care are determinants of access to professional mental health services among youth with comorbid diagnosis (depressive or substance use disorders). Conversely, it can be said that being a college or university student, living in households with income lower than \$40,000, failing to perceive a need for care, living in neighborhoods with low income, and not having a family doctor can be considered risk factors of access to mental health services for youth with mental disorders.

It is important to mention that there were counterintuitive and conflicting findings in this study. Findings from this study are not conclusive on whether neighborhood-level

of immigration, living in rural communities, living arrangements (eg., living alone vs. living with parents), and self-reported physical health can be considered determinants or risk factors of access to professional mental health services among youth. Further research is needed to clarify the effects of these variables on access to mental health services among youth.

Implications

Since this study examined access to mental health care from general practitioners and mental health specialists, this study offers information to mental health care providers who work with youth populations. Mental health care providers, especially general practitioners, are common points of contact for youth with mental disorders, and knowing more about individual and ecological determinants and risk factors might help providers advance their programs and services.

Government policy makers at the provincial and federal levels can use the results from this study to help make decisions about public funding to improve mental health services. In particular, results from this study referring to access to mental health care specialists (e.g., psychologists) could be used to either increase such services or to better distribute services in needed areas. In addition, the results will likely offer insight into the promotion of help-seeking behaviors among youth with mental illness. Identifying factors associated with access to mental health services may help policy makers direct program funding and ensure public funds are utilized to the maximum advantage.

The strength of this study is that it used a large, nationally representative sample of adolescents and young adults to examine access to mental health services. The analysis of secondary data provides reliable population estimates of social factors (e.g., socio-

economic position) that are beyond the scope of most primary data collection (Wade & Brannigan, 2010). Much of the prior research on youth focuses either on high school or university populations, while this study includes a large random sample of both adolescents and young adults.

This study not only examined individual and ecological determinants of access to mental health services but also analyzed key variables at the health region-level to provide a context in which access to services occurs. From the findings, it can be expected that with an aging population, availability and organization of health care services might be largely directed towards addressing physical and mental illnesses prevalent among these age groups (45 and over), such as high rates of cardiovascular diseases, cancers, and respiratory illnesses. However, it has been found that rates of depressive and anxiety disorders are also prevalent among adults (Pearson et al., 2013). It is possible that mental health services are being implemented to serve adult populations while failing to engage youth in accessing and utilizing services.

This study confirmed previous findings regarding low access to mental health services among visible minorities (Broman, 2012; Mason et al., 2013). Research suggests that visible minorities have lower rates of accessing services due to stigma, lower trust, and beliefs about the efficacy of mental health treatments (Thomas et al., 2011). The results from this study could be contrasted with administrative data to examine rates of access to mental health services among visible minorities, in particular in urban centres where visible minorities are concentrated.

Although diagnosis of mental disorders among youth have been found to be strong predictors of access to services, the results from this study indicate that it is not

diagnosis of mental disorders per se, but rather the perception of need for care that drives access to services. Therefore, perceived need for care should be addressed to engage youth in accessing and utilizing services. Research has found that perceived need for care is related to ethnicity, physical and mental health status (Sunderland & Findlay, 2013; Urbanoski et al., 2008). These factors could inform public policy aiming at increasing access to services among youth.

The findings from this study also demonstrate that while almost 50% of youth with depressive disorders consulted professional services, only 22% of youth with substance use disorders consulted services. Collaboration linking general practitioners and substance abuse treatment facilities should be encouraged by policymakers to promote holistic treatment suitable for substance use disorders.

Although research has found that in public health care systems income is not related to youth accessing services (Roy-Byrne et al., 2009; Steele et al., 2007), the results from this study demonstrates the opposite. At the individual level, high household income was associated with greater services. Similarly, at the region level, youth who live in households with income higher than 40,000 are 15 times more likely to access professional mental health services. Given that most provinces across Canada cover only few consults with professionals in their health care insurance plans, these results can inform policies at the provincial level in regards to inclusion of higher number of consults with professionals, thus alleviating out-of-pocket spending for mental health services.

The results from this study also indicate that youth who live in rural communities are less likely to access different types of services, and these results have implications for policies that aim at increasing the number of specialty mental health services in rural

areas. It seems that it is not only service availability that might drive access to mental health care but also the adequate use of such services. The organization and distribution of mental health services within communities, as well as the promotion of services could be associated with higher service use among youth in rural communities.

Limitations

The results from this study should be considered in light of the following limitations. This was a cross-sectional study, therefore the causal nature of the associations between individual, neighborhood, and region-level determinants cannot be determined. Depressive and substance use disorders were identified based on algorithms (measures of the WHO-CIDI) not clinical diagnoses, therefore, underestimating the rate of mental health problems among youth. The questions from CCHS-MH on access to mental health services were self-reported. Self-reports of access to professional services may differ from administrative records, possibly because of recall or social desirability biases. Given high prevalence rates of depressive and substance use disorders among youth and low rates of access to mental health care, this study focused on youth with these disorders, excluding other mental disorders that might also be prevalent among youth (e.g., anxiety disorders, eating disorders; Pearson et al., 2013). Although this study described risk factors to access mental health services for youth, risk factors and barriers of access to services were not fully examined. A complete analysis of risk factors could help understand the low rates of access to mental health services among youth populations.

Although this study found that geographic location was associated with access to mental health care among youth, the effects of this association was not strong.

Neighborhood and region-level effects were not measured with multi-level analysis, as this was beyond the scope of this study. Due to the complex design of the CCHS-MH and the different geography levels included in this study, bootstrap coefficients provided by Statistics Canada were applied. After applying bootstrap coefficients, the results indicated weak effects and nil significance, this might be because the coefficients of variation provided by Statistics Canada are not adequate to use at a geography level other than Census Metropolitan Areas, as is explained in the User Guide of CCHS-MH (Statistics Canada, 2013a). Finally, this study does not account for other factors that might be related to youth access to mental health services; for example, family stress level, insurance coverage, availability of providers, attitudes or beliefs about seeking mental health care might also be related to accessing mental health services (Bradley, McGrath, Brannen, & Bagnell, 2010; O'Connor, Martin, Weeks, & Ong, 2014).

Future Directions

Future research should examine individual and ecological determinants using a multilevel logistic regression analysis. Given that multicollinearity was found between the outcome measures, and the data are divided in three levels of aggregation, multilevel analysis would be more suitable to examine access to services. Multilevel logistic regression accounts for the correlation of responses within levels and provides between-area variance estimates of response (intraclass correlation coefficient; Diaz-Granados et al., 2010). The data would consist of individuals (level 1), nested within neighborhoods (level 2), nested within health regions (level 3). The analyses would develop incrementally. First, the random-effects model would be estimated between-health region and between-neighborhood variability in access to services. Second, indicators at the

individual-level would be included (Model 1). Third, neighborhood-level indicators would be included (Model 2). Then, health region-level variables would be incorporated (Model 3). After the final model, it would be appropriate to test the statistical interaction between presence-absence of depressive and substance use disorders following age, sex, education, income, and community size.

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Appendix A

Table 1 Outcome Variables

Consultation or utilization of professional mental health services - past 12 months
During the past 12 months, have you seen, or talked on the telephone to, any of the following people about problems with your emotions, mental health or use of alcohol or drugs?
- Family doctor, psychiatrist, psychologist, nurse, social worker)
Total number of types of professionals consulted - past 12 months
During the past 12 months, have you seen, or talked on the telephone to, any of the following people about problems with your emotions, mental health or use of alcohol or drugs?
- Family doctor, Psychiatrist, Psychologist, Nurse, Social worker
Total time spent in consultation with professionals - in hours
<i>The average length of consultation in minutes (min 1; max 240) is multiplied by the number of consultations over a year and divided by 60 to convert minutes into hours.</i>
Number of hours spent in consultations with a family doctor or general practitioner, psychiatrist, psychologist, nurse, social worker during past 12 months

Table 2 Outcome and predictor measures from CCHS – MH, PCCF+, and CCHS, 2011-2012

Data set	Outcome measures	Level of measurement	Description
CCHS, 2012	Consultation and use of professional mental health services in the past 12 months	Nominal YES/NO	Utilization of professional services for help with mental health problems or use of alcohol/drugs. Professionals include psychiatrists, psychologists, family doctors, social workers, counsellors.
CCHS, 2012	Total number of types of professionals consulted in the past 12 months	Scale Min 0 - max 6	Types of professionals include general practitioners, nurses, psychiatrists, psychologists, social workers and counsellors, each considered a type of professional. Hospitalization services were not used in the creation of this variable.
CCHS, 2012	Total hours of consultation with professionals in the past 12 months	Scale Min 1 – max 340	The amount of hours spent in consultation with all professionals during the 12 months prior to survey interview. Hospitalization services were not used in the creation of this variable.
Data set	Predictor measures	Level of measurement	Description
	Individual-level predictors		
CCHS, 2012	Age	Scale 14 years to 24 years	Age of respondent at time of survey interview. Calculated based on day, month, and year of birth
CCHS, 2012	Sex	Nominal Female/Male	
CCHS, 2012	Ethnicity	Nominal	Selection between several options of cultural backgrounds.
CCHS, 2012	Living arrangements/Marital Status	Nominal	Respondents living accommodations and marital status: child with parents, siblings, unattached alone, parent with child, common-law union, single, married, separated, divorced.
CCHS, 2012	Income/Household income	Scale	Total household income from all sources.
CCHS, 2012	Education	Scale 4 levels	The highest level of education attained by respondent, from less than secondary graduation to post-secondary graduation.
CCHS, 2012	Depressive disorders	Nominal YES/NO	Identification of the CCHS - MH/WHO-CIDI criteria for any of the measured mood disorders in their lifetime.
CCHS, 2012	Substance use disorders	Nominal YES/NO	This variable has been defined as at least three symptoms of dependence: tolerance, withdrawal, increased consumption, attempts to quit, time lost, and reduced activities, experienced in the same 12-month period. A

			maladaptive pattern manifested by three (or more) symptoms occurring at any time in the same 12-month period.
CCHS, 2012	Perceived need for care	Scale	Perceived need for care divided in four types.
CCHS, 2012	Social provisions scale	Scale Min 10 – max 40	The scale assesses five provisions of social relationships: attachment, guidance, social integration, reliable alliance, and reassurance of worth.
CCHS, 2012	Self-rated physical health	Scale	Physical health divided in four types.
Neighborhood-level predictors			
PPCF+	Community Size	Nominal	Divides census metropolitan areas or census agglomeration areas in five types
PCCF+	QAIPPE Quintile Neighborhood income per person equivalent	Scale	Quintile Neighborhood income per person equivalent (IPPE) is a household size-adjusted measure of household income, based on 2006 Census summary data at the DA level.
PCCF+	IMMTER Immigrant (foreign-born) Tercile	Scale	The IMMTER variable divides the immigrant population into three equal parts, with roughly 2 million immigrants in each tercile.
Region-level predictors			
CCHS, 2011-2012	Not having a family doctor		-
CCHS, 2011-2012	Income	Scale	Income at the health region level.

Note: Adapted from “Canadian Community Health Survey (CCHS) – Mental Health, Derived Variables, Microdata files”, by Statistics Canada, 2013, p. 65, 71-72, 74-75, 92, 119-120, 194-195, 239-240, 242, 256-257, 260-261, 266. Adapted from “Postal Code Conversion File Plus (PCCF+) Version 6A, Reference Guide”, by Statistics Canada, 2013, p. 15, 29, 30.

Appendix B

Table 3 Outcome Variables as a Percentage Divided by Age and Mental Disorders

	Adolescents	15 – 19 years N = 2,294,09			Young adults		20 – 24 years N = 2,162,954	
	Depressive disorders (N = 170,991)	Substance use disorders (N = 240,908)	Comorbid (N = 54,527)	Substance use disorders (N = 279,937)	Depressive disorders (N = 188,510)	Comorb id (N = 53,900)		
Consulted professional services								
Yes	12	49.7	25.3	56.3	12.8	22.2	48.2	52.2
No	88	50.3	74.7	43.8	87.2	77.8	51.8	47.8
Types of professional								
0 types	88.6	52.2	76	47.9	87.6	79.4	53	52.2
1 type	7.4	21	16.4	27.1	8.3	13.6	24.7	26.1
2–5 types	4.1	26.8	7.6	25	4.1	7	22.3	21.7
Hours of consultation								
0 hours	93.3	62.9	82.7	54.8	94.1	89.5	71	70.6
1–10 hours	3.1	12.9	7.7	16.7	3.4	4.4	9.7	5.9
11+ hours	3.6	24.2	9.6	28.6	2.5	6.1	19.4	23.5

Table 4 Percentages of each predictor variable

	N = 4,457,163	%
Individual-level predictors		
Age		
Adolescents	2,294,209	50.4
Young Adults	2,162,954	49.6
Sex		
Females	2,178,244	52.9
Males	2,278,919	47.1
Cultural background		
Caucasian	3,131,668	74.6
Visible minority	1,308,006	25.4
Living arrangements		
Child with parents	3,090,803	649
Unattached	4,048,179	89.3
Marital Status		
Single	4,048,179	91.2
Married	106,417	2.4
Common law	286,181	6.4
Education level completed		
High school student	1,475,136	35.4
High school graduate	917,684	21.6
University/college student	862,094	17
Post-secondary graduate	1,183,246	26
Household income		
No income	26,826	0.6
< \$5,000	35,573	0.8
\$5,000-\$9,999	66,208	1.5
\$10,000-\$14,999	145,660	3.3
\$15,000-\$19,999	166,344	3.7
\$20,000-\$29,999	361,346	8.1
\$30,000-\$39,999	384,853	8.6
\$40,000-\$49,999	324,405	7.3
\$50,000-\$59,999	411,998	9.2
\$60,000-\$69,999	354,242	7.9
\$70,000-\$79,999	326,455	7.3
\$80,000-\$89,999	303,843	6.8
\$90,000-\$99,999	219,563	4.9
\$100,000 < 150K	766,111	17.2
\$150000 OR MORE	563,737	12.6
Mental disorders		
Depressive disorder YES	360,604	8.2
Depressive disorder NO	4,066,217	91.8
Substance use disorder YES	523,209	12.3
Substance use disorder NO	3,855,469	87.7
Perceived need for care		
No perceived need for care	3,569,076	79.3
All perceived needs met	521,023	12.1
Perceived need partially met	205,862	5
Perceived need not met	140,686	3.6
Social support scale		
High social support (score 35 or more)	1,474,055	32.7
Self-rated physical health		
Poor	51,788	1.6
Fair	470,393	10.7
Good	1,436,969	33.2
Very good	1,641,541	36.9

Excellent	853,856	17.5
Neighborhood-level predictors		
Community size		
Community size 100,000 to 1,500,000 vs. community size 99,000 to < 10,000	3,400,850	76.3
Community size 99,000 to < 10,000 vs. community size 100,000 to 1,500,000	1,056,300	23.6
Neighborhood immigrant terciles		
Lowest foreign born	3,869,750	86.2
Middle foreign born	863,650	19.3
Highest foreign born	587,450	13.1
Neighborhood income quintiles		
Lowest quintile	1,021,600	22.9
Medium-low quintile	832,750	18.6
Middle quintile	891,550	20
Medium-high quintile	870,050	19.74
Highest quintile	826,050	18.53
Region-level predictors		
No regular doctor	1,147,760	25.7
Income below 20%	1,206,138	27

Appendix C

Table 5 Sequential Binary Logistic Regression – Consultation with professionals

	OR	95% CI
Step 1 Individual-level predictors		
Constant	41.64	
Age	1.02*	[1.03, 1.02]
Females (1) Males (0)	2.14*	[2.16, 2.12]
Visible minorities (1) vs. White (0)	0.78*	[0.78, 0.77]
Common-law union (1) vs. Living alone (0)	0.66*	[0.67, 0.65]
Youth with parent (1) vs. Living alone	0.78*	[0.80, 0.77]
Education	0.88*	[0.88, 0.87]
Household income	1.03*	[1.03, 1.03]
Do not have depressive disorders (1) vs. Diagnosis of depressive disorders (0)	0.06*	[0.07, 0.06]
Do not have substance use disorders (1) vs. Diagnosis of substance use disorders (0)	0.25*	[0.26, 0.25]
Perceived need	1.07*	[1.09, 1.06]
Social support scale	0.94*	[0.94, 0.94]
Self-rated physical health	0.67*	[0.67, 0.66]
Depressive disorders by Substance use disorders	1.81*	[1.85, 1.77]
Depressive disorders by Perceived need	2.07*	[2.08, 2.06]
Substance use disorders by Perceived need	1.27*	[1.27, 1.26]
Social support by Perceived need	1.27*	[1.28, 1.27]
Step 2 Neighborhood-level predictors		
Constant	60.23	
Community size (100,000 – 1,500,000 + habitants) (1) vs. Community size (99,000 habitants or less)	1.31*	[1.32, 1.29]
Middle immigration tercile (1) vs. Lowest immigration tercile (0)	0.73*	[0.74, 0.72]
Highest immigration tercile (1) vs. Lowest immigration tercile (0)	0.63*	[0.64, 0.62]
Income quintiles	1.09*	[1.09, 1.08]
Step 3 Region-level predictors		
Constant	50.85*	
No family doctor	0.71*	[0.75, 0.67]
Income health region	8.15*	[9.45, 7.03]

Note: *OR* = odds ratio; *CI* = confidence interval. Step 1 - $R^2 = .418$ (Hosmer & Lemeshow), .175147.5 (Cox & Snell), .213 (Nagelkerke).

Model $\chi^2(17) = 959251.17$, $p < .01$. * $p < .001$.

Step 2 - $R^2 = .422$ (Hosmer & Lemeshow), .179803.4 (Cox & Snell), .214 (Nagelkerke).

Model $\chi^2(21) = 967654.97$, $p < .01$. * $p < .001$.

Step 3 - $R^2 = .422$ (Hosmer & Lemeshow), .179346.2 (Cox & Snell), .214 (Nagelkerke).

Model $\chi^2(23) = 968724.2$, $p < .01$. * $p < .001$.

Table 6 Sequential Binary Logistic Regression with Bootstrap Procedure - Consultation with Professionals

	B	95% CI
Step 1 Individual-level predictors		
Constant	-2.34	[-16.22 1.52]
Age	0.02	[-0.42 0.48]
Females	-0.74	[-2.83 1.33]
Ethnicity	0.34	[-2.16 2.85]
Common-law union vs. Living alone	0.13	[-3.20 3.46]
Youth with parent vs. Living alone	0.36	[-4.03 4.75]
Education	-0.13	[-1.13 0.86]
Household income	0.03	[-0.27 0.34]
Do not have depressive disorders vs. depressive disorders	2.15	[-0.83 5.14]
Do not have substance use disorders vs. substance use disorders	1.29	[-3.12 5.72]
Perceived need	0.51	[-5.11 6.13]
Social support scale	1.57	[-0.11 3.25]
Self-rated physical health	-0.05	[-0.26 0.15]
Depressive disorders by Substance use disorders	-0.73	[-2.44 0.97]
Depressive disorders by Perceived need	-0.39	[-2.98 2.19]
Substance use disorders by Perceived need	0.24	[-0.37 0.86]
Social support by Perceived need	-0.41	[-1.33 0.50]
Step 2 Neighborhood-level predictors		
Community size (100,000 – 1,500,000 + habitants)	-0.24	[-2.70 2.21]
Middle immigration tercile vs. Lowest immigration tercile	0.30	[-2.21 2.81]
Highest immigration tercile vs. Lowest immigration tercile	0.40	[-3.11 3.93]
Income quintiles	0.07	[-0.62 0.76]
Step 3 Region-level predictors		
No regular source of care	-0.38	[-13.39 12.62]
Income health region level	2.24	[-33.52 38.02]

Note: *B* = observed coefficient; *CI* = confidence interval. Model $\chi^2(23) = 12.93$, $p = 0.935$. * $p < .001$.

Table 7 Multinomial Logistic Regression – Types of Professionals Consulted

	OR	95% CI
1 type of professional vs. 0 types		
Individual-level predictors		
Intercept		
Age	0.99*	[0.99 1.00]
Females (1) vs. Males (0)	1.89*	[1.87 1.91]
Visible minorities (1) vs. White (0)	0.90*	[0.89 0.91]
Child with parents (1) vs. Living alone (0)	1.44*	[1.42 1.46]
Common-law union (1) vs. Living alone (0)	0.68*	[0.67 0.69]
Education	0.93*	[0.93 0.94]
Income	1.04*	[1.04 1.04]
No depressive disorders (1) vs. Depressive disorders (0)	0.13*	[0.12 0.13]
No substance use disorders (1) vs. Substance use disorders (0)	0.39*	[0.38 0.40]
Perceived need	1.14*	[1.12 1.15]
Social support scale	0.92*	[0.92 0.92]
No depressive disorder by No substance use disorder	1.14*	[1.11 1.17]
No Depressive disorder by Perceived need	2.09*	[2.07 2.10]
No substance use disorder by Perceived need	1.22*	[1.21 1.23]
Perceived need by Social support scale	1.31*	[1.30 1.31]
Neighborhood-level predictors		
Community size 100,000 (1) + vs. Community size 10,000 – 99,999 (0)	1.41*	[1.39 1.42]
Middle immigration tercile (1) vs. Lowest immigration tercile (0)	0.68*	[0.67 0.69]
Highest immigration tercile (1) vs. Lowest immigration tercile (0)	0.90*	[0.89 0.92]
Neighborhood income	1.06*	[1.06 1.06]
Region-level predictors		
No family doctor	1.47*	[1.39 1.56]
Income health region level	3.70*	[3.13 4.38]
2 – 5 types of professionals vs. 0 types		
Individual-level predictors		
Intercept		
Age	1.17*	[1.17 1.18]
Females (1) vs. Males (0)	3.23*	[3.19 3.28]
Visible minorities (1) vs. White (0)	0.19*	[0.18 0.19]
Child with parents (1) vs. Living alone (0)	0.50*	[0.49 0.51]
Common-law union (1) vs. Living alone (0)	0.60*	[0.58 0.61]
Education	0.70*	[0.69 0.70]
Income	1.02*	[1.02 1.02]
No depressive disorders (1) vs. Depressive disorders (0)	0.02*	[0.02 0.02]
No substance use disorders (1) vs. Substance use disorders (0)	0.39*	[0.38 0.40]
Perceived need	1.48*	[1.46 1.50]

Social support scale	0.91*	[0.90 0.91]
No depressive disorder by No substance use disorder	1.66*	[1.61 1.72]
No Depressive disorder by Perceived need	1.95*	[1.93 1.96]
No substance use disorder by Perceived need	1.08*	[1.07 1.09]
Perceived need by Social support scale	1.33*	[1.32 1.33]
<hr/> Neighborhood-level predictors <hr/>		
Community size 100,000 + (1) vs. Community size 10,000 – 99,999 (0)	1.06*	[1.04 1.08]
Middle immigration tercile (1) vs. Lowest immigration tercile (0)	0.77*	[0.76 0.78]
Highest immigration tercile (1) vs. Lowest immigration tercile (0)	0.43*	[0.42 0.44]
Income quintiles	1.06*	[1.06 1.07]
<hr/> Region-level predictors <hr/>		
No family doctor	0.28*	[0.25 0.30]
Income health region	0.11*	[0.08 0.14]

Note: *OR* = odds ratio; *CI* = confidence interval. (McFaden), .305 (Cox & Snell), .225 (Nagelkerke), .397 Model $\chi^2(42) = 1022403.32$, $p < .01$. * $p < .001$.

Table 8 Multinomial Logistic Regression with Bootstrap Procedure - Types of professionals

	B	95% CI	
1 type of professionals vs. 0 types of professionals			
Individual-level predictors			
Constant	-1.96	[-19.00	-15.06]
Age	-0.02	[-0.57	0.53]
Males vs. females	-0.52	[-2.97	1.91]
Ethnicity	0.02	[-2.78	2.83]
Child with parents vs. living alone	-0.13	[-3.72	3.44]
Common-law union vs. living alone	0.45	[-4.33	5.23]
Education	-0.04	[-1.26	1.16]
Income	0.04	[-0.31	0.41]
No depressive disorders vs. Depressive disorders	1.79	[-1.97	5.56]
No substance use disorders vs. Substance use disorders	1.25	[-3.39	5.89]
No depressive disorder by No substance use disorder	0.14	[-6.51	6.79]
No Depressive disorder by Perceived need	1.59	[-0.08	3.28]
No substance use disorder by Perceived need	-0.05	[-0.29	0.18]
Perceived need by Social support scale	-0.74	[-2.47	0.98]
No Depressive disorder by Perceived need	-0.37	[-2.99	2.25]
No substance use disorder by Perceived need	0.26	[-0.40	0.93]
Neighborhood-level predictors			
Community size 100,000 + vs. Community size 10,000 – 99,999	-0.32	[-3.17	2.53]
Middle immigration tercile vs. Lowest immigration tercile	0.35	[-2.74	3.46]
Highest immigration tercile vs. Lowest immigration tercile	0.06	[-4.77	4.90]
Neighborhood income	0.07	[-0.72	0.86]
Region-level predictors			
No regular source of care	0.29	[-15.09	15.68]
Income health region level	2.23	[-38.82	43.29]
2-5 types of professionals vs. 0 types of professionals			
Individual-level predictors			
Constant	-6.21	[-25.48	13.05]
Age	0.14	[-0.56	0.84]
Males vs. females	-1.07	[-4.05	1.91]
Ethnicity	1.58	[-3.40	6.56]
Child with parents vs. living alone	0.64	[-5.05	6.35]
Common-law union vs. living alone	0.00	[-6.90	6.90]
Education	-0.31	[-1.79	1.15]
Income	0.03	[-0.38	0.45]
No depressive disorders vs. Depressive disorders	2.99	[-0.65	6.64]
No substance use disorders vs. Substance use disorders	0.61	[-7.19	8.42]

No depressive disorder by No substance use disorder	0.46	[-7.61	8.54]
No Depressive disorder by Perceived need	1.57	[-0.28	3.43]
No substance use disorder by Perceived need	-0.06	[-0.39	0.25]
Perceived need by Social support scale	-0.68	[-2.63	1.26]
No Depressive disorder by Perceived need	-0.16	[-3.57	3.23]
No substance use disorder by Perceived need	0.27	[-0.43	0.98]
Neighborhood-level predictors			
Community size 100,000 + vs. Community size 10,000 – 99,999	0.00	[-3.76	3.77]
Middle immigration tercile vs. Lowest immigration tercile	0.27	[-3.60	4.15]
Highest immigration tercile vs. Lowest immigration tercile	0.83	[-4.54	6.21]
Neighborhood income	0.08	[-0.97	1.15]
Region-level predictors			
No regular source of care	-1.03	[-20.69	18.62]
Income health region level	-1.87	[-58.62	54.87]

Note: *B* = observed coefficient; *CI* = confidence interval. Model $\chi^2(46) = 16.38, p = 0.933$. * $p < .001$.

Table 9 Multinomial Logistic Regression - Hours of Consultations with Professionals

	OR	95% CI	
1 – 10 hours of consultation vs. 0 hours of consultation			
Individual-level predictors			
Intercept			
Age	1.11*	[1.11	1.11]
Females (1) vs. Males (0)	1.72*	[1.70	1.73]
Visible minorities (1) vs. White (0)	0.61*	[0.60	0.62]
Child with parents' (1) vs Living alone (0)	0.89*	[0.88	0.90]
Common-law union (1) vs. Living alone (0)	0.85*	[0.84	0.86]
Education	0.95*	[0.95	0.96]
Income	1.04*	[1.03	1.04]
No depressive disorders (1) vs. Depressive disorders (0)	0.14*	[0.14	0.14]
No substance use disorders (1) vs. Substance use disorders (0)	0.89*	[0.86	0.91]
Perceived need	1.45*	[1.43	1.47]
Social support scale	0.93*	[0.93	0.93]
No depressive disorder by No substance use disorder	0.76*	[0.74	0.78]
No Depressive disorder by Perceived need	1.89*	[1.88	1.91]
No substance use disorder by Perceived need	1.03*	[1.02	1.04]
Perceived need by Social support scale	1.25*	[1.25	1.25]
Neighborhood-level predictors			
Community size 100,000 (1) + vs. Community size 10,000 – 99,999 (0)	0.98*	[0.97	1.00]
Middle immigration tercile (1) vs. Lowest immigration tercile (0)	0.55*	[0.55	0.56]
Highest immigration tercile (1) vs. Lowest immigration tercile (0)	0.86*	[0.85	0.88]
Neighborhood income	1.10*	[1.10	1.10]
Region-level predictors			
No family doctor	2.17*	[2.03	2.31]
Income health region level	15.95*	[13.28	19.16]
11 + hours of consultation vs. 0 hours of consultation			
Individual-level predictors			
Intercept			
Age	0.91*	[0.91	0.92]
Females (1) vs. Males (0)	3.40*	[3.34	3.45]
Visible minorities (1) vs. White (0)	0.46*	[0.45	0.47]
Child with parents (1) vs. Living alone (0)	0.67*	[0.65	0.68]
Common-law union (1) vs. Living alone (0)	0.24*	[0.23	0.24]
Education	0.88*	[0.88	0.89]
Income	1.04*	[1.03	1.04]
No depressive disorders (1) vs. Depressive disorders (0)	0.03*	[0.03	0.03]
No substance use disorders (1) vs. Substance use disorders (0)	0.18*	[0.18	0.19]
Perceived need	1.19*	[1.17	1.20]
Social support scale	0.88*	[0.88	0.88]
No depressive disorder by No substance use disorder	1.65*	[1.60	1.70]
No Depressive disorder by Perceived need	1.95*	[1.93	1.97]
No substance use disorder by Perceived need	1.13*	[1.12	1.14]

Perceived need by Social support scale	1.30*	[1.30	1.31]
Neighborhood-level predictors			
Community size 100,000 + (1) vs. Community size 10,000 – 99,999 (0)	1.01*	[1.00	1.03]
Middle immigration tercile (1) vs. Lowest immigration tercile (0)	1.10*	[1.08	1.12]
Highest immigration tercile (1) vs. Lowest immigration tercile (0)	0.97*	[0.95	1.00]
Income quintiles	0.98*	[0.97	0.98]
Region-level predictors			
No family doctor	0.08*	[0.07	0.08]
Income health region	0.50*	[0.38	0.64]

Note: *OR* = odds ratio; *CI* = confidence interval; (McFaden), .301 (Cox & Snell), .199 (Nagelkerke), .382 Model $\chi^2(42) = 893199.77$, $p < .01$. * $p < .001$.

Table 10 Multinomial Logistic Regression with Bootstrap Procedure - Hours of

Consultation

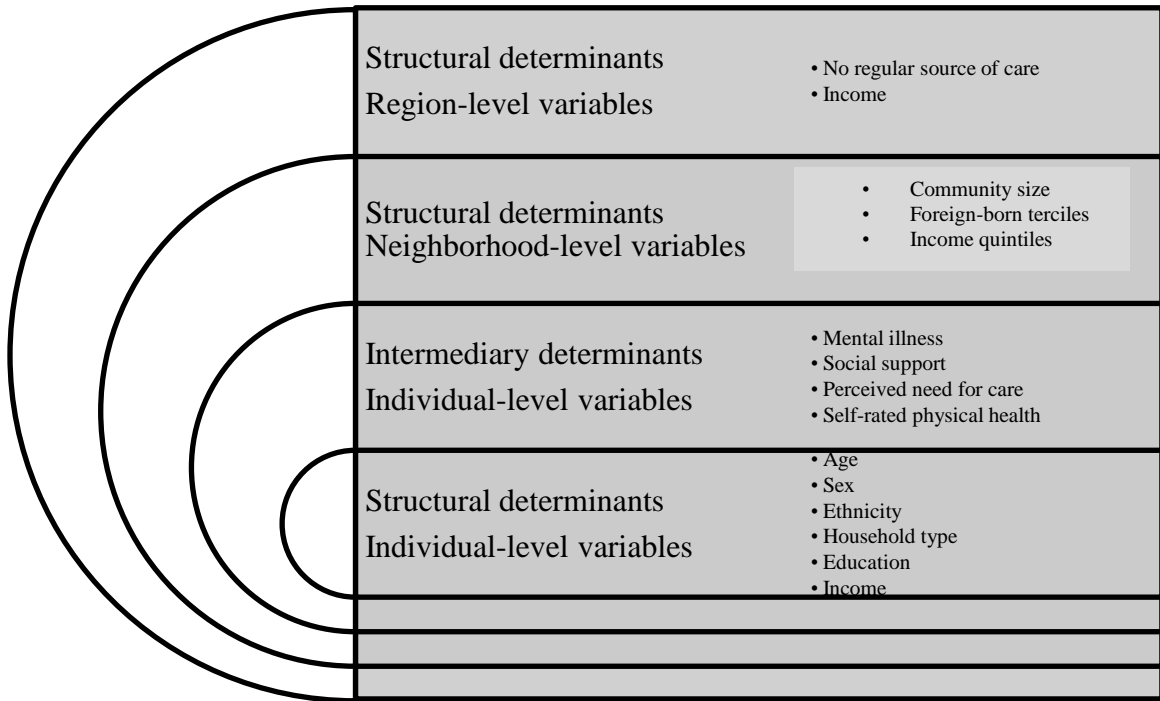
	B	95% CI	
1-10 hours of consultation vs. 0 hours of consultation			
Individual-level predictors			
Constant	-5.86	[-25.24	13.51]
Age	0.09	[-0.47	0.66]
Males vs. females	-0.45	[-2.95	2.05]
Ethnicity	0.45	[-3.12	4.03]
Child with parents vs living alone	0.15	[-3.95	4.27]
Common-law union vs. living alone	0.06	[-5.57	5.70]
Education	-0.02	[-1.30	1.24]
Income	0.04	[-0.36	0.45]
No depressive disorders vs. Depressive disorders	2.12	[-1.73	5.98]
No substance use disorders vs. Substance use disorders	0.47	[-4.48	5.43]
No depressive disorder by No substance use disorder	-0.31	[-7.31	6.69]
Perceived need	1.41	[-0.02	2.85]
Social support scale	-0.04	[-0.33	0.24]
No Depressive disorder by Perceived need	-0.64	[-2.22	0.93]
No substance use disorder by Perceived need	-0.08	[-2.51	2.34]
Perceived need by Social support scale	0.22	[-0.38	0.82]
Neighborhood-level predictors			
Community size 100,000 + vs. Community size 10,000 – 99,999	0.01	[-3.10	3.12]
Middle immigration tercile vs. Lowest immigration tercile	0.58	[-2.71	3.89]
Highest immigration tercile vs. Lowest immigration tercile	0.13	[-4.75	5.01]
Income quintiles	0.10	[-0.70	0.91]
Region-level predictors			
No regular source of care	0.76	[-14.94	16.47]
Income health region level	3.58	[-41.77	48.93]
11+ hours of consultation vs. 0 hours of consultation			
Individual-level predictors			
Constant	0.01	[-19.01	19.04]
Age	-0.08	[-0.86	0.70]
Males vs. females	-1.16	[-4.37	2.03]
Ethnicity	0.74	[-3.71	5.21]
Child with parents vs living alone	0.09	[-5.49	5.68]
Common-law union vs. living alone	-0.90	[-8.32	6.52]
Education	-0.10	[-1.62	1.42]
Income	0.04	[-0.43	0.51]
No depressive disorders vs. Depressive disorders	2.81	[-1.01	6.65]
No substance use disorders vs. Substance use disorders	1.39	[-5.28	8.07]
No depressive disorder by No substance use disorder	0.42	[-8.54	9.39]
Perceived need	1.41	[-0.12	2.94]

Social support scale	-0.09	[-0.46	0.26]
No Depressive disorder by Perceived need	-0.69	[-2.56	1.17]
No substance use disorder by Perceived need	-0.20	[-3.55	3.15]
Perceived need by Social support scale	0.26	[-0.45	0.98]
<hr/>			
Neighborhood-level predictors			
<hr/>			
Community size 100,000 + vs. Community size 10,000 – 99,999	0.04	[-4.08	4.17]
Middle immigration tercile vs. Lowest immigration tercile	-0.06	[-4.22	4.08]
Highest immigration tercile vs. Lowest immigration tercile	0.04	[-11.69	11.79]
Income quintiles	0.08	[-1.21	1.23]
<hr/>			
Region-level predictors			
<hr/>			
No regular source of care	-2.15	[-24.90	20.58]
Income health region level	-0.29	[-58.24	57.64]

Note: *B* = Observed coefficient; *CI* = confidence interval. Model $\chi^2(46) = 16.96$, $p = 0.934$. * $p < .001$.

Appendix D

Figure 1 Commission on the Social Determinants of Health Framework (CSDH)



Note: Adapted from “A Conceptual Framework for Action on the Social Determinants of Health”, by O. Solar and A. Irwin, 2010. World Health Organization, p. 6.

Curriculum Vitae

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Universities attended (with dates and degrees obtained):

- Bachelor of Arts in Psychology - Clinical Psychology. Pontificia Universidad Católica del Ecuador (PUCE), School of Psychology, 2007-2012. Honors Thesis: "Lineamientos de Primeros Auxilios Psicológicos para la Asistencia en Desastres (Parameters of Mental Health First Aid in Disaster Interventions).

Conference Presentations:

- Peñaherrera, M.A. & Garcès Dávila, I. (2016, August). A phylogenetic approximation to the challenge hypothesis: Evolutionary correlates of circulating testosterone and socioecological indicators. American Society of Primatologist and International Primatological Society joint conference, Chicago, Illinois, United States.
- Peñaherrera, M.A, Garcès Dávila, I. & Fernandes, H. B. (2016, August). Of quickies and quarrels: Phylogenetic associations between patterns of copulation and agonistic interactions in extant primates. American Society of Primatologist and International Primatological Society joint conference, Chicago, Illinois, United States.
- Garces Dávila, I., Peñaherrera-Aguirre, M., & Peters, P. (2016, May). Examining neighborhood determinants and life history in the prevalence of mental illness and service use. Oral session presented at the meeting of the Canadian Association of Geographers (CAG), Health and Health Care Study Group, Halifax, NS.
- Garces Dávila, I., Peñaherrera-Aguirre, M., & Peters, P. (2016, April). Adult PTSD in Victims of Child Maltreatment: Access to Mental Health Services. Oral session presented at the Graduate Research Conference, University of New Brunswick,

Fredericton, NB.

- Garces Davila, I., & Peters, P. (2016, April). Labour Market Integration of Immigrants: Does the NB Provincial Nominee Program Work? Poster presented at the New Brunswick Policy Research Forum, Canadian Open Data Summit organized by the NB Policy Research Network, Saint John, NB.
- Garces Davila, I., & Peñaherrera Aguirre, M. (2016, March). Impact of mental disorders in the workplace: does access to mental health services make a difference? Poster presented at the Interprofessional Health Research Day (iHR Day), Saint John Regional Hospital, Saint John, NB.
- Garcés Dávila, M. I., & Ronis, S. T. (2015, June). Accountability in mental health services: The role of mandates, outcomes, and partnerships in non-profit organizations. Poster session presented at the meeting of the Canadian Psychological Association (CPA), Ottawa, ON.
- Garcés Dávila, M. I., & Ronis, S. T. (2014, November). Accountability of mental health services in non-profit organizations: Examining the link between mandates and outcomes in New Brunswick. Poster session presented at the meeting of the New Brunswick Health Research Foundation (NBHRF), Moncton, NB.
- Aguirre, P. & Garcés Dávila, M. I. (2012, June). Sexual abuse, family crisis, and application techniques. Oral presentation at the meeting of Spanish and Latin American Network of Systemic Schools VIII Relates Congress, Cuenca, Azuay, Ecuador.