Discrimination and Depressive Symptom Trajectories of Middle-aged and Older Adults with Chronic Diseases

A DISSERTATION
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Dedication

Dedicated to my family, Sun-kyung, and Ami. Their love made the whole thing invaluable.

Abstract

Depression is a serious health concern for adults who have been diagnosed with cancer or diabetes. In addition to the challenges associated with chronic disease management, perceived discrimination has been identified as a factor that increases the risk of depressive symptoms. However, empirical evidence using longitudinal data to test the association between perceived discrimination and depressive symptoms of those with cancer or diabetes is limited. Using Andersen’s Behavioral Model and the Theory of Fundamental Causes as guiding frameworks, this three-paper dissertation study presents a scoping review (Study 1) and two quantitative studies (Studies 2 and 3) to investigate the association between perceived discrimination and depressive symptoms among middle-aged and older adults with a cancer history or diabetes. In Study 1, an assessment of 23 peer-reviewed journal articles provides strong empirical evidence for statistically significant direct or indirect relationships between discrimination/stigma and depressive symptoms. In Studies 2 and 3, latent growth modeling using data from the Health and Retirement Study indicates that cancer survivors had an increasing linear trajectory of depressive symptoms and people with diabetes had a decreasing linear trajectory of depressive symptoms over a 4-year period (Study 2: 2010–2014, Study 3: 2014-2018). Findings from these studies support the need for social workers and other members of the health care team to offer tailored assessment and treatment approaches to address depressive symptoms for cancer survivors and people with diabetes, especially those who may perceive discrimination based on their race, ethnicity, socioeconomic status, culture, language, and having a medical diagnosis. Implications for future investigations are discussed.

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Chapter One: Introduction

Among adults aged 50 or older in the United States (U.S.), 5.1 million (4.5%) reported a major depressive episode (MDE), and 3.2 million (2.9%) experienced an MDE with severe impairments in life activities, home or work management, or social relationships in 2018 (Substance Abuse and Mental Health Services Administration, 2019). Depressive symptoms are even more pronounced in persons who experience a chronic illness (Nouwen et al., 2010; Pitman et al., 2018). Adults with chronic conditions such as cancer and diabetes represent two populations that are affected by depressive symptoms after diagnosis (Victoria & Dampil, 2019; Zhao et al., 2014). In order to intervene effectively and reduce depressive symptoms in these populations, rigorous longitudinal research is needed to explore how depressive symptoms manifests over time and identify how perceived discrimination affects depressive symptoms trajectories (Clark et al., 2016; Nouwen et al., 2019).

Based on a conceptual framework that combines Andersen's Behavioral Model (Andersen, 2014) and the Theory of Fundamental Causes (Link & Phelan, 1995), this three-paper dissertation study included an analysis of the extant literature on discrimination/stigma in the context of cancer and diabetes, as well as two quantitative studies that tested the association between perceived discrimination and depressive symptoms of middle-aged (50–64 years old) and older adults (65 years or older) with a cancer history (i.e., from their initial diagnosis through the remainder of their lives) or diabetes (type 1 or type 2). Specifically, Study 1 consisted of a scoping review to map empirical evidence from peer-reviewed journal articles on the association between discrimination/stigma and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. Study 2 performed latent growth modeling to investigate the effect of perceived discrimination on the four-year trajectory of depressive symptoms of middle-aged and older adult cancer survivors using data from the Health and Retirement Study (HRS). Using HRS data, Study 3 implemented an identical latent growth modeling approach to identify the effect of perceived discrimination on the four-year trajectory of depressive symptoms of middle-aged and older adults with diabetes.

Problem Statement

Cancer and diabetes are two common chronic diseases that middle-aged and older adults experience in the U.S. Approximately 90% of 16.9 million cancer survivors in the U.S. were adults aged 50 or older in 2019 (Miller et al., 2019). The incidence of diabetes is 17.5% among adults aged 45-64, and 26.8% among adults aged 65 years or older (Centers for Disease Control and Prevention, 2020). Given advancements in post-diagnostic treatment and health care management, the lives of adults with these chronic diseases are being extended (Miller et al., 2019; US Census Bureau, 2015) and additional research is needed to address quality of life issues for these populations.

Approximately 5.1 million adults aged 50 or older experienced a major depressive episode in 2018 (Substance Abuse and Mental Health Services Administration, 2019). In particular, depressive symptoms are more nuanced among adults with a cancer history or diabetes due to the stress associated with the diagnosis, treatment process, and the healthcare management process (Bogner et al., 2012; Garcia et al., 2016; Hamer, Batty, & Kivimaki, 2011; Pan et al., 2010; Zhao et al., 2014). Cancer survivors are known to experience a 1.5 times higher risk of depressive symptoms compared to those without a cancer history (Zhao et al., 2014), and adults with diabetes have a 9% to 24% higher rate of depressive symptoms compared to those without diabetes (Ali et al., 2006; Nouwen et al., 2010). Given these findings, reducing and managing the depressive symptoms of adults with a cancer history and diabetes needs to be a priority in health care settings.

The depressive symptoms of cancer survivors have been associated with compromised physical functioning, lack of sleep, less health care service utilization, and higher mortality rates compared to people without cancer (Irwin, 2013; Magnuson et al., 2019; Mols et al., 2013). Likewise, depressive symptoms of adults with diabetes may be a barrier to engagement in health behaviors and health care service utilization (Golden et al., 2008; Knol, 2006; Renn et al., 2011; Rotella & Mannucci, 2013). However, depressive symptoms associated with chronic disease are less frequently recognized among middle-aged and older adults, as compared to younger aged groups, because they are classified as experiences of loss, grief, and social withdrawal rather than depression (Casey, 2018). These findings emphasize the importance of conducting research on depressive symptoms of middle-aged and older adults with a cancer history or diabetes. Additionally, given that depressive symptoms change over time among cancer survivors and those with diabetes (Almeida et al., 2016; Rottmann et al., 2016), investigating how depressive symptoms manifest over the long-term and the factors that affect these trajectories will be beneficial to researchers and practitioners.

A large body of research has reported diverse factors that affect depressive symptoms of adults with a cancer history or diabetes. Previous studies revealed the following factors are associated with higher depressive symptoms of adult cancer survivors or people with diabetes: older age, being female, identifying as non-Hispanic white, being single, lower income, lower education, lower sense of control, smaller social network, not having health insurance, compromised physical health, more frequent smoking and alcohol use, and less frequent physical activities (Assari & Lankarani, 2017; Erim et al., 2019; Khuwaja et al., 2010; McCurley et al., 2019; Mols et al, 2018; Schafer & Koltai, 2015; Vodermaier et al, 2011; Zhao et al., 2014). Furthermore, depressive symptoms were associated with cancer types, cancer recurrence, and cancer duration (Linden et al, 2012; Zhao et al., 2014), as well as with diabetes duration (Asefa et al., 2020). The literature also reported that discrimination may affect depressive symptoms and contribute to health disparities (Link & Phelan, 2001; Hatzenbuehler et al., 2013). However, empirical studies that examined the association between discrimination and depressive symptoms among middle-aged and older adults with cancer history or diabetes is still limited (Holmes-Truscott et al., 2020; Ostroff et al., 2019). In particular, there is a paucity of studies that investigated this association using longitudinal data from a national sample, which emphasizes the importance of conducting research on this topic.

Purpose and Research Questions

The purpose of this three-paper dissertation research was to investigate the association between perceived discrimination and depressive symptoms using a scoping review (Study 1) and longitudinal survey design (Studies 2 and 3). The current study addressed the following six research questions.

1. What is the current state of the literature addressing the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?

2. What types of methodologies were used in the literature to address the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?
3. What existing evidence has been reported on the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?
4. What is the trajectory of depressive symptoms of adults aged 50 or older with a cancer history or diabetes?
5. Does perceived discrimination influence the trajectory of depressive symptoms of adults aged 50 or older with a cancer history or diabetes over time?
6. What other factors influence the trajectory of depressive symptoms of adults aged 50 or older with a cancer history or diabetes over time?

Theoretical Foundation

This dissertation research used a conceptual framework based on the two theories: Andersen's Behavioral Model (Andersen, 2014) and the Theory of Fundamental Causes (Link & Phelan, 1995).

Andersen's Behavioral Model

Andersen's Behavioral Model was developed to explain how individual characteristics and environmental factors influence health behaviors and outcomes (Andersen, 2014). The sixth and most recent revision of Andersen's Behavioral Model describes the association of five main constructs: (1) predisposing factors, (2) enabling factors, (3) need factors, (4) health behaviors, and (5) outcomes (Andersen et al., 2014). *Predisposing factors* refers to existing conditions such as social-cultural characteristics that indirectly lead to health behaviors. *Enabling factors* refer to conditions having individuals facilitate health behaviors through personal or community resources. Personal resources include income, medical care, and social relationships whereas community resources include availability of health service facilities and personnel in the community. *Need factors* include perceived and evaluated needs which encourage people to engage in health behaviors. Perceived needs include an individual's worries, pains, or symptoms of illness. Evaluated needs include a medical provider's judgement of an individual's health status or prior illness diagnosis experience. *Health behaviors* include personal practices such as nutrition, exercise, alcohol use, and the use of health services. The *outcomes* of health behaviors include the degree to which individuals assess their physical or mental health status. Guided by Andersen's Behavioral Model, the proposed study will include each of the five constructs, with depressive symptoms being the outcome of interest.

Theory of Fundamental Causes

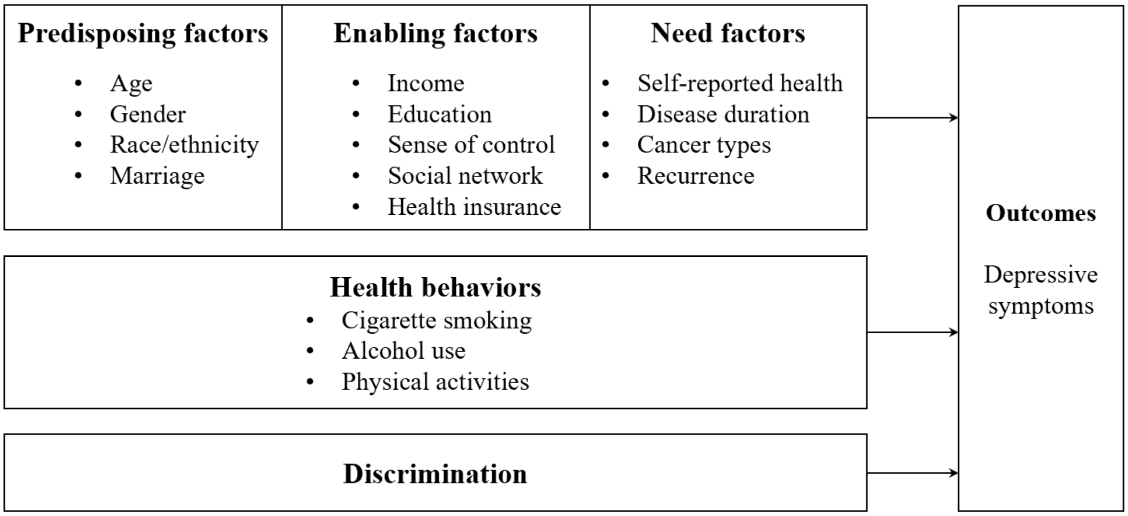
The Theory of Fundamental Causes states that individuals with lower socioeconomic status (SES) experience more health problem and mortality than those with higher SES (Link & Phelan, 1995; Phelan, Link, & Tehranifar, 2010). Those with lower SES lack important resources including knowledge, money, power and prestige, and social network, which function as fundamental causes of health inequalities. Four primary principles regarding fundamental causes were introduced in this theory. First, these fundamental causes influence multiple health problems. Second, they affect health problems via multiple risk factors. Third, they encourage individuals to access resources to avoid the risks or outcomes of health problems. Fourth, the relationship between the fundamental causes and health outcomes is reproduced over time. In this dissertation study, the concept of perceived discrimination was used as a proxy of power and prestige as proposed in this theory.

Conceptual Framework

The conceptual framework used in this study is shown in Figure 1.1. In Study 1, a scoping review of peer-reviewed journal articles was conducted to summarize research on the relationship between discrimination/stigma and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. In Studies 2 and 3, the trajectories of depressive symptoms were examined as follows: the effect of predisposing factors, enabling factors, need factors, health behaviors, and perceived discrimination on depressive symptoms trajectories of middle-aged and older adults with a cancer history (Study 2) and adults with diabetes (Study 3) were examined. In Studies 2 and 3, predisposing factors (e.g., age, gender, race/ethnicity, marriage), enabling factors (e.g., income, education, sense of control, social network, health insurance), need factors (e.g., self-reported health, disease duration, cancer types, recurrence), health behaviors (e.g., smoking, alcohol use, physical activities), and perceived discrimination as a proxy of power and prestige were included as factors that affect the trajectory of depressive symptoms.

Figure 1.1

Conceptual framework



Overview of Literature Review

This literature review provides an overview as the basis for a general understanding of middle-aged and older adults with cancer and diabetes, as well as the factors that affect their depressive symptoms. This literature review also addresses research gaps that offer the importance of investigating the relationship between discrimination and depressive symptoms among middle-aged and older adults with a cancer history or diabetes.

Middle-aged and Older Adults with a Cancer History

The concept of cancer survivorship was first used by Mullan (1985) who suggested a new perspective in reaction to the dominant view of explaining only two paths for people diagnosed with cancer: cured or not cured (Khan et al., 2012). Mullan (1985) argued that there is one path for a person with a cancer diagnosis, which is “survival” or dealing with physical and psychological effects of cancer diagnosis and treatments. Mullan suggested three seasons of cancer survival: (1) acute survival, the period when individuals focus on treatment after diagnosis; (2) extended survival, the period when the survivors focus on dealing with the physical and psychological effects of treatment; and (3) permanent survival, the period when recurrence is not likely to occur while the survivors are still dealing with the long-term consequences of treatment. In this study, cancer survivors refer to people who have a cancer history, i.e., from their initial diagnosis through the remainder of their lives.

Approximately 40% of the U.S. population is expected to be diagnosed with cancer at some point in their lifetime (National Cancer Institute, 2019). About 16.9 million people in the U.S. were reported to have a history of cancer as of January 2019, and it is estimated that the number of cancer survivors will increase to over 22.1 million by 2030 (National Cancer Institute, 2019). As shown in Table 1.1, About 90% of cancer survivors are 50 years and over in 2019 (Miller et al., 2019). In the same year, about a third were diagnosed with cancer within the last 5 years, and about half were diagnosed from 6 to 20 years previously, and one-fifth were diagnosed more than 21 years ago (National Cancer Institute, 2019).

Table 1.1

Estimated number of cancer survivors by age and by years since diagnosis, 2019

Ages	*N*	(%)	Years since diagnosis	*N*	(%)
19 or less	113,610	(0.7)	0-5 years	5,527,420	(32.7)
20–29	194,360	(1.2)	6-10 years	3,802,050	(22.5)
30–39	436,300	(2.6)	11-15 years	2,684,620	(15.9)
40–49	969,450	(5.7)	16-20 years	1,855,780	(11.0)
50–59	2,380,560	(14.0)	21-25 years	1,198,320	(7.1)
60–69	4,466,900	(26.4)	26-30 years	773,770	(4.6)
70–79	4,760,980	(28.1)	31 or over	1,078,430	(6.4)
80 or over	3,598,220	(21.3)			
Total	16,920,370	(100)			

Source. National Cancer Institute (2019).

Table 1.2 presents the top three cancer types in both men and women in the U.S. as of January 2019. The three most prevalent cancer types of new cases were prostate, lung and bronchus, and colon and rectum for men, and breast, lung and bronchus, and colon and rectum for women. The three most prevalent cancer types of new deaths were lung and bronchus, prostate, and colon and rectum for men, and lung and bronchus, breast, and colon and rectum for women. Based on these incidence and mortality data, this study focused on four types of cancer survivors: breast, prostate, lung, and colon.

Table 1.2

Estimated new cancer cases and deaths by sex, United States, 2019

New cases in male			New cases in female		
Types	*N*	(%)	Types	*N*	(%)
Prostate	174,650	(20%)	Breast	268,600	(30%)
Lung & bronchus	116,440	(13%)	Lung & bronchus	111,710	(13%)
Colon & rectum	78,500	(9%)	Colon & rectum	67,100	(8%)
All sites	870,970	(100%)	All sites	891,480	(100%)
New deaths in male			New deaths in female		
Types	*N*	(%)	Types	*N*	(%)
Lung & bronchus	76,650	(24%)	Lung & bronchus	66,020	(23%)
Prostate	31,620	(10%)	Breast	41,760	(15%)
Colon & rectum	27,640	(9%)	Colon & rectum	23,380	(8%)
All sites	320,670	(100%)	All sites	285,210	(100%)

Source. National Cancer Institute (2019).

Middle-aged and Older Adults with Diabetes

There are two types of diabetes (type 1 and type 2) and both types of diabetes are chronic diseases that affect the way a person's body regulates blood glucose (Joslin Diabetes Center, 2021). Type 1 diabetes develops in childhood or early adulthood and is characterized by a person's inability to produce insulin. People with type 1 diabetes need daily insulin injections or an insulin pump to survive. Type 2 diabetes is usually developed in adults over 40. People with type 2 diabetes produce insulin, but it is either insufficient or cannot be used effectively to remove glucose from the bloodstream and into cells (Joslin Diabetes Center, 2021). In this study, people diagnosed with either type 1 or 2 diabetes were included.

As shown in Table 1.3, approximately 34.1 million (13%) of adults in the U.S. had diabetes in 2018 and it is known that type 2 diabetes accounts for 90% to 95% of all diabetes cases (Centers for Disease Control and Prevention, 2020). The prevalence of diabetes among U.S. adults is increasing and expected to reach 33% by 2050 as life expectancy is prolonged (Boyle et al., 2010). The incidence of diabetes increases with older age, i.e., 17.5% in adults aged 45 to 64 years and 26.8% in adults aged 65 years or older (Centers for Disease Control and Prevention, 2020).

Due to prevention efforts and more efficacious treatments for people with cancer and diabetes, the lives of these individuals are being extended (Miller et al., 2019; US Census Bureau, 2015). These trends highlight the need to address the mental health of people who have a cancer history or diabetes to improve their overall quality of life.

Table 1.3

Estimated prevalence of diabetes in the United States, 2013-2016

Characteristics	Total diabetes percentage
Age in years	
18–44	4.2%
45–64	17.5%
≥ 65	26.8%
Sex	
Male	14.0%
Female	12.0%
Total	13.0%

Source. Centers for Disease Control and Prevention (2020).

Depressive symptoms

Depressive symptoms consist of a complex pattern of deviations in feelings, cognition, and behaviors and represents lowering of individuals' mood below their baseline level (Beck & Alford, 2009). Beck and Alford (2009) defined depression in terms of attributes such as alteration in mood (sadness, loneliness, apathy), negative self-concept (self-reproaches, self-blame), regressive and self-punitive wishes (desires to escape, hide, or die), vegetative changes (anorexia, insomnia, loss of libido), and change in activity level (retardation or agitation). The *Diagnostic and Statistical Manual of Mental Disorders* – 5th edition (DSM-V) outlines the criteria of major depressive disorder as at least five specific symptoms during the 2-week period, among depressed mood, sleep disorder, interest deficit, guilt, energy deficit, concentration deficit, appetite disorder, psychomotor retardation, and suicidality; at least one of the symptoms is either depressed mood or interest deficit (DMS-V, 2013). In this study, depressive symptoms refer to the eight symptoms during the past week, including felt depressed, felt everything they did was an effort, sleep was restless, was not happy, felt lonely, did not enjoy life, felt sad, felt unmotivated (Radloff, 1977).

Discrimination/stigma and Depressive Symptoms

Scholars have described in detail the concepts of discrimination and stigma (Goffman, 1963; Link & Phelan, 2006). Both discrimination and stigma overlap and co-occur each other; however, stigma is a broader concept than discrimination in that the stigmatization process includes discrimination (Hatzenbuehler et al., 2013; Link & Phelan, 2001; Stangl et al., 2019). Although research has demonstrated that discrimination and stigma exacerbate health disparities and contribute to adverse physical or mental health outcomes (Hatzenbuehler et al., 2013), previous studies on the relationship between discrimination/stigma and depressive symptoms is limited in scope (Fox et al., 2018; Longdon & Read, 2017; Mukolo et al., 2010; Pescosolido et al., 2008). In particular, few studies have investigated the association between discrimination/stigma and depressive symptoms among people with a cancer history or diabetes using longitudinal data. In particular, research linking discrimination/stigma, mental health, and physical health will contribute substantively to previous study findings and direct our attention to creating more tailored clinical interventions for people with chronic disease.

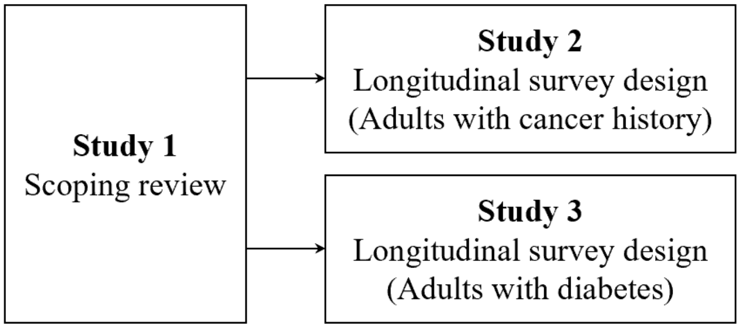
Methodology

Research Design

Figure 1.2 presents the overall research design that combined three independent studies for this dissertation. For Study 1, a scoping review was conducted to investigate the current state of published, peer-reviewed empirical evidence that addressed the association between discrimination/stigma and depressive symptoms of middle-aged or older adults with cancer history or diabetes. For Studies 2 and 3, quantitative analyses were conducted using a longitudinal survey research design to (a) examine the trajectories of depressive symptoms of middle-aged or older adults with a cancer history (Study 2) or diabetes (Study 3), and (b) investigate factors that affect these trajectories. These quantitative studies employed secondary data from the Health and Retirement Study (HRS). The HRS is a nation-wide longitudinal panel study that surveys approximately 20,000 U.S. adults aged 50 or older who are tracked every two years from their entry into the study until death (University of Michigan Institute for Social Research, 2010). The Survey Research Center of the University of Michigan Institute for Social Research has been running the HRS with support from the National Institute on Aging at National Institutes of Health (NIH) and the Social Security Administration (University of Michigan Institute for Social Research, 2010).

Figure 1.2

Research design



Scoping Review

A scoping review is one type of a knowledge synthesis method where researchers map previous literature on a certain topic by investigating key concepts, research gaps, and evidence sources, in order to provide directions for future research, practice, and policy (Arksey & O'Malley, 2005; Daudt et al., 2013; Levac et al., 2010). A scoping study is conducted in six stages: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, (5) collating, summarizing, and reporting the results, and (6) consultation (Arksey & O'Malley, 2005; Daudt et al., 2013; Levac et al., 2010). In this study, the scoping review (Study 1) examined the extant literature, summarized research findings, and identified research gaps using a sample of 23 published peer-reviewed journal articles that reported empirical evidence on the topic on the relationship between stigma/discrimination and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. The scoping review was conducted using Covidence, a systematic review management software, as well as Microsoft Excel.

Latent Growth Modeling

Latent growth modeling (LGM) is one type of structural equation modeling that is used in longitudinal studies (Duncan & Duncan, 2004). LGM can test the hypothesized growth form's adequacy, correct measurement error in observed variables, incorporate diverse constructs simultaneously, and develop a common trajectory (Duncan & Duncan 2004). In this dissertation research, the two quantitative investigations (Studies 2 and 3) used LGM to investigate the trajectories of depressive symptoms and factors that affect the trajectories in two steps. First, unconditional modeling without any covariates was performed to (a) examine the pattern of the trajectory of depressive symptoms of the total respondents and (b) investigate the variances in the intercept and slope of the trajectories. Second, covariates were added in conditional modeling to examine factors that affect the different trajectories of depressive symptoms. Data were prepared with SPSS 26 (IBM Corp, 2019) and the analyses were conducted using Mplus 8.6 (Muthén & Muthén, 1998).

Ethical Consideration

To secure high ethical standards of the current study process, study-specific documents were reviewed by the Human Subjects Institutional Review Board (IRB) at the University of Minnesota. This study was approved as an exempt study (IRB Study Number: 00008265) due to its use of deidentified secondary data, and the use of the HRS restricted data (Cancer Site) was approved by the HRS Restricted Data Agreements (RDA number: 2019-080). The researcher maintained respondent anonymity throughout the whole research process. To protect confidentiality in the HRS restricted data, the researcher was able to distinguish participants only by the identifier numbers that were randomly provided by the HRS. The direct respondent identifiers such as name, address, SSN, Medicare/Medicaid identifier, place of birth, were removed from both public (Core, Exit) and restricted dataset (Cancer Site) when the researcher access the data. Thus, these direct identifiers were not used in any of the analyses, and the researcher will not publish statistical results that can potentially identify respondents, either directly or inferentially. All published research resulting from the HRS restricted data analysis will be reviewed according to the Terms of the Agreement for Use of Restricted Data from the HRS.

Chapter Two (Study 1): Linking Discrimination and Stigmatization to the Depressive Symptoms of Cancer Survivors and People with Diabetes: A Scoping Review

Introduction

Stigma and discrimination contribute to health disparities by reducing resource availability, weakening social relationships, and worsening psychological and behavioral responses, which subsequently exacerbate health outcomes (Hatzenbuehler et al., 2013). Scholars have described the attributes of stigma and discrimination and the relationship between these two constructs. Stigma has been used to indicate marking or labeling individuals with stereotypes to exclude or discriminate against the labeled individuals (Goffman, 1963; Link & Phelan, 2006). Goffman (1963) described three types of stigma: (1) stigma due to various physical deformities, (2) stigma due to individual character perceived as weak, negative, and treacherous, such as mental disorder, addiction, alcoholism, suicidal attempts, imprisonment, homosexuality, unemployment, and radical political behavior, and (3) stigma transmitted through lineages, such as race, ethnicity, religion, and nation. Stigma brings about discrimination that prevents social acceptance, reduce individuals' opportunities, and strengthen social inequalities (Goffman, 1963). Link and Phelan (2006) described three major forms of discrimination. First, *direct discrimination* refers to instances in which individuals experience overt rejection in their daily lives such as employment applications and housing. Second, *structural discrimination* refers to cases in which useful information is shared only with certain groups of people (e.g., based on race or religion). Third, *insidious discrimination* involves cases in which individuals recognize that people had applied negative labels to them such as unintelligent, untrustworthy, poor, or dangerous.

Stigma and discrimination

Stigma overlaps and co-occurs with discrimination; however, stigma is a broader concept than discrimination in that the stigmatization process incorporates several elements including discrimination (Hatzenbuehler et al., 2013; Link & Phelan, 2001; Stangl et al., 2019). Link and Phelan (2001, 2006) reported that stigma occurs when the components are converged, such as labeling individuals, linking them to undesirable characteristics, separating them from the majority group, and discriminating against them, all of which contributes to their loss of status in a society. Power is also exercised in the process of stigma because individuals who lack social, cultural, economic, and political power become part of a stigmatized group, although low-power groups also attempt to stigmatize high-power group (Link & Phelan, 2001).

The Health Stigma and Discrimination Framework describes how discrimination is an outcome of stigma (Stangl et al., 2019). Drivers and facilitators such as fear of disease or infection, fear of social and economic ramification, and different social and cultural norms, determine if the marking of stigma occurs (Stangl et al, 2019). Next, stigma is manifested through experienced discrimination (e.g., refusal of housing, gossip), internalized stigma (e.g., self-stigma), stereotypes (beliefs about characteristics of individuals), or prejudice (negative evaluation on individuals). Stereotypes or prejudice can work as drivers and facilitators, as well as manifestations of stigma (Stangl et al., 2019).

Health- and non-health-related stigma/discrimination

This scoping review included both health-related stigma/discrimination and non-health-related stigma/discrimination. Health-related stigma/discrimination was attributed to physical or mental health conditions, while non-health-related stigma/discrimination was attributed to factors other than health condition, such as race, gender, sexual orientation, occupation, or social class (Link & Phelan, 2006; Stangl et al, 2019). Health-related discrimination/stigma may lead to more stress compared to non-health-related discrimination/stigma, because it can affect experiences in everyday life (e.g., ability to work, social life) in combination with stress-related illnesses, and it may even discourage care-seeking for illnesses (Link & Phelan, 2006). In addition, individuals with lower socioeconomic status may experience greater risks of morbidity and mortality, which in turn exacerbates health disparities.

Stigma/discrimination and depressive symptoms

While the relationship between stigma/discrimination and physical health status has been discussed in a large body of empirical studies (Abu-Odeh, 2014; Barlösius & Philipps, 2015; DeJoy & Bittner, 2015; Ratcliffe & Ellison, 2015; Stangl & Sievwright, 2016), empirical evidence on the relationship between stigma/discrimination and mental health such as depressive symptoms is limited (Fox et al., 2018; Longdon & Read, 2017; Mukolo et al., 2010; Pescosolido et al., 2008). This paucity of research emphasizes the necessity of empirical studies in this area. In particular, it is important to investigate depressive symptoms of middle-aged and older adults because depressive symptoms are less recognizable as individuals become older (Casey, 2018). The reason for this lack of recognition of depressive symptoms among middle-aged and older adults may be due to different symptoms such as social withdrawal, loss, and grief, which are recognized as common phenomenon that individuals in these age cohorts commonly experience, rather than as mental illness that needs to be treated (Casey, 2018).

Middle-aged and older adults commonly experience chronic diseases such as cancer or diabetes. The majority (90%) of about 16.9 million cancer survivors in the United States (U.S.) were aged 50 years or older as of January 2019 (Miller et al., 2019), and about 17.5% of those aged 45 to 64 years and 26.8% of those aged 65 years or older had diabetes (Centers for Disease Control and Prevention, 2020). Due to advanced prevention and treatment for people with cancer and diabetes, the lives of these individuals are being extended (Colby & Ortman, 2015; Miller et al., 2019).

Depressive symptoms are more common among middle-aged and older adults with a cancer history, and depressive symptoms can be a barrier to cancer treatment and reduce quality of life after treatment (Caruso et al., 2017; İzci et al., 2020; Magnuson et al., 2019; Reyes-Gibby et al., 2012). Cancer survivors had a 1.5 times higher risk of depressive symptoms than those without a cancer history in a population-based study using the Behavioral Risk Factor Surveillance System (BRFSS; Zhao et al., 2014). Depressive symptoms in middle-aged and older adult cancer survivors are associated with reduced physical functioning, lack of sleep, greater health care service utilization, and higher mortality rates (Irwin, 2013; Magnuson et al., 2019; Mols, Husson, Roukema, & van de Poll-Franse, 2013).

Depressive symptoms are also more common among middle-age and older adults with diabetes compared to those without diabetes. Meta-analytic studies reported that the prevalence of depressive symptoms among people with diabetes was 9% to 24% higher than those without diabetes (Ali, Stone, Peters, Davies, & Khunti, 2006; Nouwen et al., 2010). Diabetes can increase depressive symptoms due to the stress linked to the diagnosis, the treatment process, and glucose management practices such as ongoing glycemic monitoring, diet, and exercise (Bogner et al., 2012; Garcia et al., 2016; Hamer, Batty, & Kivimaki, 2011; Pan et al., 2010). Additionally, the depressive symptoms experienced by people with diabetes can be a barrier to engage in healthy behaviors and use health care service for their disease management (Golden et al., 2008; Knol, 2006; Renn, Feliciano, & Segal, 2011; Rotella & Mannucci, 2013).

Given this body of research, investigating the association between stigma/discrimination and depressive symptoms among middle-aged and older adult cancer survivors and people with diabetes is warranted. This is a considerably new research area with limited empirical evidence and, at this point, it is necessary to systematically investigate what has been done, identify research gaps, and provide direction for future studies on this topic. A scoping review is one type of systematic review methodology to map existing evidence regarding certain questions within a given content (Arksey & O'Malley, 2005; Daudt, van Mossel, & Scott, 2013). To the best of this author's knowledge, a scoping review on the relationship between discrimination/stigma and depressive symptoms focusing on middle-aged and older adults with cancer history or diabetes has not been published.

Research Questions

This scoping study investigated the current state of published, peer-reviewed empirical studies directly addressing the relationship between discrimination/stigma and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. The specific questions that guided this review are as follows:

1. What is the current state of the literature addressing the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?
2. What types of methodologies were used in the literature to address the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?
3. What existing evidence has been reported on the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?

Methods

This scoping study was developed primarily based on the framework proposed by Arksey and O'Malley (2005) and combined with Levac, Colquhoun, and O'Brien's (2010) enhancement. A scoping review is one type of knowledge synthesis methodology that maps the literature on a particular topic to identify key concepts, research gaps, and types of evidence sources thereby providing information to future research, practice, and policymaking (Daudt et al., 2013). A scoping study is considered an optimal methodology when the research area has not yet been comprehensively reviewed before (Arksey & O'Malley, 2005). Using a scoping review approach, this study examined the extant literature, summarized research findings, and identified research gaps on the relationship between stigma/discrimination and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. This study utilized a six-stage framework:

(1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, (5) collating, summarizing, and reporting the results, and (6) consultation (Arksey & O'Malley, 2005; Daudt, van Mossel, & Scott, 2013; Levac, Colquhoun, & O'Brien, 2010).

Inclusion and exclusion criteria: Identifying and selecting relevant studies

Peer-reviewed journal articles that reported empirical studies, regardless of their publication date, were included in the literature search. Regarding populations of interest, articles were selected if they included adults who were aged 40 or older with a cancer history or diabetes. Both cross-sectional and longitudinal information about the relationship between stigma/discrimination and depressive symptoms was the focus of this search. This scoping review excluded papers if the full article was unavailable or written in a language where no translation to English was readily available. Books, book chapters, monographs, and dissertations that were not published in peer-reviewed journal articles were also excluded. The search included journal articles that were published as of April 29, 2021.

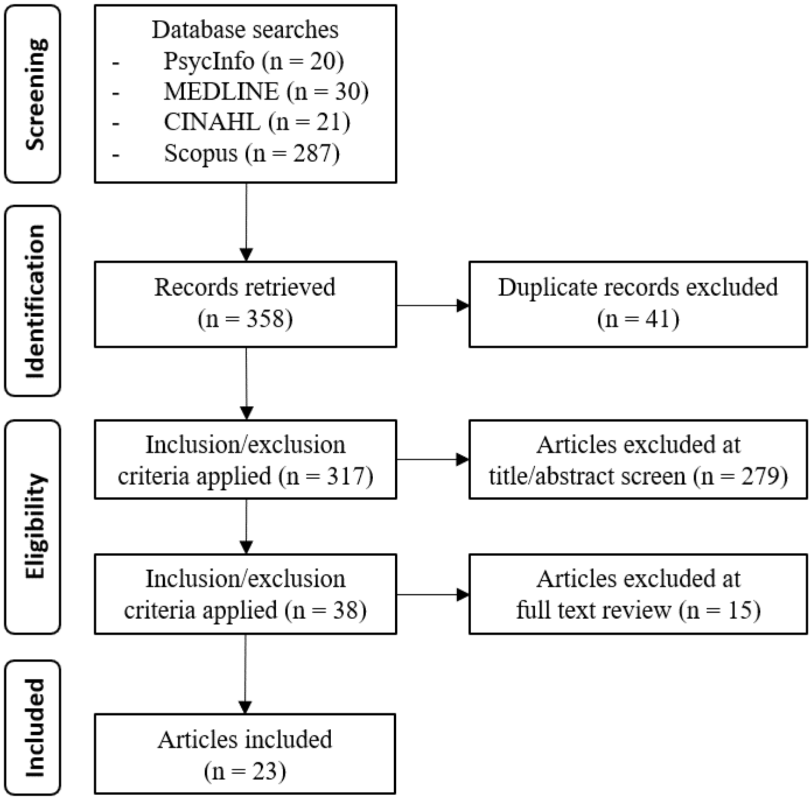
Four online literature databases were selected as relevant to the topic and provided interdisciplinary depth based on the recommendation of a research librarian who has an expertise in searching bibliographic databases. These databases included: PsycInfo (Ovid), MEDLINE (Ovid), CINAHL (EBSCOhost), and Scopus (ELSEVIER). Comprehensive searches for relevant studies were conducted using these databases that were available through the libraries at the University of Minnesota. Based on the nature of a scoping review, the search strategies were iteratively developed with multiple refinements as the review progressed. Final search strategies are reported in Appendix A.

The final results were imported into Covidence, a systematic review management software where the imported literature can be managed, duplicates can be automatically identified, and the records of voting based on screening titles, abstracts, and full text are recorded.

The data collection process was reported using a PRISMA 2009 Flow Diagram as presented in Figure 2.1 (Moher et al., 2009). Titles and abstracts were filtered based on the inclusion and exclusion criteria. The full texts of articles that matched the initial round for inclusion were retrieved for review. The articles were repeatedly sorted until the final pool for scoping review was determined. See Figure 1 for the chart of scoping strategy (Moher et al., 2009).

Figure 2.1

PRISMA chart of scoping strategy



Results

Research question 1

What is the current state of the literature addressing the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?

Publication trends. All 23 sample studies were published in 2006 or later: One (4.3%) was published between 2006 and 2009, 17 studies (73.9%) were published between 2010 and 2019, five articles (21.7%) were published between 2020 and April 2021. Seven (30.4%) of the 23 sample studies were published in nursing journals, five studies (21.7%) in medical or psychiatry journals, four studies (19%) in public health journals, four studies (19%) psychology journals, and three studies (14.3%) in social work journals.

Aims. The majority (*n* = 21, 91.3%) of the 23 studies aimed to examine the relationship between stigma/discrimination and depressive symptoms. Among them, 17 studies investigated the direct relationship between stigma/discrimination and depressive symptoms, while four studies examined the indirect relationships. Two studies examined the mediating effects of self-esteem, self-efficacy, social support, psychological distress, and resilience on the relationship between discrimination and depressive symptoms (Chu et al., 2021; Holmes-Truscott, 2020). One study reported the direct relationship between discrimination/stigma and depressive symptoms in the mediation model among guilt- or shame-proneness, discrimination/stigma, and depressive symptoms (Williamson et al., 2020). One study investigated the moderating effect of ambivalence over emotional expression and intrusive thoughts on the relationship between discrimination and depressive symptoms (Tsai & Lu, 2019). Only one of the 23 studies tested validity of instrument related to stigma/discrimination (Kato, Takada, Hashimoto, 2014). Additionally, one study explored pathways in managing depressive symptoms through a qualitative method (Hansen & Cabassa, 2012). See Table 2.1 for detailed information on each of the 23 studies included in the review.

Table 2.1

Description of Scoped Studies (N = 23)

Authors	Discipline	Aim	Disease	Countries	Race/ethnicity	*N*	Design	Analysis	Discrimination/Stigma scales	Depression scales
Brown et al. (2014)	Nursing	Examine the relationship of LCS with anxiety, depression, and QOL and if these effects differ by whether smoking or not	Lung cancer patients	Unknown	Unknown	149	Cross-sectional	Linear multiple regression	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)
Cataldo and Brodsky (2013)	Nursing	Examine the relationship between Lung Cancer Stigma (LCS) with anxiety, depression, and symptom severity	Lung cancer patients	Unknown	Unknown	144	Cross-sectional	Linear multiple regression	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)
Cataldo et al. (2012)	Nursing	Examine the relationship of LCS with depression and Quality of Life (QOL)	Lung cancer patients	Unknown	Unknown	192	Cross-sectional	Linear multiple regression	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)
Chambers et al. (2015)	Public health	Examine the mediating effects of threat appraisals and social constraints on the relationship between health-related stigma and psychological distress and QOL	Lung cancer patients	Australia	-	49	Cross-sectional	Linear multiple regression (mediation)	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983)
Chu et al. (2020)*	Public health	Examine the mediating effects of concerns about breast cancer, self-efficacy, and depressive symptoms on the relationship between self-stigma and QOL	Breast cancer survivors	US	Chinese	112	Cross-sectional	Linear multiple regression (mediation)	Self-Stigma Scale short-form (SSS; Mak, 2010)	Brief Symptom Inventory (BSI; Derogatis & Spencer, 1993)
Esser et al. (2018)	Medical psychology, Medical sociology	Examine the mediating effect of body image on the relationship between perceived stigmatization and depressive symptomatology	4 types of cancers (breast, prostate, lung, colorectal)	Germany	-	1748	Cross-sectional	Linear multiple regression (mediation)	Social Impact Scale (SIS; Fife, 2000)	Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001)
Gredig (2017)	Social work	Examine the relationship between experienced/perceived stigma and depressive symptoms	Type 1 and 2 diabetes	Switzerland	-	Qual: 30 Quant: 3347	Mixed methods	Structural equation modeling (mediation)	Diabetes-related stigma indicators (Gredig, Bartelsen-Raemy, 2017)	Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001)
Hamilton et al. (2013)	Nursing	Examine whether psychosocial factors predict depression	Cancer patients	US	African American	77	Cross-sectional	Linear multiple regression	Cancer stigma scale adapted from Internalized Stigma Scale for HIV/AIDS (Sayles, 2008)	Geriatric Depression Scale-Short Form (GDS-SF15; Yesavage & Sheikh, 1986)

Hansen et al. (2012)	Social work	Examine the help-seeking pathways (recognition of needs, treatment initiation, adherence, barriers to care) in managing their depression	Diabetes	US	Latinx	19	Qualitative	Narrative analysis	-	-
Holmes-Truscott et al. (2020)	Psychology	Examine the moderation effects of self-esteem, self-efficacy, and/or social support on the relation of diabetes stigma with psychological, behavioral, and HbA_{1c} outcomes	Type 1 diabetes	Australia	-	959	Cross-sectional	Linear multiple regression (moderation)	Diabetes Stigma Assessment Scale (DSAS; Browne, 2016; Browne, 2017)	Patient Health Questionnaire (PHQ-8; Kroenke et al., 2009)
Kamen et al. (2017)*	Public health	Examine the mediating effects of psychosocial resources on the relationship between minority stress and psychological distress	Breast cancer survivors	US	White and Non-white	201	Cross-sectional	Theoretical coding & Structural equation modeling (mediation)	Interpersonal discrimination adapted for sexual orientation (Stuber, 2003)	Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983)
Kato et al. (2014)	Medicine	Assess the psychometric properties of a Japanese version of the Self-Stigma Scale (SSS-J)	Type 2 diabetes	Japan	-	210	Cross-sectional	Structural equation modeling (confirmatory factor analysis)	Self-Stigma Scale Japanese version (SSS-J; Kato et al., 2014)	Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001)
LeBrón et al. (2019)	Social work	Examine the association of racial/ethnic discrimination with depressive symptoms, diabetes-related distress, and HbA1c	Type 2 diabetes	US	Latinx	222	Cross-sectional	Linear multiple regression	Everyday Discrimination Scale (Williams et al., 1997)	Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001)
Lee et al. (2006)	Psychiatry	Develop a descriptive instrument to examine the relationship among treatment-related stress with anxiety and depressive symptoms	Type 2 diabetes	Hong Kong	-	Qual: 7 Quant: 333	Mixed methods	Thematic analysis & Binary logistic regression	Instrument developed through focus group	Instrument developed through focus group
Maguire et al. (2019)	Nursing	Examine the relationship of LCS with symptom burden/severity, depression, and deficits in health-related QOL	Lung cancer patients	Scotland	-	201	Cross-sectional	Linear multiple regression	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)
March et al. (2015)	Public health	Examine the relationship between discrimination experiences and their burden with comorbid depression	Diabetes	US	Latinx	221	Cross-sectional, RCT	Binary logistic regression	Everyday discrimination instrument developed from two scales (Williams et al., 1997; Krieger et al., 2005)	EURO-D (Prince, 2002)
Ostroff et al. (2019)	Psychiatry and Psychology	Examine group differences in LCS for patients who report clinically significant depressive symptoms	Lung cancer patients	US	White, African American, and others	231	Cross-sectional	Receiver operating characteristic (ROC) analysis	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)

Phelan et al. (2013)**	Medicine	Examine the relationship of stigma, self-blame, and perceived blame with depressive symptoms	Colorectal cancer	US	White, African, and others	1109	Cross-sectional	Linear multiple regression	The cancer stigma instrument developed from three scales (Fife, 2000; Szmukler et al., 1996; Link et al., 1997)	Patient-Reported Outcomes Measurement Information System Depression Scale (PROMIS Depression; Pilkonis et al., 2011)
Shen et al. (2015)	Psychiatry and Medicine	Examine the moderating effect of posttraumatic growth on the relationship between stigma and psychological distress	Lung cancer survivors	US	White, African, and others	141	Cross-sectional	Linear multiple regression (moderation)	The adapted Shame and Stigma Scale in head and neck cancer (Kissane, 2013)	Hospital Anxiety and Depression Scale (HADS)
Tsai and Lu (2019)*	Psychology	Examine the moderating effect of ambivalence over emotional expression and intrusive thoughts on the relationship between self-stigma and depressive symptoms	Breast cancer survivors	US	Chinese	112	Cross-sectional	Linear multiple regression (moderation)	Self-Stigma Scale short-form (SSS; Mak & Cheng, 2010)	Brief Symptom Inventory (BSI; Derogatis & Spencer, 1993)
Williamson et al. (2020)	Psychiatry and Medicine	Examine the mediating effect of internalized lung cancer stigma on the relationship of shame- and guilt-proneness with depressive symptoms and anxiety	Lung cancer patients	US	White and others	50	Cross-sectional	Linear multiple regression (mediation)	Cataldo Lung Cancer Stigma Scale (Cataldo et al., 2011; Cataldo et al., 2012)	Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983)
Yilmaz et al. (2020)	Nursing	Examine the relationship between cancer-related stigma and depression	Cancer patients	Turkey	-	303	Cross-sectional	Linear multiple regression	Questionnaire for measuring attitudes toward cancer Turkish version (Cho et al., 2013; Yılmaz et al., 2017)	Beck Depression Inventory (BDI; Beck et al., 1961)
Yuan et al. (2020)	Nursing	Examine predictive factors associated with anxiety and depressive symptoms	Oral cancer patients	China	-	230	Cross-sectional	Binary logistic regression	Social Impact Scale (SIS; Fife, 2000)	The Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996)

Note. * The sample is female. ** The sample is male.

Research question 2

What types of methodologies were used in the literature to address the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?

Study designs. Among the 23 sample studies, 20 (87%) were quantitative studies, one (4.3%) was qualitative study, and 2 (8.7%) were mixed-method studies. Most of the quantitative studies utilized cross-sectional designs and one of them used a randomized controlled trial. The one qualitative study conducted both focus groups and individual in-depth interviews. One of the two mixed-method studies conducted individual interviews and a cross-sectional survey, while the other mixed-method study conducted focus group interviews and a cross-sectional survey.

Samples. Among the 23 sample studies, three articles had only female respondents, while one study had only male respondents. The samples of the remaining 20 studies included both male and female respondents. Sixteen studies (70%) examined adult cancer survivors while seven studies (30%) were adults with diabetes. Among the 20 quantitative-only studies, three (13%) had sample sizes less than 100, 12 (52.2%) had sample sizes between 100 and 400, and three (13%) had sample sizes between 900 and 1800. Among the 23 sample studies, 11 (47.8%) were conducted in the U.S., that included diverse race/ethnicities ($n = 5$), African Americans ($n = 1$), Latinx ($n = 3$), and Chinese ($n = 2$). Nine international studies (39.1%) were conducted in other countries: Australia ($n = 2$), German ($n = 1$), Switzerland ($n = 1$), Scotland ($n = 1$), Turkey ($n = 1$), Japan ($n = 1$), Hong Kong ($n = 1$), and China ($n = 1$). The country locations for three studies were unknown.

Operationalization. Among 21 studies that did not utilize focus group interviews, 15 (71.4%) used health-related stigma/discrimination scales while six (28.6%) used non-health-related stigma/discrimination scales. Of the 15 studies that used health-related stigma/discrimination scales, 13 studies used cancer-related stigma/discrimination scales: Seven studies used Cataldo Lung Cancer Stigma (Cataldo et al., 2011; Cataldo et al., 2012), one study used Shame and Stigma Scale in Head and Neck Cancer (Kissane et al, 2013), one study used the Questionnaire for Measuring Attitudes toward Cancer – Turkish version (Yilmaz et al., 2017), one study used a cancer stigma scale adapted from the Internalized Stigma Scale (Sayles et al., 2008) originally designed for people with HIV/AIDS, one study used Cancer Stigma Scale adapted from three studies (Fife & Wright, 2000; Szmukler et al., 1996; Link et al., 1997), and two studies used Social Impact Scale (Fife & Wright, 2000) adapted to cancer stigma. Of the 15 studies that used health-related scales, two studies used diabetes-related stigma/discrimination scales, one study used Diabetes Stigma Assessment Scale (Browne et al., 2016; Browne et al., 2017), and the other study used two series of formative single-item indicators (Diamantopoulos & Siguaw, 2006).

All the health-related stigma/discrimination scales included items that assessed perceptions (e.g., I am not as good as others because I have a disease, I feel uncomfortable to tell others that I have a disease, and other people discriminate me because I have a disease). The Questionnaire for Measuring Attitudes toward Cancer (Yilmaz et al., 2017) also included multiple items that specified other people who perceive the person with cancer(s) (e.g., friends, neighbors, family, employer/co-workers). Gredig and Bartelsen-Raemy (2017) developed formative indicators that assess discrimination/stigma in diverse situations (e.g., leisure activities and social contacts, school, workplace, military service, mobility, tax, insurance). The Social Impact Scale (Fife & Wright, 2000) assessed experiences of rejection and stigma (i.e., social rejection, financial insecurity), as well as psychological feelings regarding stigma (i.e., internalized shame, social isolation) due to diseases.

Of the six studies that used non-health-related stigma/discrimination scales, three studies used the Self-Stigma Scale (Mak & Cheung, 2010), one study used the Everyday Unfair Treatment Scale (Williams et al., 1997), one study used Interpersonal Discrimination (Stuber et al., 2003), and one study used the Everyday Discrimination Scale adapted from two studies (Krieger et al., 2005; Williams et al., 2017).

Each of non-health-related discrimination/stigma scales assessed different types of stigma/discrimination. The Self-Stigma Scale (Mak & Cheung, 2010) used in three studies included cognitive, affective, and behavioral dimensions of stigma due to an individual’s identity. In one study, the Interpersonal Discrimination Scale was adapted to assess discrimination due to sexual orientation or gender (Stuber et al., 2003). The Everyday Discrimination Scale (Williams et al., 1997) used in one study focused on unfair treatment experiences due to any reason. March et al. (2015) combined two scales (Krieger et al, 2005; Williams et al., 1997) to focus on racial discrimination.

For depressive symptoms, among the 21 studies that did not use focus group interviews, six (28.6%) used the Center for Epidemiologic Studies-Depression Scale (CES-D; McDowell & Newell, 1996), five (23.8%) used the Patient Health Questionnaire (PHQ-9; Spitzer, Kroenke, & Williams, 1999), four (19%) used the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), and two (9.5%) used the Brief

Symptom Inventory (BSI, Derogatis & Spencer, 1993). The Geriatric Depression Scale-Short Form (GDS-SF15; Yesavage & Sheikh, 1986), the Beck Depression Inventory (BDI; Richter et al., 1998), the Patient-Reported Outcomes Measurement Information System (PROMIS) Depression Scale (PROMIS Depression; Pilkonis et al., 2011), and the EURO-D (Prince et al., 2002) were each used in one of the sample studies.

Analyses. Among the 20 quantitative-only studies, 11 (55%) examined the direct relationships among the variables using linear multiple regression analyses, binary logistic regression analyses, and receiver operating characteristic analysis, while eight (40%) examined indirect relationships including mediation and moderation models. One quantitative study investigated the validation of scales using confirmatory factor analysis. One qualitative study used narrative analysis to analyze both focus groups and individual interviews to investigate the indirect relationships. Among the two mixed methods studies, one study used thematic analysis and logistic regression, and the other study implemented theoretical coding and mediation modeling using structural equation modeling to investigate the direct relationships.

Research question 3

What existing evidence has been reported on the relationship between discrimination/stigma and depressive symptoms in middle-aged or older adult cancer survivors or people with diabetes?

Direct relationships between discrimination/stigma and depressive symptoms. All 14 studies that examined the direct relationships between discrimination/stigma and depressive symptoms reported statistically significant positive associations in quantitative or mixed methods designs. Key findings from these studies are summarized below.

Cancer survivors. Multiple quantitative studies reported that lung cancer stigma had significant direct relationship with depressive symptoms among lung cancer survivors (Brown et al., 2014; Cataldo et al., 2012; Cataldo & Brodsky, 2013; Maguire et al., 2019; Ostroff et al., 2019). Chambers et al. (2015) reported that health-related stigma of lung cancer survivors had significant relationship with depressive symptoms. Hamilton et al. (2013) reported that the association between perceived stigma and depressive symptoms were significant in correlational analysis, but not significant in multivariate analysis among African American cancer patients. Phelan et al. (2013) reported that cancer stigma was significantly associated with depressive symptoms among colorectal cancer survivors. Yilmaz et al. (2020) reported that cancer-related stigma was significantly associated with depressive symptoms among cancer patients in a middle-income country. Yuan et al. (2020) reported that the social isolation dimension of stigma was a predictor of depressive symptoms among oral cancer patients in China.

People with diabetes. Kato et al. (2014) reported that self-stigma was significantly associated with depressive symptoms of adults with diabetes in Japan. LeBrón et al. (2019) reported that racial/ethnic discrimination was positively associated with depressive symptoms among Latinx individuals with type 2 diabetes. March et al. (2015) revealed that depression was significantly associated with experiences of major discrimination and the experience of discrimination in getting care for physical health in a randomized controlled trial of urban Hispanics with poorly controlled diabetes. Lee et al. (2006) reported that experiencing depression significantly differed by stigma/discrimination among Chinese participants with type 2 diabetes in Hong Kong.

Indirect relationships between discrimination/stigma and depressive symptoms. Nine studies investigated indirect relationships among the factors. Key findings from these studies are summarized below.

Adult cancer survivors. Chu et al. (2020) revealed that self-stigma significantly affects depressive symptoms via either concerns about breast cancer or self-efficacy for coping with cancer among Chinese American breast cancer survivors. Esser et al. (2018) revealed that body image mediated the relationship between stigmatization and depressive symptoms in breast, colon, lung, prostate cancer survivors, as well as the total of the four types of cancer survivors. Williamson et al. (2020) reported that lung cancer stigma’s mediation effects on the relationship between guilt- or shame-proneness and depressive symptoms were not statistically significant among adults with lung cancer. Tsai and Lu (2019) reported that depressive symptoms of Chinese American breast cancer survivors decrease as self-stigma increases when ambivalence over emotional expression is lower, while their depressive symptoms increase as self-stigma increases when ambivalence over emotional expression is higher. Similarly, Tsai and Lu (2019) also reported that depressive symptoms of Chinese American breast cancer survivors decrease as self-stigma increases when intrusive thoughts are lower, while their depressive symptoms increase as self-stigma increases when intrusive thoughts are higher. A mixed method study (Kamen et al., 2017) reported that discrimination indirectly and significantly affects depression through resilience, social support, and psychological distress among female breast cancer survivors who identified as lesbian/bisexual or preferring female partners. Shen et al. (2015) reported that among those who quit smoking prior to their cancer diagnosis (pre-diagnosis quitters), stigma had a significant positive association with depressive symptoms at high levels of posttraumatic growth (i.e., experiences of positive outcomes due to their cancer).

Adults with diabetes. Holmes-Truscott et al. (2020) reported that as self-esteem increased, the effect of diabetes stigma on depressive symptoms decreased among people with type 1 (insulin treated) and non-insulin-treated type 2 diabetes. One qualitative study (Hansen & Cabassa, 2012) reported that stigma associated with taking medication is a barrier to antidepressant medication adherence among low-income Latinx individuals with diabetes and depression.

Discussion

This paper described the current status, methodologies, and findings of empirical studies that examined the relationship between discrimination/stigma and depressive symptoms among middle-aged or older adults with a cancer history or diabetes. The scoping review yielded 23 peer-reviewed journal articles that included data from quantitative, qualitative, and mixed methods investigations. The majority of the sample studies examined direct or indirect relationships between discrimination/stigma and depressive symptoms, while only one study focused on psychometric properties or the development of a descriptive instrument (Kato et al., 2014). Nearly three-quarters (70%) of the 23 sampled studies examined middle-aged or older adult cancer survivors while the remaining 30% examined middle-aged or older adults with either type 1 or type 2 diabetes.

This study reported that all of the 23 sample studies have been published later than 2006, which indicates that the topic of discrimination/stigma and depressive symptoms has been emphasized within the past 15 years. Theoretical frameworks such as the Theory of Fundamental Causes (Link & Phelan, 1995; Phelan et al., 2010) and the Health Stigma and Discrimination Framework (Stangl et al., 2019) explain how discrimination and stigma affect health. The relationships between discrimination/stigma and physical health (Himmelstein et al., 2018; Mouzon et al., 2017; Pachankis & Lick, 2018; Pearl et al., 2020; Shrout & Weigel, 2021) and the relationship between discrimination/stigma and mental health (Dodd et al., 2021; Picco et al., 2017; Taylor et al., 2018; Wheaton et al., 2018) have been empirically tested in a large body of studies. However, given that only limited empirical evidence has been reported on the associations among discrimination/stigma, physical health, and mental health combined (Arnett et al., 2019; Salom et al., 2018; Weisz & Quinn, 2018), further investigation on this topic will contribute to this important area of scholarly inquiry. In particular, this scoping review directs our attention to the relationship between discrimination/stigma and depressive symptoms among middle-aged or older adults with a cancer history or diabetes, which is vital given the number of adults over age 40 who are affected by cancer and diabetes.

This scoping review revealed that more than half (52%) of the 23 sample studies were published in nursing, medicine, or psychiatry journals, while others were published in public health, psychology, or social work journals. The majority (87%) of the sample studies used quantitative methods with cross-sectional survey design, while a few studies used mixed methods and qualitative methods with focus group or individual interviews.

This study suggests that future studies using longitudinal data or population-based studies with large sample sizes will provide much needed supplemental empirical evidence on the relationship between discrimination/stigma and depressive symptoms among middle-aged or older adults with cancer history or diabetes. In addition to the necessity of further quantitative evidence, empirical results from qualitative or mixed methods studies will provide a deeper understanding of how discrimination and stigma affect mental health by offering examples from individuals' lived experience. This will also inform the development of tailored, long-term intervention strategies to reduce depressive symptoms of individuals with chronic diseases who experienced discrimination or stigma. It will also offer pathways for future research and community-based educational interventions to reduce depressive symptoms of individuals of racial/ethnic minority groups who experienced stigma/discrimination.

Regarding scales of discrimination and stigma, more than 70% of the sample studies used health-related stigma/discrimination scales including cancer- and diabetes-stigma/discrimination scales, while less than 30% used non-health-related discrimination and stigma scales focused on sexual orientation, gender, race, or other factors. While multiple studies used a scale adapted for lung cancer stigma that has undergone psychometric testing (Brown et al., 2014; Cataldo et al., 2012; Cataldo & Brodsky, 2013; Maguire et al., 2019; Williamson et al., 2020), some studies combined items from multiple existing scales or created original items (Hamilton et al., 2013; March et al., 2015; Phelan et al., 2013), which would require further steps to assess their validity and reliability. Developing instruments to assess health-related discrimination/stigma adapted for certain types of cancer or diabetes and testing their psychometric properties will be beneficial for researchers to closely investigate the relationship between discrimination/stigma and depressive symptoms in a context of individuals with each specific manifestation of these chronic diseases.

Most of the quantitative studies reported statistically significant relationships between discrimination/stigma and depressive symptoms, and a qualitative study reported the substantial influence of discrimination/stigma on depressive symptoms in a help-seeking pathway in managing their depression. In particular, regarding discrimination/stigma, some studies focused on discriminatory perceptions or attitudes (Sayles et al., 2009; Yilmaz et al., 2020), while other studies focused on discriminatory experiences in daily lives (Fife & Wright, 2000; Gredig, 2017; Landrine & Klonoff, 1996). Further investigation on which dimension of discrimination/stigma is associated with depressive symptoms of middle-aged or older adults with cancer history or diabetes will provide additional information for intervention development. For example, discrimination/stigma can be included in needs assessment in health care settings in social work, public health, or nursing to reduce the individuals' depressive symptoms. Educational interventions should be developed for the general population to provide education on chronic diseases, which can reduce stigma or discriminatory perceptions, attitudes, or behaviors directed toward individuals with chronic illnesses. Detailed information about how discriminations/stigma manifestations (e.g., perceptions, attitudes, and behaviors), sources of discrimination/stigma (e.g., family, relatives, neighbors, friends, colleagues), and discrimination/stigma types (race/ethnic, gender, and health conditions) influence depressive symptoms will provide additional information that can be utilized in health care settings.

Limitations

This current scoping review has limitations that influence how the findings should be interpreted. First, this scoping review did not assess the internal or external validity of each study's results. Scoping reviews aim to map in a descriptive manner the literature investigating ranges of previous studies on a topic, rather than systematically assessing the validity of the study results. Quantitative systematic review methodologies such as meta-analysis was not suitable for this emerging research area given the paucity of empirical studies on the topic of discrimination/stigma and depressive symptoms among adults with cancer history or diabetes. Rather, this study included researchers who participated in the initial process of deciding the topic, scope, search terms, and analytic approach, in addition to soliciting advice from a research librarian to improve the integrity of the literature search process. Second, this scoping review has the potential to exclude relevant studies because the search exclusively focused on peer-reviewed journals written in English. This study did not include any grey literature such as unpublished studies, agency reports, and conference presentations, as well as books, book chapters, and dissertations not published in peer-reviewed journals. Further investigation with an expanded scope of the literature on this topic will provide an opportunity to map the research on this topic more extensively.

Conclusion

This scoping review examined the relationship between discrimination/stigma and depressive symptoms among middle-aged or older adults with chronic diseases using published peer-reviewed journal articles. This is a critical step toward establishing the relationship among discrimination/stigma, mental health, and physical health focusing on cancer survivors and those with diabetes, and it offers directions for novel investigations on this topic. Future studies are needed to investigate the relationship between discrimination/stigma and depressive symptoms among people with diverse types of chronic diseases so that tailed interventions can be developed to improve community health and well-being.

Appendix A

Search Strategy

	PsycINFO (last run April 29, 2021)
1	exp "Depression (Emotion)"/ or exp Major Depression/
2	exp Social Discrimination/
3	exp Racism/
4	exp Microaggression/
5	exp Implicit Bias/
6	exp prejudice/
7	2 or 3 or 4 or 5 or 6
8	1 and 7
9	limit 8 to (English language and (360 middle age <age 40 to 64 yrs> or "380 aged <age 65 yrs and older>" or "390 very old <age 85 yrs and older>") and "0110 peer-reviewed journal")

	MEDLINE (last run April 29, 2021)
1	exp "Depression (Emotion)"/ or exp Major Depression/
2	exp Social Discrimination/
3	exp Racism/
4	exp Microaggression/
5	exp Implicit Bias/
6	exp prejudice/
7	exp Social Stigma/ or exp Stereotyping/
8	2 or 3 or 4 or 5 or 6 or 7
9	1 and 8
10	exp Neoplasms/
11	exp Diabetes Mellitus, Type 1/ or exp Diabetes Insipidus, Nephrogenic/ or exp Diabetes Mellitus, Type 2/ or exp Diabetes Insipidus/ or exp "National Institute of Diabetes and Digestive and Kidney Diseases (U.S.)"/ or exp Diabetes Mellitus/ or exp Diabetes, Gestational/ or exp Diabetes Complications/ or exp Diabetes Mellitus, Experimental/
12	10 or 11
13	9 and 12
14	limit 13 to (English language and ("middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)") and Medline)

	CINAHL (last run April 29, 2021)
S1	(MH "Discrimination+") OR (MH "Discrimination, Employment") OR (MH "Weight Bias") OR (MH "Sexism+") OR (MH "Racism") OR (MH "Ageism")
S2	(MH "Stigma")
S3	S1 OR S2
S4	(MH "Cancer Survivors") OR (MH "Cancer Patients")
S5	(MH "Diabetes Mellitus, Type 1+") OR (MH "Diabetic Patients") OR (MH "Diabetes Mellitus") OR (MH "Diabetes Mellitus, Type 2") OR (MH "Diabetes Mellitus, Gestational")
S6	(MH "Central Nervous System Depressants+") OR (MH "Appetite Depressants+") OR (MH "Depression+") OR (MH "Respiration Disorders+") OR (MH "Seasonal Affective Disorder") OR (MH "Center for Epidemiological Studies Depression Scale") OR (MH "Death Depression Scale") OR (MH "Self-Rating Depression Scale") OR (MH "Hamilton Rating Scale for Depression") OR (MH "Geriatric Depression Scale") OR (MH "Edinburgh Postnatal Depression Scale") OR (MH "Depression, Postpartum") OR (MH "Depression, Reactive")
S7	S4 OR S5
S8	S3 AND S6
S9	S7 AND S8 (Limiters - Age Groups: Middle Aged: 45-64 years, Aged: 65+ years, Aged, 80 and over; English Language; Publication Type: Journal Article)

	Scopus (last run April 29, 2021)
	TITLE-ABS-KEY (stigma OR discrimination OR racism OR microaggression OR prejudice) AND TITLE-ABS-KEY (("cancer survivor*" OR "cancer patient*") OR (diabetes OR diabetic*)) AND TITLE-ABS-KEY (depression OR "depressive symptoms") AND adult* AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))

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Chapter Three (Study 2): Perceived Discrimination and Depressive Symptom Trajectory of Middle-aged and Older Adult Cancer Survivors

Introduction

Approximately 16.9 million adults in the United States (U.S.) had a history of cancer as of January 2019, the majority of whom (90%) were aged 50 years and older (Miller et al., 2019). This high percentage of cancer survivors in middle and late adulthood is related to two major phenomena. First, cancer incidence has increased due to a growth in the older adult population aged 65 and older (US Census Bureau, 2015). Second, higher cancer screening rates have translated into detecting cancer earlier and receiving advanced treatments that prolong survival (Miller et al., 2019). With this extended cancer survivorship among middle-aged and older adults, interest in these age cohorts has shifted to their overall quality of life by strengthening the focus on the mental health as well as physical health of cancer survivors.

Cancer survivors are more likely to have a higher risk of depressive symptoms than people without cancer (Pitman et al., 2018). A population-based study using the Behavioral Risk Factor Surveillance System (BRFSS) reported that 13.9% of adult cancer survivors had depressive symptoms while 8.9% of those without cancer history had depressive symptoms (Zhao et al., 2014). Depressive symptoms in adult cancer survivors may interrupt cancer treatment and result in a lower quality of life after their recovery (Caruso et al., 2017; İzci et al., 2020; Magnuson et al., 2019; Reyes-Gibby et al., 2012). Additionally, depressive symptoms among middle-aged and older cancer survivors are associated with health functioning, insomnia, poor compliance in the intervention process, increased medical care use, and higher mortality rates (Irwin, 2013; Magnuson et al., 2019; Mols et al., 2013). However, depressive symptoms of older adults are less likely to be diagnosed because older adults present differently than younger adults (e.g., loss, grief, lethargy, and social withdrawal), which tend to be viewed as common symptoms at their age, rather than an illness that needs treatment (Casey, 2018). Given these differences in affective presentation, investigating the depressive symptoms of middle-aged and older adult cancer survivors is necessary to assist them in achieving both physical and psychological well-being.

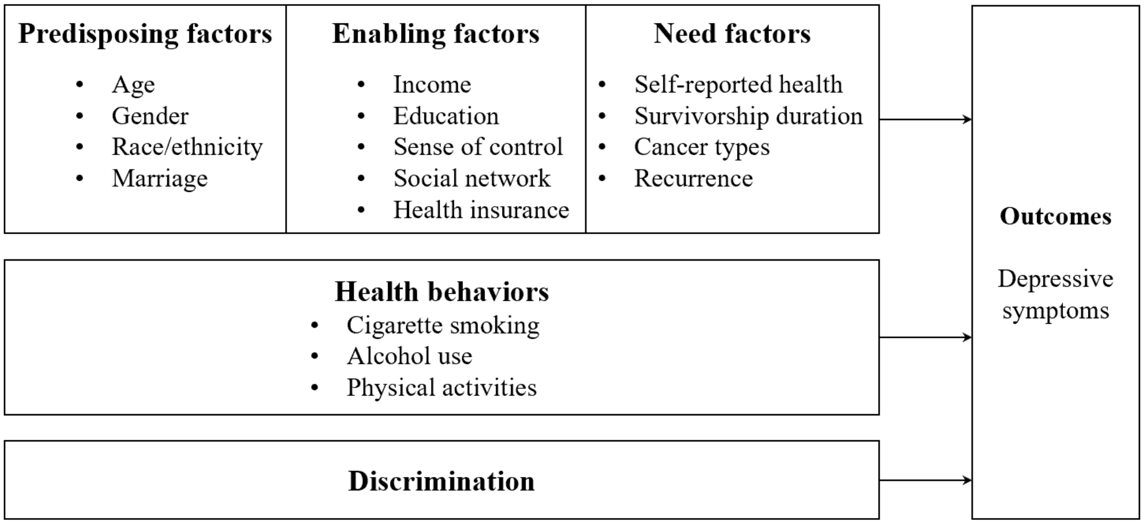
Theoretical Framework

Andersen's Behavioral Model (Andersen, 1995; Andersen et al., 2014) provides a theoretical explanation that individuals' predisposing, enabling, and need factors, as well as their health behaviors, can be the determinants of depressive symptoms among middle-aged and older adult cancer survivors. Predisposing factors are pre-owned personal conditions that facilitate health behaviors (e.g., age, gender, race/ethnicity, marriage), enabling factors are conditions that encourage health behaviors through individual resources (e.g., income, education, sense of control, social network, and health insurance), and need factors consist of a person's perception of health conditions or a medical provider's judgement of health status or illness diagnosis experience (e.g., self-reported health, survivorship duration, cancer types, recurrence) (Andersen, 1995; Andersen et al., 2014). Health behaviors include an individual's personal practices (e.g., cigarette smoking, alcohol use, physical activities).

The Theory of Fundamental Causes offers additional understanding that discrimination, a proxy measure of power in society, can influence depressive symptoms among adult cancer survivors (Link & Phelan, 1995; Link & Phelan, 2001; Phelan et al., 2010). According to this theory, a person's experience with discrimination in everyday circumstances can adversely affect their mental and physical well-being (Link & Phelan, 2001). If it for this reason that one's perception of being discriminated against is an important factor to address when examining both mental and physical health outcomes. Figure 3.1 presents the theoretical framework based on Andersen's Behavioral Model (Andersen, 1995; Andersen et al., 2014) and the Theory of Fundamental Causes (Link & Phelan, 1995; Link & Phelan, 2001; Phelan et al., 2010).

Figure 3.1

Theoretical framework



Predisposing factors. Studies have examined the relationship between predisposing factors and depressive symptoms of cancer survivors. In particular, these investigations have reported conflicting results regarding the relationship between age and depressive symptoms. For example, a few studies reported positive relationship between age and depressive symptoms among breast, colorectal, and lung cancer survivors (Mols et al., 2018; Nikbakhsh et al., 2014), while other studies reported negative relationship among prostate or breast cancer survivors as well as other types of cancer survivors (Champion et al., 2014; Kinlock et al., 2017; Reyes-Gibby et al., 2012; Zhao et al., 2014). With regard to gender identity, female cancer survivors reported higher depressive symptoms than male cancer survivors (Linden et al., 2012; Vodermaier et al., 2011). In a population-based study of racially and ethnically diverse cancer survivors, people who identified as Black reported more depressive symptoms than non-Hispanic whites, and those who identified as Hispanics/Latinx reported fewer depressive symptoms than non-Hispanic whites (Zhao et al., 2014). Cancer survivors who were married experienced lower depressive symptoms compared to unmarried cancer survivors (Donovan et al., 2014; Mols et al., 2018; Zhao et al., 2014). These sociodemographic characteristics were included as predisposing factors in the analytic model because they have been associated with depressive symptoms.

Enabling factors. Regarding enabling factors, some studies have found that lower education was associated with higher depressive symptoms among cancer survivors (Kim et al., 2008; Rogers at el., 2011), while other studies reported that education was not significantly associated with depressive symptoms (Erim et al., 2019; Kinlock et al., 2017; Lockefeer & De Vries, 2013). Adult cancer survivors with higher income had lower depressive symptoms in both male and female groups (Erim et al., 2019; Kim et al., 2008). Conflicting results have been reported regarding the relationship between health insurance and depressive symptoms including both statistically significant and non-significant associations (Kinlock et al., 2017; Malak et al., 2021). Having strong social support and a large social network were associated with lower depressive symptoms among adult cancer survivors (Hughes et al., 2014; Schafer & Koltai, 2015). Few studies have reported that association between sense of control and depressive symptoms among cancer survivors (Mystakidou et al., 2015). Mystakidou et al. (2015) reported that higher depressive symptoms were significantly associated with higher perceived control over the course of illness and lower perceived control over the cause of illness. Further investigation of this relationship is necessary. The diverse resources that can reduce depressive symptoms were included as enabling factors in the analytic model.

Need factors. Studies of U.S. adult cancer survivors reported the effects of need factors on depressive symptoms. Depressive symptoms were highest among those with less than one year of survivorship compared to those with one year or more of survivorship (Zhao et al., 2014). Cancer survivors who experienced a recurrence had higher distress, depressive symptoms, anxiety, and suicidal ideation in both U.S.-based and non-U.S.-based samples (Andersen et al., 2005; Lee et al., 2014). Depressive symptoms of cancer survivors by cancer types were reported differently by age groups in a clinical setting. Compared to colon cancer survivors, breast cancer survivors had higher depressive symptoms in the middle-aged group and lower depressive symptoms in the older adult group (Linden et al., 2012). In the same study, lung cancer survivors had higher depressive symptoms and prostate cancer survivors had lower depressive symptoms, compared to colon cancer survivors across age cohorts (Linden et al., 2012). These aforementioned factors, which included self-rated health status and diagnosis information from medical providers, were included as need factors in the analytic model.

Health behaviors. Overall, poor self-rated health has been shown to be associated with higher depressive symptoms among cancer survivors (Calhoun et al., 2015). Regarding health behaviors, smoking and smoking relapse were significantly associated with depressive symptoms among cancer survivors (Berg et al., 2013;

Guimond et al., 2017). Cancer survivors who drank moderately (1-14 drinks per week), had lower depressive symptoms than abstainers (0 drinks per week) in a longitudinal study (Paulson et al., 2018). Physical activities directly affected depressive symptoms and mediated the relationship between fatigue and depressive symptoms (Clark et al., 2016; Hata et al., 2020). These health behaviors, which are associated with depressive symptoms of those with diabetes, were included in this study.

Discrimination. Previous studies have reported that discrimination is associated with racial disparities in mental health (Sternthal et al., 2011; Williams et al., 1997; Williams & Mohammed, 2009). However, few studies have examined this relationship within cancer survivors. Specifically, perceived discrimination has been shown to influence one’s mental health in areas such as life satisfaction and quality of life (Merluzzi et al., 2015; Wallace & Baker, 2018). Given the influence discrimination has on one’s sense of mental well-being, it is necessary to explicitly investigate the relationship between perceived discrimination and depressive symptoms among middle-aged and older adult cancer survivors.

Mortality. Death was included as an auxiliary variable in this study because it is related to both attrition and depressive symptoms of middle-aged and older adults (Jia et al., 2018; Twenge et al., 2018).

Study Rationale and Goals

Previous studies have used primarily cross-sectional data or samples drawn from limited contexts (e.g., one organization) to understand adult cancer survivors’ depressive symptoms (Jadoon et al., 2010; Wang et al., 2014). However, understanding the longitudinal change of depressive symptoms among cancer survivors is important because they appear in different patterns over time, which affects the lives of cancer survivors over the long-term. The trajectory of depressive symptoms of cancer survivors decreased over time in national studies and clinical trial testing (Andersen et al., 2017; Boyes et al., 2013; Rottmann et al., 2016; Stanton et al., 2015). Depressive symptoms were prominent especially within the first year after cancer diagnosis, and the rate of decrease became slower over time (Andersen et al., 2017; Rottmann et al., 2016). These studies examined a short-term trajectory within one year, included only short-term cancer survivors whose survivorship duration was less than 5 years, or they were conducted in a limited clinical trial settings (Andersen et al., 2017; Boyes et al., 2013; Rottmann et al., 2016; Stanton et al., 2015). Additionally, few longitudinal studies have examined the effects of health behaviors and discrimination on the trajectories of depressive symptoms comprehensively.

The primary goals of this study were to (a) examine the pattern of depressive symptoms among middle-aged and older adult cancer survivors and (b) investigate factors that affect the variance in the trajectories. This study focused on cancer survivors aged 50 or older who account for 90% of the adult cancer survivors in the U.S. (Miller et al., 2019). Additionally, this study tests a conceptual model based on both Andersen's Behavioral Model and the Theory of Fundamental Causes, by including sociodemographic characteristics, modifiable health behaviors, and a social structural variable (i.e., discrimination) as factors that influence the trajectory of depressive symptoms.

Research Questions and Hypotheses

Listed below are the research questions and hypotheses of this study.

1. What is the trajectory of depressive symptoms of adult cancer survivors aged 50 or older?

    Hypothesis 1a: The linear trajectory of depression will yield a good model fit.

    Hypothesis 1b: The trajectory of depression will increase over time.

2. Are there distinct trajectories of depressive symptoms based on the linear model for adult cancer survivors aged 50 or older?

    Hypothesis 2a: The variance in the intercept of the depressive symptoms trajectory will be statistically significant ($p < .05$).

    Hypothesis 2b: The variance in the slope of the depressive symptoms trajectory will be statistically significant ($p < .05$).

3. Does perceived discrimination influence the trajectory of depressive symptoms of adult cancer survivors aged 50 or older over time?

    Hypothesis 3a/3b: A higher intercept (3a)/ a steeper slope (3b) for the depressive symptoms trajectory will be significantly associated with higher perceived discrimination.

4. What other factors influence the trajectory of depressive symptoms of adult cancer survivors aged 50 or older over time?

    Hypothesis 4a/4b: A higher intercept (4a)/ a steeper slope (4b) for the depressive symptoms trajectory will be significantly associated with: (1) being younger, (2) being female, (3) non-white race, (4) being unmarried, (5) lower education, (6) lower income, (7) lower sense of control, (8) smaller social network, (9) no health insurance, (10) worse self-reported health, (11) breast or lung cancer types, (12) recurrence, (13) survivorship of less than 5 years,

(14) higher cigarette smoking, (15) higher alcohol use, and (16) lower physical activities, and (17) deceased during the study period.

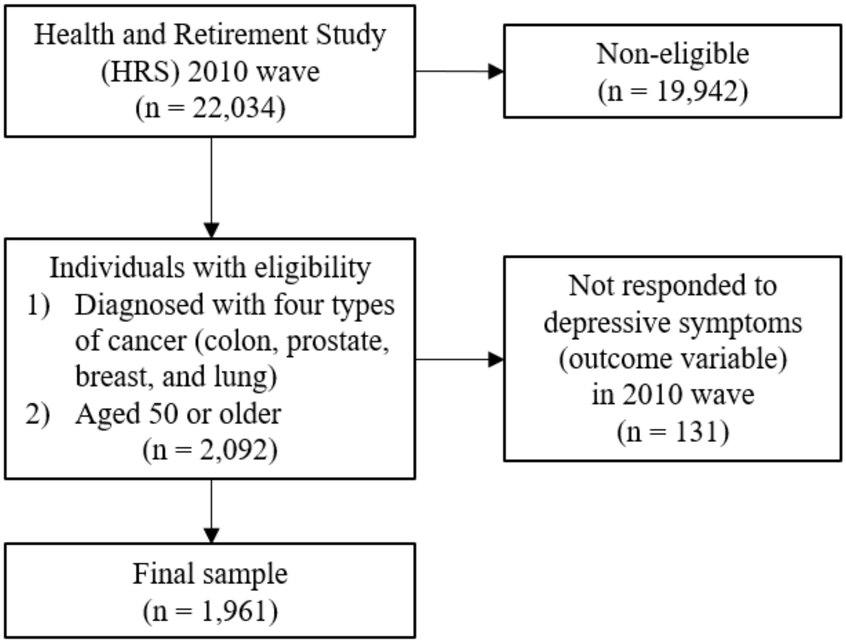
Methods

Participants

The Health and Retirement Study (HRS) is a nation-wide panel study that uses a multi-stage area probability sample of adults aged 50 or older across the U.S. (University of Michigan Institute for Social Research, 2009). The HRS is conducted by the Survey Research Center of the University of Michigan and sponsored by the National Institute on Aging at NIH and the Social Security Administration (University of Michigan Institute for Social Research, 2010). Three waves (2010, 2012, and 2014) were drawn from publicly available data (RAND HRS Longitudinal data, RAND HRS Detailed Imputations File, and Exit), as well as restricted data from the Cancer site. Among 22,034 respondents of wave 2010, 2,092 were selected who were aged 50 or older and had been diagnosed at some time with one of four types of cancers (colon, breast, prostate, lung). Among them, 1,961 respondents who responded to items for depressive symptoms throughout the three waves were selected as the sample for this study. Due to attrition, the 2012 and 2014 waves decreased by 213 and 295 cases, respectively. Figure 3.2 presents the process to obtain the final sample.

Figure 3.2

Participant selection for this study



Measures

The abridged 8-item Center for Epidemiological Studies-Depression (CES-D) scale was used to measure depressive symptoms (Radloff, 1977). Respondents answered yes (1) or no (0) to the eight items (felt depressed, felt everything they did was an effort, sleep was restless, was happy-reverse coded, felt lonely, enjoyed life-reverse coded, felt sad, felt unmotivated) and the summated score ranging from 0 to 8 was used, with higher scores indicating a higher level of depressive symptoms. The Cronbach's alphas throughout the three waves were between .793 and .814.

For all categorical variables that identified more than three groups, a reference group was designated and dummy-coded variables were created coded as (1) yes or (0) no for all remaining groups. Race was categorized into four groups, including non-Hispanic white (reference group), Black, Hispanic, and other. Education was categorized into three groups, less than high school education (reference group), high school graduates, and college graduates. Annual household income was categorized into four groups, including < \$20,000 (reference group), \$20,000–\$39,999, \$40,000–\$99,999, and ≥ \$100,000. Gender was coded as (1) female or (0) male. Marriage was coded as (1) married or (0) separated/divorced/widowed/never married. Age was coded as a continuous variable. For sense of control, Lachman and Weaver's (1998) Perceived Constraints on Personal Control scale was used and responses to the five, 6-point Likert scale items (strongly disagree to strongly agree) were combined as a mean score (Cronbach's alpha = .873). Social network was assessed by the mean score of three, 6-point Likert response scale (less than once a year or never to three or more times a week) items that asked how often the respondents meet up, talk on the phone, and write or email with their friends (Cronbach's alpha = .527). Health insurance was dichotomized as (1) yes or (0) no, and self-reported health was categorized into three groups: poor (reference group), fair/good, and very good/excellent. Cancer type was categorized into four groups, including colon, lung, breast, and prostate. Recurrence was coded as (1) yes or (0) no. Duration of survivorship was calculated as 2010 subtracted by the year of respondents' cancer diagnosis and was dichotomized as (1) more than 5 years (0) 5 years or less.

For perceived discrimination, the mean score of the 6-point Likert scale responses (never to almost everyday) to the six items of Perceived Discrimination Scale was used (Kessler et al., 1999). The Cronbach's alpha was .833. Cigarette smoking was measured by the number of cigarettes smoked per day. Alcohol use was measured by the number of days per week a respondent drank alcohol. Physical activities were measured by three, 5-point Likert scale items that asked how often the respondent takes part in vigorous activities (e.g., running, swimming), moderate activities (e.g., gardening, cleaning the car), and mild activities (e.g., vacuuming, home repairs). The answers were coded as hardly ever or never to everyday, and the mean score of the three responses was used. Cronbach's alpha was .417. As an auxiliary variable highly correlated with attrition, death was included as a covariate (Dong & Peng, 2013; Graham, 2003). Death was coded (1) yes or (0) no depending on whether the respondents have a record of being deceased between 2010 and 2014.

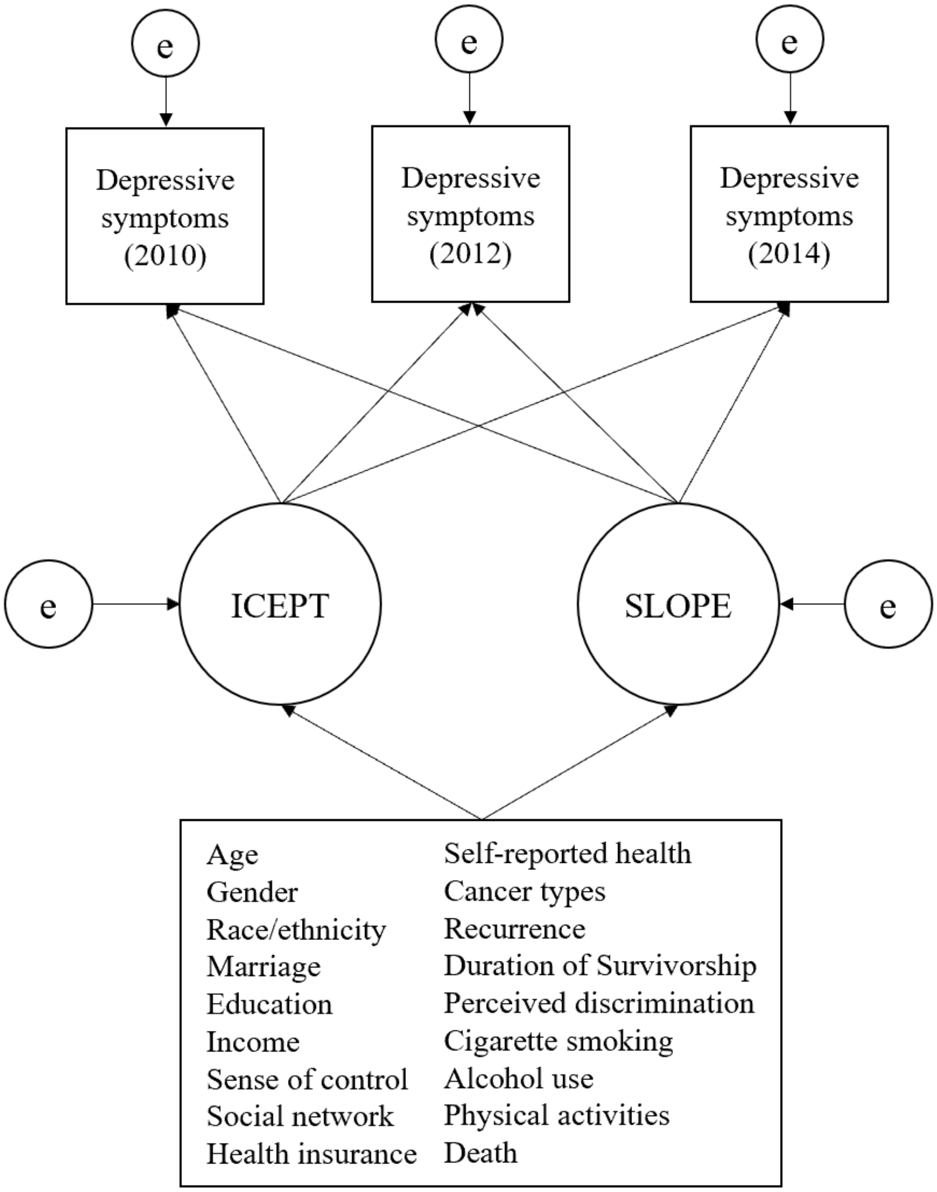
Analysis

Univariate analyses (frequencies, descriptive statistics) were initially performed to summarize the sociodemographic characteristics of the sample. Bivariate analyses were conducted to examine if the depressive symptoms in 2010 (first wave) differed by sociodemographic characteristics. Next, latent growth modeling analyses were conducted. First, unconditional modeling without any covariates was processed to (1) investigate the pattern of the trajectory of depressive symptoms of the total respondents and (2) identify the variances in the intercept and slope of the trajectories. Second, conditional modeling was performed by adding covariates to examine factors that affect the different trajectories of depressive symptoms. Figure 3.3 presents the research model.

The HRS data have a relatively high attrition rate of 10.8% and 25.9% in the 2012 and 2014 waves, respectively, given that longitudinal data of older adults reflect high mortality and weakened health. To deal with missing values including attrition, this study used Full Information Maximum Likelihood (FIML) estimation and included an auxiliary variable of death that is strongly correlated with attrition as a covariate (Dong & Peng, 2013; Graham, 2003). Data were prepared using SPSS 26 (IBM Corp, 2019) and the analyses were conducted with Mplus 8.6 (Muthén & Muthén, 1998).

Figure 3.3

Analytic model



Results

Sociodemographic Characteristics of the Sample

Table 3.1 presents the univariate and bivariate analyses results for the sociodemographic characteristics of the sample. The average age was 71.7 years (*SD* = 10.1). Approximately half of the respondents (51.6%) were male. The majority of the respondents identified as non-Hispanic white (73.5%), followed by Black (18.1%), Hispanic/Latinx (7.0%), and other (1.4%). About 59.5% of the sample was married. More than half (55.6%) of the sample were high school graduates, 18.1% had less than a high school education, and 26.3% were college graduates. Nearly one-quarter (24.8%) of the respondents earned less than $20,000 in annual household income and 14.3% earned $100,000 or more. The majority of the sample (96.6%) had health insurance. Approximately one-third (34.2%) of the sample reported their health status to be very good or excellent while 10% indicated that it was poor. About 16% of the sample were colon cancer survivors, 35.5% were breast cancer survivors, 13.2% were prostate cancer survivors, and 38% were lung cancer survivors. Approximately 26.2% of the cancer survivors experienced a cancer recurrence and about 41.3% had been diagnosed with cancer within the last 5 years. Less than one fifth (19.8%) of the sample was recorded as dead in the 2012 and 2014 waves.

The bivariate analysis results indicated that the respondents who were female ($t_{(1917)} = 5.046$, $p < .001$), who were not married ($t_{(1917)} = -8.227$, $p < .001$), whose education level was lower ($F_{(2, 1912)} = 27.004$, $p < .001$), who had lower income ($F_{(3, 1915)} = 45.472$, $p < .001$), who did not have health insurance ($t_{(1904)} = -4.137$, $p < .001$), who reported worse self-reported health status ($F_{(2, 970)} = 21.386$, $p < .001$), who had been diagnosed with cancers less than five years ago ($t_{(1917)} = -1.811$, $p = .070$), and who were deceased ($t_{(1917)} = 2.971$, $p = .003$) had significantly higher depressive symptoms compared to their counterparts. Non-Hispanic white respondents had significantly lower depressive symptoms compared to Black and Hispanic respondents ($F_{(3,\ 1914)} = 10.047$, $p < .001$). Those who had a prostate cancer history had significantly lower depressive symptoms compared to other types of cancer survivors ($F_{(3,\ 1915)} = 14.746$, $p < .001$). Age ($r = -.079$, $p < .001$), sense of control ($r = -.306$, $p < .001$), social network ($r = -.099$, $p = .006$), alcohol use ($r = -.128$, $p < .001$), and physical activities ($r = -.119$, $p < .001$) were negatively correlated with depressive symptoms, while perceived discrimination ($r = .292$, $p < .001$) and cigarette smoking ($r = .104$, $p = .001$) were positively correlated with depression. See Table 3.1 for additional information.

Table 3.1

Results of Univariate and Bivariate Analyses (N = 1,961)

	N	%	Depressive symptoms			
			M	*SD*	*F/t* (post hoc test)	*p*
Gender						
Female	949	48.4	1.7	2.09	5.046	< .001
Male	1012	51.6	1.2	1.79		
Race						
Non-Hispanic White (a)	1441	73.5	1.3	1.87	10.047	< .001
Black (b)	354	18.1	1.7	2.03	(a < b, c)	
Hispanic (c)	137	7.0	2.1	2.40		
Other (d)	28	1.4	1.8	1.99		
Marriage						
Married	1166	59.5	1.1	1.71	-8.227	< .001
Separated/divorced/widowed/never married	795	40.5	1.9	2.18		
Education						
Less than high school (a)	355	18.1	2.0	2.06	27.004	< .001
High school graduate (b)	1088	55.6	1.5	2.03	(a > b > c)	
College graduate (c)	514	26.3	1.0	1.60		
Annual household income					45.472	< .001
< $20,000 (a)	486	24.8	2.2	2.27	(a > b > c, d)	
$20,000–$39,000 (b)	557	28.4	1.5	1.94		
$40,000–$99,999 (c)	638	32.5	1.0	1.68		
≥ $100,000 (d)	280	14.3	0.8	1.48		
Health insurance						
Yes	1881	96.6	1.4	1.91	-4.137	< .001
No	67	3.4	2.6	2.39		
Self-reported health						
Poor (a)	196	10.0	3.5	2.52	21.386	< .001
Fair or good (b)	1091	55.6	1.6	1.90	(a > b > c)	
Very good or excellent (c)	671	34.2	0.6	1.28		
Cancer types						
Colon (a)	319	16.3	1.9	2.23	14.746	< .001
Breast (b)	696	35.5	1.5	1.99	(a > b > c)	
Prostate (c)	259	13.2	1.1	1.70	(d > c)	
Lung (d)	746	38.0	1.8	2.05		
Recurrence						
Yes	465	26.2	1.6	2.01	1.948	.042
No	1310	73.8	1.4	1.94		
Duration of survivorship						
> 5 years	1152	58.7	1.3	1.89	-1.811	.070
≤ 5 years	809	41.3	1.5	2.00		
Death						
Yes	389	19.8	1.7	1.99	2.971	.003
No	1572	80.2	1.4	1.94		
			M	*SD*	*r*	*p*
Age			71.7	10.06	-.079	< .001
Sense of control			4.7	1.08	-.306	< .001
Social network			3.8	1.08	-.099	.006
Perceived discrimination			1.5	0.69	.292	< .001
Cigarette smoking			1.2	5.03	.104	.001
Alcohol use			1.3	2.17	-.128	< .001
Physical activities			1.2	0.76	-.119	< .001
Depressive symptoms (2010)			1.4	1.96		
Depressive symptoms (2012)			1.5	1.96		
Depressive symptoms (2014)			1.5	2.05		

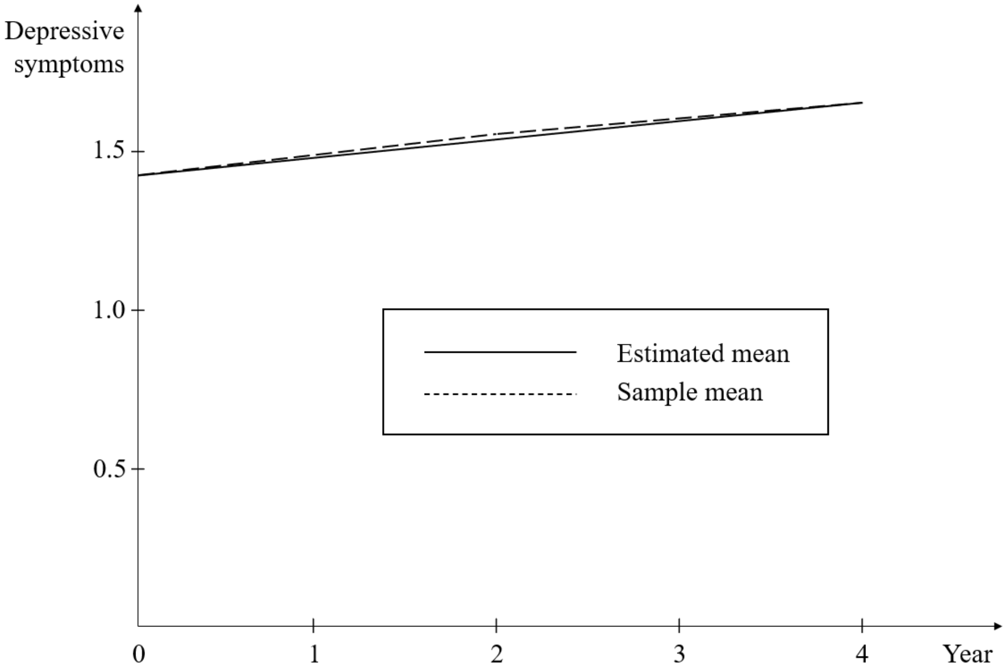
Note. An independent samples t-test was performed for binary variables (gender, marriage, health insurance, recurrence, duration of survivorship from diagnosis, and death); ANOVA was used for categorical variables (race, education, income, self-reported health, and cancer types); Post hoc test used Scheffe's test result; characteristics of continuous variables were analyzed by correlation analysis using Pearson's correlation coefficient.

Unconditional Model

Figure 3.4 presents the results of unconditional modeling. The linear unconditional growth model had good model fit (χ^2 = 0.051, df = 1, *p* > .05; RMSEA = .000, CFI = 1.000, TLI = 1.001), and the sample means and the estimated means are almost consistent as shown in Figure 3.4. This implies that the linear model may fit well for the trajectory of depressive symptoms of the sample. Figure 3.4 presents an estimated unconditional linear model that increases over time throughout the three waves. The variance of the intercept was significant (*B* = 2.287, *SE* = 0.167, *p* < .001), which indicates that significant variability in the intercept of the trajectories among the respondents exists and conditional modeling is suggested to investigate factors that affect the variability in the intercept. The variance of the slope was not statistically significant (*B* = 0.005, *SE* = 0.021, *p* = .800).

Figure 3.4

Sample mean and estimated mean of depressive symptoms in the linear unconditional model



Conditional Model

The conditional model based on Andersen's Behavioral Model (Andersen, 1995; Andersen et al., 2014) and Theory of Fundamental Causes (Phelan et al., 2010; Link & Phelan, 1995) fit well overall (χ^2 = 34.560, df = 27, $p > .05$; RMSEA = .026, CFI = 0.981, TLI = 0.943). Women were more likely to have higher depressive symptoms at baseline than men (B = 1.172, SE = .300, $p < .001$). Respondents with an annual household income between $40,000 and $99,999 were more likely to have lower depressive symptoms at baseline compared to that of respondents with less than $20,000 of annual household income (B = -0.792, SE = .239, p = .001). People with a high sense of control were more likely to have lower depressive symptoms at baseline than people with a low sense of control (B = -0.355, SE = .069, $p < .001$). Breast cancer survivors were more likely to have lower depressive symptoms at baseline compared to colon cancer survivors (B = -0.633, SE = .301, p = .035). People who experienced a cancer recurrence were more likely to have higher depressive symptoms at baseline than those who did not experience a recurrence (B = 0.720, SE = .197, $p < .001$). People with higher level of perceived discrimination were more likely to have higher depressive symptoms at baseline than those with a low level of perceived discrimination (B = 0.574, SE = .122, $p < .001$). People who engaged in physical activities were more likely to have lower depressive symptoms at baseline than those who did not engage in (B = -0.263, SE = .104, p = .011).

As shown in the unconditional model where the variance in the slope of the trajectory of depressive symptoms of the total sample was not statistically significant, most factors were not significantly associated with the slope of the trajectories of depressive symptoms in the conditional model. However, the results of the conditional model indicated that age and cancer types were significantly associated with the slope of the trajectories of depressive symptoms. Older respondents were more likely to have a higher increasing rate of the trajectory compared to their younger counterpart (*B* = 0.009, *SE* = 0.004, *p* = .013). Breast (*B* = 0.209, *SE* = 0.105, *p* = .047) and lung (*B* = 0.229, *SE* = 0.110, *p* = .037) cancer survivors were more likely to have a higher increasing rate of the trajectories compared to colon cancer survivors. See Table 3.2 for additional information.

Table 3.2

Conditional Model with Latent Growth Model for Depressive Symptoms (N = 1,961)

	ICEPT ON				SLOPE ON			
	Estimate	SE	Est/SE	*p*	Estimate	SE	Est/SE	*p*
Age	-0.008	0.010	-0.830	.407	0.009	0.004	2.471	.013
Gender (ref = male)	1.172	0.300	3.900	.000	-0.151	0.112	-1.356	.175
Race (ref = Non-Hispanic White)								
Black	0.106	0.216	0.490	.624	-0.067	0.075	-0.898	.369
Hispanic	-0.279	0.386	-0.722	.471	0.183	0.124	1.476	.140
Other	-0.528	0.862	-0.612	.540	0.181	0.265	0.681	.496
Marriage (ref = not married)	-0.137	0.172	-0.794	.427	0.055	0.059	0.924	.356
Education (ref < high school graduate)								
High school graduate	-0.021	0.206	-0.101	.920	-0.016	0.074	-0.210	.834
College graduates	-0.380	0.255	-1.491	.136	-0.012	0.088	-0.136	.892
Annual Income (ref < $20,000)								
$20,000–$39,000	-0.422	0.231	-1.822	.069	-0.073	0.082	-0.888	.374
$40,000–$99,999	-0.792	0.239	-3.312	.001	0.058	0.084	0.688	.492
≥ $100,000	-0.547	0.317	-1.724	.085	-0.010	0.110	-0.094	.925
Sense of control	-0.355	0.069	-5.120	.000	0.032	0.025	1.282	.200
Social network	-0.099	0.073	-1.350	.177	0.009	0.025	0.349	.727
Health insurance (ref = no)	-0.007	0.432	-0.016	.987	-0.119	0.148	-0.803	.422
Self-reported health (ref = poor)								
Fair/good	-0.098	0.154	-0.640	.522	0.070	0.054	1.315	0.189
Very good/excellent	-0.312	0.167	-1.865	.062	-0.004	0.058	-0.074	0.941
Cancer types (ref = colon)								
Breast	-0.633	0.301	-2.104	.035	0.209	0.105	1.984	.047
Prostate	0.092	0.271	0.341	.733	0.077	0.095	0.811	.417
Lung	-0.390	0.287	-1.358	.174	0.229	0.110	2.083	.037
Recurrence	0.720	0.197	3.664	.000	-0.132	0.071	-1.857	.063
Duration of survivorship (ref < 5 years)	-0.008	0.172	-0.044	.965	-0.059	0.059	-1.002	.316
Perceived discrimination	0.574	0.122	4.703	.000	-0.032	0.042	-0.766	.444
Cigarette smoking	0.010	0.017	0.605	.545	0.001	0.006	0.206	.837
Alcohol use	-0.034	0.033	-1.003	.316	-0.005	0.011	-0.429	.668
Physical activities	-0.263	0.104	-2.539	.011	0.012	0.037	0.332	.740
Death (ref = no)	-0.105	0.230	-0.457	.647	0.242	0.131	1.848	.065
χ^2	*34.560							
CFI	0.981							
TLI	0.943							
RMSEA	.026							

* *p* = .096

Discussion

This study revealed the trajectory of depressive symptoms among middle-aged and older adult cancer survivors using longitudinal data from the HRS. The findings presented an increasing linear trajectory over a 4-year period, which is different from previous research findings that have reported that the depressive symptoms of adult cancer survivors decrease over time (Andersen et al., 2017; Rottmann et al., 2016; Stanton et al., 2015). Given that previous studies focused on short-term cancer survivors, female cancer survivors, and populations outside the U.S., this study added further evidence regarding the trajectory of depressive symptoms focusing on four types of cancer survivors who are aged 50 or over. The increasing trajectory of depressive symptoms suggests that prevention and intervention programs are necessary for middle-aged and older adult cancer survivors throughout their course of survivorship.

This study found that women were more at a risk of higher depressive symptoms over time compared to men, which has been noted in a large body of research (Linden et al., 2012; Vodermaier et al., 2011). Adult women may earn less money while working more hours than men, as well as have much more responsibility such as household tasks and caring for children, which may contribute to higher depressive symptoms compared to men (Meyer et al., 2008; Nolen-Hoeksema et al., 1999). In this study, breast cancer survivors had lower depressive symptoms over time compared to colon cancer survivors. This finding is in line with previous study findings that breast cancer survivors had higher depressive symptoms compared to colon cancer survivors among adults aged between 19 and 69; however, they had lower depressive symptoms among older adults aged 70 and older (Linden et al., 2012; Vodermaier et al., 2011). Most breast cancer survivors are female and these survivors may experience changes in body image, especially scars on the breast that can potentially affect their relationship with partners (Lee et al., 2013). The study findings imply that interventions to reduce depressive symptoms of adult cancer survivors should be particularly highlighted among female and breast cancer survivors.

In addition to gender differences, this study also found negative associations between physical activities and depressive symptoms for middle-aged and older adult cancer survivors. These relationships have been reported in a large body of studies (Clark et al., 2016; Hata et al., 2020). Adult cancer survivors with a high sense of control had lower depressive symptoms over time compared to their counterpart, which is consistent with one previous study (Mirowsky, 2013). This finding suggests that improving an individual's sense of control through the process of accomplishing small tasks would help reduce depressive symptoms among middle-aged and older adult cancer survivors (Abeles, 1991). These findings further suggest that when developing interventions for depressive symptoms in middle-aged and older adult cancer survivors, improving self-care management including physical activities can improve physical health, which can be effective in reducing depressive symptoms.

With regard to income, cancer survivors with higher annual household income had lower depressive symptoms over time compared to their counterpart, which is consistent with previous research (Erim et al., 2019; Kim et al., 2008). This finding can be explained using Andersen's Behavioral Model in that people with more resources to facilitate better health behaviors (e.g., physical activities, healthy diet, and health care service use) would likely report lower depressive symptoms (Andersen, 1995). Additionally, cancer survivors who experienced a cancer recurrence had higher depressive symptoms over time compared to survivors who did not experience a recurrence. This finding was consistent with previous evidence that cancer survivors who experienced a recurrence reported cancer distress including more depressive symptoms, anxiety, and suicidal ideation (Andersen et al., 2005; Lee et al., 2014). The current study also revealed that adult cancer survivors who reported a higher level of perceived discrimination had higher depressive symptoms over time. Given that only a few studies have reported an association between discrimination and mental health such as life satisfaction and quality of life of adult cancer survivors (Merluzzi et al., 2015; Wallace & Baker, 2018), this study provides important information regarding the association between perceived discrimination and depressive symptoms among the middle-aged and older adult cancer survivors. In health care settings, income, cancer recurrence, and perceived discrimination should be integrated in assessments of and interventions for depressive symptoms when working with cancer survivors. Those who have a lower household income, who experienced a cancer recurrence, and a high level of perceived discrimination should be prioritized for clinical intervention and health care management to promote optimal health care outcomes.

Implications

This study investigated factors that affect the trajectory of depressive symptoms of cancer survivors aged 50 or older using theoretical frameworks based on Andersen's Behavioral Model and the Theory of Fundamental Causes. Further, it provided information for more customized and specialized intervention programs to reduce depressive symptoms of middle-aged and older adult cancer survivors in health care settings. Given that the depressive symptoms of cancer survivors increase over time according to the findings obtained in this study, early interventions to prevent or reduce depressive symptoms in this vulnerable population is warranted. Social and medical service providers including social workers, nurses, and physicians should be aware of the factors that influence the trajectory of depressive symptoms and use this information during assessment and treatment. For example, interventions for depression should be emphasized for female and breast cancer survivors.

Discrimination experience also should be explored and integrated into the assessment process, especially for cancer survivors who identify as members of groups that are at greater risk of discrimination in their everyday lives. Local, regional, and national legislative efforts can be enacted to improve cancer survivors with access to affordable and culturally appropriate mental health services, especially for members of racial and ethnic minority who are at high risk of microaggressions (Auguste et al., 2021; Forrest-Bank & Cuellar, 2018) and discrimination in everyday encounters.

Middle-aged and older adult cancer survivors whose sense of control and household income were low and who experienced a cancer recurrence should be a priority for interventions in health care settings. The service providers should include programs to encourage physical activities in their interventions along with services for depressive symptoms. For example, the American Cancer Society Hope Lodge in Minneapolis provides diverse programs including physical activities, yoga, meditation, cooking, or gaming to reduce mental problems of cancer patients who are currently in the treatment process and staying in the lodge. Developing similar programs for middle-aged and older adult cancer survivors and encouraging their participation will help them improve their mental well-being. The M Health Cancer Care at the University of Minnesota is operating cancer support groups where short- and long-term cancer survivors as well as their family members can seek emotional support, which can contribute to reducing the onset or intensity of mental health challenges including depressive symptoms, anxiety, or hopelessness.

Limitations

This study has several limitations that influence how the findings should be interpreted. First, the Health and Retirement Study did not use a random sample and it oversampled individuals who identified as Black or Hispanic/Latinx. Second, the current study utilized only three waves of data. Although the HRS has collected data over twenty years, this study included three waves because of concerns about attrition rates due to age and medical vulnerability. Third, information of covariates from the second and third waves were not included in this study even though they are conceptually time-varying variables. While variables such as health status, social network, perceived discrimination, cigarette smoking, alcohol use, and physical activities are subject to change over time, including information of these variables from the second and third waves introduces a large portion of missingness. Finally, while the physical activities and social network scales had low internal consistency, they were included in the analytic model based on theoretical and empirical evidence, which is one limitation of using a secondary data.

Conclusion

This study highlighted the importance of examining perceived discrimination and health behaviors when examining depressive symptoms among middle-aged and older adult cancer survivors over time. Future studies are needed to replicate these analyses with multiple measures of discrimination and samples that include a broad representation from the Black/African American, Latinx, Asian Pacific Islander, and Native American communities.

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Chapter Four (Study 3): Perceived Discrimination and Depressive Symptom Trajectory of Middle-aged and Older Adults with Diabetes

Introduction

In 2018, an estimated 34.1 million (13%) of adults in the United States (U.S.) had either diagnosed or undiagnosed diabetes (Centers for Disease Control and Prevention, 2020), the majority of whom (90% to 95%) would be identified with type 2 diabetes (Centers for Disease Control and Prevention, 2020). In the case of type 2 diabetes, a person's body does not produce enough insulin or it is unable to use insulin effectively thereby increase glucose levels in the bloodstream that ultimately harm the body (Joslin Diabetes Center, 2021). In type 1 diabetes, the body does not produce insulin and requires either daily insulin injections or the use an insulin pump to provide the body with insulin so that blood glucose levels can be regulated (Joslin Diabetes Center, 2021). Type 1 diabetes is usually developed in children or young adults, while type 2 diabetes is more likely to occur in those who are over the age of 40 (Joslin Diabetes Center, 2021).

The prevalence of adult diabetes in the United States is projected to increase 33% by 2050 as life expectancy increases (Boyle et al., 2010). The incidence of adult diabetes also increases with age, with 17.5% of those aged 45 to 64 years and 26.8% of those aged 65 years or older being diagnosed with diabetes for the first time (Centers for Disease Control and Prevention, 2020). Compared to younger adults with diabetes, middle-aged and older adults with diabetes are at higher risk of diabetic complications, disability, comorbid diseases (e.g., cardiovascular disease) and mortality, which may be associated with compromised mental health (Corriere et al., 2013; Huang et al., 2014; Wray et al., 2005). Given these adverse outcomes, investigating the mental health of middle-aged and older adults with diabetes is necessary to support their long-term disease management and quality of life (Boyle et al., 2010).

Depressive symptoms are common among adults with diabetes, and studies that used prospective or retrospective study designs reported the bidirectional relationship between diabetes and depressive symptoms (Aarts et al., 2009; Garcia et al., 2016). Diabetes may be a risk factor of depressive symptoms due to the psychological burden throughout diagnosis, treatment, and challenges for clinical practice, including glycemic control, eating habits, and exercise (Bogner et al., 2012; Garcia et al., 2016; Hamer et al., 2011; Pan et al., 2010). Conversely, it has also been proposed that depressive symptoms preceded diabetes by reducing health behaviors or influencing biochemical changes (Golden et al., 2008; Knol etal.,2006; Renn et al., 2011; Rotella & Mannucci, 2013). An early meta-analytic study revealed that the prevalence of depression among those with type 2 diabetes was 17.6%, which is twice as high as those without diabetes (Ali et al., 2006). In another meta-analytic study that reviewed only longitudinal studies, people with type 2 diabetes had a 24% higher risk of developing depression compared to adults without diabetes (Nouwen et al., 2010).

Since the coexistence of diabetes and depressive symptoms is associated with higher rates of complications, more disability, higher diabetes treatment expense, and shorter lifespan, investigating depressive symptoms of adults with diabetes is critical (Egede, 2004; Egede et al., 2016; Katon et al., 2008; Park et al., 2013). In particular, the presentation of depressive symptoms can change over time and individuals manifest different patterns of depressive symptoms (Almeida et al., 2016). Additionally, the depressive symptoms of older adults are sometimes less visible compared to that of younger adults, due to the presentation of social withdrawal, loss, and lethargy that is more common among older adults (Casey, 2018). Thus, examining the trajectories of depressive symptoms among middle-aged and older adults with diabetes and the factors that affect these trajectories are necessary.

Previous studies have investigated trajectories of depressive symptoms among people with diabetes using scales such as the Geriatric Depression Scale-15 (GDS-15; Almeida et al., 2016), Patient Health Questionnaire-9 (PHQ-9; Arshad & Alvi, 2016), and Center for Epidemiological Studies-Depression (CES-D; Chiu et al., 2017; Hood et al., 2017). Overall, the results obtained from these studies suggested a J-shaped curve that decreases for ten to twenty years and then increases over a longer period, however, temporal trends have not been described explicitly (Almeida et al., 2016; Arshad, & Alvi, 2016; Chiu et al., 2017; Hood et al., 2017). Further investigations of depressive symptom trajectories, especially among middle-aged and older adults with diabetes, will enhance our understanding on how depression manifests over time in these age cohorts.

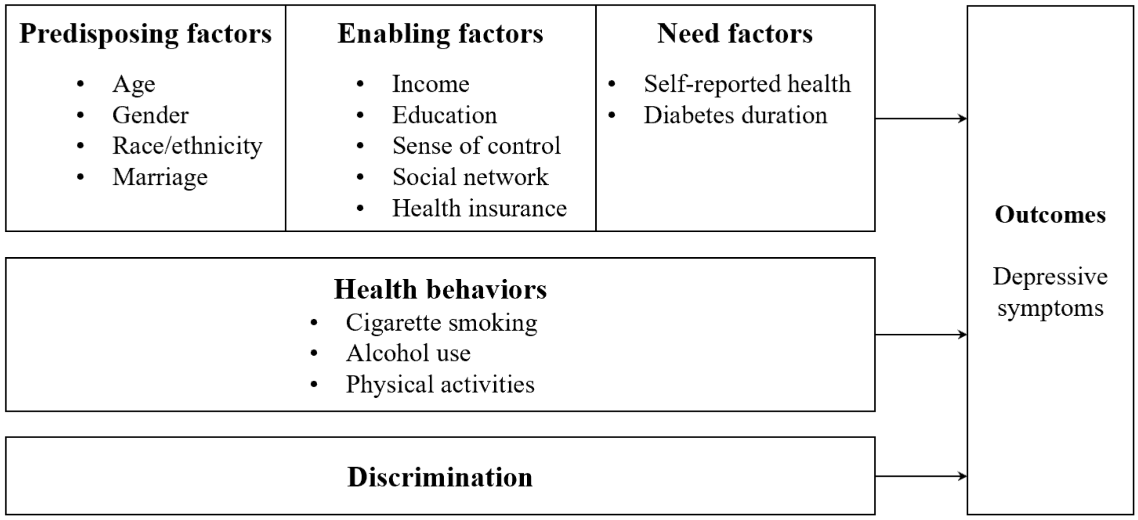
Theoretical Framework

This study used a theoretical framework that combined Andersen's Behavioral Model (Andersen, 1995; Andersen et al., 2014) and the Theory of Fundamental Causes (Link & Phelan, 1995; Phelan et al., 2010) to explain the factors that affect the trajectories of depressive symptoms (Figure 4.1). Andersen's Behavioral Model posits that predisposing, enabling, and need factors, as well as health behaviors may affect depressive symptoms of people with diabetes (Andersen et al., 2014). Predisposing factors consists of preexisting sociodemographic characteristics, enabling factors are the resources that can encourage a person's engagement in health behaviors, and need factors are an individual's perception of health conditions or medical provider's judgement of health status or illness diagnosis (Andersen, 1995; Andersen et al., 2014). All of these factors can be facilitated by better mental health directly or indirectly through health behaviors.

The Theory of Fundamental Causes additionally implies that power and prestige can affect depressive symptoms of those with diabetes (Link & Phelan, 1995; Phelan et al., 2010). This theory describes how discrimination in everyday life can adversely affect a person's mental and physical well-being (Link & Phelan, 1995; Phelan et al., 2010). Given the potential influence of discrimination on a person's mental and physical well-being, this variable was included in our model to determine the extent to which it explains depression in middle-aged and older adults.

Figure 4.1

Theoretical framework



Predisposing factors. This study included age, gender, race/ethnicity, and marriage as predisposing factors. Previous research has reported that older adults with diabetes had higher depressive symptoms in U.S.- and non-U.S.-based studies (Collins et al., 2009; Hashim et al., 2016; Khuwaja et al., 2010; Raval et al., 2010), while a non-significant association between age and depressive symptoms was also reported in studies conducted outside the United States (Asefa et al., 2020; Sweileh et al., 2014). The majority of previous studies reported that female adults with diabetes had higher depressive symptoms compared to male adults with diabetes (Al-Amer et al., 2011; Kalantari et al., 2014; Khuwaja et al., 2010; Sweileh et al., 2014), whereas a few studies revealed that adult men with diabetes had similar or higher depressive symptoms than adult women with diabetes (Asefa et al., 2020; Zahid et al., 2008). Black and Hispanic adults with diabetes experienced higher depressive symptoms compared to White adults with diabetes (Assari & Lankarani, 2017; Bauer et al., 2017). Married adults with diabetes reported lower depressive symptoms in non-U.S.-based studies (Asefa et al., 2020), whereas marital status was not associated with depressive symptoms of adults with diabetes in U.S. studies (Collins, Corcoran, & Perry, 2009). The aforementioned sociodemographic factors were included as predisposing factors in the model analytic because they can affect depressive symptoms.

Enabling factors. Education, income, sense of personal control, social network, and health insurance were included as enabling factors in this study. Adult diabetics who completed a higher level of education reported higher depressive symptoms (Al-Amer et al., 2011; McCurley et al., 2019; Mohamed et al., 2012; Sweileh et al., 2014), while a recent study reported a non-significant relationship between education and depressive symptoms (Asefa et al., 2020). A positive association between income and depressive symptoms was revealed in a cross-sectional study (McCurley et al., 2019), while income was not significantly associated with depressive symptoms in a longitudinal study (Ell et al., 2010). Investigations have demonstrated that sense of personal control mediated the relationship between stressful life events and depressive symptoms by enhancing disease self-management among adults with diabetes (Chou & Chi, 2001; Nagelkerk et al., 2006). Social support and social networks had negative associations with depressive symptoms and moderated the relationship between stressful events and depressive symptoms among older adults (Assari & Lankarani, 2017; Chou & Chi, 2001; Kong et al., 2019). Having health insurance was associated with lower depressive symptoms among primary care patients including diabetics (Hirschtritt et al., 2018). These enabling factors were included in the analytic model as factors that can facilitate an individual's engagement in health behaviors and reduce depressive symptoms over time.

Need factors. Self-reported health and diabetic duration were included as need factors in this study. Previous studies reported that adult diabetics with chronic diseases had higher depressive symptoms (Hashim et al., 2016; Khuwaja et al., 2010; Sweileh et al., 2014). A longer duration of diabetes was associated with higher depressive symptoms (Asefa et al., 2020), whereas a few studies reported a non-significant relationship between duration and depressive symptoms in people with type 2 diabetes (Kalantari et al., 2014; Raval et al., 2010). These need factors, which included self-rated health and diagnosis based on medical provider's judgement, were included in the analytic model.

Health behaviors. Cigarette smoking, alcohol use, and physical activities, which are considered key health-related behaviors of adult diabetics, were included in this study. In a 4-year longitudinal study, more cigarette smoking was related to higher depressive symptoms among adult diabetes (McGihon et al., 2019). Primary care patients with more alcohol use had higher depressive symptoms (Hirschtritt et al., 2018). Older adults with diabetes who engaged in more physical activities reported lower depressive symptoms (Mendes et al., 2019; Vu et al., 2018). Cigarette smoking, alcohol use, and physical activities have been associated with depressive symptoms in people with diabetes and were included in the analytic model.

Discrimination. This study included perceived discrimination, as a proxy of power and prestige, because it is believed to affect the presentation of depressive symptoms among people with diabetes (Link & Phelan, 1995; Link & Phelan, 2001; Phelan et al., 2010). In a study of Latinx adults with type 2 diabetics, a higher level of racial/ethnic discrimination was associated with higher depressive symptoms (LeBrón et al., 2019; McCurley et al., 2019).

Mortality. Adults with diabetes who experienced depression had much shorter survival time compared to those who did not experience depression (Jeong et al., 2017; Naicker et al., 2017). Death was included in this study as an auxiliary variable related to attrition and depressive symptoms of middle-aged and older adults.

Study Rationale and Goals

Evidence regarding factors affecting depressive symptoms among adults with diabetes has been extensively reported. However, among these studies, there is still a lack of research that used U.S.-based samples. In particular, few longitudinal studies have comprehensively examined the effects of health behaviors and perceived discrimination on depressive symptoms focusing on middle-aged and older adult diabetics. This longitudinal investigation utilized national panel data from U.S. respondents to investigate factors affecting the trajectories of depressive symptoms among middle-aged and older adults with diabetes, guided by Andersen's Behavioral Model (Andersen, 1995;

Andersen et al., 2014) and the Theory of Fundamental Causes (Link & Phelan, 1995; Phelan et al., 2010).

Research Questions and Hypotheses

Listed below are the research questions and hypotheses that guided this study.

1. What is the depressive symptoms trajectory of adults with diabetes?

    Hypothesis 1a: The linear trajectory of depression will yield a good model fit.

    Hypothesis 1b: The trajectory of depression will increase over time.

2. Are there distinct trajectories of depressive symptoms based on the linear model for adults with diabetes?

    Hypothesis 2a: The variance in the intercept of the depressive symptoms trajectory will be statistically significant ($p < .05$).

    Hypothesis 2b: The variance in the slope of the depressive symptoms trajectory will be statistically significant ($p < .05$).

3. Does perceived discrimination affect depressive symptoms trajectory of adults with diabetes over time?

    Hypothesis 3a/3b: A higher intercept (3a) and a steeper slope (3b) for the depressive symptoms trajectory will be significantly associated with higher perceived discrimination

4. What other factors influence the depressive symptoms trajectory of adults with diabetes over time?

    Hypothesis 4a/4b: A higher intercept (4a) and a steeper slope (4b) for the depressive symptoms trajectory will be significantly associated with: (1) being younger, (2) being female, (3) non-white race, (4) being unmarried, (5) lower education, (6) lower income, (7) lower sense of control, (8) smaller social network, (9) no health insurance, (10) worse self-reported health, (11) breast or lung cancer types, (12) recurrence, (13) survivorship of less than 5 years, (14) higher cigarette smoking, (15) higher alcohol use, and (16) lower physical activities, and (17) deceased during the study period.

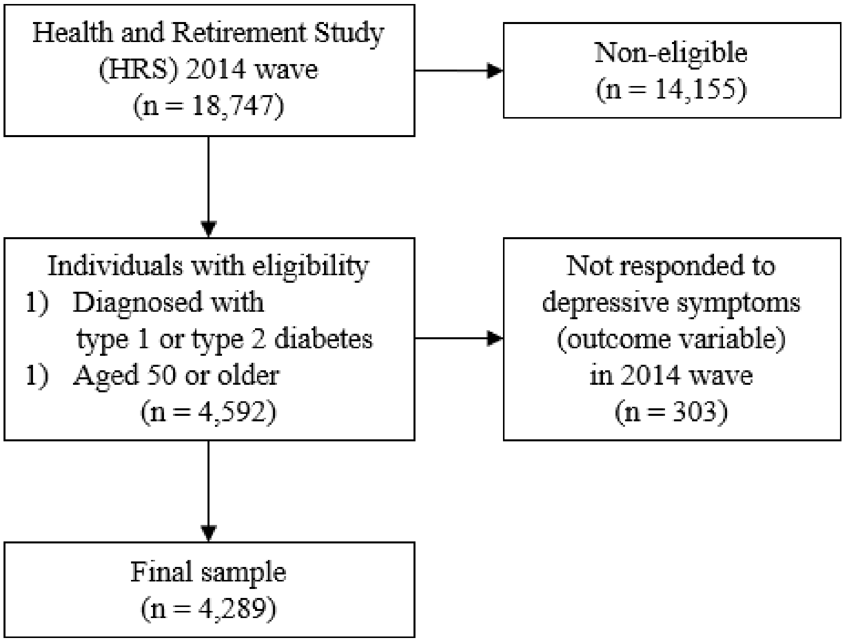
Methods

Participants

This study used the Health and Retirement Study (HRS), a nation-wide longitudinal panel study in the United States targeting adults aged 50 or older, directed by the University of Michigan's Survey Research Center, and supported by National Institute on Aging at NIH and the Social Security Administration (University of Michigan Institute for Social Research, 2010). The HRS used a multi-stage area probability sample with supplemental oversamples of racial minority groups (University of Michigan Institute for Social Research, 2010). Three waves (2014, 2016, 2018) were extracted from the RAND HRS longitudinal file and two waves (2016 and 2018) from Exit were merged in this study. Among the 18,747 participants in 2014 wave, 4,592 participants who were aged 50 or older in 2014 and who had been diagnosed with diabetes (type 1 or type 2) before 2014 were identified as eligible for this study. Among them, 4,289 reported depressive symptoms information in the 2014, and they were selected as the final sample of this study. Due to attrition, 624 and 656 dropped out of the 2016 and 2018 waves, respectively. Figure 4.2 presents the process to acquire the final sample.

Figure 4.2

Participant selection for this study



Measures

Depressive symptoms were assessed by the abridged 8-item Center for Epidemiological Studies-Depression (CES-D): felt depressed, felt everything they did was an effort, sleep was restless, was happy-reversed, felt lonely, enjoyed life-reversed, felt sad, and felt unmotivated (Radloff, 1977). The answers to the eight items (1 = yes, 0 = no) were summed, including the two reversed-scored items, whereby higher scores represent a higher number of depressive symptoms. The Cronbach’s alphas ranged between .806 and .825 for the three waves.

With regard to sociodemographic characteristics, age was included as a continuous variable, and gender (1 = female, 0 = male) and marriage (1 = married, 0 = separated/divorced/widowed/never married) were dichotomized. For each of the categorical variables, dummy variables were created and coded as (1 = yes, 0 = no). Race was categorized into four groups, including non-Hispanic White (reference group), Black, Hispanic, and other. Education was categorized into three groups, including less than high school (reference group), high school graduate, and college graduate. Annual household income was categorized into four groups, including < \$20,000 (reference group), \$20,000–\$39,999, \$40,000–\$99,999, and ≥ \$100,000.

Sense of control was assessed using five items taken from the Perceived Constraints on Personal Control scale (Lachman & Weaver, 1998) and the mean score of the 6-point Likert scale responses was used for the measurement (1 = strongly disagree to 6 = strongly agree; Cronbach's alpha = .902). Social network was measured by three items asking how often a respondent met up, spoke on the phone, and wrote to or emailed with friends. The 6-point Likert scale responses were used to measure the items (less than once a year or never to three or more times a week), and the mean score was used for social network (Cronbach's alpha = .501). Health insurance was dichotomized depending on whether the respondent had health insurance (1 = yes, 0 = no). Self-reported health was assessed by a single-item and the responses were categorized as follows: poor (reference group), fair or good, very good or excellent.

Perceived discrimination was assessed by six items of a Perceived Discrimination Scale (Kessler et al., 1999). The mean score of the responses to the six items (strongly disagree to strongly agree) was used and the Cronbach's alpha was .833. Health behaviors such as cigarette smoking and alcohol use were included as continuous variables. Cigarette smoking was assessed by a single item that measured the number of cigarettes a respondent smoked in a day. Alcohol use was measured by the number of days per week they drink alcohol. For physical activities, the participants answered three

5-point Likert scale items that examined how often they took part in vigorous activities (e.g., jogging), moderate activities (e.g., walking at a moderate pace), and mild activities (e.g., doing laundry). Their answers were coded as 0 = hardly ever or never, 1 = one to three times a month, 2 = once a week, 3 = more than once a week, 4 = every day, and the mean score of the three items were used to indicate the level of physical activity of each participant (Cronbach’s alpha = .425). Additionally, death was included as an auxiliary variable because it is highly correlated with attrition (Dong & Peng, 2013; Graham, 2003). Death was dichotomized depending on whether the participants were reported as deceased between 2014 and 2018.

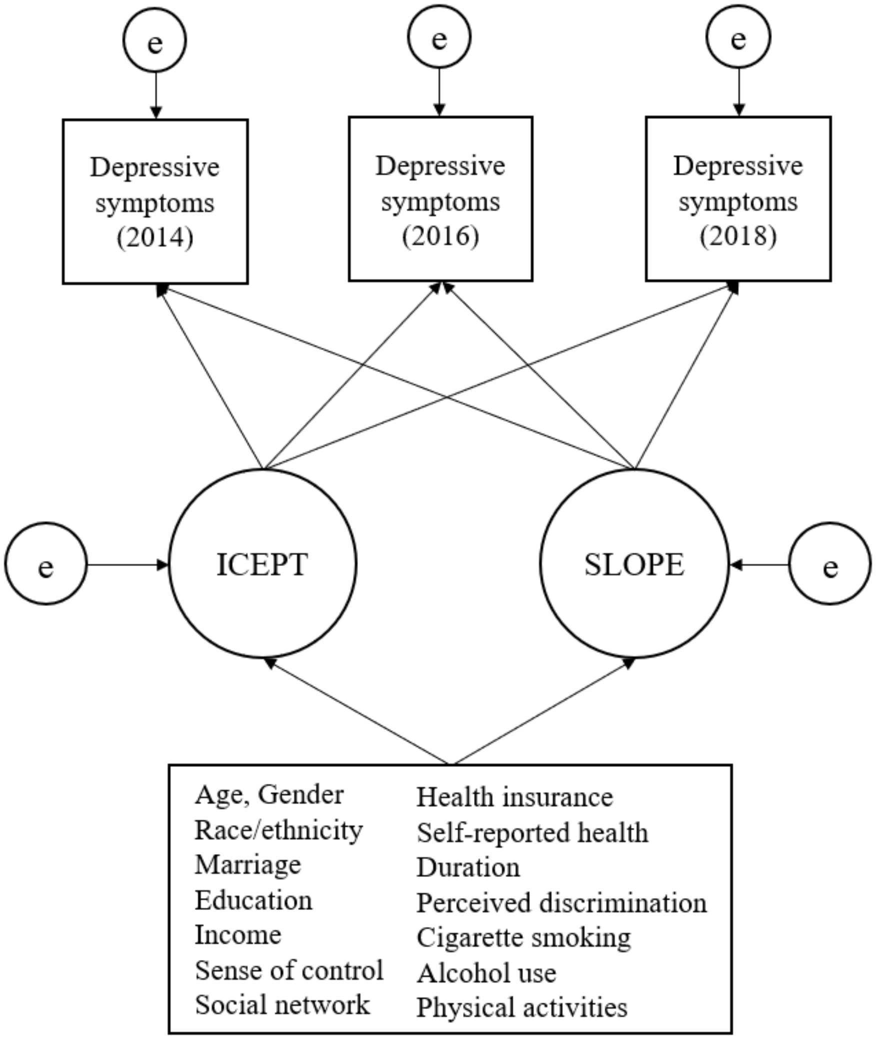
Analysis

Univariate analyses were conducted to explore the sociodemographic characteristics of the sample, and bivariate analyses were conducted to investigate significant differences in depressive symptoms by sociodemographic characteristics. Latent growth modeling, which is a variant of structural equation modeling that can demonstrate different aspects of change over time (Chan, 2002), was conducted to investigate the trajectory of depressive symptoms in two steps. First, unconditional modeling was conducted to identify the patterns of depressive symptoms over time as well as to examine the variances in the intercept and slope of the trajectories. Second, conditional modeling was performed by adding covariates to investigate factors that affect the variances in the trajectories of depressive symptoms. Figure 4.3 presents the research model.

Since the HRS surveyed middle-aged and older adults and tracked them until their death, the attrition rate was relatively high (14.5% and 29.8% in the 2016 and 2018 waves, respectively), which is common in data of older adults because it reflects their higher risk of mortality and weakened health. Listwise deletion of attrition cases may systematically underrepresent the sample, whereby information of participants who dropped out throughout the three waves due to their compromised health status or earlier death may be omitted from the study results. The effective sample size may be reduced, which can increase standard errors and bring about parameter bias in listwise deletion (Newman, 2003). Thus, this study used Full Information Maximum Likelihood (FIML) with inclusion of an auxiliary variable of death that is strongly correlated with attrition (Dong & Peng, 2013; Graham, 2003). SPSS 26 (IBM Corp, 2019) was used for longitudinal data management and Mplus 8.6 (Muthén & Muthén, 1998) was used for the analyses.

Figure 4.3

Analytic model



Results

Sociodemographic Characteristics of the Sample

Table 4.1 presents the univariate and bivariate analysis results for sociodemographic characteristics of the respondents reported in wave 2014. The average age was 69 years (*SD* = 9.70). Of the respondents, more than half (55.8%) were male and the sample identified predominantly as non-Hispanic White (52.6%), followed by Black (24.8%), Hispanic/Latinx (18.7%), and other (3.9%). More than half (54.2%) were married. Approximately half (52.7%) of the sample were high school graduates, 24.6% completed less than a high school education, and 22.7% were college graduates. One-third (33.3%) reported an annual household income of less than \$20,000, 24.9% indicated \$20,000–\$39,999, 30.6% indicated \$40,000–\$99,999, and 11.1% reported \$100,000 or more. A vast majority of the sample (93.4%) had health insurance. More than two thirds (67.4%) rated their health as fair or good, while 20% reported very good or excellent and 12.7% indicated poor. One-fifth (19.8%) reported their diabetes duration to be within 5 years, 28.8% reported between 6 and 10 years, and 51.4% reported more than ten years. About 7.7% of the respondents were reported as deceased in the 2016 or 2018 waves.

The bivariate analysis results indicated that respondents had significantly higher depressive symptoms if they were female ($t_{(4287)} = 8.192$, $p < .001$), not married ($t_{(4286)} = -9.829$, $p < .001$), had a lower level of education ($F_{(2, 4248)} = 67.945$, $p < .001$), had lower income ($F_{(3, 4284)} = 93.936$, $p < .001$), did not have health insurance ($t_{(4273)} = -3.387$, $p < .001$), reported lower self-reported health status ($F_{(2, 4284)} = 425.833$, $p < .001$), had diagnosed with diabetes more than ten years ago ($F_{(2, 3747)} = 3.976$, $p = .019$), and were alive ($t_{(4287)} = -3.852$, $p < .001$) compared to their counterparts. Respondents who identified as non-Hispanic White had significantly lower depressive symptoms compared to those who identified as Black, Hispanic, and having other racial identities ($F_{(3, 4277)} = 28.636$, $p < .001$). Among the continuous variables, age ($r = -.066$, $p < .001$), sense of control ($r = -.351$, $p < .001$), social network ($r = -.122$, $p < .001$), and physical activities ($r = -.202$, $p < .001$) had statistically significant negative correlations with depressive symptoms, while perceived discrimination ($r = .234$, $p < .001$) had a significant positive correlation. See Table 4.1 for additional information.

Table 4.1

Results from Univariate and Bivariate Analyses (N = 4,289)

	N	%	*Depressive symptoms*			
			M	*SD*	*F/t* (*post hoc test*)	*p*
Gender						
Female	1896	44.2	2.1	2.35	8.192	< .001
Male	2393	55.8	1.6	2.03		
Race						
Non-Hispanic White (a)	2250	52.6	1.6	2.09	28.636	<.001
Black (b)	1062	24.8	2.0	2.26	(a < b < c)	
Hispanic (c)	802	18.7	2.4	2.43	(a < d)	
Other (d)	167	3.9	2.1	2.30		
Marriage						
Married	2323	54.2	1.6	2.06	-9.829	< .001
Separated/divorced/widowed/never married	1965	45.8	2.3	2.37		
Education						
Less than high school (a)	1045	24.6	2.5	2.35	67.945	< .001
High school graduate (b)	2241	52.7	1.9	2.24	(a > b > c)	
College graduate (c)	965	22.7	1.3	1.92		
Annual household income						< .001
< $20,000 (a)	1430	33.3	2.6	2.46	93.936	
$20,000–$39,000 (b)	1066	24.9	1.9	2.21	(a > b > c > d)	
$40,000–$99,999 (c)	1314	30.6	1.5	1.95		
≥ $100,000 (d)	478	11.1	0.9	1.54		
Health insurance						
Yes (a)	3993	93.4	1.9	2.20	-3.387	< .001
No (b)	282	6.6	2.5	2.53		
Self-reported health						
Poor	543	12.7	4.1	2.48	425.833	< .001
Fair or good	2888	67.4	1.8	2.11	(a > b > c)	
Very good or excellent	856	20.0	0.8	1.40		
Duration						
≤ 5 years (a)	743	19.8	1.7	2.04	3.976	.019
6–10 years (b)	1079	28.8	1.9	2.22	(a < c)	
> 10 years (c)	1928	51.4	1.9	2.23		
Death						
Yes (a)	330	7.7	1.5	1.93	-3.852	< .001
No (b)	3959	92.3	1.9	2.25		

			Depressive symptoms	
	M	*SD*	*r*	*p*
Age	69.0	9.70	-.066	< .001
Sense of control	4.7	1.21	-.351	< .001
Social network	3.6	1.07	-.122	< .001
Perceived discrimination	1.6	0.78	.234	< .001
Cigarette smoking	0.2	0.40	.063	.229
Alcohol use	0.4	0.50	-.019	.408
Physical activities	1.2	0.78	-.202	< .001
Depressive symptoms (2014)	1.9	2.23		
Depressive symptoms (2016)	1.8	2.17		
Depressive symptoms (2018)	1.7	2.10		

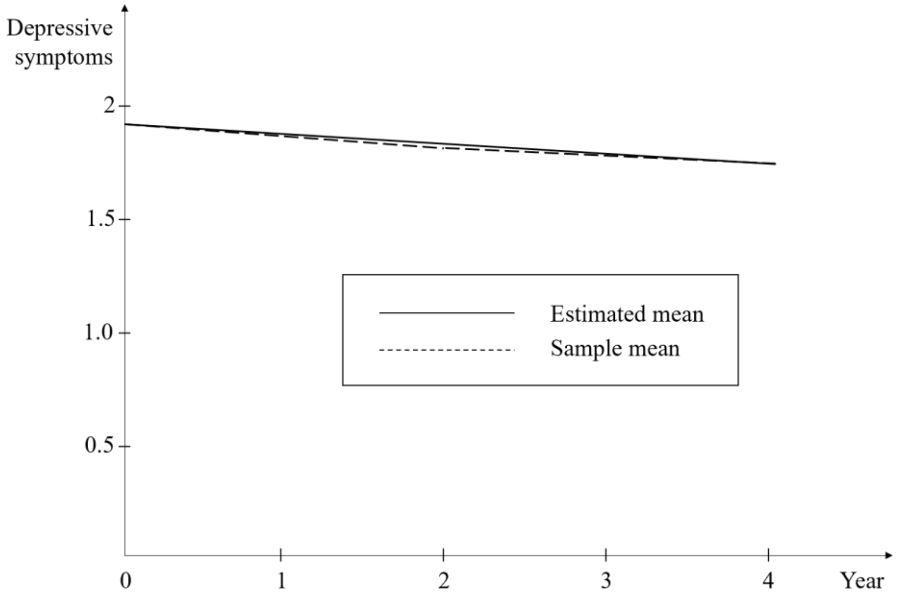
Note. An independent samples t-test was performed for binary variables (gender, marriage, health insurance, and death); ANOVA was used for categorical variables (race, education, annual household income, self-reported health, and duration); Scheffe’s test was used for post hoc test; characteristics of continuous variables were analyzed by correlation analysis using Pearson’s correlation coefficient.

Unconditional Model

The unconditional growth model fit the data, including the three repeated assessments of depressive symptoms to identify patterns of depressive symptoms over time. Given that the model indices indicated very adequate fit ($\chi^2 = 0.154$, $df = 1$, $p > .05$; RMSEA = .000, CFI = 1.000, TLI = 1.001), and the sample mean and the estimated mean were almost identical as shown in Figure 4.4, the linear model fit well to estimate the decreasing trajectories of depressive symptoms throughout the three waves. The statistically significant variance of the intercept indicated significant between-subject variability in the intercept of the depressive symptoms' trajectories, suggesting the addition of factors in the conditional model to explain the variance of the intercept (B = 3.026, SE = 0.139, $p < .001$). However, the variance of the slope of the unconditional model was not statistically significant, which suggested negligible between-subject variability in the slope of the trajectories (B = 0.028, SE = 0.016, $p > .05$).

Figure 4.4

Sample mean and estimated mean of depressive symptoms in the linear unconditional model



Conditional Model

The conditional model had good model fit indices (χ^2 = 23.037, df = 24, *p* > .05; RMSEA = .000, CFI = 1.000, TLI = 1.004). Older participants were more likely to have lower depressive symptoms at baseline (*B* = -0.031, *SE* = .009, *p* < .001). Respondents who were married were more likely to have a lower depression baseline than people who were not married (*B* = -0.363, *SE* = .171, *p* = .034). Adults with diabetes who had a higher sense of control were more likely to have a lower depression baseline (*B* = -0.333, *SE* = .063, *p* < .001). People whose diabetes duration is over ten years were more likely to have higher depressive symptoms at baseline compared to those whose duration is less than 5 years (*B* = -0.283, *SE* = .201, *p* = .159). Those who reported fair or good health status (*B* = -1.047, *SE* = 0.223, *p* < .001) and very good or excellent health status (*B* = -1.725, *SE* = .279, *p* < .001) were more likely to have a lower depression baseline than those with poor self-reported health. People who reported higher perceived discrimination were more likely to have a higher depression baseline (*B* = 0.521, *SE* = .104, *p* < .001).

As expected in the unconditional model where the variance in the slope of the trajectories of depressive symptoms was not significant, most covariates did not significantly affect the slope of the depressive symptoms' trajectory in the conditional model, which means the slopes of the trajectories of depressive symptoms were not significantly different depending on the factors. However, self-reported health was the only covariate that affected the slope of the depressive symptoms' trajectory in the conditional model. The depressive symptoms of people who reported their health status to be fair or good (*B* = 0.145, *SE* = 0.071, *p* = .041) and very good or excellent (*B* =

0.220, *SE* = 0.087, *p* = .011) were more likely to have a steeper decrease than that of people with poor self-reported health. See Table 4.2 for additional information.

Table 4.2

Conditional Model with Latent Growth Model for Depressive Symptoms (N = 4,289)

	ICEPT ON				SLOPE ON			
	Estimate	SE	Est/SE	*p*	Estimate	SE	Est/SE	*p*
Age	-0.031	0.009	-3.516	.000	0.002	0.003	0.729	.466
Gender (ref = male)	0.050	0.153	0.323	.746	0.073	0.047	1.576	.115
Race (ref = non-Hispanic White)								
Black	-0.074	0.194	-0.384	.701	-0.006	0.058	-0.106	.916
Hispanic	0.353	0.216	1.631	.103	-0.055	0.065	-0.834	.404
Other	-0.154	0.399	-0.385	.700	0.076	0.126	0.601	.548
Marriage (ref = not married)	-0.363	0.171	-2.120	.034	0.063	0.052	1.205	.228
Education (ref = less than high school graduate)								
High school graduate	-0.320	0.185	-1.726	.084	0.014	0.058	0.236	.813
College graduate	-0.398	0.238	-1.667	.095	-0.003	0.074	-0.038	.970
Income (ref < $20,000)								
$20,000–$39,000	-0.042	0.209	-0.201	.840	-0.004	0.065	-0.060	.952
$40,000–$99,999	-0.327	0.219	-1.492	.136	-0.044	0.065	-0.060	.952
≥ $100,000	-0.538	0.305	-1.766	.077	-0.096	0.092	-1.045	.296
Sense of control	-0.333	0.063	-5.245	.000	0.003	0.020	0.140	.888
Social network	0.006	0.068	0.084	.933	0.005	0.021	0.223	.824
Health insurance (ref = no)	0.275	0.327	0.842	.400	0.162	0.102	1.589	.112
Self-reported health (ref = poor)								
Fair/good	-1.047	0.223	-44.695	.000	0.145	0.071	2.041	.041
Very good/excellent	-1.725	0.279	-6.193	.000	0.220	0.087	2.533	.011
Duration (ref ≤ 5 years)								
6–10 years	0.283	0.201	1.409	.159	-0.053	0.060	-0.884	.377
Over 10 years	0.395	0.187	2.110	.035	-0.082	0.057	-1.441	.150
Perceived discrimination	0.521	0.104	5.021	.000	0.001	0.032	0.026	.980
Cigarette smoking	-0.012	0.019	-0.625	.532	-0.004	0.006	-0.701	.483
Alcohol use	-0.054	0.044	-1.207	.227	0.006	0.013	0.433	.665
Physical activities	-0.090	0.098	-0.923	.356	0.020	0.030	0.674	.501
Death (ref = no)	0.198	0.259	0.765	.444	-0.048	0.076	-0.629	.529
$\chi^2_{(22)}$	*23.037							
CFI	1.000							
TLI	1.004							
RMSEA	.000							

* *p* = .518

Discussion

The findings of the current study provide additional evidence to understand the trajectory of depressive symptoms among middle-aged and older adults with diabetes in the United States. Overall, this study identified a trajectory of depressive symptoms that was linear and one that gradually decreases. This is consistent with previous research that reported a decreasing trajectory (Arshad & Alvi, 2016; Hood et al., 2014); however, it was inconsistent with other studies reporting an increasing trajectory (Almeida et al., 2016; Chiu et al., 2017) among adults with diabetes. The outcomes of this empirical investigation emphasize the importance of providing early interventions and programs to address the manifestation of depression in middle-aged and older adults with diabetes.

This study revealed that older and married adults with diabetes had lower depressive symptoms over time compared to their counterparts, which is consistent with previous studies (Asefa et al., 2020; Collins et al., 2009; Hashim et al., 2016; Khuwaja et al., 2010; Raval et al., 2010). Older adults who are married experience greater family support compared to non-married individuals, which may be associated with lower depressive symptoms (Stokes & Moorman, 2018).

With regard to sense of control, this investigation reported that respondents with a higher sense of control were more likely to have lower depressive symptoms over time, which is consistent with previous study results (Chou & Chi, 2001). A higher sense of control may be associated with positive health behaviors such as diet management and physical activities that can foster good physical and mental health. One study demonstrated that positive attitudes, social support, medication adherence, collaborative relationships with encouraging practitioners, and group education effectively improve diabetes self-management (Nagelkerk et al., 2006). These factors should be considered when developing and implementing interventions to improve diabetes self-management for middle-aged and older adults with diabetes.

Respondents who reported better overall health had lower depressive symptoms over time. The negative association between perceived health and depressive symptoms has been revealed in previous studies (Mendes et al., 2019; Vu et al., 2018), and this study confirmed this association among the middle-aged and older adults with diabetes. This finding suggests that physical health management should also be emphasized to deal with depressive symptoms of adults with diabetes. Additionally, longer diabetic duration was associated with higher depressive symptoms over time, which is consistent with previous reports (Asefa et al., 2020). Longer diabetic duration may bring about more stress and strain throughout the disease management process as well as restrictions to physical activities or diets. As a result, interventions to address the onset and expression of depressive symptoms should pay particular attention to adults whose diabetic duration is longer than ten years.

Adult with diabetes who reported higher perceived discrimination had higher depressive symptoms over time, which was consistent with previous studies conducted with Latinx participants (LeBrón et al., 2019; McCurley et al., 2019). The current study provides additional evidence of the effect of perceived discrimination on depressive symptoms of adults with diabetes using individuals from diverse racial and ethnic backgrounds. This finding implies that the influence of perceived discrimination on health outcomes needs to be integrated into routine clinical assessments of middle-aged and older adults with diabetes in health care settings.

Implications

The current study integrated two theoretical frameworks to offer a nuanced understanding of the factors that influence the depressive symptoms trajectory of people with diabetes who are aged 50 or older. Additionally, this study provided evidence that can be used to develop tailored, short- and long-term intervention strategies for depressive symptoms of middle-aged and older adults with diabetes in the health care settings. Social workers, nurses, physicians, and other members of the health care team should be aware of which factors should be considered to reduce depressive symptoms of middle-aged and older adults with diabetes. Specifically, early intervention (e.g., after an initial diagnosis of diabetes) for depressive symptoms is especially important given the decreasing trajectory of depressive symptoms. Health care providers need to redouble their efforts in education their patients and clients about the importance of improving physical health as a means to reduce depressive symptoms for those with longer diabetic duration. These providers also need to consider that improving sense of control can help reduce depressive symptoms by encouraging self-care management skills among middle-aged and older adults with diabetes. For example, as part of the Advancing Diabetes Self-Management from Diabetes Initiative, a national program of the Robert Wood Johnson Foundation, certified diabetes educators enroll patients into the program on a referral basis (Robert Wood Johnson Foundation, 2009). The program provides patients who experience negative emotions or clinical depression with behavioral health interventions including mental health counseling (e.g., solution focused brief therapy) from a psychologist or clinical social worker (Robert Wood Johnson Foundation, 2009). This program also provides an 8-week stress reduction program for people with diabetes that includes activities such as individual or group physical activity sessions and cooking clubs (Robert Wood Johnson Foundation, 2009). Additionally, service providers in health care settings should also address the effects of perceived discrimination in interventions for depressive symptoms, with particular attention paid to people who may experience discrimination based on race/ethnicity, appearance, culture, or language. Policy makers should make efforts to create and strengthen legislation to protect those who are at risk of discrimination, especially for members of the community who are managing chronic illnesses, as a means to reduce the negative effects of discrimination on mental health.

Limitations

The findings of this study need to be interpreted with caution. First, the HRS used a non-random sample and it oversampled participants who identified as Black or Hispanic, which may not accurately represent the middle-aged and older adult population. Second, while variables of social network, health status, perceived discrimination, cigarette smoking, alcohol use, and physical activities may change over time, this study included them as time-invariant variables in the analysis. These variables were included in the analytic model based on the theoretical framework. However, including those variables in all three waves yielded a large portion of missingness. Third, this study did not include the type of diabetes (1 versus 2) as a covariate because the HRS dataset did not distinguish between these two types of diabetes. Fourth, this study included three waves of data, despite having more waves were available, because including more than three waves would have increased the attrition rate. Finally, the reliability of two covariates (physical activities and social network) was low. In spite of their low internal consistency, the physical activities and social network scales were included in the model because these factors have been reported as risk factors of depressive symptoms among people with diabetes. Utilizing scales of physical activities and social network with higher internal consistency in future investigations will provide precise effects of these variables on the trajectory of depressive symptoms.

Conclusion

This study highlighted the positive relationship between perceived discrimination and the trajectory of depressive symptoms among middle-aged or older adults with diabetes in the United States. Future studies that include covariates as time-varying variables will provide more elaborate results on the associations between the covariates and the trajectory of depressive symptoms. Also, including the type of diabetes as a covariate will provide more robust findings. Qualitative methods, which would provide a nuanced explanation of the relationship between discrimination and depression based on one’s lived experience, should be consider in future investigations so that tailored interventions can be developed in a meaningful and evidenced-based manner.

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Chapter Five: Discussion and Conclusion

This section integrates findings from the scoping review and quantitative studies to understand the association of perceived discrimination and depressive symptoms of middle-aged and older adults with a cancer history or diabetes. It also presents implications for research, practice, and policy, as well as study limitations.

Discussion of Integrated Results

Study 1 consisted of a scoping review that described the current status, methodologies, and findings of empirical studies conducted over the past 15 years that examined the association between discrimination/stigma and depressive symptoms among middle-aged and older adult cancer survivors or those with diabetes. These studies were published in nursing, medicine, psychiatry, public health, psychology, or social work journals. The majority of the 23 peer-reviewed journal articles reported statistically significant direct or indirect relationships between discrimination/stigma and depressive symptoms, which was consistent with theoretical descriptions claiming that discrimination may be related to mental health and intensify health inequality (Link, & Phelan, 1995; Phelan et al., 2010; Stangl et al., 2019).

The scoping review also revealed empirical studies that focused on diverse aspects of discrimination/stigma. Among the studies used in the scoping review, more than 70% used *health-related* stigma/discrimination scales, while less than 30% used *non-health-related* discrimination/stigma scales related to sexual orientation, gender, or race. Some studies developed original items or combined existing scales for the discrimination instruments (Hamilton et al., 2013; March et al., 2015; Phelan et al., 2013), some focused on discriminatory perceptions or attitudes (Sayles et al., 2009;

Yilmaz et al., 2020), while others focused on discriminatory experiences in a person's daily life (Fife & Wright, 2000; Gredig, 2017; Landrine & Klonoff, 1996).

The scoping review also identified a lack of longitudinal studies using U.S. population-based data, as well as qualitative approach on this topic. Given the clear emphasis on cross-sectional studies found in this review, Studies 2 and 3 aimed to fill a critical research gap by examining the association between perceived discrimination and depressive symptoms trajectories among middle-aged and older adult cancer survivors (Study 2) and those with diabetes (Study 3) using a longitudinal data obtained from a national sample. In Study 2, the quantitative findings reported an *increasing* linear trajectory for depressive symptoms over a 4-year period for cancer survivors, which is not consistent with the decreasing trajectory reported by previous researchers (Andersen et al., 2017; Rottmann et al., 2016; Stanton et al., 2015), suggesting the need for future research to explore this inconsistency. In particular, women, breast cancer survivors, those with low household income, those who engaged in less intensive physical activities, and those who experienced a cancer recurrence were at greater risk of higher depressive symptoms over time compared to their counterparts. These outcomes are consistent with previous studies (Andersen et al., 2005; Calhoun et al., 2015; Clark et al., 2016; Hata et al., 2020; Lee et al., 2014; Linden et al., 2012).

In Study 3, findings reported a *decreasing* linear trajectory for those with diabetes, which is consistent with previous research findings (Arshad & Alvi, 2016; Hood et al., 2014). For adults with diabetes, those who were younger, single, reported poor self-reported health, and experienced a longer diabetic duration were more at a risk of higher depressive symptoms over time compared to their counterparts. These findings are aligned with previous research (Asefa et al., 2020; Mendes et al., 2019; Stokes & Moorman, 2018). For both cancer survivors and adults with diabetes, lower sense of control and higher perceived discrimination were significantly associated with depressive symptoms over time, consistent with previous findings (Chou & Chi, 2001; LeBrón et al., 2019; McCurley et al., 2019; Merluzzi et al., 2015; Mirowsky, 2013; Nagelkerk et al., 2006; Wallace & Baker, 2018). These empirical findings suggest implications for research, practice, and policy.

Implications for Research, Practice, and Policy

From a research perspective, the current study integrated two theoretical frameworks—Andersen's Behavioral Model and the Theory of Fundamental Causes—to offer a nuanced understanding of how discrimination influences depressive symptoms outcomes in cancer survivors and people with diabetes who are aged 50 or older. This study critically examined the extant literature and provided empirical evidence using longitudinal data to explicate the depressive symptoms trajectories for these two groups of adults. Future studies are needed to assess the psychometric properties and dimensions of discrimination scales and how specific dimensions are associated with depressive symptoms. This new information will provide additional guidance that can be utilized by social workers, public health educators, and health care providers to address the health-related consequence of discrimination when working with their clients, patients, and the general public. Additionally, research using longitudinal or population-based data with large sample sizes or qualitative data will add supplemental empirical evidence to the currently existing evidence on this topic.

In the context of clinical practice, the study findings can be used to inform mental health care interventions for adults with chronic diseases and strengthen clinical protocols designed to reduce depressive symptoms in cancer survivors and adults with diabetes. Given that the depressive symptoms of cancer survivors increased over time, it seems necessary to develop long-term interventions to address depressive symptoms over the entire course of their survivorship. Also, given the decreasing trajectory of depressive symptoms of those with diabetes, the need for prevention and early intervention programs is warranted to eliminate or reduce the severity of depressive symptoms, which will increase the likelihood of improved health outcomes for this population.

This study also provided information for more customized and specialized intervention programs to reduce depressive symptoms of middle-aged and older adult cancer survivors and those with diabetes in health care settings. Social and medical service providers (e.g., social workers, nurses, physicians) should be aware of the factors that were revealed to influence the trajectory of depressive symptoms and use this information during assessment and treatment. Among cancer survivors, women and breast cancer survivors, those with low household income, and those who experienced a cancer recurrence should be identified early for clinical intervention. For adults with diabetes, providers should be aware that younger adults, those who were not married, or those who have a longer diabetic duration should be prioritized for interventions. Similarly, improving sense of control will be helpful for both cancer survivors and those with diabetes, by encouraging and supporting self-management practices after their diagnosis.

Given the negative mental health consequences associated with experiences of discrimination in a person’s everyday life, service providers should include questions about discrimination experiences in the assessment process for both cancer survivors and those with diabetes. Additionally, programs and interventions to reduce depressive symptoms should dedicate additional resources to those who experienced discrimination in terms of race, ethnicity, economic status, culture, language, and being diagnosed with a chronic illness. Educational programs directed to the public are needed to improve knowledge about cancer and diabetes as a way to reduce discrimination or microaggressions (Kalra & Baruah, 2015; Stergiou-Kita et al., 2016) directed toward those who are diagnosed with these diseases.

From a policy perspective, legislation at the local, regional, and national levels should be leveraged to offer free or low-cost mental health services for people with chronic illness who are at risk of discrimination. The main focus of this effort would be to provide individuals with easy access to much needed mental health services as a means to improve population health. Policies and legislative efforts to reduce discrimination due to race, ethnicity, appearance, culture, language, sexual orientation, gender identity, or medical conditions—e.g., Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (Executive Office of the President, 2021)—are necessary, and education about these policies and laws in schools, healthcare settings, and the workplace should be emphasized.

Limitations of Study

This current dissertation study has several key limitations. The scoping review did not assess the internal or external validity of the results of the sample studies. Given that the current body of empirical evidence regarding the association between discrimination/stigma and depressive symptoms among adults with cancer history or diabetes is limited, a scoping review was more suitable than a quantitative systematic review methodology (i.e., meta-analysis).

The two quantitative studies (Studies 2 and 3) used data from the Health and Retirement Study, which were not obtained from a random sample. Although people who identify as Black and Hispanic/Latinx were oversample, this sample may not accurately represent the population of adults aged 50 or older in the U.S. Even though these studies utilized longitudinal survey designs, partial longitudinal information was not included in the analysis. For example, the latent growth modeling used in this study included only three waves, despite of the availability of additional waves, since including additional waves produced a large portion of missing cases, which is common when working with longitudinal data of older adults. For the identical reason, even though the covariates (e.g., health status, social network) manifests differently over time, only information on the covariates at baseline was included in statistical analysis. Finally, the quantitative studies utilized several scales with low reliability for the covariates (e.g., physical activities, social network). These scales were included, despite their low reliability, because there were strong theoretical justifications for their use.

Conclusion

This dissertation study offered a critical examination of the association between discrimination and depressive symptoms among middle-aged or older adults with chronic diseases by descriptively reviewing previous empirical evidence and providing quantitative information on this topic using a nation-wide longitudinal data. Future investigations on this topic should explore in detail—both qualitatively and quantitatively—how discrimination differentially affects individuals who identify as Black/African American, Latinx, Asian Pacific Islander, and Native American. In addition, studies that examine person with other types of chronic diseases are warranted. These investigations will provide the data needed to develop evidenced-based interventions that can be tailored for a particular population and implemented in a way to improve the mental and physical health outcomes of cancer survivors and people with diabetes.

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