

**TRANSLATING KNOWLEDGE TO ACTION: CREATION OF THE EVIDENCE-
BASED EXERCISE AND DEPRESSION TOOLKIT FOR HEALTH CARE PROVIDERS
WORKING WITH INDIVIDUALS WITH DEPRESSION**

by

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Abstract

The purpose of this dissertation was to 1) use a systematic and phased process to develop an evidence-based resource (toolkit) about exercise and depression for health care providers working with adults with depression in Canada (based on treatment guidelines) and 2) provide a step by step guide for translating knowledge into action for health care interventions. This dissertation was guided by the Knowledge to Action Framework and the AGREE II (Appraisal of Guidelines for Research & Evaluation) instrument. Study 1 was a scoping review to identify the barriers and facilitators to engagement in physical activity (PA) and exercise for adults with depression. A behavioural analysis informed by the Theoretical Domains Framework (TDF) determined that future intervention should target the emotion and social influences domains. Study 2 was a scoping review to identify the barriers and facilitators to PA promotion by health care providers (HCP) working with individuals with mental illness. The most prominent barriers and facilitators were within the domains of beliefs about the consequences and environmental context & resources. Study 3 was a qualitative study to guide toolkit development. Interviews were conducted with adults with lived experience with depression (AWD) and HCP. Study 4 described the systematic and phased process used to develop the evidence-based ‘Exercise and Depression Toolkit’ for HCP working with AWD. The four phases included: reviews of relevant literature, formative interviews, an expert panel meeting, and final toolkit development. Various stakeholders were involved throughout the process including HCP, AWD, researchers, and exercise professionals. Study 5 evaluated the ‘Exercise and Depression Toolkit’ in practice by HCP working with AWD and attained feedback on the toolkit to inform national dissemination and uptake. The toolkit was found to be acceptable and have positive innovation attributes.

Concerns about effort and time to use it in practice informed dissemination plans and selection of

end users. Together, the studies in this dissertation have resulted in the first evidence-based resource, the 'Exercise and Depression Toolkit', to help health care providers and individuals with depression collaboratively consider exercise as a treatment.

Lay Summary

Exercise is now recommended as a first line treatment for depression in Canada. However, access to exercise programming varies and is not yet a standard part of most mental health services in Canada. The purpose of this dissertation was to develop an evidence-based ‘Exercise and Depression Toolkit’ to help health care providers (HCP) and individuals with depression consider exercise as a treatment option. The toolkit was created over four phases: reviews of relevant literature, formative interviews, an expert panel meeting, and final toolkit development and evaluation. Various stakeholders were involved throughout the process including HCP, adults who have lived experience with depression, researchers, and exercise professionals who have experience working with adults with depression. The toolkit is a starting point to help health care providers integrate evidence-based guidelines into practice and to integrate exercise into health service delivery to improve the lives of Canadians living with depression.

Preface

This dissertation is comprised of five original studies with details below. Three of five studies are published manuscripts.

Study 1 (Chapter 2): *This is a published manuscript.*

Glowacki, K., Duncan, M., Gainforth, H., & Faulkner, G. (2017). Barriers and Facilitators to physical activity and exercise among adults with depression: A scoping review. *Mental Health and Physical Activity*, 13, 108-119.

KG's contribution:

- Author of ethics application (UBC, Office of Research Services, Behavioural Research Ethics Board, 'Exercise and depression: moving from efficacy to effectiveness' #H19-00054)
- Co-created study design with supervisor GF and second author MD
- Lead investigator for data collection, analysis and interpretation
- Primary author of manuscript

Co-authors' contribution:

- GF revised and approved the ethics application and study design, was the fourth contributing author of the manuscript, attained/provided funding, helped with interpretation of the data and revised and approved the final version of the manuscript
- MD assisted with study design, collection, analysis, and interpretation of the data and writing of the manuscript
- HG revised the article and approved the final version of the manuscript for submission

Study 2 (Chapter 3): *This is a published manuscript.*

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KG's contributions:

- Author of ethics application (UBC, Office of Research Services, Behavioural Research Ethics Board, 'Exercise and depression: moving from efficacy to effectiveness' #H19-00054)
- Co-created study design with supervisor GF and second author KW
- Co-lead for data collection, and lead investigator for analysis and interpretation
- Primary author of manuscript

Co-authors' contribution:

- GF revised and approved the ethics application and study design, was the third contributing author of the manuscript, attained/provided funding, helped with interpretation of the data and revised and approved the final version of the manuscript
- KW co-lead the literature search and assisted with data collection, analysis, interpretation and writing of the manuscript

Study 3 (Chapter 4)

Glowacki, K., Fagan, M., & Faulkner, G (2020). Exploring the acceptability of exercise as a treatment for depression among health care providers and adults with lived experience with depression in Canada.

KG's contributions:

- Author of ethics application (UBC, Office of Research Services, Behavioural Research Ethics Board, 'Exercise and depression: moving from efficacy to effectiveness' #H19-00054)
- Co-created study design with supervisor GF
- Lead investigator for data collection, analysis and interpretation
- Primary author of manuscript

Co-authors' contributions:

- GF revised and approved the ethics application and study design, contributed to writing the manuscript, attained/provided funding, helped with interpretation of the data and revised and approved the final version of the manuscript
- MF acted as a 'critical friend' and reviewed all coding done by KG and helped interpret data through discussion

Study 4 (Chapter 5): *This is a published manuscript and an online article.*

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KG's contributions:

- Author of ethics application (UBC, Office of Research Services, Behavioural Research Ethics Board, 'Exercise and depression: moving from efficacy to effectiveness' #H19-00054)
- Co-created study designs
- Co-developed and wrote the content of the toolkit (intervention)
- Led the organization and planning of expert panel meeting
- Co-formed expert panel and co-lead expert panel meeting
- Lead investigator for data collection, analysis and interpretation
- Primary author of manuscript

Role of co-authors':

- GF revised and approved the ethics application and study designs, contributed to writing the manuscript, attained/provided funding, helped with interpretation of the data and revised and approved the final version of the manuscript. GF also co-created study

designs, co-developed and wrote the content of the toolkit (intervention), co-formed and co-lead expert panel meeting

- All co-authors (KAN, MB, LC, SI, RWL, SM, EM, AS, & AT) participated in the expert panel meeting, contributed expertise and recommendations to develop the intervention, provided feedback and approved the final version of the manuscript
- KAN helped with recommendations and modifications of AGREE II items

Study 5 (Chapter 6)

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KG’s contributions:

- Author of the ethics application (UBC, Office of Research Services, Behavioural Research Ethics Board, ‘The Exercise and Depression Toolkit Evaluation’ #H17-01009)
- Lead investigator for study design, data collection, data analysis and interpretation
- Primary author of the manuscript

Co-authors’ contributions:

- GF revised and approved the ethics application and study design, contributed to writing the manuscript, attained/provided funding, helped with interpretation of the data and revised and approved the final version of the manuscript
- DZ helped with data collection, analysis and interpretation of the data, and revised and approved the final version of the manuscript

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List of Abbreviations

ACT= Assertive Community Treatment

AGREE II= Appraisal of Guidelines, Research and Evaluation II

AWD= Adults who have lived experience with depression

BC= British Columbia

BCT= Behaviour Change Technique

BCW= Behaviour Change Wheel

CANMAT= Canadian Network for Mood and Anxiety Treatments

CBC= Canadian Broadcasting Company

CIHR= Canadian Institutes of Health Research

DoI= Diffusion of Innovation

ECR= Environmental Context and Resources

HAPA= Health Action Process Approach

HCP= Health care providers

IWD= Individuals with lived experience with depression

KT= Knowledge Translation

KTA= Knowledge to Action Framework

MDD= Major Depressive Disorder

MI= Mental Illness

NICE= National Institute for Health and Care Excellence

PA= Physical Activity

PAGs= Physical Activity Guidelines

PHQ= Personal Health Questionnaire

RCT= Randomized Controlled Trial

SCT= Social Cognitive Theory

SDT= Self-Determination Theory

SSRI=Selective Serotonin Reuptake Inhibitor

TDF= Theoretical Domains Framework

TPB= Theory of Planned Behaviour

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Over the past decade as an occupational therapist, a student, and a volunteer I have had the privilege to work with many individuals who have experienced depression and other mental illnesses. I have learnt from each and every one of you and you are the reason I do this work. You continue to motivate and inspire me, thank you.

Dedication

This is dedicated to my Mom and Dad, my partner Joe and my dog Henk. Without your unconditional love and support none of this would have been possible.

Chapter 1: Introduction

1.1 Prevalence of depression in Canada

In Canada, one in five individuals experiences a mental health problem or illness in a year (Mental Health Commission of Canada, 2013). Mood and anxiety disorders, inclusive of depression, are the most prevalent. Major Depressive Disorder (MDD) is a clinically diagnosed mental illness. Throughout this dissertation, the use of the term depression refers to MDD unless otherwise noted. The Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-V) is commonly used for classification of depression and outlines certain diagnostic criteria. Five (or more) of the following symptoms must be present for a minimum of two weeks and impair functioning: depressed mood most of the day, lack of pleasure or interest, weight loss or gain, sleep disturbance, low energy, feelings of worthlessness or guilt, inability to concentrate, and recurrent thoughts of death. MDD can also be diagnosed with specifiers such as “with anxious distress” (APA, pg. 184, 2013).

Depression is one of the leading causes of disability and disease burden in Canada and globally (MHCC, 2013; World Health Organization, 2020). Canada’s national burden has been estimated to be more than that of lung, prostate, breast and colorectal cancers combined (Ratnasingham et al., 2012). It is estimated that depression affects over 300 million people worldwide, which has increased significantly since 2005 (WHO, 2020). Depression can be debilitating with symptoms such as hopelessness, despair and thoughts of death. It has been established that there is a strong link between suicide and mental disorders such as depression (WHO, 2020). Depression not only greatly impacts individuals, families and communities; it is a significant burden on economies and health care systems. Investing in mental health programs

and resources can help make a difference to the health of a population and the economy (MHCC, 2013). There is an urgent need to develop innovative and acceptable treatment options that can reach individuals who experience depression.

In Canada, the annual prevalence of MDD was 3.9% in 2012, and the lifetime prevalence (exclusive of bipolar disorder) is estimated to be 9.9% (Patten et al., 2015). MDD prevalence was higher among individuals aged 15-45 years, women, declined with age, and was higher for those not working and unmarried (Patten et al., 2015). There is no evidence of diminishing prevalence of MDD or Major Depressive Episodes in Canada since 2002, despite developments in treatment and increases in the number of people seeking treatment (Knoll et al., 2017; Patten et al., 2016). Thus, it is important to understand treatment options for Canadians living with depression and how they can be improved upon.

Depression is referred to as a chemical imbalance in the brain, and certain neurotransmitters (serotonin, norepinephrine and dopamine) are imbalanced and not at necessary levels to maintain positive mood (Blumenfield, 2010). While it is unclear the exact cause of depression, potential causal mechanisms are thought to be a combination of environmental and genetic factors. It is likely that a variety of different pathways (neurobiological and others) and/or different genes acting together in combination leads to the same end point of depression (Saveanu, & Nemeroff, 2012; Sullivan et al., 2000), thus various treatments affect these pathways differently. Causes are probabilistic, and so it is important to consider individual past experiences (inclusive of previous treatment history and response), preferences, barriers, risk factors, how one interacts with their environment, supporting evidence and side effects when considering treatment options and a decision is being made.

1.1.1 Treatment of Depression in Canada

In Canada, most individuals with a mood and anxiety disorder consult their family physician for care (Statistics Canada, 2016), and will receive care and treatment recommendations in the primary care setting (Craven & Bland, 2013; Wong et al., 2014). The most common treatments for depression in Canada include medication (antidepressants) and psychotherapy, respectively (Parikh et al., 2016; Wong et al., 2014). The three types of psychotherapy recommended as first line treatments for the acute phase of MDD with level one evidence include cognitive behaviour therapy, interpersonal therapy, and behavioural activation (Parikh et al., 2016). Meta-analyses have shown the efficacy for reducing depressive symptoms, and no or small differences between these therapies (Barth et al., 2013; Cuijpers, 2015; Cuijpers, van Straten, Andersson, & Van Oppen, 2008). Access to psychological treatment can vary by geographical location and often there may be high wait times. Psychological treatment may not be accessible through universal health care in Canada, thus extended benefits or full payment for treatment may be required.

Wong and colleagues (2014) demonstrated that 85% of Canadians seeking care for depression in a primary care setting are prescribed an antidepressant. Selective Serotonin Reuptake Inhibitors (SSRIs) are the most commonly prescribed type of antidepressant. Several brand names of SSRIs are recommended as a first line treatment for acute MDD (Kennedy et al., 2016). Recent meta-analyses support the efficacy of antidepressants in MDD and effects of medication can usually be seen in 2-4 weeks, but may take up to 4-6 weeks (Hieronymus, Emilsson, Nilsson & Eriksson, 2016; Kennedy et al., 2016). Finding the right medication regime may take numerous attempts trialing different dosages and types before finding the right fit for an individual. Possible negative side-effects of antidepressant medication such as SSRIs include

nausea, fatigue, anxiety, headaches, difficulty sleeping, weight gain and sexual difficulties (Bet et al., 2013; Santarsieri & Schwartz, 2015). As mentioned previously, individual factors are important to consider such as barriers to accessing treatment. Individuals seeking any treatment for depression in Canada have identified barriers inclusive of geographical location (Downar et al., 2016; Parikh et al., 2016), cost of treatment (Organization for Economic Cooperation and Development, 2014; Parikh et al., 2016; Stats Canada, 2016), and stigma (Patten et al., 2015; Parikh et al., 2016; Sutherland & Findlay, 2015). Consideration of personal and environmental factors as well as person-oriented outcomes such as function and quality of life are also important (Lam et al., 2016). It is imperative that all treatment options be considered by both health care providers and individuals with depression seeking treatment.

1.1.2 Exercise as a treatment option for depression

Due to the mature evidence base regarding exercise and depression, depression is the first and only mental health disorder in which exercise is recommended as an evidence-based treatment (Ekkekakis, 2015). Guidelines have existed in other countries recommending exercise and physical activity (PA) for depression for over a decade. In the United Kingdom, the National Institute for Health and Care Excellence (NICE; 2009) recommends PA as a treatment for subthreshold and mild-moderate depression. The American Psychiatric Association (2010) acknowledges that exercise can be used as a monotherapy for mild depression in the acute phase after a diagnosis with monitoring of mood by a health professional. More recently, Canada released its own set of clinical guidelines for the treatment of depression. The Canadian Network for Mood and Anxiety Treatments (CANMAT) recommends exercise as a primary stand-alone treatment for adults (aged 18-65) with mild-moderate MDD, and as an adjunct treatment for moderate-severe MDD (Ravindran et al., 2016). CANMAT recommends a ‘dose’ of exercise to

aim for based on the best available evidence acknowledging that personal fitness and activity levels need to be considered. This ‘dose’ is 2-3 times a week for the duration of 30 minutes at a moderate intensity for a minimum of 9 weeks. Supervised exercise is recommended for adherence with either cardiovascular or resistance training (Ravindran et al., 2016; Stanton, & Reaburn, 2014; Stanton, Reaburn, & Happell, 2013). This is of significance, as this is the first time in Canada that exercise is recommended as a stand-alone treatment. As such, it needs to be considered as a treatment option for depression by health care providers and individuals with depression. Changes in physical activity levels may result in mood changes and other health benefits however exercise (more specifically) is recommended if utilizing as a treatment for depression.

Exercise is structured PA, done for the aim of maintaining or improving physical fitness or health (Caspersen, Powell, & Christenson, 1985). The evidence to support exercise for depression is well established. Structured exercise programs have consistently shown to significantly reduce depressive symptoms for individuals with clinical depression (Joseffson et al., 2014; Krogh, Hjorthøj, Speyer, Gluud, & Nordentoft, 2017; Schuch et al., 2016a; Shuch et al., 2016b). CANMAT and other organizations acknowledge the importance of considering person-oriented outcomes for mental illness such as functioning and quality of life (Lam et al., 2016; OCED, 2014). Exercise has been shown to improve quality of life for people living with depression (Schuch et al., 2016b). The most recent meta-analysis of 11 randomized controlled trials examined the antidepressant effects of exercise among adults (18-65 years) recruited through mental health services with a diagnosis of MDD and demonstrated a large significant overall antidepressant effect ($g = -0.79$; Morres et al., 2019). There are a number of additional positive considerations of exercise in addition to its antidepressant effect. Exercise is a cost-

effective health promotion intervention (Abu-Omar et al., 2017), is low risk, and provides various health benefits. Individuals who experience mental illness have significantly lower levels of PA and spend more time sitting than the general population (Stubbs, Williams, Gaughran & Craig, 2016). Further, individuals with mental illness have a lower life expectancy than the general population of 12-15 years and are at a higher risk of developing chronic conditions such as diabetes and heart disease, and exercise reduces this risk (Richardson, Avripas, Neal, & Marcus, 2005; Rosenbaum, Tiedemann, Sherrington, Curtis, & Ward, 2014). Exercise or PA can provide other important psychosocial benefits beyond physical health benefits and treatment effects. If done with others, it can provide opportunity for social interaction and the development of social skills. It can also provide opportunity for one to set and achieve goals, to engage in meaningful and purposeful activity, and provide structure to the day. Such opportunities can promote confidence and a sense of achievement which can help to improve mental health (Craft, 2013). Exercise and PA promotion should be a necessary part of care for people with mental illness for overall health reasons (physical, cognitive and psychosocial) notwithstanding any potential antidepressant effect.

Research does suggest that exercise is as effective as the most common treatments in Canada including medication and psychotherapy (Cooney et al., 2013; Joseffson et al., 2014). There are some limitations of the evidence for exercise which should be acknowledged including variance of experimental and control groups, and lack of participant and outcome assessment blinding (Cooney et al., 2013; Joseffson et al., 2014; Krogh et al., 2017). When limiting to trials with low risk of bias, effect sizes for exercise on the reduction of depressive symptoms are smaller (Krogh et al., 2017; Schuch et al., 2016a), however this was not the case in the most recent meta-analysis (Moore et al., 2019). When the CANMAT guidelines were created,

evidence was reviewed and categorized into levels 1-4 which helped to determine a first line treatment recommendation (level 1 or 2 evidence plus clinical support; Ravindran et al., 2016). Exercise has the same level 1 evidence to support the treatment recommendation as medication and psychotherapy (level 1= meta-analysis with narrow confidence intervals and/or 2 or more RCTs with adequate sample size, preferably placebo controlled). However, exercise differs from these other treatment options in that it has no negative side effects and additional health benefits outside of symptom management. Finding the right treatment option depends on a variety of personal and environmental factors and individuals need to be able to consider all evidence-based options inclusive of exercise.

There remains uncertainty of the mechanisms for the antidepressant effects of exercise. The hypothesized neurobiological mechanisms include neuron growth, inflammation and oxidative stress (Schuch et al., 2016c; Schuch & Stubbs, 2019). Individuals with depression have decreased brain-derived neurotrophic factor which promotes brain growth and plasticity, and exercise on the other hand promotes brain plasticity (Firth et al., 2018; Philips, 2017). Individuals with depression have changed inflammation and oxidative stress markers, and exercise is able to counter act such changes, for example by promoting increases in anti-inflammatory enzymes (Schuch et al., 2016c). Other potential biological mechanisms of exercise include increased serotonin and norepinephrine (which are imbalanced for individuals with depression) and reduced levels of cortisol (Lin, & Kuo, 2013; Silverman & Deuster, 2014). Potential psychological mechanisms for exercise include increased self-efficacy and confidence (Craft, 2005; Craft, 2013). Since causes of depression are probabilistic, it is important to consider that various treatments (inclusive of exercise, psychotherapy and medication) affect pathways differently.

1.1.3 Exercise as a treatment option for depression in Canada

An exercise referral ‘pathway’ is a directed and systematic approach that includes structured resources delivered or developed by an exercise professional (Santa Mina et al., 2018). Such pathways exist for individuals with cancer, as well as other physical health conditions such as cardiovascular disease (Heart and Stroke, 2020; Santa Mina et al., 2018). Such pathways vary greatly in Canada for mental illness depending on the geographic location and practice setting. Exercise is not a common or standard part of mental health care. Over the past decade, I have worked in four different provinces and in varying mental health practice settings inclusive of hospitals (acute, forensic, and rehabilitation units), non-profit community organizations, and government subsidized community care. I have experienced this variability firsthand. For example, at the provincial psychiatric hospital in Newfoundland and Labrador, Canada in 2013, there was one exercise professional dedicated to the entire hospital, a physiotherapist with part-time hours. In Timmins, Ontario in 2015, mental health workers at the Canadian Mental Health Association such as social workers and counsellors were provided access to training to become certified personal trainers to deliver a unique exercise program called Active Recovery in partnership with local gyms. Assertive Community Treatment (ACT) Teams are the most intensive level of public mental health care for individuals living in the community. ACT teams and services are regulated provincially with program standards. Neither of the standards for British Columbia or Ontario have acknowledged an exercise professional as a required staff, or exercise as a part of treatment that should be offered (Ministry of Health Services, 2008; Ministry of Health and Long-Term Care, 2005). The mental health professionals required on ACT teams include a registered nurse, social worker, occupational therapist, substance abuse specialist, vocational specialist, peer support specialist, and a psychiatrist with some variability

for rural settings. Other clinical staff and mental health workers must have training and experience working with persons with a serious mental illness. Other common health care providers that work with individuals with a mental illness such as depression include a family physician, psychologist, pharmacist, and a nurse practitioner (Parikh et al., 2018; Wong et al., 2014). In summary, it is highly variable as to whether individuals with depression in Canada be exposed to exercise professionals or exercise programs specifically tailored to provide an intervention for depression. Such individuals would likely interact with a number of different health care providers who could advise exercise as a treatment option.

A substantial amount of evidence continues to grow that supports exercise as an effective treatment for depression (Joseffson et al., 2014; Krogh et al., 2017; Moores et al., 2019; Shuch et al., 2016a). Efficacy of this intervention has been established, however pragmatic trials considering effectiveness are scarce. Such trials are necessary to help translate the results of clinical trials into real world practice settings (Lederman et al., 2017; Schuch et al., 2017a; Schuch et al., 2017b;). Interventions should be delivered in routine practice with uncontrollable variables with inclusive eligibility criteria and consider other nonoptimal conditions that health care providers experience in their daily practice such as limited time and resources (Shuch et al., 2017a; 2017b). There have been longstanding calls to action to integrate exercise as an intervention for individuals with a mental illness (Faulkner & Biddle, 2001; Richardson et al., 2005), as well as more recently (Rosenbaum et al., 2018). To the best of my knowledge, exercise professionals are not a standard professional on the mental health multi-disciplinary team, and exercise is not a common treatment for depression in Canada. Due to the vast amount of evidence and treatment guidelines for exercise, this is concerning. A clear gap exists in the implementation of sustainable PA and exercise interventions within mental health settings. This

work has aimed to address this gap, and better understand how exercise can be implemented in real world practice settings in Canada.

1.2 Translational Pipeline

The traditional translational pipeline is often referred to for the progression of an intervention (originally from National Research Council and Institute of Medicine (2009); adapted and updated by Brown and colleagues, 2017). This provides a linear, phased, top-down approach to implementing an intervention in the real world (see figure 1 adapted from Brown et al., 2017). An intervention starts within a preintervention phase (considering could a program work), moving to tightly controlled efficacy trials (considering does a program work), to effectiveness studies (making a program work) in a community or system where it would be delivered. Considering the intervention of exercise for the treatment of depression within this traditional translational pipeline, efficacy has been shown.

Health care providers play an integral role as gatekeepers to any treatment and could help individuals with depression consider exercise. Commonly, an individual is diagnosed with depression by a health care provider, and together they collaboratively consider various treatment options. Depending on the choice, a referral is made, intervention begins, or a prescription is given. This work focuses on the initial treatment decision-making process. Health care providers in Canada that are currently working with adults with depression are key stakeholders for the start of integration of exercise as a treatment for depression. It is acknowledged that access to exercise referral schemes for depression is fragmented in Canada. Exercise referral schemes and pathways for the treatment and health promotion of individuals with mental illness such as depression exist in other commonwealth countries such as the United Kingdom (Buckley et al., 2018) and Australia (Stanton, Rosenbaum, Lederman & Happell,

2018). However, in Canada such pathways are inconsistent and thus referrals to exercise professionals may not always be possible which was considered in doing this work. This is acknowledged as a larger issue beyond the scope of this dissertation and an important focus of future research and advocacy. Health care providers should be engaging in health promotion with individuals with depression and this includes physical activity. However, health care providers need support in PA promotion and implementing clinical guidelines to collaborate with individuals when considering exercise as a treatment option.

1.3 Knowledge translation gap

In Canada, little structure exists for mental health professionals to explore exercise as a treatment option with adults with depression. Clinical treatment guidelines such as the CANMAT guidelines were developed to help health care providers implement evidence-based research into their clinical practice (Ravindran et al., 2016). This is an important first step in Canada, as it is the first-time exercise has been recommended as a front-line treatment for depression. However, releasing guidelines or providing education about guidelines is not enough for behaviour change and for implementation of such guidelines (Pederson et al., 2017). Guidelines help to understand ‘what’ to do, but not ‘how’ to do it (implementation). This work aims to address the ‘how’ to for implementation of the clinical guidelines. Specifically, the research will address the gap between the clinical treatment guidelines and referral to exercise programming for depression treatment.

Further, McCurdy and colleagues (2020) recently reviewed the physical activity sector in the context of mental illness treatment and identified prominent barriers that health care providers face in engaging with the PA sector (programs and professionals) which include a perceived lack of access and awareness to PA professionals or organizations (such as their role

and where and how to refer). Thus, this work addresses this gap in creating a potential bridge between mental health and exercise professionals and programs in Canada.

1.4 Purpose

Seminal work has been done to facilitate the implementation of guidelines for other clinical populations. The first-ever international Physical Activity Guidelines (PAGs) for adults with chronic spinal cord injuries were released in 2011 (Ginis et al., 2011). After release of these PAGs, a working group used a systematic process to develop an evidence-informed spinal cord injury specific resource to supplement the guidelines and support behaviour change, the ‘SCI Get Fit Toolkit’ (Arbour-Nicitopoulos et al., 2013; SCI Action Canada 2013). An environmental scan was conducted to initiate a similar resource for exercise and depression. This was conducted through collaboration with a research team at the University of British Columbia developing an online platform in partnership with HealthLink BC to synthesize all online resources for physical activity specific to various health conditions with plans to be publicly available in the summer of 2020 (Physical Activity Support Kit Initiative, 2016). I was given access to all online resources the team found for physical activity and mental illness to review. Internet searches were also conducted with key words such as ‘exercise’, ‘physical activity’, ‘depression’ and ‘mental illness’ and any other resources found were reviewed. It was determined that there are no specialized evidence-informed resources (i.e. a toolkit) to supplement the CANMAT guidelines specific to exercise as a treatment for depression to support health care providers.

The purpose of this dissertation was to use a systematic and phased process to develop an evidence-based resource (toolkit) about exercise and depression for health care providers working with adults with depression in Canada. The second purpose was to provide a guide

outlining a step by step process for translating knowledge into action for health care interventions.

1.5 General Structure

There is a need to better apply research evidence in the real world. Knowledge translation (KT) is defined as “a dynamic and iterative process that includes synthesis, dissemination, exchange, and ethically-sound application of knowledge” (CIHR, 2016). This dissertation is considered knowledge translation work and was guided by The Knowledge to Action (KTA) Framework which helps conceptualize knowledge creation and the process of moving knowledge into action (Graham et al., 2006). See Figure 2 for a visual representation of this entire framework which has been referenced throughout this dissertation (adapted from Graham et al., 2006). Completing the process is complex and done in multiple steps over time which should be an iterative process. Consultation of stakeholders and knowledge users is also an acknowledged important part of the process.

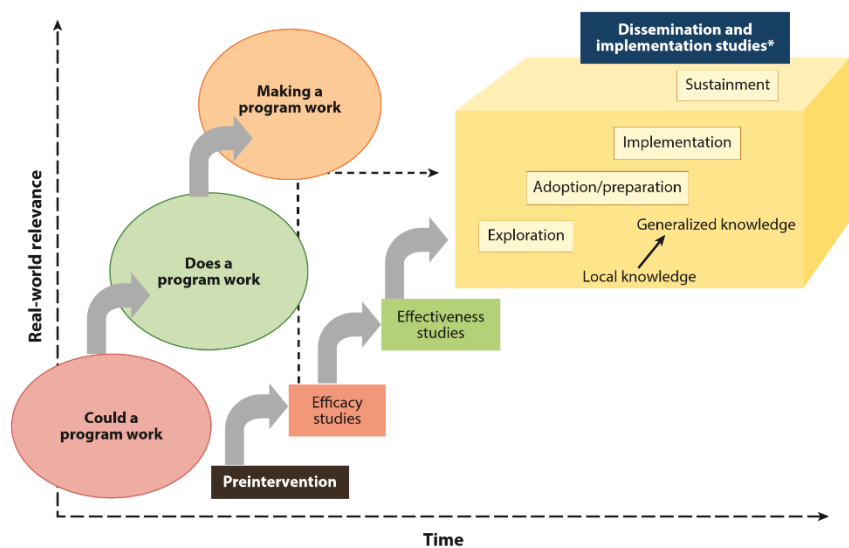
The first component of the KTA is the Knowledge Funnel which represents knowledge creation relevant to health care. This involves knowledge inquiry, synthesis, and tools/products (evidence-based interventions). The release of the CANMAT guidelines and recommendations around exercise as a treatment for depression can be considered the ‘knowledge’. The second component is the Action Cycle which has multiple stages. The first stage is to identify a problem or gap, which for this work as discussed previously, guidelines alone are not enough for behaviour change and little is known about implementing exercise in mental health practice settings in Canada. The next stages in the Action Cycle are to adapt to the local setting to determine what is feasible and relevant when moving from one setting to another, and determine the barriers and facilitators to knowledge use for relevant stakeholders. The first three studies in

this dissertation are within these stages. The first two studies of this dissertation were two complementary scoping reviews on two different behaviours. The first review included studies that report on barriers and facilitators to physical activity participation among individuals with depression (Glowacki, Duncan, Faulkner & Gainforth, 2017). The second scoping review conducted included studies that report on the barriers and facilitators that health care providers experience when promoting PA to individuals with a mental illness (inclusive of but not limited to depression; Glowacki, Weatherson & Faulkner, 2019a). These reviews were done to synthesize existing literature in the field, and to inform toolkit content. The third study was conducted simultaneous to the first studies to consult stakeholders. This was a qualitative study conducted to inform toolkit content and format, as well as explore experiences of mental health care providers and adults with depression in Canada related to exercise and exercise promotion.

The first three studies (and initial steps in the KTA framework) helped to determine which implementation strategies be used, guiding us to the next stage of the KTA: selecting, tailoring and implementing the intervention. The fourth study described the entire systematic and phased process (inclusive of internal consultation with an expert panel) used to develop the intervention, ‘The Exercise and Depression Toolkit’ (also referred to as the toolkit throughout this dissertation; Glowacki et al., 2019b). The next stages of the KTA Action Cycle include monitoring knowledge use, evaluating outcomes and sustaining knowledge use. For this, the fifth and final study of this dissertation was a case study evaluation looking at the use of the toolkit in practice, as well as acceptability and perceived attributes of the toolkit. Table 1 provides a summary of the five studies of this dissertation and outlines objectives and methods used.

The series of studies in this dissertation and the creation of the ‘Exercise and Depression Toolkit’ is the first step in bridging the gap between treatment guidelines for depression and the

consideration of exercise as a treatment option in practice. It is hoped this will help to advance the consideration of exercise in routine mental health practice, within the Canadian context. The Knowledge to Action framework provided a road map to advance application of knowledge in health care. Methods and theoretical perspectives were chosen for each step of the Action Cycle within this framework which are the five key studies of this dissertation (See Table 1). This could act as a guide for future researchers working to translate knowledge into action and are considering implementation of health care interventions. With advocacy and research initiatives, it is anticipated that the toolkit will help health care providers integrate evidence-based guidelines into their practice related to exercise and depression. It is also anticipated that this will be a starting point in helping exercise become an accessible treatment option that is integrated into health service delivery to improve the lives of the many Canadians living with depression (Glowacki et al., 2019b; Glowacki & Faulkner, 2019).



*These dissemination and implementation stages include systematic monitoring, evaluation, and adaptation as required.

Figure 1 Traditional translational pipeline (Adapted from Brown et al., 2017)

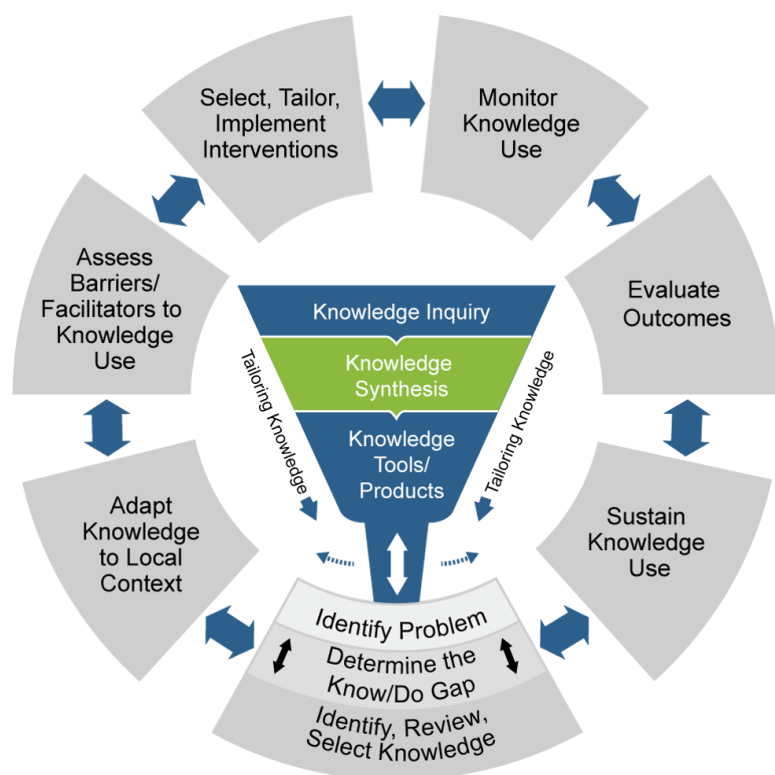


Figure 2 Knowledge to Action Framework (adapted from Graham et al., 2006)

Study	Purpose	Methods
Study 1: Barriers and Facilitators to Physical Activity and Exercise among Adults with Depression: A Scoping Review.	The primary purpose of this review was to identify the barriers and facilitators to engagement in physical activity and exercise for adults with depression. The secondary purpose was to categorize and analyze the barriers and facilitators within the Theoretical Domains Framework (TDF) to help guide clinicians and exercise interventionists working with this population in the future.	A mixed-methods scoping review was conducted, and the TDF and definitions of each domain was used to categorize the barriers and facilitators extracted from the included studies.
Study 2: Barriers and facilitators to health care providers' promotion of physical activity for individuals with mental illness: A scoping review.	The primary purpose of this review was to identify the barriers and facilitators to PA promotion by health care providers working with individuals with mental illness.	A mixed-methods scoping review was conducted, and the TDF and definitions of each domain was used to categorize the barriers and facilitators extracted from the included studies.
Study 3: Exploring the acceptability of exercise as a treatment for depression among health care providers and adults with lived experience with depression in Canada.	The purpose of this study was to guide the toolkit development process by exploring the perspectives and experiences of health care providers and individuals with depression on PA and PA promotion in the Canadian context.	Semi-structured phone and in-person interviews were conducted with individuals with lived experience with depression and health care providers in Canada. A thematic analysis was conducted using an inductive and deductive approach.
Study 4: It's more than just a referral: Development of an evidence-informed exercise and depression toolkit	The purpose of this study was to describe this systematic and phased process used to develop the evidence-based 'Exercise and Depression Toolkit' for health care providers working with adults with depression. Various stakeholders were involved throughout the process including health care providers, adults who have lived experience with depression, researchers, and exercise professionals.	The four phases of development included: reviews of relevant literature, formative interviews, an expert panel meeting, and final toolkit development. AGREE II was consulted throughout the development process and used to guide toolkit content and dissemination strategies. Modifications were made to items for health promotion and resource development rather than guideline development.
Study 5: "If I didn't have the toolkit, I would never have that conversation": pilot evaluation of health care providers' use of the 'Exercise and Depression Toolkit'.	The primary purpose of this study was to evaluate use of the toolkit in practice by health care providers working with individuals with depression. The secondary purpose was to attain feedback on the toolkit to determine necessary modifications and help inform national dissemination and uptake of the toolkit.	This study was conceptually informed by Rogers' Diffusion of Innovation theory, and the Theoretical Framework of Acceptability. An exploratory case study methodology was adopted. Health care providers working with adults with depression were given the toolkit to use in practice for four weeks. Semi-structured phone interviews were conducted pre and post intervention, and electronic weekly logs were used to track use of the toolkit. A content analysis was conducted.

Table 1 Summary of studies

Chapter 2: Barriers and Facilitators to Physical Activity and Exercise among Adults with Depression: A Scoping Review.

The first and second study (outlined in chapter 2 and chapter 3) were two complementary scoping reviews looking at two different behaviours. The first review looks at the factors that influence behaviour for adults with depression engaging in physical activity. The second looks at the factors that affect health care providers who work with individuals with a mental illness (inclusive of depression) when promoting physical activity. These two studies fall within the Action Cycle of the Knowledge to Action Framework to guide moving knowledge into action (see Figure 3; adapted from Graham et al., 2006). These two studies aimed to help determine and understand the barriers and facilitators to knowledge use among relevant stakeholders within the Action Cycle.

2.1 Background

In Canada, one in five people experiences a mental health problem or illness in a year (MHCC, 2013). Mood and anxiety disorders are the most prevalent, and depression is one of the largest sources of disability and disease burden in Canada and globally (MHCC, 2013; WHO, 2017). Investing in mental health programs and resources can make a difference to the health of a population and the economy (MHCC, 2013). There is an urgent need for the development of innovative and acceptable treatment options for individuals with depressive symptoms. The efficacy of structured exercise programs – as a subset of physical activity– for the reduction of depressive symptoms is well established (Kerr et al., 2009; Rhetorst et al., 2009). Recent meta-analyses (Josefsson et al. 2014; Schuch et al. 2016a) on exercise intervention in individuals with depressive disorders conclude that exercise has a moderate to large antidepressant effect.

Exercise is cost-effective, has low risk, and may be just as effective as other therapies (pharmaceutical and psychotherapy; Cooney et al., 2013). Furthermore, individuals with mental illness have a lower life expectancy than the general population of 12-15 years and are at a higher risk of developing chronic conditions such as diabetes and heart disease, whereas exercise reduces this risk (Richardson et al., 2005; Rosenbaum et al., 2014). As such, the Canadian Network for Mood and Anxiety Treatments (CANMAT) has recently revised treatment guidelines and now recommend exercise as a primary intervention for mild to moderate Major Depressive Disorder (MDD) and a secondary therapy for moderate-severe MDD (Ravindran et al., 2016). Similar recommendations are present in the National Institute for Health and Care Excellence (2010) guidelines for the treatment of depression. Despite the evidence that exercise can help reduce depression, little research has been done to identify how to increase physical activity in individuals with depression or encourage engagement in structured exercise programs. Such detail is noticeably lacking in the reports of randomized controlled trials examining exercise as an intervention for depression (see Cooney et al., 2013).

In Canada, little structure exists for mental health professionals to explore exercise as a treatment option for adults with depression, and there is a need to develop evidence-based resources that can be used to facilitate exercise engagement. As the first part of a multistep process to develop such resources and interventions, it is necessary to understand population specific factors that enable or prevent engagement in exercise and physical activity. Subsequently such information can be used to inform intervention design and clinical practice. Two recent systematic reviews have examined factors related to physical activity and exercise in populations with depression (Vancampfort et al., 2015) and severe mental illness (Firth et al., 2016). In the first review, Vancampfort and colleagues (2015) examined the correlates of

physical activity for people with depression. This provides insight into factors that are associated with physical activity among individuals with depression although is less clear on the potential determinants of physical activity in this population. Identifying the causal relationship and modifiable factors is essential for interventionists. For successful behaviour change, it is vital to conduct a thorough behaviour analysis looking at causes of behaviours such as identified barriers and facilitators to engagement (Michie, Atkins & West, 2014). Firth and colleagues (2016) examined motivating factors and barriers of exercise in severe mental illness and categorized the barriers and motivators into physical (biological), psychological, and socio-ecological factors. However, severe mental illness is inclusive of schizophrenia, schizoaffective disorder and other psychotic disorders, and only 2.3% of the pooled sample in the review had a diagnosis of major depression or bipolar disorder and no sub-analysis by disorder was provided to understand differential barriers and facilitators between populations. Both reviews examined only quantitative data which may only assess factors that researchers consider to be relevant, potentially omitting barriers and facilitators unique to the population that were not considered in the design process. Qualitative approaches allow participants to inform researchers as to what barriers and facilitators are relevant to them and open new lines of inquiry as a result. Thus, the inclusion of quantitative, qualitative and mixed-methods studies in one review may help to better understand individuals' experiences of a complex behaviour such as exercise and physical activity. To build on these reviews (Firth et al., 2016; Vancampfort et al., 2015), adopting a comprehensive behaviour change theory which links to a systematic method of intervention design is needed. Implementing interventions and treatment in real-world settings is associated with many factors and requires change at an individual, organizational and/or community level (Michie et al., 2014). Organizing these factors into broader theories of behaviour change can

help guide interventions to target the determinants of physical activity. Theory-based physical activity interventions have been shown to be more effective than non-theory-based interventions (Gourlan et al., 2016). Conducting a theory-based analysis of the barriers and facilitators affecting physical activity or exercise engagement among people with depression provides a framework for comprehensively understanding the relationship between these factors and the mechanisms by which they affect behaviour. The Theoretical Domains Framework (TDF) is an integrative framework of behaviour change that can be used to identify modifiable factors to target with intervention and treatment (Cane, O'Connor, & Michie, 2012). The TDF is comprised of 14 domains (defined in the results): knowledge; skills; memory, attention and decision processes; behavioural regulation; social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; intentions; goals; reinforcement; emotion; environmental context and resources; and social influences. These domains are constructs identified in several existing theories as determinants of behaviour change, but do not require an a priori assumption of what determinants are relevant to changing a specific behaviour in a specific population. As such, the TDF has been used in previous reviews to understand barriers and facilitators related to health behavior (Dobson et al., 2016; Heslehurst et al., 2014). The TDF is also part of a larger, meta-framework known as the Behaviour Change Wheel (BCW) that helps intervention developers select behaviour change techniques (BCTs). BCTs are observable and replicable components of an intervention designed to change behaviour (Michie & Atkins, 2014). The TDF provides a behavioral diagnosis of what needs to change in a specific context for a specific behavior to change. Specific BCTs are then linked theoretically to particular domains. Thus, a TDF analysis of a behaviour provides the initial step for developing and implementing theory-informed behaviour change interventions (Cane, O'Connor, & Michie,

2012). Such an analysis has not been conducted in the context of physical activity and exercise interventions for adults with depression. The primary purpose of this paper was to identify the barriers and facilitators to engagement in physical activity and exercise for adults with depression. The secondary aim of this paper was to categorize and analyze the barriers and facilitators within the TDF to help guide clinicians and exercise interventionists working with this population in the future.

2.2 Methods

A mixed-methods scoping review was conducted as it is appropriate to address broader topics, understudied areas, and to include a variety of different study designs (Arksey & O'Malley, 2005). The scoping review methodology was advanced by Levac, Colquhoun, & O'Brien (2010), and this enhanced framework was used to guide this review. Further, the Theoretical Domains Framework and definitions of each domain were used to categorize the barriers and facilitators extracted from the included studies (Cane, O'Connor, & Michie, 2012).

Search strategy and selection criteria: An experienced librarian at the University of British Columbia was consulted prior to starting the search to develop the search strategy. An electronic database search of Ovid Medline, PsycINFO, EMBASE, Cochrane Database of Systematic Reviews, and SPORTDiscus was done December 2016- January 2017 by the first author considering articles from database inception. The concepts of depression, mental illness, bipolar disorder, mood disorder combined with physical activity or exercise and barriers, treatment resistance, facilitators, participation, attitudes were used to search each database. Depression is considered within the broader category of mood disorders, thus the search strategy included mood disorder to broaden the search within this scoping review. Limits put on searches were for peer reviewed articles and English language. The thesaurus feature was used for each

database to determine which terms to use specific to the database to get the most relevant articles. Appendix A summarizes the search terms used for each database. A search of google scholar using “depression”, physical activity barriers and facilitators was also performed, and reference lists of relevant articles and reviews (e.g., Firth et al., 2016; Vancampfort et al., 2015) were reviewed. Articles were assessed for eligibility by title and abstract first according to inclusion criteria. Full-text articles were obtained where studies met criteria or could not be excluded on the basis of title and abstract alone. English language peer reviewed articles were included in this review. Eligible sample populations included adults aged 18-65 and majority (>50 %) diagnosed with depression, or a mood disorder, as per methods of other review articles analyzing barriers and facilitators using the TDF (Weatherson et al., 2017). If an article did not specify the number of participants and their diagnosis it was excluded. No inclusion or exclusion criteria was set on depression diagnosis, and so sample populations were confirmed by different methods including chart review or referral, treatment status, health questionnaires, or structural clinical interviews. Articles were excluded if they did not have any empirical data (acquired by observation or experimentation). Commentaries, opinion pieces and reviews of existing literature were excluded if they did not include any empirical data. Once the search was completed by the first author, the list of articles to include was reviewed by the fourth author to confirm the studies met inclusion criteria. Any difference of opinion between authors was resolved by discussion. The list of included articles was then sent to a second expert in the field to review and ensure no relevant articles were missed. See Figure 4 for Flow diagram of search and study selection, adapted from the PRISMA group (2009). Eligible studies were those reporting on barriers and/or facilitators to physical activity or exercise using quantitative, qualitative or mixed methods. A total of 13 articles were included for analysis (Azar et al., 2010; Busch et al., 2016; Carpinello et

al., 2013; Faulkner et al., 2004; Fraser et al., 2015; Kerr et al., 2012; Khalil et al., 2012; McPherson et al., 2014; Pentecost et al., 2015; Searle et al., 2011; Searle et al., 2014; Seime & Vickers, 2016; Wright et al., 2011). ‘Barriers’ were defined as any physiological, psychological or socio-ecological conditions reported to reduce or negatively affect a person’s participation in exercise (Firth et al., 2016). ‘Facilitators’ were defined as physiological, psychological, or socio-ecological conditions reported to enhance or positively affect a person’s engagement in exercise. Facilitators were differentiated from preferences which were defined as characteristics or features of exercise, physical activity or an exercise program that participants identified as enjoying and were excluded. As well, barriers and facilitators were both differentiated from “associated factors” or “correlates” by being self-reported as specifically impeding or enhancing the respondent’s participation in physical activity (e.g. a correlation between depression or self-efficacy scores and physical activity would be insufficient to be considered as a barrier or facilitator, but agreement with a statement “I find it difficult to be physically active when my depression is severe” or “I’m more likely to engage in exercise when I feel confident in my abilities” would be considered a barrier and facilitator respectively.

Data Extraction and Analysis: KG (first author) & MD (second author) independently read the included articles, and extracted any barrier or facilitator identified in each paper based on the aforementioned definition. Data extraction methods varied based on the type of study and data presented. For quantitative studies where relevant data were presented as the number of respondents endorsing a statement out of the total respondents, data was extracted as a dichotomous yes or no out of the total number of respondents. As such, Likert-like scales or other methods of demonstrating levels of agreement were dichotomized where any endorsement (e.g. agree, strongly agree) was treated as “yes” while indifference, ambivalence, or

disagreement (e.g. strongly disagree, disagree, neither agree nor disagree, neutral) was treated as a “no” (Weatherson et al., 2017). Where quantitative results were reported as a mean or median response, studies were required to demonstrate that there was a statistical relationship (i.e. correlation or regression) between the barrier or facilitator and actual physical activity participation. Barriers and facilitators were extracted from qualitative studies if they were mentioned by the authors in the results or discussion as being relevant to participants’ physical activity or exercise engagement. After initial extraction, the TDF was used to categorize the barriers and facilitators. KG and MD independently categorized the extracted barriers and facilitators into the most predominant of the 14 TDF domains as per the definition of each domain (Cane, O’Connor, & Michie, 2012). This approach was agreed upon by the first and second authors prior to categorization to ensure parsimony. Upon completing extraction and categorization, KG and MD met to determine agreement on 1) the presence or absences of barriers and facilitators within each paper, 2) the numbers extracted from quantitative papers and 3) the TDF domain categorization. The authors solved discrepancies through discussion, rereading source material, and collaboration. When no agreement could be reached, the opinion of a third author (GF) determined the final result. Final TDF categorizations were reviewed by GF and HG (fourth author) and discussed with the entire authorship team if any alternative categorizations were plausible.

2.3 Results

Table 2 summarizes the details of the studies meeting inclusion criteria. Five studies employed quantitative methods of data collection (Busch et al., 2016; Carpiniello et al., 2013; Fraser et al., 2015; Kerr et al., 2012; McPherson et al., 2014), while six used qualitative data collection methods (Azar et al., 2010; Faulkner et al., 2004; Khalil et al, 2012; Searle et al.,

2011; Searle et al., 2014; Wright et al., 2011). Pentecost et al. (2015) used a mixed-methods approach involving interviews and questionnaires, but only the qualitative data presented was relevant to identifying barriers and facilitators, and are thus included in the analysis and discussion as part of the qualitative studies. Lastly, while Seime & Vickers (2016) report a narrative review paper, they also describe barriers to exercise identified by patients in the authors' clinical experience as well as a summary of empirical qualitative data presented as a poster by the authors (Hathaway, Vickers, Finnie, & Wheeldon, 2005). As such this record was included in our qualitative data synthesis. Quantitative studies included 828 participants, 607 of which were female. Weighted mean age across samples was 44 years of age. McPherson et al., (2014) did not report mean age, though the sample ranged from 18 to over 65 years, and was predominantly (65%) between the ages of 25 and 54. Two studies relied on chart review or referral to confirm diagnosis (Carpiniello et al., 2013; Fraser et al., 2015), while the remaining three (Busch et al., 2016; 2015; Kerr et al., 2012; McPherson et al., 2014), used variations on the Patient Health Questionnaire (PHQ) (Kroenke, Spitzer, & Williams, 2001) to confirm diagnosis using established cut-points; these were also the only quantitative studies to assess depression severity. When ethnicity was reported, samples were described as predominantly (>80%) "Caucasian" or "non-hispanic white." Qualitative studies included 129 participants with depression who received relevant questions about physical activity participation and depression, 88 of which were reported as female. This participant count does not reflect non-depressed comparison controls used by Azar et al., (2010) or control participants that did not receive questions regarding barriers or facilitators of physical activity. Several qualitative studies recruited from randomized controlled trials on exercise for depression (Pentecost et al., 2015; Khalil et al, 2012; Searle et al., 2011; Searle et al., 2014). Seime and Vickers (2016) did not

provide an indication of the number or demographics of participants in the study they discuss, or the number of patients in their clinical setting that they described. Depression diagnosis was predominantly confirmed by structured clinical interviews (Pentecost et al., 2015; Searle et al., 2011; Searle et al., 2014; Wright et al., 2011), while two studies used referral or treatment status as criteria (Faulkner et al., 2004; Khalil et al, 2012); Azar et al., (2010) used a cut point score of 10 on the Center for Epidemiological Studies Depression 10-item scale (Andresen et al., 1994) and Pentecost et al., (2015) included a cut point on the PHQ-9 in addition to the clinical interview as an inclusion requirement, but did not report scores for individuals who participated in the interviews. Searle et al. (2011) reported a mean Beck Depression Index score of 29.6 (Range: 15–57), while Searle et al. (2014) reported the number of participants in mild, moderate, and severe ranges of the Clinical Interview Schedule Revised, with the majority in the moderate range. While most qualitative papers provided several descriptors of the sample, they tended to be reported as ranges or frequencies of occurrences as opposed to mean and standard deviation making it difficult to provide a synthesis of the demographics represented by the collective sample. After discussion, KG and MD reached consensus on the existence of 52 barriers and 45 facilitators, and achieved 100% agreement on extracted values from quantitative papers. Of these 97 data points, consensus on TDF domain assignment was achieved in 91 cases, leading 3 barriers and 4 facilitators to be reviewed by GF to determine final categorization. Secondary review by GF & HG did not result in the reclassification of any barriers or facilitators. Table 3 summarizes the barriers identified within the included studies organized by data type (quantitative and qualitative) and TDF categorization. Table 4 summarizes the facilitators for physical activity engagement. At times, facilitators were reported as the reverse of a barrier. For example, mood was identified as a barrier and a facilitator, as low mood was indicated as a

barrier to exercise and physical activity and positive mood was indicated as a facilitator. The following provides a narrative synthesis of key barriers and facilitators within the TDF.

1. **Knowledge:** an awareness of the existence of something.

Being unsure of what to do was a barrier, although by relatively few people, and lack of knowledge of exercise was a barrier only identified in one qualitative study. There were no facilitators within this domain.

2. **Skills:** an ability or proficiency acquired through practice.

No studies directly assessed ability or proficiency therefore no barriers or facilitators were identified within this domain.

3. **Social/Professional Role and Identity:** a coherent set of behaviours and displayed personal qualities of an individual in a social or work setting.

Barriers that emerged within this domain include feeling too old and not being a sporty person, and predominant in the qualitative literature was the idea of exercise being a low priority. One facilitator emerged in the qualitative literature from one study, the concept of returning to a more active self.

4. **Beliefs about Capabilities:** acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use.

No facilitators were identified within this domain but multiple barriers were, especially related to confidence. This includes low confidence in the ability to exercise, low confidence in ability to exercise when sad or distressed, and low confidence in ability to interact with others.

5. **Optimism:** confidence that things will happen for the best or that desired goals will be attained.

No barriers or facilitators were identified within this domain.

6. **Beliefs about Consequences:** acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation.

Only one barrier (fear of being injured) was identified although relatively infrequently by participants. Many facilitators were identified in the quantitative literature, which were all reasons for participating in physical activity, such as to maintain weight, maintain good health, and manage stress. The three facilitators identified by the most participants were participation in physical activity to improve body image, improve overall mood, and to improve overall energy levels.

7. **Reinforcement:** increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus.

No barriers were identified in this domain. Reinforcement from others was seen as a facilitator, enhancing physical activity participation.

8. **Intentions:** a conscious decision to perform a behaviour or a resolve to act in a certain way.

One predominant barrier was identified within this domain, lack of motivation. The majority of participants in the quantitative literature identified it, and it was also identified in four of the qualitative papers.

9. **Goals:** mental representations of outcomes or end states that an individual wants to achieve.

No barriers or facilitators were identified within this domain.

10. **Memory, Attention and Decision Processes:** the ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives.

Barriers and facilitators emerged within this domain from the qualitative literature. Procrastination was regarded as a barrier, while the facilitators were related mostly to having choice: variety in activities, autonomy, and having an individualized program.

11. Environmental Context and Resources: any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour.

Many barriers related to this domain were identified in the quantitative studies. However, only feeling unwell was agreed upon as a barrier by the majority of participants. From the qualitative literature, barriers that emerged in more than one paper included lack of time and cost. The other facilitators were identified from one source each, such as facilities in the neighborhood, exploring the exercise environment and having a structured program. Using anti-depressant medication was identified in two different qualitative papers as being a facilitator to physical activity participation.

12. Social influences: interpersonal processes that can cause individuals to change their thoughts, feelings or behaviours.

Barriers and facilitators were mirrored in this domain. Others' behaviours or support, and lack of encouragement were barriers identified in qualitative and quantitative literature, while others' attitude and support (and specifically from significant others), and ongoing personal support for exercise were seen as facilitators. Some other facilitators that emerged from the quantitative literature were the help of an instructor and doctor's advice.

13. Emotion: a complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event.

This was the predominant TDF domain of barriers and facilitators to physical activity across both quantitative and qualitative studies. Mood was identified as a barrier in both quantitative and qualitative literature, and positive mood was mirrored as a facilitator. Enjoyment and distraction were regarded as other facilitators. The majority of participants from the quantitative studies regarded lack of energy and being too tired as barriers. From the qualitative studies, the barriers identified in more than one study were low mood, lethargy and fatigue. Mental health, being stressed, boredom and lack of enjoyment also emerged within this domain in one study each.

14. Behavioural Regulation: anything aimed at managing or changing objectively observed or measured actions.

No barriers were identified within this domain. Various facilitators were identified, mostly related to having a tool for self-monitoring. This includes use of a pedometer (from the quantitative and qualitative literature), a self-help workbook, and a diary.

2.4 Discussion

The purpose of this study was to identify the barriers and facilitators towards exercise and physical activity engagement among adults with depression. Findings could inform intervention and resource development addressing behaviour change related to exercise and physical activity for individuals with depression. To the best of our knowledge, this is the first review on self-reported barriers and facilitators related to physical activity for adults with depression using a TDF analysis. This review highlights the need for future interventions to explicitly target the emotion domain of the TDF. Among the barriers and facilitators identified by this literature review, many are commonly identified as determinants of behaviour within existing theories and models of behaviour change commonly applied in physical activity intervention. The Beliefs

About Capabilities domain is present as self-efficacy in Social Cognitive Theory (SCT) (Bandura, 1986) and the Health Action Processes Approach (HAPA) (Schwarzer, 2008), as perceived behavioural control in the Theory of Planned Behaviour (TPB) (Ajzen, 1991), and as competence in Self-Determination Theory (SDT) (Ryan & Deci, 2000). As well, Beliefs about Consequences is also prominent in these models as outcome expectancies in SCT and the HAPA model, and attitudes in TPB. Intentions are central to the TPB, HAPA, and Transtheoretical Model (Prochaska & Velicer, 1997). Environmental Context & Resources is also considered as influencing factors under the Social Ecological Model (Stokols, 1992), and behavioural regulation is covered in the HAPA model with constructs such as action control and action planning.

Reflecting the barriers and facilitators we identified in the current review, future interventions should consider targeting the domains of Beliefs about Capabilities, Intentions, and Beliefs about Consequences. For the facilitators of physical activity and exercise participation, the most predominant TDF domain was Social Influences (quantitative and qualitative data combined). Using the Behavior Change Wheel for guidance, 10 different BCTs can be linked and recommended from an expert consensus for addressing Social Influences (Cane, O'Connor, & Michie, 2012; Cane et al., 2015): Social comparison, Social support (general, practical, and emotional), Information about others' approval, Vicarious reinforcement, Restructuring the social environment, Modelling or demonstrating behavior, Identification of self as role model, and Social reward (Cane et al., 2015). The Social Influences domain also appears in existing behaviour change theories; the SCT as social modeling, TPB as subjective norms, and SDT as relatedness. As such, physical activity intervention developers will likely already be familiar with a number of behaviour change techniques (BCTs) that target social influences and these

other domains (see Cane et al., 2015 for expert consensus on BCTs that align with these domains). Across the quantitative and qualitative literature reviewed, the Emotion domain was the most predominant TDF domain of barriers identified among individuals with mood disorders. The majority of participants in the quantitative studies identified “low mood,” “lack of energy” and “being too tired” as barriers within this domain, all symptoms of depression (WHO, 2017). Previous work has shown high levels of depressive symptoms are associated with low levels of physical activity (Vancampfort et al., 2015). Furthermore, “low mood” and “fatigue” were referenced as barriers in five qualitative studies. Low mood has been previously identified as a major barrier among people with severe mental illness (including depression) (Firth et al., 2016). Feeling states also may act as a facilitator to physical activity when positively valenced. Despite this, the impact of feeling states as a determinant of physical activity behaviour has largely been left out of the aforementioned behaviour change theories, except as a Belief about Consequences (i.e. physical activity will make me feel better). A similar critique is frequently made by Ekkekakis and colleagues from a theoretical standpoint (e.g. Ekkekakis & Dafermos, 2012; Ekkekakis, Parfitt, & Petruzzello, 2011). However, it is apparent that this domain is particularly salient among individuals with depression from a practical perspective, and may represent a unique barrier with regards to importance and challenge due to the symptomatic nature of mood and emotional dysregulation present in this population. Interventions to increase physical activity in this population should employ BCTs that address this domain. Rebar et al. (2016) describe physical activity behaviour as not just being related to a person’s intentions and beliefs about physical activity, but may be influenced by automatic processes such as habit or emotion. In line with this, further research could examine the applicability of dual-process theories that incorporate conscious and non-conscious influences, for understanding physical activity among

adults with depression. For example, one potential theory is the Context, Executive, and Operational Systems theory (Borland, 2017) which can be applied to understand behaviours that may be hard to maintain, such as physical activity. Using the Behaviour Change Wheel and BCT taxonomy allows intervention developers to link TDF domains with BCTs driven by theory (Cane, O'Connor, & Michie, 2012). From expert consensus, four specific BCTs are recommended to target behaviour change within the emotion domain (Cane et al., 2015): Reduce negative emotions, Information about emotional consequences, Self-assessment of affective consequences, and Emotional social support. Michie and colleagues (2013) define reduce negative emotions as advice on ways of reducing negative emotions to facilitate performance of the behaviour. Information about emotional consequences involves providing written, verbal, or visual information about emotional outcomes of performing the behaviour, whereas self-assessment of affective consequences is to prompt assessment of feelings after attempts at performing the behaviour. Lastly, emotional social support is to advise on, arrange or provide emotional social support for performance of behaviour (e.g. bringing a friend to workout class) (Michie et al., 2013). Although rarely reported in the literature (Cooney et al., 2013), a few physical activity behaviour change interventions have attempted to target the Emotion domain using these relevant BCTs. For example (Haase, Taylor, Fox, Thorp, & Lewis, 2010) recognized mood as a barrier to physical activity in their spiral model of depression when outlining their randomized control trial (data published as Chalder, Wiles, Campbell, Hollinghurst, Haase, et al., 2012). The spiral model begins with symptoms of depression “Feeling low/Low Motivation” which leads to less total activity, which leads to less engagement in pleasurable activities, and this in turn worsens feelings and increases fatigue and tiredness, contributing to worsened symptoms. Individuals delivering the intervention are expected to show and explain the spiral to

participants, and explain “Inactivity can drag you down, and physical activity can pull you up” (Chalder, Wiles, Campbell, Hollinghurst, Searle, et al., 2012) and provide information on the feel-good effects of physical activity, thus employing the information about emotional consequences BCT. This spiral approach has also been adopted by Strom et al. (2013) and Pentecost et al. (2015) in subsequent physical activity interventions. Additionally, Chalder, Wiles, Campbell, Hollinghurst, Haase, and colleagues (2012) had participants in their intervention keep a log of their physical activity as well as things that made them feel better or worse, as a method of Self-assessment of affective consequences, with the intention that participants would recognize that physical activity improved their affective state. Finally, trying to Reduce negative emotions in order for patients to engage in more physical activity when the physical activity is meant to be a treatment, may seem like a tautology. Strom and colleagues (2013) employed this BCT by including a module for participants of common thinking errors that occur when facing setbacks and how to deal with them. Future research should investigate the effectiveness of these, and other behavior change interventions that specifically target this emotion domain.

2.5 Strengths and Limitations

A significant strength of this paper is that a systematic approach was used to conduct a scoping review to determine theory-driven behaviour change techniques that can be replicated by other interventionists for a specific population. However, as this was a scoping review, a quality assessment of included articles was not performed. The developers of the TDF acknowledge that the domains are not mutually exclusive (Michie et al., 2005). However, in categorizing barriers and facilitators into domains for this review, the authors adopted a conservative approach by identifying the single most relevant domain for the sake of parsimony. An additional strength of

this review is that it evaluated qualitative as well as quantitative studies, although the extraction of barriers and facilitators from the qualitative studies was a more subjective process. A limitation was that no inclusion or exclusion criteria was set on how sample populations received a depression diagnosis. Experts were consulted regarding the results of our search but it is always possible some studies were not located. Lastly, no analysis of specific sub-populations within adults with depression was done, for example looking at gender, cultural barriers, or depression severity in part because not all studies reported data by sub-sample. Given the heterogeneity of the present studies, grouping of studies based on similar characteristics would result in relatively small stratified assessments that may miss important barriers by chance rather than meaningful differences between sub-populations.

2.6 Conclusion

This review provides insight into the barriers and facilitators to engagement in physical activity for adults with depression. The most prominent barriers and facilitators could be classified within the Emotion domain. Accordingly, future interventions should explicitly target this domain and apply BCTs such as reducing negative emotions, providing information about emotional consequences, developing opportunities for self-assessment of affective consequences, and providing emotional social support (Cane et al., 2015). Future research should explicitly report on the use of BCTs and follow the Template for Intervention Description and Replication (TIDieR) (Hoffman et al., 2014) to assist in this goal. In doing so it will be possible to explicitly examine the effectiveness of behavior change techniques that specifically target the barriers and facilitators we identified. Such work may be vital to make exercise and physical activity for depression a more common clinical practice.

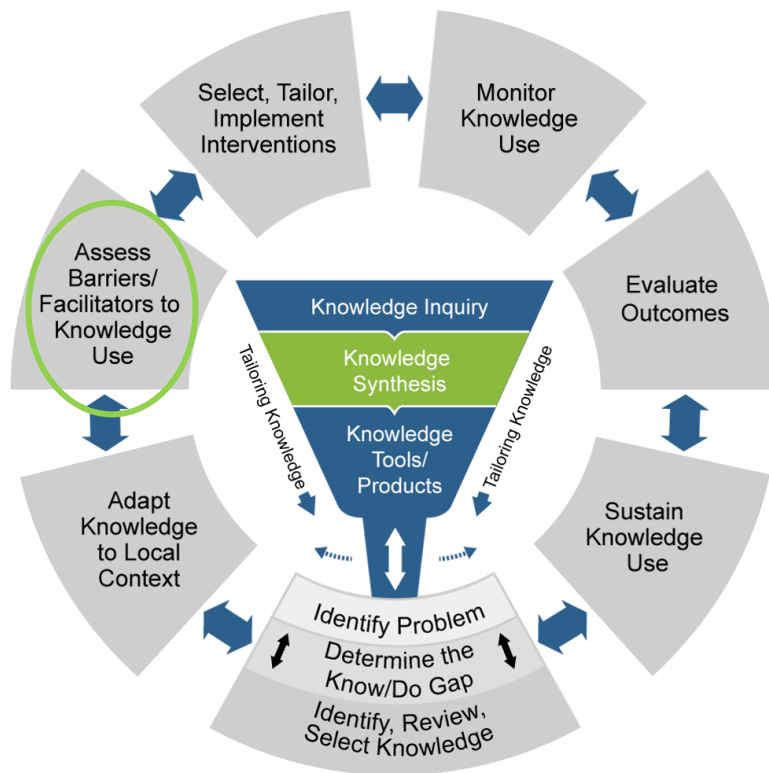


Figure 3 Action Cycle step

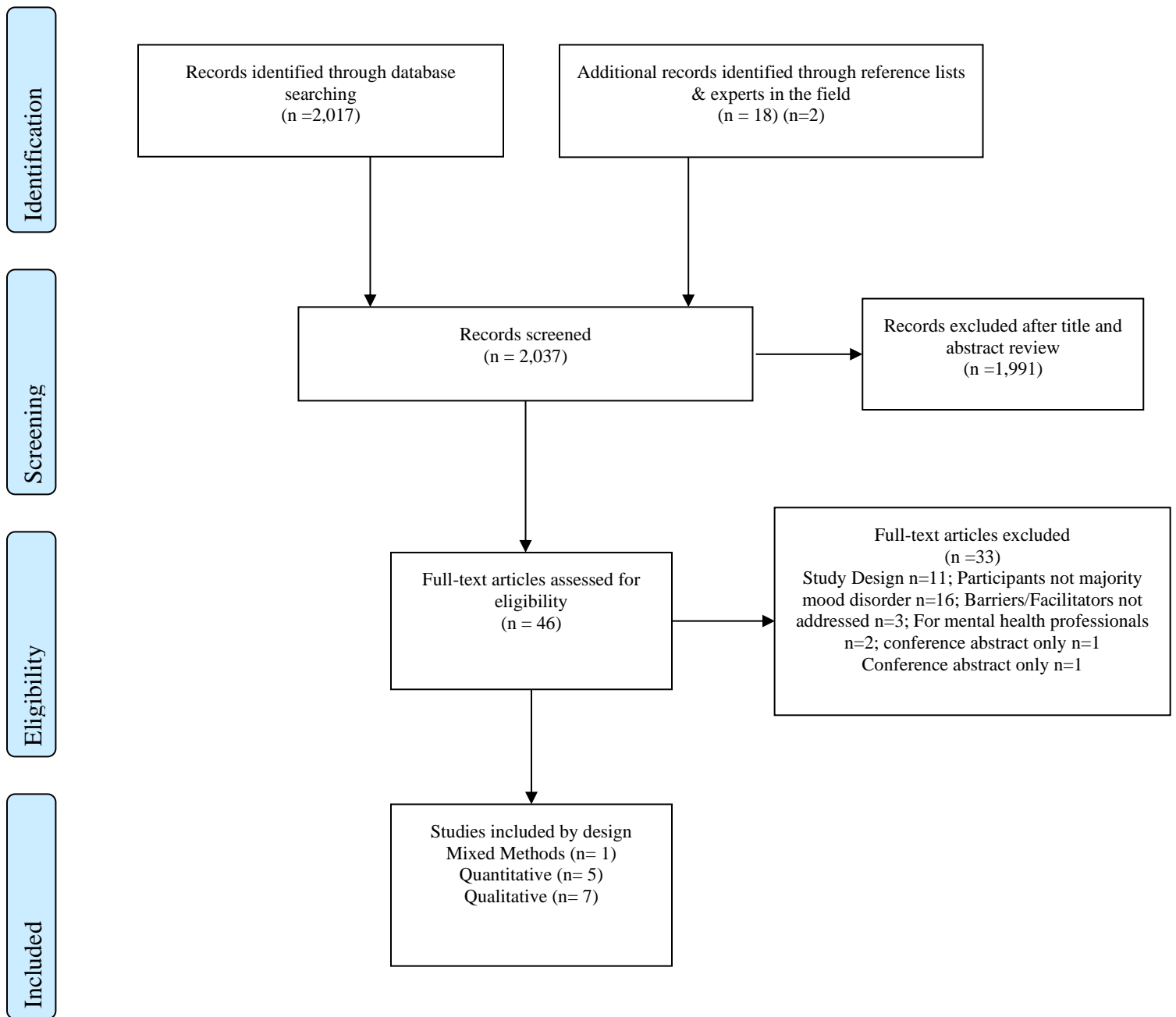


Figure 4 PRISMA flow diagram for search and study selection (adapted from PRISMA group, 2009)

	Type of Study	Method	Analysis Approach	n	n Female	Age Mean (SD) /Range	Ethnicity	Diagnosis	Diagnosis Method
Busch, 2016	Quantitative	Self-report Survey/Questionnaire	Response Frequency	102	51	39.4 (13.1)	83% Caucasian 7% African-American	Depression	≥10 on the PHQ-8
Carpiniello, 2013	Quantitative	Self-report Survey/Questionnaire	Response Frequency	138	90	50.0 (11.8)	-	Major depression 27.5% Bipolar disorder 25.4% Schizophrenia/psychotic disorders 29% Anxiety disorders 19.6% Personality disorders 5.8% Other diagnoses 6.5%	Referral
Fraser, 2015	Quantitative	Self-report Survey/Questionnaire	Response Frequency	101	73	40.7 (14.5)	-	Depression 61% Bipolar disorder 19%	Chart Review
Kerr, 2008	Quantitative	Self-report Survey/Questionnaire	Response Frequency	23	18	41.0 (8.7)	86.4% Non-Hispanic White	Mild-to-moderate depression	≥15 on the PHQ-9 at intake
McPherson, 2014	Quantitative	Self-report Survey/Questionnaire	Response Frequency	464	375	Adults ≥18	95.5% Caucasian	Major depression or dysthymia	≥3 on the PHQ-2
Pentecost, 2015	Mixed (Qualitative)	Interviews	Thematic analysis	7	4	48.0 (10.7)	-	Current primary diagnosis of depression	Structured clinical interview (ICD) & between 10 and 23 on PHQ-9
Azar, 2010	Qualitative	Semi-structured interviews	Social Ecological Model	20	20	23.4	-	Depressive symptoms	≥10 on CES-D-10
Faulkner, 2004	Qualitative	Semi-structured interviews (5 over 1 year)	Three profiles generated	6	Unclear	-	-	Clinical depression	Referral
Khalil, 2012	Qualitative	Focus Groups	Framework analysis	19	19	-	-	Receiving treatment for depression	Self-report
Searle, 2011	Qualitative	Interviews, Clinical Practice	Framework analysis	33	19	19-69	-	Depression	Structured clinical interview (ICD)
Searle, 2014	Qualitative	Interviews	Grounded Theory	19	11	19-69	95% White 5% Multiracial	Depression	Structured clinical interview (ICD)
Seime, 2006	Qualitative	Interviews	-	-	-	-	-	Clinically depressed	No details

Wright, 2011	Qualitative	Interviews	Interpretive Phenomenological Analysis	25	15	-	-	Bipolar Disorder	Structured clinical interview (DSM-IV)
Note: PHQ=Patient Health Questionnaire, CES-D=Centre for Epidemiological Studies-Depression, numbers after either abbreviation indicate the number of questions used in that variant; ICD=International Centre for Disease, DSM-IV=Diagnostic and Statistical Manual for Mental Disorders 4 th edition.									

Table 2 Characteristics of studies

TDF Domain	Barriers (Quantitative)	Barriers (Qualitative)
Knowledge	- Unsure what to do 15/138 (<i>Carpiniello, 2016</i>)	- Knowledge (<i>Wright, 2011</i>)
Skills	None identified	None identified
Social/Professional Role and Identity	- Feel too old 7/101 (<i>Fraser, 2015</i>) - Not the sporty type 29/101 (<i>Fraser, 2015</i>)	- Low priority (<i>Azar, 2010; Faulkner, 2004; Khalil, 2012</i>) - Not a sporty person (<i>Faulkner, 2004</i>)
Beliefs about Capabilities	- Low confidence in ability 30/102 (<i>Bush, 2016</i>) - Low confidence in ability when sad/distressed 104/138 (<i>Carpiniello, 2016</i>)	- Low confidence/ self-efficacy in ability (<i>Azar, 2010; Faulkner, 2004; Searle, 2011; Searle, 2014</i>) - Self-consciousness (<i>Azar, 2010</i>) - Low confidence in abilities to interact with others (<i>Faulkner, 2004</i>)
Optimism	None identified	None identified
Beliefs about Consequences	- Fear of being injured 36/341 (<i>Bush, 2016; Carpiniello, 2016; Fraser, 2015</i>)	None identified
Reinforcement	None identified	None identified
Intentions	- Lack of motivation 184/341 (<i>Bush, 2016; Carpiniello, 2016; Fraser, 2015</i>)	- Lack of motivation (<i>Azar, 2010; Faulkner, 2004; Searle, 2011; Searle, 2014</i>)
Goals	None identified	None identified
Memory, Attention, Decision Process	None identified	- Procrastination (<i>Azar, 2010</i>)
Environmental Context & Resources	- Lack of time/takes too much time 45/341 (<i>Bush, 2016; Carpiniello, 2016; Fraser, 2015</i>) - Cost 19/101 (<i>Fraser, 2015</i>) - Lack of environmental access 73/341 (<i>Bush, 2016; Carpiniello, 2016; Fraser, 2015</i>) - Weather 16/101 (<i>Fraser, 2015</i>) - Feel unsafe going outdoors 16/101 (<i>Fraser, 2015</i>) - Inconvenient 23/102 (<i>Bush, 2016</i>) - Lack of equipment (clothes) 22/101 (<i>Fraser, 2015</i>) - Injured recently 17/102 (<i>Bush, 2016</i>) - Physical health problems 44/101 (<i>Fraser, 2015</i>) - Feel Unwell 61/101 (<i>Fraser, 2015</i>)	- Lack of time (<i>Azar, 2010; Wright, 2011</i>) - Cost (<i>Khalil, 2012; Wright, 2011</i>) - Facilities (<i>Wright, 2011</i>) - Weather (<i>Wright, 2011</i>) - Perceptions of external events (<i>Faulkner, 2004</i>) - Physical health (<i>Wright, 2011</i>)
Social Influences	- Lack of encouragement and support from others 17/102 (<i>Bush, 2016</i>)	- Lack of encouragement to participate (<i>Azar, 2010</i>) - Others' behaviours or support (<i>Faulkner, 2004; Khalil, 2012</i>) - Lack of support monitoring exercise program (<i>Faulkner, 2004</i>) - Body image (<i>Faulkner, 2004</i>) - Doing it alone (<i>Khalil, 2012</i>)
Emotion	- Mood (sad, angry, etc.) 66/102 (<i>Bush, 2016</i>) - Lack of energy 130/239 (<i>Carpiniello, 2016; Fraser, 2015</i>) - Too tired 141/203 (<i>Bush 2016; Carpiniello, 2016</i>) - Illness itself 27/138 (<i>Carpiniello, 2016</i>) - Too shy/embarrassed 36/101 (<i>Fraser, 2015</i>) - Lack of enjoyment 30/102 (<i>Bush, 2016</i>) - Find it boring 23/102 (<i>Bush, 2016</i>)	- Low mood (<i>Azar, 2010; Faulkner, 2004; Wright, 2011</i>) - Lethargy/fatigue (<i>Faulkner, 2004; Searle, 2011</i>) - Mental health (<i>Wright, 2011</i>) - Guilt (should be doing other things) (<i>Azar, 2010</i>) - Being stressed (<i>Azar, 2010</i>) - Fear of social interaction (<i>Faulkner, 2004</i>) - Lack of enjoyment (<i>Azar, 2010</i>) - Find it boring (<i>Faulkner, 2004</i>)
Behavioural Regulation	None identified	None identified

Table 3 Barriers identified to physical activity and exercise

TDF Domain	Facilitators (Quantitative)	Facilitators (Qualitative)
Knowledge	None identified	None identified
Skills	None identified	None identified
Social/Professional Role and Identity	None identified	-Return to more active self (<i>Pentecost, 2015</i>)
Beliefs about Capabilities	None identified	None identified
Optimism	None identified	None identified
Beliefs about Consequences	-Maintain weight 99/101 (<i>Fraser, 2015</i>) -Maintain good health 99/101 (<i>Fraser, 2015</i>) -Manage stress 96/101 (<i>Fraser, 2015</i>) -Improve emotional wellbeing 95/101 (<i>Fraser, 2015</i>) -Build up strength 81/101 (<i>Fraser, 2015</i>) -Improve flexibility 80/ 101 (<i>Fraser, 2015</i>) -Improve sleep 80/101 (<i>Fraser, 2015</i>) -Give space to think 74/101 (<i>Fraser, 2015</i>) -Improve appearance 65/101 (<i>Fraser, 2015</i>) -Manage pain 44/101 (<i>Fraser, 2015</i>) -Improve body image 274/452 (<i>McPherson, 2014</i>) -Improve fitness 218/450 (<i>McPherson, 2014</i>) -Improve overall mood 293/452 (<i>McPherson, 2014</i>) -Improve energy levels 363/553 (<i>Fraser, 2015; McPherson, 2014</i>)	
Reinforcement	None identified	-Reinforcement from others (<i>Faulkner, 2004</i>)
Intentions	None identified	None identified
Goals	None identified	None identified
Memory, Attention, Decision Process	None identified	-Variety in activities (<i>Faulkner, 2004</i>) -Autonomy (<i>Searle, 2014</i>) -Individualized program (<i>Wright, 2011</i>)
Environmental Context & Resources	-Home over gym 38/138 (<i>Carpiniello, 2016</i>)	-Facilities in the neighborhood (<i>Azar, 2010</i>) -Exploring the exercise environment (<i>Khalil, 2012</i>) -Safe location (<i>Wright, 2011</i>) -Structured program (<i>Faulkner, 2004</i>) -Anti-depressant medication (<i>Faulkner, 2004; Searle, 2014</i>)
Social Influences	-Instructor's help 93/138 (<i>Carpiniello, 2016</i>) -Doctor's advice 147/293 (<i>Carpiniello, 2016; Fraser, 2015</i>) -Email & phone calls targeting behavioural skills related to PA 12/23 (<i>Kerr, 2008</i>)	-Significant other's attitude or support (<i>Azar, 2010; Searle, 2014</i>) -Others' attitude or support (<i>Azar, 2010; Faulkner, 2004; Khalil, 2012</i>) -Social norms (<i>Azar, 2010</i>) -Facilitated group session (<i>Faulkner, 2004; Khalil, 2012</i>) -Ongoing personal support for exercise (<i>Searle, 2014; Seime, 2006 ; Wright, 2011</i>) -In-person & phone call support (<i>Searle, 2014</i>) -Support in connecting to fitness centre (<i>Seime, 2006</i>) -Exercising with others (<i>Wright, 2011</i>)
Emotion	-Enjoyment 55/101 (<i>Fraser, 2015</i>)	-Mood (<i>Faulkner, 2004; Wright, 2011</i>) -Distraction (<i>Faulkner, 2004</i>)
Behavioural Regulation	-Pedometer for self-monitoring 19/23 (<i>Fraser, 2015</i>)	-Regulation of exercise (<i>Wright, 2011</i>) -Routine (<i>Wright, 2011</i>) -Pedometer (<i>Pentecost, 2015</i>) -Self-help workbook (<i>Pentecost, 2015</i>) -Diary (<i>Pentecost, 2015</i>)

Table 4 Facilitators identified to physical activity and exercise

Chapter 3: Barriers and facilitators to health care providers' promotion of physical activity for individuals with mental illness: A scoping review

3.1 Background

Individuals with mental illness (MI) have a lower life expectancy than the general population by 10 to 20 years and are at a higher risk of developing chronic conditions and physical complications such as diabetes and heart disease (Chesney, Goodwin, & Fazel, 2014). Physical activity (PA) reduces this risk (Richardson et al., 2005; Rosenbaum, Tiedemann, Sherrington, Curtis, & Ward 2014). More recently, it has become evident that exercise and physical activity are beneficial for both physical and mental health of individuals with mental illness (Stanton & Happell, 2014) and brain functioning (Deslandes et al., 2009). PA can be defined as any bodily movement produced by skeletal muscles that results in energy expenditure (Casperson, Powell, & Christenson, 1985). Exercise is a subset of PA and is defined as physical activity that is planned, structured, repetitive and done for the purposes of improving or maintaining physical fitness (Casperson et al., 1985). There has been a call to implement PA and exercise programming into health care services for individuals with a mental illness (Richardson et al., 2005; Rosenbaum et al., 2018; Vancampfort et al., 2015a).

A growing body of research demonstrates that exercise is an effective intervention for various mental illnesses. Rosenbaum et al. (2014) showed that exercise has a large effect in reducing depressive and schizophrenia symptoms, and a moderate effect in improving quality of life amongst people with mental illness. Firth and colleagues (2015) demonstrated that 90 minutes of moderate-vigorous exercise a week can significantly reduce psychiatric symptoms as well as improve functioning for individuals with schizophrenia. Exercise has also been shown to

be effective for reducing symptoms for those with clinical anxiety (Aylett, Small & Bower, 2018). While more research is needed to understand the impact of exercise on mood for those with bipolar disorder, exercise is acknowledged as an important intervention for general health benefits in this population (Thomson et al., 2015). The evidence to support exercise for depression is the most established. Structured exercise programs have consistently been shown to significantly reduce depressive symptoms for individuals with clinical depression (Joseffson et al., 2014; Krogh, Hjorthøj, Speyer, Gluud, & Nordentoft, 2017; Schuch et al., 2016a).

In light of this evidence, international bodies acknowledge and recommend exercise for mental illness. The Royal Australian and New Zealand College of Psychiatrists (2015) recommend that exercise should be integrated in usual care for delivery in all mental health settings, and as a core element for individuals with psychiatric conditions. The National Institute for Clinical Excellence (NICE) in the UK (2014) recommend that those with psychosis or schizophrenia should be offered a combined PA program by their health care provider. Due to the mature evidence base regarding exercise and depression, depression is the first and only mental health disorder in which exercise is recommended as an evidence-based treatment. The Canadian Network for Mood and Anxiety Treatments (CANMAT) recommend exercise as a primary intervention for mild-moderate Major Depressive Disorder (MDD) (Ravindran et al., 2016). NICE (2009) recommends PA as a treatment for subthreshold and mild-moderate depression. The American Psychiatric Association (2010) also identifies that exercise can be used as a monotherapy for mild depression in the acute phase after a diagnosis with monitoring of mood by a health professional. International recommendations and clinical treatment guidelines are developed to help health care providers implement evidence-based research into their clinical practice (Ravindran et al., 2016). Guidelines help to understand ‘what’ to do, but

not ‘how’ to do it (implementation). Health care providers play an integral role as gatekeepers in implementing guidelines and helping individuals with a mental illness engage in PA. Adults with mental illness have also identified the importance of social influences inclusive of the support of a health professional for engaging in exercise and PA (Firth et al., 2016; Glowacki, Duncan, Gainforth & Faulkner, 2017). Thus, we need to further understand the barriers and facilitators to PA promotion in clinical practice.

Conducting a theory-based analysis of the barriers and facilitators affecting health care providers’ promotion of exercise or PA for individuals with a mental illness provides a framework for comprehensively understanding the relationship between these factors and the mechanisms by which they influence behaviour. The Theoretical Domains Framework (TDF) is an integrative framework of behaviour change that can be used to identify these modifiable factors, and then guide theory driven intervention (Cane, O’Connor, & Michie, 2012). The TDF is comprised of 14 domains (defined in the results): knowledge; skills; memory, attention and decision processes; behavioural regulation; social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; intentions; goals; reinforcement; emotion; environmental context and resources; and social influences. These domains are constructs identified in several existing theories as determinants of behaviour change. The TDF has been used in previous reviews to understand barriers and facilitators related to health behaviour (Dobson et al., 2016; Glowacki et al., 2017; Heslehurst et al., 2014). The TDF is also part of a larger, meta-framework known as the Behaviour Change Wheel (BCW) that helps intervention developers select behaviour change techniques (BCTs). BCTs are the active ingredients within an intervention (what can be observed and replicated) designed to change behaviour (Michie & Atkins, 2014). The TDF provides a behavioural diagnosis of what needs to change in a specific

context for a specific behaviour to change. Specific BCTs are then linked theoretically to particular domains. Thus, conducting a TDF analysis provides the initial step for developing and implementing theory-informed behaviour change interventions (Cane, O'Connor, & Michie, 2012).

Previous systematic reviews have summarized the barriers and facilitators of primary care providers to physical activity counselling and promotion (Hébert, Caughey, & Shuval, 2012; Huijg et al., 2014), and of allied and other non-medical health professionals (Crisford et al., 2018). While these reviews provide insight into the factors affecting behaviours of general clinicians working in health care, they do not provide information related to the promotion of PA for specific health populations where barriers may be more challenging. Individuals with mental illness have unique barriers to engaging in exercise compared to the general population related to their psychiatric symptoms, physical health co-morbidities and side-effects of medication (Vancampfort et al., 2015b). More recent work has been done to further understand health care providers that work specifically with individuals with mental illness, and their promotion of PA or exercise (Carlbo, Claesson, & Åström, 2018; Stanton et al., 2017; Soundy et al., 2014; Way et al., 2018). However, to the best of our knowledge no review has synthesized this research. This is needed to inform interventions and initiatives to support effective implementation of PA into clinical practice. The primary purpose of this review was to identify the barriers and facilitators to PA promotion by health care providers working with individuals with mental illness.

3.2 Methods

A mixed-methods scoping review guided by Levac and colleagues' methodological framework (2010) was conducted as it is appropriate to address broader topics, understudied areas, and to include a variety of different study designs (Arksey & O'Malley, 2005). The

Theoretical Domains Framework and definitions of each domain were used to categorize the barriers and facilitators extracted from the included studies (Cane, O'Connor, & Michie, 2012). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Reviews (PRISMA-ScR) criteria guided reporting of the methods and findings and is included in the Appendix for reference (Tricco et al., 2018). A protocol for this review was not registered.

Inclusion Criteria: Since no review has been conducted on the PA promotion behaviours of health care providers who work with individuals with mental illness, we adopted a broad approach for operationalizing key concepts. The broader concept of mental illness, characterized by altered thinking, mood or behaviour, was used and includes mood disorders, schizophrenia, anxiety and personality disorders. We also included serious mental illness. Any health care provider designation was included (e.g., General Practitioner, nurse, physiotherapist, mental health worker). The broader concept of physical activity was used, which incorporates the subset of exercise as defined previously. For the purposes of this review, the definition of PA promotion was adapted from The Ottawa Charter's definition of health promotion (cited in Hyndman, 2007) and is 'the process of enabling people to increase control over and improve their health through physical activity or exercise'. This is inclusive of, but not limited to, any encouragement of or conversation related to PA, reviewing past experience, counselling, prescription, and facilitation of, or referral to, a PA program or routine. Barriers and facilitators were defined as any physiological, psychological or socio-ecological condition reported to reduce/negatively or enhance/positively affect a health care provider's promotion of PA, respectively. Facilitators were differentiated from modes of delivery of PA promotion. These were defined as techniques,

strategies or preferences that described the way in which someone promoted PA. For the purposes of this review, modes of delivery of PA promotion were not extracted.

Using these definitions, articles included in this review met the following criteria: (1) sample populations were health care providers working with individuals with mental illness, and (2) investigated barriers and/or facilitators to PA promotion. Studies using quantitative, qualitative or mixed methods were included. Articles were excluded if they did not specify the client population diagnosis that the health care providers worked with. For example, if a study included General Practitioners within primary care, but did not specify any client populations with a mental illness such as depression, it was excluded. Commentaries, opinion pieces, and reviews of existing literature were excluded if they did not have any empirical data (acquired by observation or experimentation).

Search strategy and study selection: Articles were identified for inclusion through a process. First an experienced librarian was consulted prior to starting the search to help develop the search strategy. Articles found from a previous study (Glowacki et al., 2017) were reviewed by the librarian to identify important concepts for the electronic database search (Happell, Platania-Phung & Scott, 2013; Happell, Platania-Phung, Scott, & Nakivell, 2013). The key concepts of health care provider attitude, PA/health promotion, and mental illness were identified. Subject headings and free text terms reflective of our key concepts and informed by similar reviews (Verhaeghe et al., 2011; Huijg et al., 2014; Crisford et al., 2018) were chosen in collaboration with the librarian and the search strategy was refined.

An electronic database search was then conducted in Ovid MEDLINE (1946 to present), PsycINFO (1597 to present), EMBASE (1974 to present), and Cochrane (CENTRAL AND CDSR; 2005 to present) by the second author in September 2018. See Appendix for a detailed

search strategy for PsycINFO. Subject headings were specific to each database (using the thesaurus feature). Subject headings for all key concepts were used in every database except for PsycINFO. The final search in PsycINFO did not include the subject heading terms for mental illness as this excessively narrowed the search results. Free text terms were the same in each database. Limits put on searches were for English language. In addition, a search of google scholar using key concepts (exercise OR “physical activity” OR “health promotion”) AND (“health care provider*”) was done and the first 10 pages of titles were screened for eligibility. After removal of duplicates (n = 659), two reviewers screened articles by title and abstract first according to inclusion criteria, and full-text articles were obtained as needed. In addition, reference lists of eligible articles and other relevant articles (editorials, opinion pieces, reviews) were screened to identify any potentially eligible articles that were missed. Once screening was completed by the first and second author, the list of articles to include was reviewed by the third author to confirm the studies met inclusion criteria, and that no relevant articles were missed. Any difference of opinion between all authors was resolved by discussion. Figure 5 provides a flow diagram of search and study selection adapted from the PRISMA Group (2009).

Data Extraction and Analysis: Together, the two authors extracted data from the eligible studies using a data extraction form including: provider type, practice setting, client population and country. To identify barriers and facilitators, the first two authors independently read through each eligible article line by line and extracted any section of text if it met the aforementioned definitions of barrier or facilitator. Barriers and facilitators were only extracted if it was clearly stated they affected the health care providers’ behaviour of promoting PA. We distinguished text as a barrier or facilitator based on how the authors of each article reported and classified the factor influencing PA promotion. Data extraction methods varied based on the type

of study and data presented. For quantitative studies where data were presented as the number of respondents endorsing a statement out of the total respondents, data was extracted as a dichotomous yes or no out of the total number of respondents. As such, Likert-style scales or other methods of demonstrating levels of agreement were dichotomized where any endorsement (e.g. agree, strongly agree) was treated as “yes”, or disagreement (e.g. strongly disagree, disagree) was treated as a “no” (Weatherson, Gainforth & Jung, 2017). Ambivalence or neutral statements were not extracted as we were concerned with identifying factors that individuals perceived to be the most salient to their own behaviour. Barriers and facilitators were extracted from qualitative studies if they were mentioned by the authors in the results as being relevant to PA promotion by health care providers. Authors met to compare extraction and consensus was met through discussion.

Next, the TDF was used to categorize the barriers and facilitators. The first two authors independently categorized the extracted barriers and facilitators into any relevant domains within the TDF, using domain definitions (Cane, O’Connor, & Michie, 2012). Given that the TDF domains are not mutually exclusive (Michie et al., 2005), some items were coded to multiple domains (e.g., lack of training was always coded to ‘Knowledge’, ‘Skills’ and ‘Environmental Context & Resources’ domains, and client barriers were always coded to ‘Beliefs about Consequences’ and ‘Social Influences’). Upon completing categorization, the first two authors met to assess agreement on the TDF domain categorization. The authors solved discrepancies through discussion, rereading source material, and collaboration. When no agreement could be reached, the opinion of the third author determined the final result. The third author also reviewed final TDF categorizations. Similar factors were categorized into sub-themes. Important TDF domains were those that had multiple sub-themes, whereby the majority of participants in

quantitative studies agreed on the presence of the factor, and more than one qualitative study identified the sub-theme.

3.3 Results

Figure 5 displays the flow diagram of search and study selection. A total of 33 articles were included for analysis (Bartlem et al., 2016; Brand et al., 2016; Bressington et al., 2016; Bressington et al., 2018; Browne, Mihas & Penn, 2016; Burks & Keeley, 1989; Burton et al., 2010; Carlbo et al., 2018; Faulkner & Biddle, 2002; Ganiah et al., 2017; Happell et al., 2012; Happell et al., 2013a; Happell et al., 2013b; Harding, 2013; Joyce & O'Tuathaigh, 2014; Kinnafick et al., 2018; Leutwyler et al., 2012; Patel et al., 2011; Phongsavien, 2007; Radovic et al., 2017; Robson et al., 2013; Searle et al., 2012; Soundy et al., 2014; Stanton, 2013; Stanton et al., 2015a; Stanton et al., 2015b; Stanton et al., 2017; Stubbs et al., 2014a; Stubbs et al., 2014b; Verhaeghe et al., 2013; Way et al., 2018; Wendt, 2005; Zanelidou et al., 2017).

Table 5 summarizes each article included in the review based on provider type, practice setting, client population and country. Fifteen studies employed quantitative methods (Bartlem et al., 2016; Brand et al., 2016; Bressington et al., 2018; Burks & Keely, 1989; Burton et al., 2010; Ganiah et al., 2017; Happell et al., 2013a; Joyce & O'Tuathaigh, 2014; Phongsavien et al., 2007; Robson et al., 2013; Stanton, 2013; Stanton et al., 2015b; Stanton et al., 2017; Wendt, 2005; Zanelidou et al., 2017) and twelve used qualitative methods of data collection (Bressington et al., 2016; Browne et al., 2016; Carlbo et al., 2018; Faulkner & Biddle, 2002; Happell et al., 2012; Kinnafick et al., 2018; Leutwyler et al., 2012; Patel et al., 2011; Searle et al., 2012; Soundy et al., 2014; Verhaeghe et al., 2012; Way et al., 2018). Six studies used a mixed-methods approach to data collection (Happell et al., 2013b; Harding 2013; Radovic et al., 2017; Stanton et al., 2015a; Stubbs et al., 2014a; Stubbs et al., 2014b); however, barriers and/or facilitators were only

reported quantitatively in two studies (Stanton et al., 2015a; Radovic et al., 2017), and qualitatively in three studies (Happell et al., 2013b; Stubbs et al., 2014a; Stubbs et al., 2014b). Data from two studies by Happell et al. (2013a and 2013b) and two studies by Stubbs et al. (2014a and 2014b) were from the same study samples.

Quantitative data represented a total of 3246 participants. The majority of providers in each study were female except for in five studies (Burks & Keeley, 1989; Burton et al., 2010; Ganiah et al., 2017; Joyce & O'Tuathaigh, 2014; Stanton et al., 2015a). Two studies did not report percentage female (Brand et al., 2016; Stanton et al., 2015b). Qualitative data represented 1327 participants, with the majority being female. One mixed-methods study reported barriers and facilitators quantitatively and qualitatively (Harding, 2013). This study included 73 staff providing care to individuals with MI at group homes in the USA.

After discussion, the first two authors identified 133 barriers and 98 facilitators across the 33 articles. Of these 231 data points, consensus on TDF domain assignment was achieved through discussion in all but one case, which was reviewed by the last author to determine final categorization. Table 6 and Table 7 display the barriers and facilitators to PA promotion, respectively, organized by data type (quantitative and qualitative) and TDF categorization. The most prominent TDF domains were 'Beliefs about consequences', 'ECR', and 'Social influences.' The following section provides a narrative synthesis of key barriers and facilitators within the TDF.

1. **Knowledge:** an awareness of the existence of something.

Lack of awareness of the evidence supporting PA in the treatment of MI was seen as a barrier, whereas being aware of the therapeutic potential of PA was a facilitator to the promotion of PA by providers. Similarly, lack of knowledge/training on how to promote PA

to clients was a barrier, and the reverse, having knowledge/previous training was a facilitator. Most providers referred to (a lack of) PA-specific training, while exercise physiologists identified (a lack of) training on how to promote PA to individuals with MI.

2. **Skills:** an ability or proficiency acquired through practice.

Similar to the Knowledge domain, (lack of) training and (lack of) knowledge on how to promote/prescribe PA were prominent influencers of provider behaviour. Other facilitators coded to this domain included providers having personal experience with PA and feeling competent to prescribe PA.

3. **Social/Professional Role and Identity:** a coherent set of behaviours and displayed personal qualities of an individual in a social or work setting.

A facilitator amongst qualitative studies was that various health care providers (general Practitioners, exercise physiologists, mental health nurses) believed that they have a key role in PA promotion and delivery. Participants reported that in their positions, they were best positioned and appropriate individuals to promote PA and felt that information coming from them would legitimize the prescription to clients. Correspondingly, very few providers reported that promoting PA was not part of their role and would be best delivered by someone else. However, in two qualitative studies, there was some uncertainty about who can prescribe PA. Other barriers within this domain included providers feeling too inactive themselves to promote PA and thinking that it was the client's own responsibility or choice to be active (and not their responsibility to promote PA).

4. **Beliefs about Capabilities:** acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use.

Lack of confidence to promote PA and feeling it was difficult to do so were identified as barriers, however only in two studies. There was also a reported feeling of difficulty in integrating PA at an institutional level. Mostly, participants reported having the confidence and competence to promote PA/exercise to clients. No facilitators were identified within the qualitative studies.

5. **Optimism:** confidence that things will happen for the best or that desired goals will be attained.

Amongst quantitative studies and one qualitative study, the belief that clients will not adhere to an exercise program was identified. Within qualitative studies, pessimism about change was identified as a barrier in two studies, and optimism about the benefits of PA for MI treatment was identified as a facilitator in one study. One quantitative study identified that the majority of participants agreed that clients would change their physical activity because of the care they provide.

6. **Beliefs about Consequences:** acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation.

This was the most predominant TDF domain for both barriers and facilitators to PA promotion across both quantitative and qualitative studies. Reflecting the optimism domain, providers felt that people with MI would not adhere to an exercise program. Many acknowledged that clients themselves experience important barriers to being active, including a lack of motivation, MI symptoms, poor physical health, and other environmental factors (e.g., financial limitations, transportation issues, poor weather and lack of family support), and so providers do not promote PA. Some providers were not convinced that PA was a helpful or legitimate treatment option for MI, and in some cases might exacerbate MI

symptoms. Two qualitative studies identified that PA was not considered appropriate in inpatient settings where patients may be acutely ill. Other negative consequences included that it takes time away from other treatments, or causes an additional burden on clients, and that it may cause damage to the therapeutic relationship, violate human rights or lead to physical injury of the client or clinician.

Conversely, many reported that PA was beneficial to clients for many reasons: treating MI symptoms, reducing medication needs, improving physical health, providing daily structure and/or a positive distraction, and providing opportunities for socialization. Additionally, providers believed that PA is an appropriate treatment method for MI and that clients would find this option acceptable.

7. **Reinforcement:** increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus.

No barriers were identified in this domain. In one study, nurses reported that clients describing the benefits of PA reinforced the provider to continue to recommend PA to other clients.

8. **Intentions:** a conscious decision to perform a behaviour or a resolve to act in a certain way.

One qualitative study identified that providers lack the motivation to prescribe and investigate PA as a treatment option for their clients. However, only one individual from one quantitative study agreed that they were uninterested in prescribing exercise for adolescents with depression. One qualitative study identified that PA is often forgotten about during patient care planning. A key barrier across six qualitative studies was that the treatment of critical symptoms was a priority before encouraging PA. This was mirrored as a facilitator:

once clients were stable providers were then able to consider PA promotion. In two qualitative studies, clinicians discussed their commitment to a holistic approach to treatment which encompassed consideration of physical health needs.

9. **Goals:** mental representations of outcomes or end states that an individual wants to achieve.

No barriers were identified within this domain. A commitment to a holistic approach, with a PA focus, was coded as a facilitator in this domain.

10. **Memory, Attention and Decision Processes:** the ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives.

As coded above to the Intentions domain, a key barrier across six qualitative studies was the treatment of MI symptoms before encouraging PA. In acute, inpatient settings, providers are trained to make decisions to prioritize the immediate critical needs and safety of the client.

As identified as a facilitator in one qualitative study, only when a client is considered stable, can PA promotion be a focus. Another facilitator identified was client preference for alternative options to medication, which reduced the treatment options for the provider to choose from. In one qualitative study, nurses discussed relying on intuition when it comes to promoting PA to clients with schizophrenia.

11. **Environmental Context and Resources (ECR):** any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour.

ECR was the second most prominent TDF domain. As noted above, a lack of PA training was identified as a predominant barrier to PA promotion/prescription, whereas previous PA education/training was reported as an important facilitator (although the majority of

providers reported not having prior training). Lack of time due to excessive workload, high demands of everyday practice and unpredictable occurrences of crisis, were identified by a variety of providers as barriers across both quantitative and qualitative studies. However, the majority of providers in the quantitative studies did not agree that lack of time was a barrier. Participants also reported a lack of resources, including access to equipment, shortages in funding and staff, and a lack of organizational support. Relatedly, a lack of consistent programming was identified as a barrier in qualitative studies. Facilitators included the integration of PA into the operations of the facility/clinic and access to incentives (e.g., monetary rewards) and other resources (information, programs) to provide to clients to reinforce their PA participation.

12. Social influences: interpersonal processes that can cause individuals to change their thoughts, feelings or behaviours.

The most prevalent barriers coded in this domain were the clients' own barriers to PA engagement (see Beliefs about consequences). In two quantitative studies, some clinicians felt that clients did not want mental health professionals to provide PA counselling. Other barriers that emerged from the qualitative literature were the lack of support from others and the stigma about MI. This was not always the case as clinicians in three qualitative studies felt that they were supported and in harmony with what their colleagues from other professions and settings were doing for PA promotion. Specific interactions with clients that supported providers' PA promotion behaviour included clients' receptivity to PA advice, preference for alternatives to medication for treatment options, and expressing the benefits of PA engagement.

13. **Emotion:** a complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event.

No facilitators were categorized to this domain. Clinicians reported fear and concern over the physical health risk of clients participating in exercise, appearing to be hypocritical for promoting a behaviour they do not engage in themselves, and some viewed prescribing exercise to disinterested participants as a violation of human rights.

14. **Behavioural Regulation:** anything aimed at managing or changing objectively observed or measured actions.

No barriers or facilitators were identified within this domain.

3.4 Discussion

The purpose of this study was to identify the barriers and facilitators to PA promotion experienced by health care providers working with individuals with MI. Overall, barriers and/or facilitators were identified in all TDF domains except ‘Behavioural Regulation’. Importantly, this review highlights two key TDF domains that should be targeted to assist health care providers’ promotion of PA to individuals with MI: ‘Beliefs about the Consequences’, and ‘Environmental Context & Resources (ECR)’. A comprehensive and theoretical examination of these factors allows researchers to prioritize and develop evidence-based strategies to support implementation of clinical guidelines related to exercise into practice.

The most predominant TDF domain for both barriers and facilitators to PA promotion was ‘Beliefs about Consequences’. An important barrier identified by health care providers was the barriers faced by clients (also coded to ‘Social Influences’). Individuals with mental illness experience numerous barriers to PA engagement related to their illness and unique from the

general population (e.g., low mood, psychiatric symptoms) (Firth et al., 2016; Glowacki et al., 2017; Vancampfort et al., 2015b). This possibly relates to the pessimistic belief that clients will not adhere if the practitioner promotes PA. Avery & Patterson (2018) describe this belief that nothing can be done as therapeutic nihilism, and this affects health care providers' motivation to promote PA. However, the presence of client barriers, coupled with therapeutic nihilism, should not be an excuse to forgo the promotion of PA. Providers have a duty to care and to help individuals with mental illness overcome barriers to engaging in meaningful occupations and treatments such as exercise. Behaviour change is of course challenging yet systematic reviews demonstrate intervention is possible (Bridle, Spaniers, Patel, Atherton, & Lamb, 2012; Dauwan, Begemann, Heringa, & Sommer, 2016; Josefsson, Lindwall, & Archer, 2014) and qualitative research undoubtedly tells us that individuals want support in leading healthier lives (Azar, Ball, Salmon, & Cleland, 2011; Searle et al., 2014; Wright, Armstrong, Taylor & Dean, 2011). With the evolving integration of exercise and PA into treatment guidelines for MI, there may be an opportunity for developing training opportunities that challenge pessimistic assumptions and equip practitioners with strategies and skills to help their clients overcome barriers to increasing PA.

Another important domain identified in this review was 'ECR'. A common clinician barrier was a lack of training on how to promote PA (closely related to lack of knowledge and skills). Similarly, primary care providers identified a lack of knowledge and training in PA as their top barriers when working with the general population (Hébert, Caughy, & Shuval, 2012; Huijg et al., 2015). In contrast, health care providers in this review and others (Huijg et al., 2015; Crisford et al., 2018) identified that training to enhance knowledge and skills was an important factor to engaging in PA promotion. Other barriers within 'ECR' include a lack of resources such

as programs and staff. These findings align with a recent international consensus about the integration of PA in mental health services that identified that resource and organizational culture changes are needed for successful integration (Rosenbaum et al., 2018). Changes to organizational culture include a change in infrastructure around programming and staff, as well as training for either mental health professionals on exercise/PA or for exercise specialists on MI. For exercise as a treatment for MI to gain wider acceptance there remains the need for formalized organizational and structural support, targeted funding, ongoing education and training of commissioners and providers of mental health services and practitioners, and the development of evidence-based exercise and PA programs. Accordingly, future research examining the integration of PA into mental health care should focus on the systems of care rather than only at the individual level.

This review included studies that examined barriers and facilitators to PA promotion by a variety of health care providers to a variety of clinical MI subpopulations. It is important to consider if and how these different groups and/or contexts may require a targeted intervention approach to overcome population or context specific barriers. While only three articles examined clinicians working with clients of a specific age group, adolescents and older adults (Radovic et al., 2017; Leutwyler et al., 2012; Zanutidou et al., 2017), no differences in barriers and facilitators were identified between these groups.

Health care providers working with individuals with depression are an important clinical subpopulation, as all current clinical treatment guidelines center around adults with depression (APA, 2010; NICE, 2009; Ravindran et al., 2016). Seven studies included in this review examined practitioners that specifically work with individuals with depression (Burks & Keeley, 1989; Brand et al., 2016; Patel et al., 2011; Radovic et al., 2017; Searle et al., 2012; Stanton et

al., 2015a; Zanetidou et al., 2017). Overall, no discernible differences were found for these providers in relation to their main barriers and facilitators to PA promotion compared to the rest of the studies in this review. Thus, the overall results from this review can be used to inform intervention for this subpopulation of health care providers.

Health care providers that work with individuals with schizophrenia are another important subpopulation, as schizophrenia is a chronic and severe mental disorder that is typically chronic and disabling (National Institute of Mental Health, 2016). Five studies included in this review focused on providers who work specifically with individuals with schizophrenia (Carlbo et al., 2018; Leutwyler et al., 2012; Soundy et al., 2014; Stubbs et al., 2014a; Stubbs et al., 2014b), and four further studies included providers that work with individuals with serious mental illness, inclusive of schizophrenia (Browne et al., 2016; Harding, 2013; Kinnafick et al., 2018; Robson et al., 2013). A unique facilitator influencing behaviour in these studies was the use of incentives (e.g., discount to fitness facilities) to help promote PA. Incentivizing can promote behaviour on two levels: for the client, by reducing barriers related to resources (e.g., limited finances), and for the provider, by acting as a resource and a tool by which to discuss and promote PA with a client. It is likely that incentives would work in the same way for clinicians that work with other MI populations, as individuals with MI are likely to experience lower income and higher rates of unemployment (MHCC, 2017).

In this review another emerging subpopulation of providers was exercise specialists. Three studies examined specialist mental health physiotherapists (Soundy et al., 2014; Stubbs et al., 2014a; Stubbs et al., 2014b), and two included exercise physiologists (Stanton, 2013; Stanton et al., 2017). It is important to note that not all mental health care systems have exercise specialists embedded within the multidisciplinary mental health team. For example, in Canada no

coordinated national or provincial referral scheme exists for individuals diagnosed with a mental illness to seek mental health treatment from an exercise specialist. The studies that included exercise physiologists were both conducted in Australia, where mental health components are incorporated into the professionals' graduate training (Stanton et al., 2017), and individuals with MI can receive referrals to see accredited exercise physiologists (Lederman et al., 2016). Better integration of exercise specialists into the mental health system could alleviate the need to train mental health providers on the specifics of PA promotion or prescription. For this to happen advocacy to key stakeholders such as government health authorities, decision makers, and community organizations still remains necessary.

3.5 Implications

From this review, key theoretical domains in the TDF can be mapped onto intervention functions and behaviour change techniques (BCTs) via the Behaviour Change Wheel to support intervention design and delivery (Michie, Atkins & West, 2013; Cane et al., 2015). For example, a recommended BCT that can be used for intervention is educating providers with *information on the health consequences* (to their client) of promoting PA and on the clinical guidelines supporting this evidence to address providers' lack of knowledge on the evidence-base for PA in the treatment of MI. Mental health care providers identified a need for training on PA promotion. Training could provide the opportunity for clinicians to engage in *behavioural rehearsal/practice* (e.g., role play), which is practicing the performance of a behaviour multiple times in a context when the behaviour is not necessary to increase habit & skill (Michie et al., 2013b).

While policy- and organizational-level changes are warranted (Rosenbaum et al., 2018), these changes require considerable time and funding. Providing training to health care providers on skills, knowledge, the positive benefits of PA for individuals with MI, and clinical guidelines

may be a feasible and acceptable starting point to a complex problem (Avery & Patterson, 2018). Training, complementary with recovery-oriented principles (Davidson, Shmutte, Dinzeo, & Andres-Hyman, 2009), can equip clinicians with tools and behaviour change techniques to help clients overcome barriers to PA. Training could be delivered to health care providers in a variety of ways, including in-person or online modules, and at a variety of times throughout their professional career (at the outset and ongoing). In order for shifts in organizational culture to occur sustainably over time, mental health professional training should incorporate PA-specific content into curriculum to prepare health care providers before entering their practice (Faulkner & Biddle, 2001). The emergence of initiatives such as ‘Exercise is Medicine’ (<http://exerciseismedicine.org/>) may provide some momentum to such considerations.

3.6 Strengths and Limitations

A significant strength of this paper was the use of a theoretical framework to conduct a behavioural analysis to systematically understand the factors influencing behaviour of health care providers that work with individuals with MI. This analysis can assist with the creation of future interventions to support the PA promotion by health care professionals. Other interventionists can replicate this analytical approach for any specific population/behaviour. While some clinical guidelines specify exercise for mental illness (not PA per se), exercise is a subset of physical activity and we made no separation of these terms in this review. As this was a scoping review, no quality assessment of included articles was performed. An additional strength of this review is that it evaluated qualitative and quantitative studies. We did not have access to the raw data from the included studies and had to rely on the reporting of barriers and facilitators by original authors for extraction and coding. Determining the factors directly affecting the health care providers’ behaviour was difficult as this behaviour is multi-layered and affected by

client behaviour. This made it difficult at times to determine if a barrier or facilitator was mentioned in relation to the behaviour of providers' promotion of PA, or in relation to their clients' behaviour of engaging in PA. Finally, it is possible that there are factors representative of other TDF domains (e.g., Goals, Behavioural Regulations) that may hinder or support PA promotion by health care professionals, yet we were limited to extracting and coding data that the original authors identified.

3.7 Conclusion

This review provides insight into the barriers and facilitators that health care providers experience when promoting PA to individuals with mental illness. The most prominent barriers and facilitators were encompassed within the domains of 'Beliefs about the Consequences', and 'Environmental Context & Resources'. To address these important domains and help clinicians promote PA, specialized training is vital and should incorporate recommended BCTs in a relevant way (Cane et al. 2015). Training should provide education on the evidence base, and teach health care providers the skills to employ evidence-based behaviour change techniques to help their clients overcome barriers to PA. Training could be implemented at a curriculum level to mental health care provider trainees before entering the field as a professional to ensure culture changes around the use of PA for MI, or for exercise specialists in working with individuals with MI. However, greater integration of PA promotion within mental health care will require broader systemic change.

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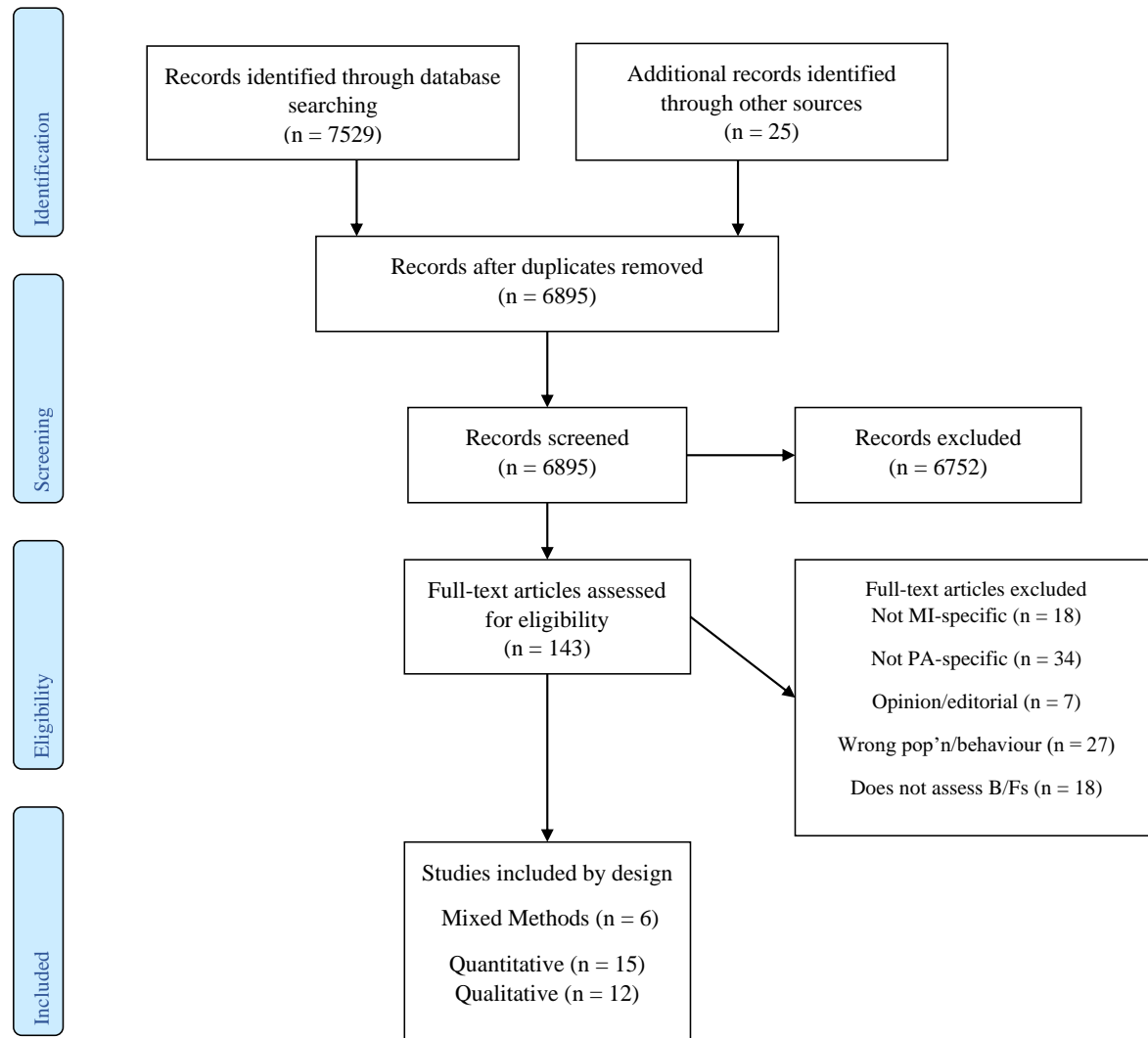


Figure 5 PRISMA flow diagram of search and study selection

	Type of Study	Method	Analysis Approach	Practitioner Type	Practitioner Age	Practice Setting	n	n Female	Client Population	Country
Bartlem et al., 2016	Quantitative	Questionnaire (telephone)	Agreement	Registered Nurses, Psychiatrists and other allied health	20-49 (years) n=85	Community mental health services	151	88	Individuals seeking community mental health care	New South Wales, Australia
Brand et al., 2016	Quantitative	Questionnaire (online)	Frequency	Staff members involved in PAEP	NR	Psychiatric Hospital (inpatient & outpatient)	48	NR	Inpatients with psychiatric disorders (80% Personality & Mood disorders)	Switzerland (German speaking area)
Bressington et al., 2016	Qualitative	Interviews	Inductive thematic analysis	Registered Mental Health Nurses	31-40 (years) n=6, >40 n=5	Community psychiatric service	11	6	Individuals with serious mental illness	Hong Kong
Bressington et al., 2018	Quantitative	Questionnaire (PHASe)	Agreement	Registered Psychiatric and General Nurses	<29 (years) n=76, 30-39 n=139, 40-49 n=120, 50+ n=119	Inpatient psychiatric units or outpatient/community settings	481	275	People with serious mental illness	Hong Kong, Japan, Qatar
Browne et al., 2016	Qualitative	Focus Groups	Constant Comparison	Clinicians providing treatment to individuals with SMI	Mean age in years = 37.3 ± 10.1	Local clinics	14	9	Adults with serious mental illness	U.S.A. (southeastern state)
Burks & Keeley, 1989	Quantitative	Questionnaire (mail)	Frequency	Psychotherapists	Mean age in years = 46.6	Private practice (73.4%)	232	83	Depression (21.2 %) and Anxiety (18.1 %) most frequently reported	NR
Burton et al., 2010	Quantitative	Questionnaire	Agreement	Psychologists	Mean age in years= 42.12 ± 8.04 (Range= 22-75 years)	Private, community, not for profit, education, hospital/primary care/ GP clinic, corporate/commercial	236	200	Majority mental health client issues (e.g. anxiety, depression, mental illness, phobias, psychosis)	Australia (Queensland)
Carlbo et al., 2018	Qualitative	Focus Groups	Qualitative content analysis	Registered Nurses and nurse assistants	NR	Inpatient unit at hospital and associated outpatient unit	12	9	Adults with schizophrenia	Western Sweden
Faulkner & Biddle, 2002	Qualitative	Semi-structured interviews	Thematic analysis	Mental Health Nurses	Mean age in years = 35.25 ± 6.98	Mental health trust (inpatient)	12	9	NR	United Kingdom

Ganiah et al., 2017	Quantitative	Questionnaire (PHASe)	Agreement	Mental Health Nurses	Mean age in years= 32.5 ± 7.22	Mental health hospitals	202	81	Individuals with mental illness	Jordan
Happell et al., 2012	Qualitative	Focus Groups	Thematic analysis	Mental Health Nurses	NR	Community mental health, acute inpatient & other	38	NR	People seeking mental health services	Australia (Queensland)
Happell et al., 2013a¹	Quantitative	Questionnaire (PHASe)	Agreement	Members of the Australian College of Mental Health Nurses	NR	Public inpatient and community settings	643	468	Individuals with serious mental illness	Australia
Happell et al., 2013b¹	Mixed-Methods (Extracted Qualitative)	Questionnaire (Open-ended questions)	Thematic analysis	Members of the Australian College of Mental Health Nurses	NR	Mental health services (public and private)	643	468	Individuals with serious mental illness	Australia
Harding, 2013	Mixed-Methods	Questionnaire (closed- and open-ended questions)	Agreement & themes	Direct Care Staff	NR	Mental health group homes	73	NR	Individuals with serious mental illness living in group homes	U.S.A. (one New England state)
Joyce & O'Tuathaigh, 2014	Quantitative	Questionnaire	Frequency	General Practitioners	Mean age in years= 48.5 ± 9.5	Primary care and private clinics	102	34	Individuals with chronic illnesses, including depression	Ireland
Kinnaffick et al., 2018	Qualitative	Interviews	Thematic analysis	Healthcare assistants	Mean age in years= 30.27 ± 7.75	Secure mental health hospital	11	6	Individuals (adolescents, adults) with severe mental illness	United Kingdom
Leutwyler et al., 2012	Qualitative	Interviews	Constant comparison	Mental Health Staff	Range ≥21 years	Transitional residential and day treatment center, locked residential facility & intensive case management program	23	NR	Older adults with schizophrenia	U.S.A.
Patel et al., 2011	Qualitative	Interviews	Thematic analysis	General Practitioners	Mean age in years= 50.8 ± 7.1	General practice settings	15	10	Individuals with depression	Auckland, New Zealand
Phongsavan et al., 2007	Quantitative	Questionnaire (email)	Frequency	Mental Health Therapists	NR	Community health, hospital, private clinics, specialist centres, schools	51	38	NR	Australia (Southwest Sydney)

Radovic et al., 2018	Mixed-methods (Extracted Quantitative)	Questionnaire (EMIQ-adapted for adolescents)	Frequency	Mental Health Clinicians	25–35 yrs (60%), 36–45 yrs (20%), 46–55 yrs (13.6%), < 25 yrs (3.2%) 56–65 yrs (3.2%).	NR	125	100	Adolescents with Depression	Australia
Robson et al., 2013	Quantitative	Questionnaire (PHASe)	Agreement	Mental Health Nurses	20-30 (years) n=72, 31-40 n=189, 41-50 n=182, >50 n=124	NHS Mental Health Trust	585	365	People with serious mental illness	United Kingdom
Searle et al., 2012	Qualitative	Semi-structured telephone interviews	Emerging Themes	General Practitioners	NR	Primary Care	15	NR	Individuals with depression	United Kingdom (Bristol & Exeter)
Soundy et al., 2014	Qualitative	Questionnaire	Thematic analysis-Frequency	Specialist Mental Health Physiotherapists	NR	Inpatient, community, outpatient or combination	40	30	Individuals with schizophrenia	International
Stanton, 2013	Quantitative	Questionnaire	Frequency	Accredited Exercise Physiologists	>50% 26-35 years	Variety	61	40	People with mental illness (depression most common condition)	Australia
Stanton et al., 2015a	Mixed Methods (Extracted Quantitative)	Questionnaire	Frequency	General Practitioners	Mean age in years =46.4 ± 8.9 (Range= 31–67 years)	NR	20	9	People with depression	Australia (Central Queensland)
Stanton et al., 2015b	Quantitative	Questionnaire (EMIQ-HP)	Frequency	Nurses	Mean age in years= 42.8 ± 13.5 (Range= 21–70 years)	Adult inpatient mental health facilities	34	NR	Adults with mental illness	Australia
Stanton et al., 2017	Quantitative	Questionnaire (EMIQ-HP)	Frequency	Accredited Exercise Physiologists	Mean age in years= 33.3 ± 10.4	Variety	81	61	People with mental illness	Australia

Stubbs et al., 2014a²	Mixed-Methods (Extracted Qualitative)	Questionnaire (online)	Thematic analysis	Physical Therapists	Mean age in years= 40 ± 11.2	Inpatient, community, outpatient or combination	151	106	Individuals with schizophrenia	International (31 countries - mostly European)
Stubbs et al., 2014b²	Mixed-Methods (Extracted Qualitative)	Questionnaire (closed- and open-ended)	Content thematic analysis	Physical Therapists	Mean age in years= 40 ± 11.2	Inpatient, community, outpatient or combination	151	106	Individuals with schizophrenia	International (31 countries - mostly European)
Verhaeghe et al., 2013	Qualitative	Focus Groups	Descriptive	Mental Health Nurses	Mean age in years= 34.8 ± 8.9	Working in sheltered housing	17	13	Adults with mental disorders living in sheltered housing	Belgium (Flanders region)
Way et al., 2018	Qualitative	Questionnaire	Thematic analysis-frequency	Mental Health Professionals	Mean age in years= 46.5 ± 11.1	NR	325	263	People seeking mental health services	Australia & New Zealand
Wendt, 2005	Quantitative	Questionnaire	Frequency	Licensed Psychologists	Mean age in years= 51.8 ± 9.4	Private office, hospital, agency	174	97	Individuals participating in psychotherapy	U.S.A. (Massachusetts)
Zanetidou et al., 2017	Quantitative	Questionnaire	Frequency	Primary Care Physicians	NR	Primary care with psychiatric consultation-liaison programs	20	11	Individuals with late-life major depression	Italy
NR= Not Reported PAEP= Physical activity & exercise programs PHASe= Physical Health Attitude Scale for Mental Health Nurses EMIQ-HP= Exercise in Mental Illness Questionnaire-Health Practitioners NHS= National Health Service										
¹ Happell 2013a and 2013b are from same study sample. ² Stubbs et al., 2014a and 2014b are from the same study, reporting on different results to open-ended questions.										

Table 5 Characteristics of included studies

TDF Domain	Barriers (Quantitative)	Barriers (Qualitative)
Knowledge	<p>Lack of knowledge on how to promote PA* 174/232 (Burks & Keeley, 1989) 31/126 (Radovic et al., 2017) 37/73 (Harding, 2013) 8/34 (Stanton et al., 2015a)</p> <p>Unaware of PA evidence for treatment of MI 29/236 (Burton et al., 2010) 2/20 (Zanetidou et al., 2017)</p> <p>Lack of PA training* 135/232 (Burks & Keeley, 1989) 48/48 (Brand et al., 2016) 79/126 (Radovic et al., 2017) 167/236 (Burton et al., 2010) 335/480 (Bressington et al., 2018) 79/102 (Joyce & O'Tuathaigh, 2014) 427/643 (Happell et al., 2013a) 166/174 (Wendt, 2005)</p> <p>Lack of MI training* 32/61 (Stanton, 2013) 54/81 (Stanton et al., 2017)</p>	<p>Lack of knowledge on how to promote PA* (Carlbo et al., 2018; Harding, 2013)</p> <p>Unaware of PA evidence for treatment of MI (Carlbo et al., 2018; Faulkner & Biddle, 2002; Searle et al., 2012; Stubbs et al., 2014b)</p> <p>Lack of training* (Way et al., 2018)</p>
Skills	<p>Do not know how to promote PA* 31/126 (Radovic et al., 2017) 37/73 (Harding, 2013) 8/34 (Stanton et al., 2015a)</p> <p>Lack of PA training* 135/232 (Burks & Keeley, 1989) 48/48 (Brand et al., 2016) 79/126 (Radovic et al., 2017) 167/236 (Burton et al., 2010) 335/480 (Bressington et al., 2018) 79/102 (Joyce & O'Tuathaigh, 2014) 427/643 (Happell et al., 2013a) 166/174 (Wendt, 2005)</p> <p>Lack of MI training* 32/61 (Stanton, 2013) 54/81 (Stanton et al., 2017)</p>	<p>Do not know how to promote PA* (Carlbo et al., 2018; Harding, 2013)</p> <p>Lack of training* (Way et al., 2018)</p>
Social/Professional Role and Identity	<p>Not part of my job/role 4/125 (Radovic et al., 2017) 70/579 (Robson et al., 2013) 2/34 (Stanton et al., 2015a)</p> <p>Best delivered by someone else (e.g., exercise specialist) 35/126 (Radovic et al., 2017)</p>	<p>Not/no longer part of my job/role (Carlbo et al., 2018; Way et al., 2018)</p> <p>Uncertainty about who can prescribe PA (Carlbo et al., 2018; Kinnafick et al., 2018)</p> <p>Best delivered by someone else (e.g., exercise specialist) (Way et al., 2018)</p>

	<p>9/34 (Stanton et al., 2015a)</p> <p>Lack of personal PA engagement 17/73 (Harding, 2013)</p> <p>PA is the client's personal choice 4/174 (Wendt, 2005)</p>	<p>Lack of personal PA engagement (Way et al., 2018)</p> <p>PA is the client's responsibility (Faulkner & Biddle, 2002)</p>
Beliefs about Capabilities	<p>Lack of confidence to promote PA 6/73 (Harding, 2013)</p>	<p>Doubt in competency (Kinnafick et al., 2018)</p> <p>Difficult to integrate PA into institutional operation* (Leutwyler et al., 2012)</p>
Optimism	<p>Believe clients will not adhere* 29/126 (Radovic et al., 2017) 15/20 (Stanton et al., 2015b) 33/61 (Stanton, 2013) 2/34 (Stanton et al., 2015a) 66/174 (Wendt, 2005) 10/20 (Zanetidou et al., 2017)</p>	<p>Believe clients will not adhere* (Faulkner & Biddle, 2002)</p> <p>Pessimistic about change (Searle et al., 2012; Happell et al., 2012)</p>
Beliefs about Consequences	<p>Believe clients will not adhere* 29/126 (Radovic et al., 2017) 15/20 (Stanton et al., 2015b) 33/61 (Stanton, 2013) 2/34 (Stanton et al., 2015a) 66/174 (Wendt, 2005) 10/20 (Zanetidou et al., 2017)</p> <p>Client barriers prevent them from promoting PA:*</p> <ol style="list-style-type: none"> 1. Unmotivated 54/73 (Harding, 2013) 184/576 (Robson et al., 2013) NR/480 (Bressington et al., 2018) 144/202 (Ganiah et al., 2017) 45/174 (Wendt, 2005) 2. MI symptoms 15/126 (Radovic et al., 2017) 3. Poor physical health 3/125 (Radovic et al., 2017) 1/34 (Stanton et al., 2015a) 6/20 (Zanetidou et al., 2017) <p>PA not helpful/legitimate for treatment of MI 1/126 (Radovic et al., 2017) 5/236 (Burton et al., 2010) 7/61 (Phongsaven et al., 2007) 29/236 only for chronic illness (Burton et al., 2010) 6/61 (Phongsaven et al., 2007)</p>	<p>Believe clients will not adhere* (Faulkner & Biddle, 2002)</p> <p>Client barriers prevent them from promoting PA:*</p> <ol style="list-style-type: none"> 1. Unmotivated (Carlbo et al., 2018; Faulkner & Biddle, 2002; Happell et al., 2013b; Way et al., 2018) 2. MI symptoms (Happell et al., 2012; Kinnafick et al., 2018; Verhaeghe et al., 2013; Way et al., 2018) 3. Poor physical health (Way et al., 2018) 4. Difficulty with social interaction (Way et al., 2018) 5. Environmental factors (Happell et al., 2012; Way et al., 2018) <p>PA not legitimate for treatment of MI (Kinnafick et al., 2018; Way et al., 2018)</p>

	<p>1/34 (Stanton et al., 2015a) 10/20 (Zanetidou et al., 2017)</p> <p>Exacerbate MI symptoms 34/174 (Wendt, 2005)</p> <p>Damage to therapeutic relationship* 31/174 (Wendt, 2005)</p> <p>Client physical injury 1/126 (Radovic et al., 2017) 18/73 (Harding, 2013) 1/34 (Stanton et al., 2015a)</p> <p>Takes time away from other treatment 19/236 (Burton et al., 2010)</p> <p>Will create unacceptable burden to client 6/236 (Burton et al., 2010)</p> <p>Fear of human rights violation* 11/73 (Harding, 2013)</p>	<p>Exacerbate MI symptoms (e.g., feelings of low self-esteem, positive symptoms of schizophrenia) (Carlbo et al., 2018; Searle et al., 2012)</p> <p>Damage to therapeutic relationship* (Way et al., 2018)</p> <p>PA will not manage crisis situations (Faulkner & Biddle, 2002; Leutwyler et al., 2012)</p> <p>Clients pose risk to clinician (in secure settings) (Kinnaick et al., 2018)</p>
Reinforcement	<i>None identified</i>	<i>None identified</i>
Intentions	<p>Uninterested in prescribing PA 1/126 (Radovic et al., 2017)</p> <p>Other treatment priorities* 77/174 (Wendt, 2005)</p>	<p>No motivation to prescribe PA (Way et al., 2018)</p> <p>Treatment of other MI symptoms are a priority* (Faulkner & Biddle, 2002; Happell et al., 2012; Happell et al., 2013b; Kinnaick et al., 2018; Leutwyler et al., 2012; Way et al., 2018)</p> <p>Client safety is a priority* (Kinnaick et al., 2018)</p>
Goals	<i>None identified</i>	<i>None identified</i>
Memory, Attention, Decision Process	<p>Other treatment priorities* 77/174 (Wendt, 2005)</p>	<p>Treatment of other MI symptoms are a priority* (Faulkner & Biddle, 2002; Happell et al., 2012; Happell et al., 2013b; Kinnaick et al., 2018; Leutwyler et al., 2012; Way et al., 2018)</p> <p>PA is forgotten in patient care planning (Carlbo et al., 2018)</p> <p>Client safety is a priority* (Kinnaick et al., 2018)</p>
Environmental Context & Resources	<p>Lack of PA training* 135/232 (Burks & Keeley, 1989) 79/126 (Radovic et al., 2017) 167/236 (Burton et al., 2010) 48/48 (Brand et al., 2016) 335/480 (Bressington et al., 2018)</p>	<p>Lack of training* (Way et al., 2018)</p>

	<p>79/102 (Joyce & O'Tuathaigh, 2014) 427/643 (Happell et al., 2013a) 166/174 (Wendt, 2005)</p> <p>Lack of MI training* 32/61 (Stanton, 2013) 54/81 (Stanton et al., 2017)</p> <p>Lack of time 1/125 (Radovic et al., 2017) 17/73 (Harding, 2013) 2/34 (Stanton et al., 2015a) 22/174 (Wendt, 2005)</p> <p>Lack of resources 7/48 (Brand et al., 2016)</p> <p>Lack of infrastructure 12/20 (Zanetidou et al., 2017)</p>	<p>Lack of time (Carlbo et al., 2018; Happell et al., 2012; Verhaeghe et al., 2013; Way et al., 2018)</p> <p>Lack of resources (Searle et al., 2012; Harding, 2013; Happell et al., 2012; Way et al., 2018)</p> <p>Shortage of personnel to supervise activities (Carlbo et al., 2018; Kinnafeck et al., 2018)</p> <p>Lack of/inconsistent programs (Bressington et al., 2016; Happell et al., 2012; Happell et al., 2013b; Leutwyler et al., 2012; Way et al., 2018)</p> <p>Difficult to integrate into institutional operation* (Leutwyler et al., 2012)</p> <p>Lack of structure in provision of care (Carlbo et al., 2018)</p>
Social Influences	<p>Client barriers prevent them from promoting PA:*</p> <ol style="list-style-type: none"> 1. Unmotivated 54/73 (Harding, 2013) 184/576 (Robson et al., 2013) NR/480 (Bressington et al., 2018) 144/202 (Ganiah et al., 2017) 45/174 (Wendt, 2005) 4. MI symptoms 15/126 (Radovic et al., 2017) 5. Poor physical health 3/125 (Radovic et al., 2017) 1/34 (Stanton et al., 2015a) 6/20 (Zanetidou et al., 2017) <p>Clients do not want PA counselling from MH professional 19/236 (Burton et al., 2010) 29/174 (Wendt, 2005)</p> <p>Damage to therapeutic relationship*</p>	<p>Client barriers prevent them from promoting PA:*</p> <ol style="list-style-type: none"> 1. Unmotivated (Carlbo et al., 2018; Faulkner & Biddle, 2002; Happell et al., 2013b; Way et al., 2018) 2. MI symptoms (Happell et al., 2012; Kinnafeck et al., 2018; Verhaeghe et al., 2013; Way et al., 2018) 3. Poor physical health (Way et al., 2018) 4. Difficulty with social interaction (Way et al., 2018) 5. Environmental factors (Happell et al., 2012; Way et al., 2018) <p>Lack of supportive others (society, other health professionals) (Carlbo et al., 2018; Happell et al., 2012)</p>

	31/174 (Wendt, 2005)	Damage to therapeutic relationship* (Way et al., 2018) Stigma about MI (professionals and community) (Happell et al., 2012; Verhaeghe et al., 2013) Clients pose risk to clinician (in secure settings) (Kinnaefick et al., 2018)
Emotion	Fear of human rights violation* 11/73 (Harding, 2013)	Feelings of concern (physical health risk or hypocritical advice) (Way et al., 2018)
Behavioural Regulation	<i>None identified</i>	<i>None identified</i>
PA= Physical activity AWD= Adults with depression MH= Mental health MI= Mental illness NR= Not reported *Coded to multiple domains		

Table 6 Barriers identified to physical activity and exercise promotion

TDF Domain	Facilitators (Quantitative)	Facilitators (Qualitative)
Knowledge	Knowledge of therapeutic potential of PA for treatment of MI 8/20 (Stanton et al., 2015b) 29/51 (Phongsaven et al., 2007) 46/61 as standalone treatment (Stanton, 2013) 58/61 as adjunct treatment (Stanton, 2013) Knowledge to prescribe PA 60/144 (Radovic et al., 2017) 47/81 (Stanton et al., 2017) 144/151 (Bartlem et al., 2016) Previous PA education/training* 29/232 (Burks & Keeley, 1989) 48/48 (Brand et al., 2016) 90/236 during clinical education (Burton et al., 2010) 41/236 ongoing professional development (Burton et al., 2010) Previous MI education/training* 23/61 (Stanton, 2013) Awareness of general PA recommendations 52/126 (Radovic et al., 2017)	Knowledge of therapeutic potential of PA for treatment of MI (Searle et al., 2012) Knowledge to promote PA (Happell et al., 2013b)
Skills	Competence and skills to prescribe PA* 9/20 (Stanton et al., 2015b) 47/61 (Stanton, 2013) 144/151 (Bartlem et al., 2016)	Skills to promote PA (Happell et al., 2013b)

	<p>Previous PA education/training* 29/232 (Burks & Keeley, 1989) 48/48 (Brand et al., 2016) 90/236 during clinical education (Burton et al., 2010) 41/236 ongoing professional development (Burton et al., 2010)</p> <p>Previous MI education/training* 23/61 (Stanton, 2013)</p> <p>Have personal experience with PA 48/48 (Brand et al., 2016)</p>	
Social/Professional Role and Identity	<p>Physically active themselves 130/232 (Burks & Keeley, 1989)</p>	<p>Key role in PA promotion/delivery (favourable, appropriate, legitimate) (Faulkner & Biddle, 2002; Stubbs et al., 2014a; Stubbs et al., 2014b; Verhaeghe et al., 2013; Searle et al., 2012)</p>
Beliefs about Capabilities	<p>Confident to prescribe PA/exercise 68/145 (Radovic et al., 2017) 9/20 (Stanton et al., 2015b) 150/236 (Burton et al., 2010) 52/61 (Stanton, 2013) 51/81 (Stanton et al., 2017) 148/151 (Bartlem et al., 2016)</p> <p>Competence and skills to prescribe PA* 9/20 (Stanton et al., 2015b) 47/61 (Stanton, 2013) 144/151 (Bartlem et al., 2016)</p>	<p><i>None identified</i></p>
Optimism	<p>Believe clients will change* 137/151 (Bartlem et al., 2016)</p>	<p>Optimistic about benefits of PA for MI treatment (Faulkner & Biddle, 2002)</p>
Beliefs about Consequences	<p>Beneficial to clients:</p> <ol style="list-style-type: none"> Treating MI symptoms <ul style="list-style-type: none"> Depression 61/232 (Burks & Keeley, 1989) 16/20 (Stanton et al., 2015b) 48/48 (Brand et al., 2016) Anxiety or tension 47/232 (Burks & Keeley, 1989) Improving physical health/fitness 48/48 (Brand et al., 2016) 19/20 fitness (Stanton et al., 2015b) 18/20 CVD risk (Stanton et al., 2015b) Reduced medication needs 14/20 (Stanton et al., 2015b) 	<p>Beneficial to clients:</p> <ol style="list-style-type: none"> Treating MI symptoms <ul style="list-style-type: none"> Schizophrenia (Carlbo et al., 2018) Biochemical (Searle et al., 2012) General well-being and quality of life (Searle et al., 2012; Stubbs et al., 2014b) Social interaction (Browne et al., 2016; Faulkner & Biddle, 2002; Searle et al., 2012; Stubbs et al., 2014b; Verhaeghe et al., 2013) Structure (Searle et al., 2012)

	<p>4. Distraction 19/20 (Stanton et al., 2015b)</p> <p>PA is an appropriate treatment method 144/236 counselling (Burton et al., 2010) 194/236 advice (Burton et al., 2010) 46/61 as standalone treatment (Stanton, 2013) 58/61 as adjunct treatment (Stanton, 2013) 18/125 (Radovic et al., 2017) 18/20 (Stanton et al., 2015b)</p> <p>Clients would find it acceptable 149/236 advice (Burton et al., 2010) 129/236 counselling (Burton et al., 2010)</p> <p>Believe clients will change* 137/151 (Bartlem et al., 2016)</p>	<p>6. Distraction / normalizing effect (Faulkner & Biddle, 2002; Kinnafeck et al., 2018; Verhaeghe et al., 2013)</p> <p>7. Positive influence on mental health (Kinnafeck et al., 2018; Stubbs et al., 2014a; Stubbs et al., 2014b; Verhaeghe et al., 2013)</p> <p>8. Beneficial for general/physical health (Carlbo et al., 2018; Faulkner & Biddle, 2002; Happell et al., 2012; Kinnafeck et al., 2018; Patel et al., 2018; Stubbs et al., 2014b; Verhaeghe et al., 2013)</p> <p>9. Reduce medication needs (Patel et al., 2018)</p> <p>10. Body awareness/body image benefits (Stubbs et al., 2014b)</p> <p>PA is an appropriate treatment method (Searle et al., 2012)</p>
Reinforcement	Clients reporting positive benefits* 17/20 (Stanton et al., 2015b)	<i>None identified</i>
Intentions	Motivated to promote/lead PA/exercise 38/48 (Brand et al., 2016)	<p>Stability on other domains of care* (Carlbo et al., 2018; Verhaeghe et al., 2013)</p> <p>Commitment to a holistic approach (with a PA focus)* (Happell et al., 2013b; Kinnafeck et al., 2018;)</p>
Goals	<i>None identified</i>	Commitment to a holistic approach (with a PA focus)* (Happell et al., 2013b; Kinnafeck et al., 2018)
Memory, Attention, Decision Process	<i>None identified</i>	<p>Client preferences for alternatives to medication* (Searle et al., 2012)</p> <p>Stability on other domains of care* (Carlbo et al., 2018; Verhaeghe et al., 2013)</p> <p>Rely on intuition (Carlbo et al., 2018)</p>

Environmental Context & Resources	<p>Integrated into institutional operation 48/48 (Brand et al., 2016)</p> <p>Previous PA education/training* 29/232 (Burks & Keeley, 1989) 48/48 (Brand et al., 2016) 90/236 during clinical education (Burton et al., 2010) 41/236 ongoing professional development (Burton et al., 2010) 23/61 (Stanton, 2013)</p> <p>Well-equipped infrastructure 5/48 (Brand et al., 2016)</p> <p>Services to refer clients for PA 121/151 (Bartlem et al., 2016)</p>	<p>Integrated into institutional operation (Carlbo et al., 2018; Leutwyler et al., 2012)</p> <p>Access to incentives to provide to clients (Browne et al., 2016; Soundy et al., 2014)</p> <p>Access to resources (e.g., information, programs) (Happell et al., 2013b)</p>
Social Influences	<p>Experience/advice/support of other practitioners 40/48 peer (Brand et al., 2016) 30/48 organizational (Brand et al., 2016)</p> <p>Clients reporting positive benefits* 17/20 (Stanton et al., 2015b)</p> <p>Clients are receptive to PA advice 149/236 advice (Burton et al., 2010) 129/236 counselling (Burton et al., 2010)</p>	<p>Support from colleagues from other professions/settings (Carlbo et al., 2018; Happell et al., 2012; Happell et al., 2013b)</p> <p>Client preferences for alternatives to medication* (Searle et al., 2012)</p>
Emotion	<i>None identified</i>	<i>None identified</i>
Behavioural Regulation	<i>None identified</i>	<i>None identified</i>
<p>PAEP= Physical activity & exercise programs MI= Mental illness CVD= cardiovascular disease</p> <p>*Coded to multiple domains</p>		

Table 7 Facilitators identified to physical activity and exercise promotion

Chapter 4: Exploring the acceptability of exercise as a treatment for depression among health care providers and adults with lived experience with depression in Canada.

4.1 Background

In Canada, most individuals with a mood and anxiety disorder consult and receive treatment recommendations in the primary care setting from a family physician (Craven & Bland, 2013; Stats Canada, 2016; Wong et al., 2014). The most common treatments for depression in Canada include medication (antidepressants) and psychotherapy, respectively (Parikh et al., 2016; Wong et al., 2014). However, exercise is also recommended as a first line treatment for Major Depressive Disorder (MDD) in Canada (Ravindran et al., 2016). Structured exercise programs have consistently shown to reduce depressive symptoms and can improve quality of life for individuals with depression (Joseffson et al., 2014; Krogh, Hjorthøj, Speyer, Gluud, & Nordentoft, 2017; Schuch et al., 2016a; Shuch et al., 2016b). However less is known about effectiveness and the implementation of sustainable physical activity (PA) and exercise interventions in mental health settings. It is necessary to explore how current PA and exercise guidelines can be implemented under nonoptimal conditions (Shuch et al., 2017a; 2017b; Lederman et al., 2017).

Study one of this dissertation identified that individuals with depression express symptoms of depression (e.g. lack of motivation, low mood) as barriers to engaging in PA and the importance of social influences such as an exercise professional or a health care provider to help engage in activity (Glowacki et al., 2017). Study two determined that for health care providers, the most common barriers to PA promotion was a belief that individuals with mental

illness could not overcome barriers to PA engagement, and a lack of training on how to promote PA to individuals with mental illness (Glowacki et al., 2019a). While these studies were helpful for understanding important factors that influence behaviour, they provide little insight into how to embed PA and exercise within local practice settings in Canada. Further, in both reviews, none of the included studies were done within Canada. The Medical Research Council and the Canadian Institutes of Health Research (CIHR) have acknowledged the importance of consulting stakeholders for designing and evaluating complex interventions to be delivered in real world settings (Craig et al., 2008; Moore et al., 2015; CIHR, 2016). Interventions need to be tailored to the population, acceptable, feasible and complement specific needs. Thus, it is vital to consult stakeholders early in the intervention development process.

This study falls within the Action Cycle of the Knowledge to Action Framework which has multiple stages. This study falls within the stages of adaptation to the local setting to determine what is feasible and relevant when moving from one setting to another and determining the barriers and facilitators to knowledge use among all stakeholders (see Figure 6; adapted from Graham et al., 2006). This third core study was conducted simultaneous to the first two studies and aimed to consult two important stakeholder groups in Canada: adults with lived experience with depression and mental health care providers.

The purpose of this study was to guide the toolkit development process by exploring the perspectives and experiences of health care providers and individuals with depression on PA and PA promotion. To the best of my knowledge, no study has explored this specifically in the Canadian context before.

4.2 Methods

Research Design and Procedures: The evaluation was approved by the University of British Columbia (UBC) Institutional Ethics Review Board. Semi-structured phone and in-person interviews lasting 30–50 minutes were conducted with participants in the fall of 2017-January 2018. Details of interview guides and questions are provided below (full guides are included in the appendix).

Participants: Health Care Providers (HCP): Purposive snowball sampling was used for recruitment. As a mental health professional, I recruited through various existing networks and connections. Personal contacts who were mental health professionals were emailed and provided study details. Through word of mouth, contacts also shared study details with colleagues. To be included, a health care provider needed to either be currently or have past experience working with adults with depression. A total of $n=14$ ($n=11$ female) HCP were included with an average age of 36 years (range 25-70). HCP worked in the provinces of British Columbia (BC) and Ontario, Canada in a variety of urban and rural settings. A variety of different mental health care providers participated. This included: Case managers ($n=2$); Family physicians ($n=2$); Mental health worker ($n=1$); Nurse ($n=1$); Nurse practitioner ($n=1$); Occupational therapists ($n=2$); Psychiatrists ($n=2$); Recreational Therapist ($n=1$); and Social Workers ($n=2$). The majority of participants ($n=9$) self-reported that they were meeting the Canadian Physical Activity guidelines of 150 minutes of at least moderate intensity per week (Canadian Society of Exercise Physiology, 2011).

Adults who have lived experience with depression (AWD): Participants were recruited through community organization posters, newsletters, and word of mouth from staff at the Canadian Mental Health Association, the Mood Disorders Clinic at UBC, and Fraser Mental

Health. To be included, individuals needed to be an adult within the age range of 18-65 years old and have a self-reported diagnosis of depression from a health care provider (either current or at any point in their past). A total of $n = 13$ ($n = 9$ female) individuals participated, with an average age of 52 years old (range 32-64). All participants lived in the province of BC in a variety of urban and rural settings. The majority of participants ($n = 9$) self-reported that they were not meeting the Canadian Physical Activity guidelines of 150 minutes of at least moderate intensity per week (CSEP, 2011). See Table 8 for a summary of demographic characteristics for both HCP and AWD.

Participant Interviews: Interviews included questions for both groups of participants about their opinion on the revised CANMAT guidelines related to exercise, and acceptability of exercise as a treatment for depression. Both groups of participants were also asked about format and content preferences for toolkit development. For AWD, interviews included questions about their experience with exercise, health care providers, treatment recommendations, and exercise promotion once they were diagnosed with depression. For HCP, interviews included questions about their practice and experience working with adults with depression, and if and how they incorporated or recommended exercise and PA for adults with depression in their practice (interview guides included in appendix). Since the interviews were semi-structured, interview guides were used to prompt questions and conversation, and natural progression of conversation could flow from the questions and prompts.

Data Analysis: All interviews were audio-recorded and transcribed. To maintain confidentiality, participant numbers were assigned to each participant. Two data sets were analyzed: interviews conducted with HCP and interviews with AWD. Thematic analysis (Braun & Clarke, 2006; Braun, Clarke & Weate, 2016) was used to identify, name, categorize, and

describe broader themes. QSR International's NVivo 11 Software was used to facilitate qualitative data analysis. Abductive methods were used as an inductive and deductive approach was taken to complete coding and analysis (Smith and Sparkes, 2013). This writer engaged in active analysis through several phases to ensure thoroughness (Braun, Clarke & Weate, 2016). This included becoming familiar with data- audio recordings were listened to, then re-listened to while reading and re-reading transcripts and notes were taken. Next, codes were generated in relation to the purpose of the interviews using NVivo. Codes were reviewed to search for and identify themes. Themes were then reviewed across and within the entire data set. A critical friend reviewed all coding and the identified themes to stimulate discussion and encourage the researcher's reflexive acknowledgment of results and perspectives in the research process (Smith & McGannon, 2018). Themes were then defined and named. Writing of themes was an iterative and an integrated process throughout to aim for a comprehensive analysis. Full inductive and deductive analysis was completed for the first data set of HCP interviews. Next, inductive and deductive analysis was completed for the second data set of AWD interviews comparing and contrasting to themes identified from the first data set. Deductive coding and analysis (and frequency counts) were used to inform the development of an evidence-informed resource (a toolkit) related to format, content and role of the health care provider preferences. Inductive analysis was grounded in the data considering the exploration of HCP and AWD experiences (Braun, Clarke, & Weate, 2016). Throughout the analysis process, interpretations were discussed within the broader research team to challenge the identified themes and sub-themes in a form of peer debriefing (Lincoln & Guba, 1985). To aim for quality thematic analysis, the 15-point "checklist" for good TA was consulted (Braun & Clarke, 2006, p. 96).

4.3 Results

Results from the deductive analysis with regards to content and format preferences for toolkit development, and perceptions of the role of health care providers in recommending and discussing exercise are discussed in chapter five. The inductive analysis process determined three important themes: 1) Motivation; 2) Buy-in; and 3) Responsibility.

Motivation

Health care providers discussed and considered motivation on two levels. The first was for individuals with depression. All providers (n=14) identified lack of motivation as a barrier for adults with depression. Providers then explained a cyclical effect of this perception on their own behaviour. They explained that when individuals had a lack of motivation, this affected their own motivation to discuss exercise as they assumed the individual would not exercise because of a lack of motivation. This resembled a self-fulfilling prophecy. They also spoke of other factors influencing their own or peer motivation including lack of resources, and personal lifestyle behaviours. See Figure 7 for a visual representation of this cycle of motivation and behaviour. One provider explained motivation challenges she experiences:

“I have no doubts about the fact that physical activity is beneficial and would be very helpful for individuals. My concern is that it's hard to motivate people to partake in physical activity especially if they're depressed... But I find it challenging to motivate individuals who are not depressed to participate in physical activities, so I don't know how much success-- I have not had much success in motivating people with depression in exercising” (Nurse Practitioner).

Individuals with depression also acknowledged this concern when considering exercise to manage their depression. Almost all participants (n=11) discussed this on a personal level and

explained motivation as a barrier to any daily activities including getting out of bed, let alone being active when they were experiencing depression. This was the most commonly identified barrier, with cost being the second (identified by n=8). One participant explained this motivation in reference to going to a gym, “the biggest- the biggest barrier to going is motivating yourself out of the door and going to a place... if people isolate themselves a barrier is getting over that paranoia of walking out the door”.

Individuals with depression also expressed they have a desire to learn strategies to overcome this barrier. They explained that health care providers play an important role in discussing and recommending exercise and this could help to address motivation. One individual explained the importance of early intervention and the use of exercise as a treatment:

“I think it’s realistic and even more realistic if someone like say a physician, say a doctor identifies that earlier on when somebody was starting to feel depressed... so if it got caught before you felt, a person felt very depressed, it would be more likely that somebody would be able to have an exercise plan or at least time to get outside to move”.

Buy-in

Health care providers discussed and spoke of exercise as if it was a commodity and a tangible item they could give or sell to the people they work with. Health care providers referenced it as a “hard sell” or something to be “endorsed”. A social worker explained her personal views, “I strongly endorse this as a treatment, I have the buy-in already for it, I promote it”. A psychiatrist expressed an opposing view, “I deal with generally the severe [severity of depression] but yes, I could see how it worked for some people, it would be a hard sell”. Another psychiatrist working in a hospital discussed incorporating exercise on a higher level considering funding allocators and other health professionals, “...we don’t have enough of anything on the

patient floors, so to find room in the budget for that would be hard, and ask already overworked nurses to add it into their routine- I think that would be a hard sell”. Health care providers also discussed that legitimizing exercise as a treatment needs to be done before providers will change behaviour, and that buy-in at multiple stakeholder levels is needed. Without this broader support then guidelines will not translate into real world practice and be used or recognized as a treatment. One mental health provider who works both as a mental health professional and an exercise professional highlighted the success of this when there is buy-in at multiple stakeholder levels:

“I’m supported from the top-down in terms of promoting exercise, so that is definitely a benefit. I know that not all agencies do endorse that, right or they don’t have the funding or the time for it. They put on the backburner; my agency doesn’t put it on the backburner so that is good. We have fundraisers which help with the financial piece as well as the buy-in of local gyms like our community center we have partnerships with a couple of gyms and a couple other like private studios that use yoga that kind of stuff so the partnerships that we have with local people they are more than willing to drop the cost of something or work with individuals or with us as a group” (Social Worker).

This highlighted a positive example of an agency and community with buy-in, as well as acknowledgement that this was not the case for most health care providers (also the case for those interviewed in this study). Further, health care providers did not speak about exercise as a legitimate treatment unless they were directly asked their opinion of it during interviews. Without prompts, they often spoke of other more common treatments such as medication and psychotherapy.

The individuals with depression in this study believed that exercise may be helpful for depression. All (n=13) of these participants expressed positive views of the value of exercise and PA when their mood is low. As discussed in the previous theme, they had concerns about barriers to participation but explained that when they were able to be active, they could recall mental health benefits such as improved mood. One participant acknowledged these benefits and that they would use it as a stand-alone treatment after having a negative experience with medication:

“I think exercise is a great way to reduce the depression. I find getting outside for about 10 minutes for a walk helps kind of as a meditation... I would just use it alone as a treatment for depression. I find that medication has a lot of poor side effects and it’s not easy to take every day for a lot of people including myself”.

With regards to beliefs that exercise could be a stand-alone treatment, not all participants felt that exercise was sufficient by itself. Some participants (n=4) felt that if they were to use it as a treatment then it would be useful in combination with another option such as medication or psychotherapy.

Responsibility

Health care providers spoke about the general conversations they have related to PA promotion, taking on personal responsibility to do this and recommend being active. However, they also referenced a “multidisciplinary approach” and explained that it was “everyone’s responsibility”, “everyone in health care”. There appeared a lack of role clarity as to whose responsibility it was to engage, initiate or facilitate an exercise program beyond a general recommendation to be active. A family physician described this in a contradictory statement as she identified her role to recommend it but that she is not necessarily the one to initiate it:

“Yes- I think we have a role in like helping, like recommending it I think it makes a big difference for patients that if multiple people are recommending exercise things like that especially coming as a method of treatment- from the family physician it might [help] them consider exercise but I don’t know we would be the right people to initiate” (Family Physician).

Another family physician explained his experience, diverting responsibility to go beyond his strategy of general PA promotion:

“You’re not saying anything new with me. We’ve been saying this forever. Exercise, go outside, walk, go swimming. Once again, your definition of exercise is important. We have always told patients to do physical activity as much they can. So, do we prescribe exercise in the broad definition? No. Physical activity for the purpose of doing physical activity, yes we do and we have always done that. Do we give them prescription for an exercise routine? No, we don’t” (Family Physician).

Individuals with depression also discussed the importance of their conversations with health care providers and how this either helped them to acknowledge and validate exercise or hindered this consideration. Adults with depression spoke of general PA conversations with health care providers and that they received general recommendations to “be active”. They felt this negatively impacted their consideration of exercise, motivation and desire to pursue it. One participant reflected on talking to his family physician:

“They say ‘Get out, do something. Go on and just be active’ but they’ve never said go exercise. They said get out walking or do something. But he didn’t say go to the gym or something, he just said go for a bike ride or go do something- feel better physically. But I just chalked it up because he had his bike in his room”.

Another participant explained their negative experience:

“Actually, last time I went to my physician I was talking about... talking about exercise being helpful and then she automatically said yes and watching your diet, so she didn’t validate the exercise, but I talked to her and she wasn’t very helpful”.

As discussed previously in the theme of motivation, individuals with depression deemed health care providers to have an important role in recovery, however they felt support needs to move beyond simple exhortations to become more physically active.

4.4 Discussion

The purpose of this study was to guide the toolkit development process by exploring the perspectives and experiences of health care providers and individuals with depression with regards to exercise as a treatment for depression. Feedback specific to toolkit development and results from the deductive analysis (e.g. content and format recommendations) are discussed in chapter five. The inductive analysis and results presented in this chapter identified three important themes considered throughout the development process which includes motivation, buy-in and responsibility.

A potential cycle of motivation and behaviour (see Figure 7) needs to be broken for exercise to be considered as a treatment for depression by both HCP and AWD, which may be possible through behaviour change intervention. This starts with health care providers and how they discuss or help individuals with depression consider treatment options inclusive of exercise. If a health care provider is pessimistic about an individual’s motivation to engage in PA, then they may not even bring up the topic in conversation with that individual. Of course, it is important to acknowledge that individuals with mood disorders do experience numerous barriers inclusive of lack of motivation and low mood (Firth et al., 2016; Glowacki et al., 2017). The

presence of such barriers unique to this population may make discussions and utilizing this treatment more difficult. This should not be an excuse to dismiss the consideration of exercise. As discussed in chapter three, health care providers have a duty of care and a responsibility to help individuals with mental illness overcome barriers to engaging in meaningful occupations and treatments such as exercise. Accordingly, the toolkit needs to explicitly target this cycle and address the motivation of both the professional and the individual with depression.

Individuals with depression that participated in this study acknowledged the importance of the conversations with their health care providers and how this could help or hinder their motivation and the consideration of exercise. These findings reiterate the results from chapter two and the first scoping review conducted (Glowacki et al., 2017). The toolkit must explicitly address the emotion domain and draw on behavior change techniques (BCT) that target this domain. An example is the BCT providing information about emotional consequences of performing the behaviour (Michie et al., 2013). Articulating cycles in and out of depression using behavioural activation may help demonstrate a relationship between exercise and depression that a HCP and AWD can talk through together. Further details of the full toolkit development process, how decisions were made on which BCTs to incorporate in it and the final version of the toolkit are provided in chapter five. The full toolkit is included in the appendix for reference.

Questions remain about health care providers' views on the legitimacy of exercise as a stand-alone treatment and the need for buy-in at multiple stakeholder levels including practitioner, organization and community. This is likely impacting views of the individuals considering different treatment options for depression. Health care providers identified the need to sell or endorse exercise, and this was considered when creating the toolkit as well as for its

dissemination. The toolkit should aim to increase buy-in and endorse the consideration of exercise by highlighting the evidence base used to create the CANMAT treatment guidelines, as well as breaking down the guidelines themselves (Ravindran et al., 2016). Comparing and contrasting advantages and disadvantages of different treatment options including exercise should be presented. For dissemination and ‘selling’ the actual toolkit to providers and individuals with depression to use, efforts should be put towards creating a visually appealing website and document and highlighting trustworthy and credible Canadian partnerships and collaborators including CANMAT, the Canadian Mental Health Association, and the Centre for Active Living. The involvement of stakeholders throughout the entire process inclusive of individuals with lived experience with depression, health care providers, researchers and exercise professionals should also be considered a selling point to highlight, as it is in line with recovery-oriented guidelines for mental health practice in Canada (MHCC, 2016).

The ‘Exercise and Depression Toolkit’ will aim to increase buy-in at the individual and the health care provider stakeholder level in considering exercise as a legitimate treatment for depression. The final theme of responsibility highlights that there remain broader systemic challenges to the routine use of exercise as an intervention for depression. An international consensus statement highlights the need for culture change and the integration of exercise specialists into mental health teams which will require policy level and funding allocation changes (Rosenbaum et al., 2018). Exercise professionals and exercise referral schemes are currently fragmented in Canada within the mental health system, which I have experienced over the past eight years in several Canadian provinces. The lack of referral schemes and resources were also discussed by HCP that participated in this study. The combination of a lack of resources, a lack of time, and likely little to no training in exercise behaviour change is likely

why many HCP only provide general recommendations to be more active. At the same time, individuals with depression expressed the importance of the roles of their HCP when considering exercise. Until exercise professionals are better integrated into mental health services, current mental health care providers need to move beyond giving simple advice for people to move more or get active, and the toolkit should be created to help them do so in a realistic way with what is available.

It is acknowledged that the creation of a toolkit by itself will not solve the challenge of limited exercise referrals and programs available for mental health professionals and is thus a starting point. Creating the toolkit within this challenging context will need ongoing attention as will continued advocacy to establish exercise interventions that individuals with depression can access in Canada.

4.5 Strengths and Limitations

A strength of this paper was the use of the 15-point checklist for a good thematic analysis (Braun & Clarke, 2006). Our research team completed each of the fifteen steps, which covers the entire analysis process (i.e., transcription, coding, analysis, overall and the written report). A critical friend reviewed all coding and the identified themes to stimulate discussion and encourage the researcher's reflexive acknowledgment of results and perspectives in the research process, and to enhance trustworthiness (Elo et al., 2014; Smith & McGannon, 2018). Two stakeholder groups were consulted (AWD and HCP) to help explore perspectives and experiences. Limitations include that participants opted into the study, so were likely more receptive to exercise, and not all relevant health care provider designations were represented (e.g. no psychologist could be recruited).

4.6 Conclusion

Consultation with stakeholders is an important part of translating knowledge into action. This study helped to explore the acceptability of and how current physical activity and exercise guidelines be implemented under nonoptimal conditions in Canada. This study also helped to guide the toolkit development process by identifying three important themes considered which includes motivation, buy-in and responsibility. Broader systemic challenges remain to the routine use of exercise as an intervention for depression such as the integration of exercise professionals within mental health care teams, and such changes will take time. Current mental health care providers need to move beyond giving simple advice for people to move more, and the toolkit should be created to help them do so in a realistic way within current conditions.

	AWD* (n=13)	HCP* (n=14)
Gender, % (n) % Female	69.2 (9)	78.6 (11)
Age M (SD) Range	51.6 (10.79) 32-64	36.2 (12.95) 25-70
Ethnicity, % (n) Caucasian Asian Other	46.2 (6) 38.5 (5) 15.4 (2) (Metis, Spanish)	100 (14)
Education, % (n) Some secondary school Completed secondary school Completed College Completed University Completed Graduate School	7.7 (1) 15.4 (2) 30.8 (4) 38.5 (5) 7.7 (1)	42.9 (6) 57.1 (8)
Employment, % (n) Full-time Part-time Self-employed At home w/ children Not currently employed Other	15.4 (2) 7.7 (1) 7.7 (1) 7.7 (1) 30.8 (4) 30.8 (4)	71.4 (10) 7.1 (1) 7.1 (1) 14.3 (2)**
MPA*, % (n) < 150 minutes/week ≥ 150 minutes/week	30.8 (4) 69.2 (9)	21.4 (3) 78.6 (11)
Years Working with AWD, % (n) 0-5 5-10 10-20	N/A	28.6 (4) 42.9 (6) 14.2 (2)

20+		14.2 (2)
Diagnose Depression, % (n)	N/A	
Yes		35.7 (5)
HCP Designation, % (n)	N/A	
Recreational Therapist		7.1 (1)
Nurse		7.1 (1)
Nurse Practitioner		7.1 (1)
Family Physician		14.3 (2)
Occupational Therapist		14.3 (2)
Social Worker		14.3 (2)
Mental Health Worker		14.3 (2)
Case Manager		7.1 (1)
Psychiatrist		14.3 (2)
*AWD= Adult with Depression, HCP= Health Care Provider, MPA= Moderate intensity Physical Activity		
**2 participants were medical residents at the time of interview and reported working full-time and being a student full-time		

Table 8 Demographic characteristics

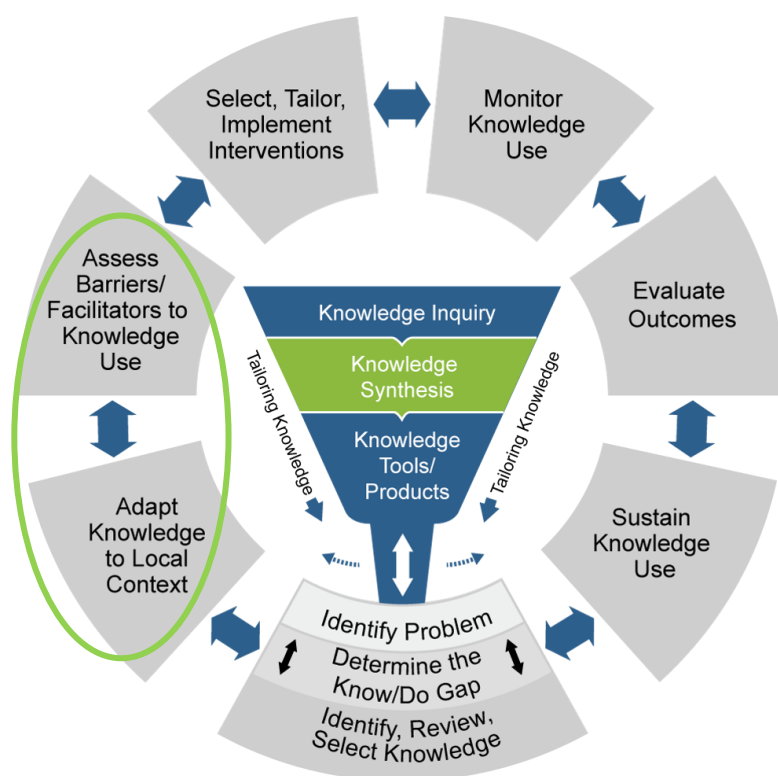


Figure 6 Action cycle steps

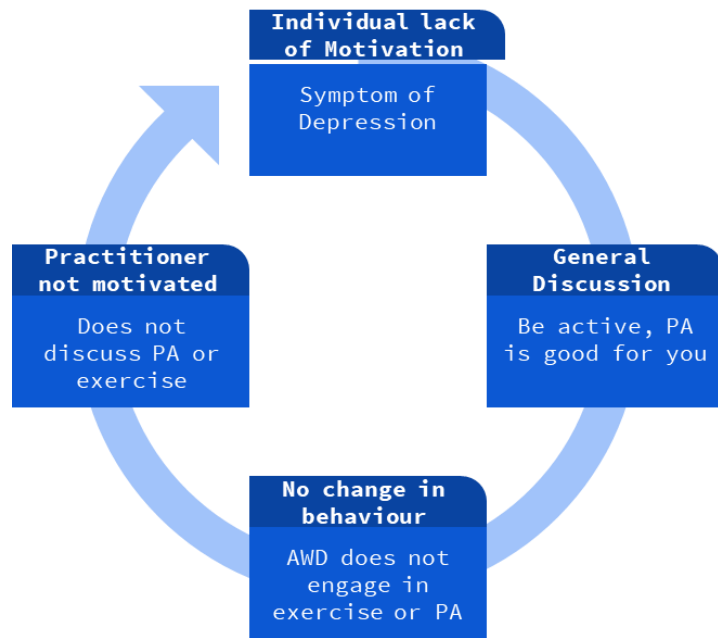


Figure 7 Cycle of motivation and behaviour

Chapter 5: It's more than just a referral: Development of an evidence-informed exercise and depression toolkit

This study highlighted the all stages followed to guide intervention development and preliminary evaluation within the Knowledge to Action Framework. This includes the Knowledge Funnel (creation of CANMAT guidelines), and the Action Cycle (studies in this dissertation). See Figure 2 in Chapter 1 for visual representation of this framework (adapted from Graham et al., 2006).

5.1 Background

Depression affects over 300 million people worldwide and its prevalence has increased significantly since 2005 (WHO, 2019). It is one of the leading causes of disability in Canada and globally (MHCC, 2013; WHO, 2019), and Canada's national burden has been estimated to be more than that of lung, prostate, breast and colorectal cancers combined (Ratnasingham, Cairney, Rehm, Manson, & Kurdyak, 2012). Depression can be debilitating with symptoms such as hopelessness, despair, and thoughts of death greatly impacting individuals, families and communities and placing significant burden on economies and health care systems. There is an urgent need to develop innovative and acceptable treatment options that are accessible to individuals with depression.

Systematic reviews have consistently shown structured exercise programs to significantly reduce depressive symptoms for individuals with depression (e.g., Cooney et al., 2013; Joseffson et al., 2014; Krogh, Hjorthøj, Speyer, Gluud, & Nordentoft, 2017; Schuch et al., 2016a). The most recent meta-analysis of 11 randomized controlled trials examined the antidepressant effects of exercise among adults (18-65 years) recruited through mental health services with a referral or

clinical diagnosis of major depression (Morres et al., 2019). Analyses demonstrated a large significant overall antidepressant effect ($g = -0.79$). In light of such evidence, depression is the first and only mental health disorder in which exercise is recommended as an evidence-based treatment in clinical guidelines.

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that results in energy expenditure (Casperson, Powell, Christenson, 1985). Exercise is a subset of PA and is defined as PA that is planned, structured, repetitive and done for the purposes of improving or maintaining physical fitness (Casperson et al., 1985). The National Institute of Clinical Care and Excellence in the United Kingdom recommends exercise as a treatment for subthreshold and mild-moderate depression (National Collaborating Centre for Mental Health UK, 2009). The American Psychiatric Association acknowledges that exercise can be used as a monotherapy for mild depression in the acute phase after a diagnosis with monitoring of mood by a health professional (APA, 2010). More recently, the Canadian Network for Mood and Anxiety Treatments (CANMAT) revised its treatment guidelines and now recommends exercise as a primary intervention for mild-moderate Major Depressive Disorder (MDD), and as an adjunctive treatment for moderate-severe MDD (Ravindran et al., 2016). Throughout this manuscript, the use of the term depression refers to MDD. CANMAT recommends a ‘dose’ of exercise based on the best available evidence acknowledging that personal fitness and current and past activity levels also be considered. This ‘dose’ is 2-3 times a week for a duration of 30 minutes at a moderate intensity for a minimum of 9 weeks. Supervised exercise is recommended for adherence, and either cardiovascular or resistance training can be used (Ravindran et al., 2016). The CANMAT guideline is of significance as this is the first time that exercise has been recommended as a monotherapy for depression in Canada.

5.1.1 Physical Activity Guidelines, Treatment Guidelines and Clinical Populations

In Canada, little structure exists for mental health professionals to explore exercise as a treatment option for adults with depression. Clinical treatment guidelines such as the CANMAT guidelines were developed to help health care providers implement evidence-based research into their clinical practice (Ravindran et al., 2016). However, releasing guidelines or providing education about guidelines are not sufficient to elicit behaviour change (Pederson et al., 2018). Guidelines help to understand ‘what’ to do, but not ‘how’ to do it (implementation). It is likely that most mental health care professionals in Canada have not received any training in exercise or PA promotion, similarly, many exercise professionals may not have been exposed to mental health training (Faulkner, 2016). Accordingly, there is a need to develop resources to support health care professionals in implementing the CANMAT guidelines and to consider exercise as an antidepressant treatment option with clients. While further consideration is needed in how best to support adults with depression to start and maintain exercise as an intervention for their depression, we have assumed that the starting point is initial treatment planning with a clinician. Work has been done to facilitate the implementation of guidelines for other clinical populations. The seminal international Physical Activity Guidelines (PAGs) for adults with chronic spinal cord injuries were released in 2011 (Martin Ginis et al., 2011). After release of these PAGs, a working group used a systematic process to develop an evidence-informed spinal cord injury specific resource to supplement the guidelines and support behaviour change, the ‘SCI Get Fit Toolkit’ (Arbour-Nicitopoulos et al., 2013; SCI Action Canada 2013). The process described by Arbour-Nicitopoulos and colleagues (2013) served as a template in developing a similar resource to be used by clinicians for implementing the CANMAT guidelines.

The aim of this article was to describe this systematic and phased process to develop the evidence-based ‘Exercise and Depression Toolkit’ for health care providers working with adults with depression. The four phases included: a review of relevant literature, formative interviews, an expert panel meeting, and final toolkit development. Various stakeholders were involved throughout the process including health care providers, adults who have lived experience with depression, researchers, and exercise professionals. The next sections will further describe each of these four phases in detail.

5.2 Methods and Results

5.2.1 Overview

The AGREE II instrument is a tool used to develop quality evidence-based guidelines, ensuring methodological rigour and transparency (AGREE II, 2017). It has also been used for resource development and health promotion (Arbour-Nicitopoulos et al., 2013; Latimer-Cheung et al., 2013). AGREE II was consulted throughout the developmental process and used to guide toolkit content and dissemination strategies. Similar to past use of the AGREE II for resource development, modifications were made to items for health promotion and resource development rather than guideline development. The project leads (KG & GF) consulted the third author (KAN) on use of the AGREE II and for appraisal of the included items. KAN was the AGREE II expert for this project given her leadership on the development and pilot-testing of the ‘SCI Get Fit Toolkit’. Table 9 outlines all AGREE II items and modifications, as well as application to the Exercise and Depression Toolkit (referred throughout this paper as the ‘toolkit’). Figure 8 provides a summary of the events and timeline leading to the development of the toolkit.

5.2.2 Toolkit Development Process

Phase One: Review of the literature

Before development of the toolkit, the evidence-base reviewed by KG and GF included the CANMAT guidelines (Ravindran et al., 2016; Lam et al., 2016) and recent meta-analyses on exercise for clinical depression (e.g., Krogh et al., 2017; Schuch et al., 2016a; 2016b). Two scoping reviews were also conducted to provide a framework for comprehensively understanding barriers and facilitators to clinician and client participation in PA and exercise promotion and participation, respectively (Glowacki, Duncan, Gainforth & Faulkner, 2017; Glowacki, Weatherson, & Faulkner, 2019). A behavioural analysis driven by theory was used in both reviews using the Theoretical Domains Framework (TDF; Cane, O'Connor, & Michie, 2012). The TDF is part of a larger meta-framework, known as the Behaviour Change Wheel, which helps intervention developers select behaviour change techniques (Cane et al., 2015; Michie & Atkins, 2014). Behaviour change techniques are the active ingredients within an intervention (what can be observed and replicated) designed to change behaviour (Michie & Atkins, 2014). Thus, conducting a TDF analysis was done to theoretically inform the content of the toolkit. The first review included thirteen studies that reported on barriers and facilitators to PA and exercise participation among individuals with depression using quantitative, qualitative or mixed methods (Glowacki, et al., 2017). To meet inclusion criteria, articles were also required to be peer reviewed, English language, include sample populations of adults aged 18-65 with the majority (>50%) diagnosed with depression, or a mood disorder. Articles were excluded if they did not specify the number of participants and their diagnosis, or if they did not report any empirical data.

This review identified common barriers to engaging in PA inclusive of low mood, lack of energy, fatigue, and lack of motivation (Glowacki et al., 2017). The top facilitators identified included others' attitude and emotional support, and ongoing support for engagement in physical

activity. The barriers identified were reflective of the Emotion domain of the TDF. Specific behaviour change techniques recommended to target behaviour change within the emotion domain include: ‘Reduce negative emotions’, ‘Information about emotional consequences’, ‘Self-assessment of affective consequences’, and ‘Emotional social support’ (Cane et al., 2015) and these are reflected in the toolkit (see phase four for further details).

The second scoping review included studies that reported on the barriers and facilitators that health care providers experience when promoting PA to individuals with a mental illness (inclusive of but not limited to depression) using quantitative, qualitative or mixed methods (Glowacki et al., 2019a). To meet inclusion criteria, articles were also required to be peer reviewed, English language, and have sample populations of any health care providers that worked with individuals with a mental illness. Articles were excluded if they did not specify the client population diagnosis that the health care providers worked with or did not report any empirical data.

Important barriers identified by health care providers in this second review were the barriers faced by clients related to their mental illness (e.g. low mood), a lack of training on how to promote PA, and lack of resources. This review highlighted two key TDF domains that should be targeted to assist health care providers’ promotion of PA to individuals with depression: ‘Beliefs about the Consequences’, and ‘Environmental Context and Resources’. The domain of ‘Optimism/Pessimism’ was also considered important. An example of a recommended behaviour change technique that can be used for intervention within these domains is educating providers with information on the health consequences (to their client) of promoting PA, and on the clinical guidelines supporting this evidence (Cane et al., 2015). The theoretical analysis and recommended behaviour change techniques from each study were reviewed and discussed by the

panel in phase three to formulate recommendations on how to incorporate the identified behaviour change techniques into the toolkit (see phase four below).

Key strengths of the two scoping reviews include the use of a theory-driven analysis to determine behaviour change techniques (Glowacki et al., 2017; 2019a; Cane et al., 2015). Furthermore, a key strength of the CANMAT guidelines includes the rigorous process used to reach a consensus on the highest level of evidence (level one: meta-analysis with narrow confidence intervals and/or two or more RCTs with adequate sample size, preferably placebo controlled plus clinical support) to support exercise as a treatment for MDD (Ravindran et al., 2016).

Key limitations of the scoping reviews include the exclusion of grey literature or articles in a language other than English (Glowacki et al., 2017; 2019a), varying methods of diagnosis of depression (Glowacki et al., 2017), and the terms PA and exercise often being used interchangeably (Glowacki et al., 2017; 2019a), even though CANMAT guidelines specify exercise as a treatment recommendation. Key limitations of the CANMAT guidelines are more reflective of the state of the exercise and depression evidence base. For example, there remains a lack of long-term data on the benefits of exercise for MDD, and less evidence regarding effectiveness in clinical practice (Ravindran et al., 2016).

Phase Two: Formative research

This phase of the project was approved by the University of British Columbia Institutional Ethics Review Board. Semi-structured interviews were conducted with the toolkit's target population of Canadian adults with a self-reported diagnosis of depression from a health care provider (n=13). Diagnosis was not confirmed by chart review or speaking to a health professional. However, participants were screened and asked whether they had been diagnosed

with depression, by whom (which health care provider), and in what practice setting (e.g. family physician in primary care). Interviews were also conducted with potential end users of the toolkit, a variety of Canadian health care providers who have experience working with adults with depression (n=14). Interviews identified needs, content and format preferences for the toolkit. See Table 8 for demographic characteristics of the participants (in Chapter 4).

Overall, participants (adults with depression and health care providers) reported the CANMAT guidelines to be acceptable. They identified that they had previous knowledge that exercise was beneficial for depression, but that they had not necessarily known it was recommended as a primary treatment. Some clarification was desired on the definition of exercise, and how much exercise was recommended as a treatment. Participants felt it was important to know the “FITT” principles, which is the frequency, intensity, time, and type of exercise, to aim for if exercise was going to be used or recommended as a treatment for depression. Participants also wanted the toolkit to include self-monitoring resources such as a mood and activity diary, and for it to highlight health and other benefits of engaging in PA. Participants requested the content of the toolkit be ‘depression tailored’, including a section on the specific barriers that adults with depression face in engaging in PA, strategies for overcoming barriers, and stories or experiences from individuals with depression about their beneficial participation in PA. Lastly, people wanted a resource that could be used collaboratively by a health care provider and an individual with depression in considering exercise as a treatment for depression. All health care providers (n=14) and the majority of individuals with depression (n=7) wanted to be able to access the resource online. The second most desired format was paper (n=5 individuals with depression; n=9 health care providers). Considering these preferences, the

panel agreed that the toolkit will be available online as a downloadable PDF to either be used online or printed and used as a paper copy as desired.

Phase Three: Expert Panel Meeting

A multidisciplinary panel of twelve experts comprised of PA and mental health researchers, health care providers, adults with lived experience with depression, and exercise professionals appraised the evidence from phases one and two to generate content, format and dissemination recommendations for the toolkit. See Table 10 for the full list of panel members, affiliations, and roles.

Scope and Purpose of the Toolkit

Prior to the expert panel meeting, the first author provided the panel with an executive summary of the results from the two scoping reviews and the interviews that were part of phases one and two. This was done one month in advance of the meeting to provide the panel adequate time to review and consider in relation to the entire toolkit project. At the beginning of the meeting, a summary of the project's objectives and overview of the evidence (e.g. CANMAT guidelines) was presented to the panel by the first and second authors (KG and GF). The first and second authors (KG and GF) defined the target population (adults with depression), and end users (health care providers) of the toolkit based on the findings from phase one and two. These decisions were also reviewed and agreed upon by the expert panel at the beginning of the meeting. Below are the objective, the target population, and the end users of the toolkit.

- **Objective:** To support health care professionals in collaborating with clients to explore exercise as a treatment option for adults (aged 18-65) with mild-moderate depression.
- **Target Population:** Adults diagnosed with mild-moderate depression aged 18-65 in Canada not meeting the recommended 150 minutes per week of moderate-vigorous PA per week.

- **End Users:** Health care providers who work with adults with depression, inclusive of (but not limited to): Family Physicians, Psychiatrists, Counsellors, Mental health Workers, Occupational Therapists, Recreation Therapists, Nurses, and Social workers. Community, Primary Care, Inpatient, and Outpatient settings.

Panel members split into two working groups, and participated in five, 45-60 minute breakout sessions. Topics of these sessions included: Review of draft content and structure of the toolkit; Facilitate decision-making around exercise as a treatment option; Addressing barriers; Look and feel of the toolkit; Dissemination. Content and format recommendations were then developed by the panel as an entire group using the evidence reviewed before the meeting (see table 11). A debriefing meeting was held at the end of the first day between the project leads and one expert panel member (KAN) to summarize these recommendations. On the second day, a facilitated discussion (lead by the project leads KG and GF) was held with the entire group to review and revise recommendations.

Phase Four: Toolkit Development

The toolkit content was written by the first author (KG) in collaboration with the second author (GF) based on the panel meeting recommendations and the desired content identified from the formative interviews with adults with depression and health care providers in phase two. It was decided by KG and GF that there would be three parts to the toolkit (see appendix). The first part is the ‘Introduction’ document created for the target audience (end user) of health care providers. This document explains the process used for toolkit development, relevant literature, and gives instructions and recommendations on how to use the toolkit. Creation of this document was guided by the second scoping review (Glowacki et al., 2019a) and the salient barriers promoting physical activity identified by health care providers. This document is to

address any pessimism regarding clients' motivation to exercise and build the self-efficacy of health care providers to discuss and recommend exercise by informing them of the evidence-base used to create the toolkit, and the inclusion of tools and behaviour change techniques to help clients overcome barriers to PA and exercise. An example of a recommended behaviour change technique for health care providers included in this document is 'Persuasion to boost self-efficacy'.

The second part of the toolkit is the 'Collaboration' document for a clinician and client to use collaboratively (pg. 1-4). An important part of developing this content was the ordering of these pages. KG and GF determined the ordering based on an anticipated collaborative treatment decision-making process. The first author (KG) works as a mental health occupational therapist and used clinical reasoning as guidance for the ordering of this section's content. This begins with a discussion of 'Why exercise?' in comparison to other treatment options and why it may be a good fit for an individual (pg.1). This page also includes the desired content of highlighting various benefits of exercise. This then leads to a discussion about someone's personal experiences with exercise or PA in the past, and the incorporation of behavioural activation and the mood cycles in and out of depression (pg. 2 'How are exercise and depression related?'). These mood cycles are to be used as an educational tool and are the recommended behaviour change technique of 'information about emotional consequences' (Cane et al., 2015) and are central to the toolkit. The conversation continues to a discussion about if exercise will be used as a treatment, how much exercise is recommended based on the CANMAT guidelines (pg. 3 'CANMAT Guidelines at a glance'). This page has the desired content of what the guidelines are, specifying the frequency, intensity, time and type of exercise to aim for if using exercise as a treatment. The conversation then leads to the discussion of common barriers or concerns that

individuals with depression may face when engaging in PA on page 4 ‘Moving More’. Possible actions (behaviour change techniques) to address or overcome these concerns are also included. The content of this page is guided by the first scoping review and TDF analysis (Glowacki et al., 2017). The page has an end-point, in which a collaborative decision is made to either refer to an exercise program, engage in further PA counselling to help increase general PA (either with the current health care provider or referral to another), or to think about exercise further and discuss at a later date.

The third part of the toolkit is the ‘Action Materials’ section, which is targeted to adults with depression. These materials are client handouts that can be given to an individual with depression by a health care provider at their discretion, and then be used independently or in collaboration with their health care provider. These handouts are linked to page 4 ‘Moving More’ of the collaborative pages and are the actions that can be taken which are recommended behaviour change techniques from the first scoping review and TDF analysis (Glowacki et al., 2017). For example, Handout #1, is a Mood and Activity Diary, which is the recommended behaviour change technique of ‘Self-assessment of affective consequences’ (Cane et al., 2015). This part of the toolkit also includes the desired content of self-monitoring resources, and stories about positive personal experiences that adults with depression have had with exercise.

After content was developed, the toolkit itself was then created in collaboration with a graphic designer. Through online survey, members of the expert panel were consulted to ensure that content and format recommendations were appropriately addressed (as per discussions that occurred during the panel meeting). Table 12 provides a summary of the panel’s feedback. Consistency was indicated between the panel recommendations and the general content and presentation of the toolkit. Responses were favourable on all items ($M = 6.42$ on a 7-point scale).

Some suggestions by the panel were to provide information about other treatment options, to change the wording of “side-effects of exercise may include...” to something more positive on page 1, and that some actions and concerns are more immediate versus long-term on page 4 ‘Moving More’. To address these suggestions, reference to the CHOICE-D document (Parikh et al., 2018) was added for more details of other treatment options. CHOICE-D is a summary of the CANMAT guidelines and treatment options for clients and families with lived experience of depression. The wording on page 1 was changed to “benefits of exercise may include...”, and the actions on page 4 were ordered from those that can be taken immediately to longer-term. The final version of the ‘Introduction’ document of the toolkit is presented as a supplementary file. The complete toolkit is available to download at www.exerciseanddepression.ca.

Panel members were also asked questions based on Rogers’ Diffusion of Innovations Theory, a theory that explains the process by which people or groups adopt or reject a new idea, behaviour or object (innovation) (Rogers, 2003). Questions were asked how the toolkit related to the five attributes of innovation adoption: relative advantage, compatibility, complexity, trialability, and observability. Table 13 provides a summary of the panel’s feedback regarding innovation attributes. Overall, panel members felt the toolkit would facilitate conversations between clinicians and clients about exercise as a treatment for depression (relative advantage), and the toolkit was easy to understand (complexity). With regards to compatibility, panel members were asked if use of the toolkit will be consistent with most clinician’s usual practice. Panel members identified that many clinicians may not be currently promoting PA or discussing and recommending exercise. However, the toolkit was viewed as something new and different, with the potential to help many health care providers to do so. An innovation adoption process is not straight forward. The panel viewed the toolkit as having relative advantage and low

complexity, which is promising for adoption by the target audience. Further work has been done to understand the perceived attributes of the innovation, and other factors that may influence adoption by health care providers specifically and is outlined in study five.

5.3 Discussion

Our working group developed the first-ever evidence-informed resource to support health care professionals in collaborating with individuals to explore exercise as a treatment option for mild-moderate depression and supplement CANMAT guidelines (Ravindran et al., 2016). This was done following an internationally accepted and rigorous consultation process (AGREE II, 2017), successfully used previously in another clinical population (Arbour-Nicitopoulos et al., 2013).

Our working group faced some challenges in the process of developing the toolkit. Access to exercise referral schemes for depression is fragmented in Canada. Systematic reviews suggest that effects and adherence are better when exercise is supervised and structured (Stubbs et al., 2016). Accordingly, the CANMAT guidelines refer to structured and supervised exercise (Ravindran et al., 2016). However, such programs may not always be available. This impacted decisions that were made by the panel regarding content of the toolkit (a greater focus on exercise than habitual or lifestyle PA) and on what the end point of the toolkit and the decision-making process was particularly if there was no option for an exercise referral. While exercise referral may not always be possible, the working group considers PA promotion as something clinicians should be engaging in with individuals with depression. However, it is acknowledged that increases in PA may not be sufficient for an antidepressant effect but will provide other important health benefits. It is important that health care providers, along with individuals with

depression considering exercise as a treatment, understand the difference between PA and exercise.

We also acknowledge that a toolkit by itself is likely insufficient in supporting behaviour change, particularly in terms of helping individuals start and maintain exercise as a treatment for mild-moderate depression. With successful and informed dissemination, this toolkit will help health care providers integrate evidence-based guidelines related to exercise and depression into their practice and will be a starting point to facilitate the decision-making process and consideration of exercise as a treatment for mild-moderate depression. For exercise to become an accessible and feasible treatment alternative integrated regularly in health service delivery, significant work is still needed. Mental health care providers will need some training on exercise and PA (Glowacki et al., 2019a), and exercise professionals will need training on working with clients with depression (Faulkner & Biddle, 2001). Continued advocacy to key stakeholders such as government health authorities, decision makers, and community organizations is necessary for larger policy and organizational-level changes to support an exercise referral infrastructure for depression in Canada.

However, we believe the toolkit will serve different purposes for different stakeholders. For health care providers, the toolkit provides an evidence-based resource that can be used in practice to guide and facilitate conversations in considering exercise as a treatment for depression. It can also be used as a tool to facilitate PA promotion. For adults with depression, the toolkit is intended to increase awareness and knowledge of recommendations around exercise as a treatment for depression, and to provide behavioural strategies to overcome barriers for increasing PA and engaging in exercise. For exercise professionals, the toolkit can be used as an advocacy tool for integration of exercise programs and professionals into mental health care.

5.4 Dissemination barriers and facilitators

Now that the toolkit has been developed, attention has turned to disseminating the toolkit to clinicians nationally. Barriers to disseminating the toolkit need to be considered. The toolkit involves multiple components, so it will need to be marketed in one package. Extra training on the use of the toolkit may be needed for health care providers. Lastly, the targeted end users of the toolkit include a wide variety of different professions, and so dissemination may need to be tailored to each.

Facilitators that may help dissemination of the toolkit are to engage champions in different sectors including stakeholders involved in this development process, as well as work with our community partners to promote the toolkit (e.g., CANMAT, Centre for Active Living, and Canadian Mental Health Association). The creation of a social media package to send to partners will help them to disseminate through their own platforms and organizations. A tiered approach to national dissemination could start with the province of British Columbia where it was created and then move to other provinces. Housing of the toolkit is in one online location (www.exerciseanddepression.ca), and stakeholders promoting and disseminating the toolkit can use one website link with endorsement. This is to help to evaluate and track reach of the toolkit.

5.5 Strengths and Limitations

A strength of this work is the thorough systematic process used to develop the toolkit through consultation of the AGREE II instrument throughout the process to ensure quality, methodological rigour and transparency on how the toolkit was developed. This includes ensuring all six domains (and 23 items within the domains) were adequately addressed: scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, applicability, and editorial independence. Table 9 explicitly outlines how all items and domains

were addressed. Some examples of rigour of development (domain 3) include reviewing relevant literature and the two scoping reviews conducted (item 7 and 8), the multi-step phased process (item 10), and the consideration of practical implications for use of the toolkit by health care providers (item 11). Our group did not calculate a quality score by appraisers of each item. In replacement of this, a survey was sent back to panel members with their recommendations and the first draft of the toolkit to ensure that these were adequately met. Stakeholder involvement was an integral part of the process, and our group aimed for diversity of perspectives and expertise of the expert panel. This includes experts in depression, PA, knowledge translation, representatives from mental health and PA organizations, health care providers, individuals with lived experience with depression and researchers. Stakeholders including adults with depression and health care providers were consulted through the entire process reflecting an integrated knowledge translation approach for effective health promotion (Arbour-Nicitopoulos et al., 2013; Olsson, Skovdahl, & Engström 2016).

5.6 Evaluation

Panel members have worked with community partners and organizations to disseminate the toolkit across the province of British Columbia, and across Canada. Further details of the dissemination strategy used are provided in chapter six (study five). The project leads have evaluated the acceptability of the intervention, perceived attributes of the innovation, and how this may influence dissemination and adoption also outlined in study five. Evaluation has been conducted on the uptake of the resource through the hosting website since going ‘live’ on September 1st, 2019 and being available for free download online. In particular, reach to the target audience (who downloaded the toolkit) and dissemination (how they found out about it)

were considered. Ethical approval was received from the institutional ethics board. Results from the data collection over the first three months are now outlined.

5.6.1 Website Domain

The toolkit is hosted on the website domain www.exerciseanddepression.ca. Google analytics was used to track users on the website, as well as demographic information for downloads of the toolkit through an integrated survey feature. In three months, a total of 5894 new users went to the website. Figure 9 summarizes this by showing a breakdown of weekly new users to the website. An increase in users was seen in weeks 6-8 (October 6th-28th). In week 6=1260 new users went to the website, week 7=2388 and in week 8=356. The Canadian Broadcasting Company (CBC) published an online news article after interviewing KG about the toolkit on October 12th, 2019 (<https://www.cbc.ca/news/canada/british-columbia/exercise-as-medicine-1.5315447>). This media release contributed to the increase in downloads. The website had an international reach as individuals visited the website from 65 different countries, however most (85%) were from Canada. The toolkit is currently available in English language. The top four countries with the highest number of new users visiting the website were English speaking countries including 1) Canada (n=5057); 2) United States of America (USA; n=442); 3) Australia (n=66) and 4) United Kingdom (n=49). Figure 10 represents a global heat map to show number of visitors per country.

5.6.2 Toolkit Downloads

The toolkit was made available to download by filling out an anonymous registration form with the following questions: Are you a health care provider (Yes/No)? If yes, what is your health care provider designation (e.g. psychiatrist, nurse, occupational therapist)? If no, are you an individual seeking help for your depression (Yes/No)? How did you find out about this

toolkit? What city and province/territory (or country) are you from? If you are interested in providing feedback on the toolkit through a brief survey, please enter your email address. Over three months, the toolkit was downloaded 1262 times (21% of the total number of website visitors). Just over half of individuals identified as health care providers (n=656). The top three reported health care provider designations include Occupational Therapist (n=170; 26%), Nurse (n=87; 13%) and General Practitioner (n=54; 8%). See Figure 11 for a summary of all health care provider downloads over three months. The most common methods reported for how someone found out about the toolkit were from a colleague (n=145; 22%) and a news article (n=138; 21%) which was helpful to understand how our dissemination efforts were working to reach health care providers. KG emailed individual health care provider contacts she knows personally to share the toolkit and asked for it to be passed on. The release of the CBC article and media coverage also helped to reach health care providers. Figure 12 provides a summary of how all health care providers found out about the toolkit. Within Canada, the most common geographic locations of health care providers include British Columbia (n=307; 47%), Ontario (n=111; 17%), and Alberta (n=101; 15%). Outside of Canada, the most health care providers reported living in the countries of the U.S.A (n=18; 3%) and Australia (n=12; 2%). Figure 13 provides a full breakdown of health care provider locations.

Of those that did not identify as health care providers, 30% reported they were seeking help for their depression (n=376). For individuals seeking help for their depression in Canada, over half were from British Columbia (n=203; 54%), and 67 (18%) were from Ontario. Outside of Canada, 19 (5%) individuals were from the USA. See Figure 14 for a complete breakdown of where individuals with depression who downloaded the toolkit are from. Individuals with depression reported they found out about the toolkit from 1) a news article (n=239; 64%); 2)

online (n=38; 11%), 3) social media (n=32; 9%); 4) family/friend (n=24; 6%); 5) UBC Alumni (n=10; 2%); and 6) other (n=33; 9%). Figure 15 provides an overview of downloads over the three months and how individuals with depression found out about the toolkit.

5.6.3 Survey Results

In the registration form for downloads, people were given the option to provide their email address to be contacted to provide feedback on the toolkit through a brief survey. Of the 656 health care providers, 241 (36%) provided their email address consenting to be contacted. All these individuals were emailed a link to a secure anonymous Qualtrics online survey. One reminder email was sent 3-4 weeks after the initial survey link was sent. Response rate was low as 25 (10%) of these health care providers completed the survey (answered at least one question after the initial screening question of ‘Are you a health care provider?’ Yes/No). The survey consisted of mostly agreement style questions on a 5-point agreement scale (1-strongly disagree 5-strongly agree) created around the Diffusion of Innovation theory (Rogers, 2003), and the Theoretical Framework of Acceptability (Sekhon, Cartwright and Francis, 2017). Questions were asked how the toolkit related to the five attributes of innovation adoption: relative advantage, compatibility, complexity, trialability, and observability and the seven constructs of acceptability: ethicality, affective attitude, burden, opportunity costs, perceived effectiveness, self-efficacy and intervention coherence. Participants were asked how often they used the toolkit in their practice in the last month. Almost half (n=12) said they have not used the toolkit, 9 (36%) identified they used it 1-2 times, and 4 people (16%) said they have used it 3-4 times. Table 14 provides a summary of the feedback regarding innovation attributes and acceptability. Overall, health care providers had positive views of the innovation attributes and acceptability of the toolkit ($M= 4.4$ for all responses). Health care providers had strong views about compatibility

and ethicality. All health care providers agreed or strongly agreed that recommending exercise aligns with their role as a health care professional, and their personal beliefs and values ($M=4.7$; $M= 4.9$ respectively). They also had strong views when asked if they will continue to use the toolkit to recommend and discuss exercise ($M= 4.7$). Agreement scores were lower for the innovation attribute of observability ($M= 3.6$). This is likely due to half of the participants ($n=12$) identifying that they have not yet used the toolkit. Responses to open-ended questions provide some further context as to why these health care providers have not used it.

Open ended questions were asked about what factored into a decision to use the toolkit in practice, likes and dislikes, desired modifications and changes, and dissemination recommendations. Health care providers identified that depression severity and an individual's overall receptiveness to discuss exercise were common factors in deciding to use the toolkit or not. Unexpectedly, health care providers also described use of the toolkit outside of one-on-one interactions with people with depression. These individuals were mostly those that reported they have not yet used the toolkit in their clinical practice in the last month. Three people described that they were using the toolkit to share with their multi-disciplinary team and how it could be implemented in their practice. Two people explained that they either had already or were planning to create a group from the toolkit. One person expressed they were on research leave, but a relevant project is implementing exercise programs for people with cancer and that they were going to use it for oncology patients generally explaining they "needn't be depressed to similarly benefit". Most people described parts of the toolkit they liked ($n=18$). Commonly this was the simplicity of the toolkit, that it was easy to use, simple language, a strong evidence base, and an appealing layout. Three people identified that they disliked a visual aspect of the toolkit, specifically "font is too small" and "could be more visual for literacy needs". One person

identified that it was not available in French. Notably, this was reinforced by five email requests for a French version of the toolkit inclusive of the Department of National Defense to disperse amongst their staff. With regards to suggested changes to the toolkit, one person recommended specific wording changes, one person recommended changing the font size, one person recommended adding a climate change encouragement section for active commuting, and one person suggested a stronger motivational interviewing presence. With regards to changes and dislikes, the most common issue identified was the font being small. This was discussed between the toolkit authors (KG & GF) and a decision was made to prioritize it being short in length and less pages and if it is viewed on a screen it could be zoomed in on. The authors also considered and explored creating a French version. Due to limited resources (cost and staff) this is not being done at this time, although seeking additional funds through grant applications and agency partnerships are being considered. While results from initial evaluation of reach, dissemination, acceptability and innovation attributes are promising for adoption, little is known about the use of the toolkit in practice.

5.7 Conclusion

Developing the ‘Exercise and Depression Toolkit’ is the first step in bridging the gap between treatment guidelines for depression and the consideration of exercise as a treatment option in practice. Development followed an internationally accepted and rigorous consultation process by use of the AGREE II instrument (2017). Results from monitoring toolkit downloads, reach and dissemination are promising for adoption. Pilot evaluation to better understand the use of the toolkit in practice has been done and is discussed in study five. In tandem with other advocacy and research initiatives, it is anticipated that the toolkit will help health care providers integrate evidence-based guidelines into their practice related to exercise and depression. It is

also anticipated that this will be a starting point in helping exercise become an accessible treatment option that is integrated into health service delivery to improve the lives of the many Canadians living with depression.

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AGREE II Item	Modified AGREE II Item	Application to the Toolkit
Domain 1- Scope and purpose: objectives, practical questions and target population.		
1) The overall objective(s) of the guideline is (are) specifically described.	The overall objective of the toolkit is specifically described.	To support health care professionals in collaborating with clients to explore exercise as a treatment option for adults with mild-moderate depression.
2) The health question covered by the guideline is specifically described.	The practical questions covered by the toolkit are specifically described.	What type of resource(s) will support health care professionals to discuss exercise as a treatment for mild-moderate depression with clients? What type of resource will motivate adults with depression to consider exercise as a treatment option?
3) The population to whom the guideline is meant to apply is specifically described.	The population to whom the toolkit is targeted towards is specifically described.	Adults diagnosed with mild-moderate depression aged 18-65 in Canada not meeting the recommended 150 minutes per week of moderate-vigorous PA per week.
Domain 2- Stakeholder Involvement: consideration of the views of the target group(s) and their representation within the recommendations development group.		
4) The guideline development group includes individuals from all relevant professional groups.	The expert panel includes individuals from all relevant professional groups.	Experts in depression, physical activity, knowledge translation; representatives from mental health & physical activity organizations; health care providers; individuals with lived experience with depression; researchers.
5) The views and preferences of the target population have been sought.	Original AGREE II item retained.	Panel included end users of the toolkit and the population the toolkit is targeting. Formative research was done through interviews with adults with depression and health care providers.
6) The target users of the guideline are clearly defined.	The target users of the toolkit are clearly defined.	Health care organizations and providers that work with adults with depression, inclusive of (but not limited to): Family Physicians, Psychiatrists, Counsellors, Mental health workers, Occupational Therapists, Recreation Therapists, Nurses, Social workers.
Domain 3- Rigour of development: methods and criteria used to inform the recommendations, the review process, and plans for updating.		
7) Systematic methods were used to search for evidence.	Original AGREE II item retained.	Research evidence purposely selected including CANMAT Guidelines (Ravindran et al., 2016) and scoping reviews on barriers and facilitators for AWD and HCP (Glowacki et al., 2017; 2019a).

8) The criteria for selecting the evidence are clearly described.	Original AGREE II item retained.	Criteria are described in the methods section of this paper and in scoping reviews (Glowacki et al., 2017; 2019a) and CANMAT guidelines (Ravindran et al., 2016).
9) The strengths and limitations of the body of evidence are clearly described.	Original AGREE II item retained.	Key strengths include use of a theory-driven analysis to determine BCTs (Glowacki et al., 2017; 2019a; Cane et al., 2015) and the rigorous process to attain the highest level of evidence (one) to support exercise for MDD (Ravindran et al., 2016). Key limitations include varying methods of diagnosis of depression (Glowacki et al., 2017), no separation of terms PA or exercise (Glowacki et al., 2017; 2019a), and lack of long-term data to support exercise for MDD (Ravindran et al., 2016). Further details provided in the methods section and in the discussion of the scoping reviews (Glowacki et al., 2017; 2019a) and CANMAT guidelines (Ravindran et al., 2016).
10) The methods for formulating the recommendations are clearly described.	Original AGREE II item retained.	A multistep process used in previous PA toolkit development work in adults with SCI was applied (Arbour-Nicitopoulos et al., 2013): 1. Review of evidence by panel participants before the meeting; 2. Summary of key points from the evidence-base; 3. Structured working groups/breakout sessions; and 4. Review of final content and recommendations by panel survey and feedback.
11) The health benefits, side effects and risks have been considered in formulating the recommendations.	The practical implications have been considered in developing the toolkit.	The toolkit increases awareness and knowledge of the CANMAT guidelines, common barriers and strategies to help individuals with depression engage in exercise & PA are identified; an advocacy tool for improving access to exercise as a treatment for depression; a link to an exercise screening tool is provided; varying programming and exercise referral schemes across Canada and demand may increase; extra training on the toolkit may be needed.
12) There is an explicit link between the recommendations and the supporting evidence.	Original AGREE II item retained.	Refer to table 11 for explicit link to each recommendation and supporting evidence base.

13) The guideline has been externally reviewed by experts before its publication.	The toolkit has been externally reviewed by experts before its publication.	Toolkit content and format recommendations were reviewed and revised by panel experts and CANMAT board members.
14) A procedure for updating the guideline is provided.	A procedure for updating the toolkit is provided.	The online toolkit will be updated according to resources available.
Domain 4- Clarity of presentation: transparency of the recommendations and dissemination options		
15) The recommendations are specific and unambiguous.	Original AGREE II item retained.	Recommendations are considered clear based on feedback from the expert panel (see table 12).
16) The different options for management of the condition or health issue are clearly presented.	Original AGREE II item retained.	Different options for management are considered clear based on feedback from expert panel (see table 12), and CHOICE-D (Parikh et al., 2018) document is referenced for further details.
17) Key recommendations are easily identifiable.	Original AGREE II item retained.	Recommendations are considered easily identifiable based on feedback from the expert panel (see table 12).
Domain 5- Applicability: dissemination-related barriers and facilitators and the expected resource implications		
18) The guideline describes facilitators and barriers to its application.	Facilitators and barriers to dissemination of the toolkit were discussed.	Facilitators and barriers are outlined in the Discussion. Key facilitators include: identifying champions in different sectors, partnering with organizations with a large following (e.g. CANMAT and Centre for Active Living), and creation of social media packages to give to champions and organizations. Key barriers include: extra training on the toolkit may be needed, and may be multiple parts to the toolkit that will need to be packaged together.
19) The guideline provides advice and/or tools on how the recommendations can be put into practice.	The recommendations provide advice and/or tools on how the toolkit can be put into practice.	Ensuring HCP can readily distinguish the credibility of the information; instructions on use of the toolkit in practice included in the 'INTRO' document; additional action materials as handouts for clients.
20) The potential resource implications of applying the recommendations have been considered.	The potential resource implications of disseminating the toolkit have been considered.	Website management and hosting; personnel available to update website and track downloads; and greater demand for resources, programs and staff.
21) The guideline presents monitoring and/or auditing criteria.	Strategies for monitoring and/or auditing the uptake of the toolkit have been considered.	Monitoring of online downloads of the toolkit (number of downloads and reach) and planned

		formal feedback on its use in practice through ongoing evaluation.
Domain 6- Editorial independence: independency of the recommendations from the views of the funding body and competing interests of the expert panel		
22) The views of the funding body have not influenced the content of the guideline.	The views of the funding body have not influenced the content of the toolkit.	Representatives from funding agencies did not participate in the development process of the toolkit.
23) Competing interests of guideline development group members have been recorded and addressed.	Competing interests of the toolkit development group have been recorded and addressed.	None of the panel members reported conflicts of interest.
Abbreviations: AWD= Adult with Depression, HCP= Health Care Provider, MDD= Major Depressive Disorder, PA= Physical Activity, SCI= Spinal Cord Injury, CHOICE-D is a document outlining treatment options for clients and families with lived experience of depression, CANMAT= Canadian Network for Mood and Anxiety Treatments		

Table 9 Modifications to AGREE II Items



Figure 8 Toolkit development timeline

Name	Affiliation and Institution	Expertise
Krista Glowacki (Project co-lead)	OT, PhD Candidate, School of Kinesiology, University of British Columbia (UBC)	Mental health, physical activity behaviour change, knowledge translation
Dr. Guy Faulkner (Project co-lead)	CIHR-PHAC Chair in Applied Public Health, School of Kinesiology, UBC	Mental health, physical activity behaviour change, knowledge translation
Dr. Kelly Arbour-Nicitopoulos	Assistant Professor, Faculty of Kinesiology and Physical Education, University of Toronto	Mental health, physical activity behaviour change, knowledge translation, resource development
Ms. Meghan Burrows	PTS, RTS, Kinect Facilitator	Mental health, exercise and physical activity programming
Ms. Leslie Chesick	Counsellor, Counselling Services, UBC	Mental health, physical activity
Ms. Lyn Heinemann	OT, Director, Recovery and Innovation, Canadian Mental Health Association (CMHA)	Mental health, community resources and programming
Ms. Sarah Irving	SW, Canadian Mental Health Association	Mental health, community resources and programming
Dr. Raymond Lam	Professor and BC leadership Chair in Depression Research, Associate Head for Research, Department of Psychiatry, UBC, Mood Disorders Centre, Cjavad Mowafaghian Centre for Brain Health; Executive Chair, CANMAT	Mental health, psychiatry
Dr. Soultana Macridis	Research Associate and Knowledge Translation Specialist, Centre for Active Living	Physical activity behaviour change, knowledge translation, resource development
Dr. Erin Michalak	Professor, CREST.BD Founder and Director, Patient Engagement Methods Lead, BC SUPPORT Unit, Mood Disorders Centre, Department of Psychiatry, UBC	Mental health, knowledge translation, resource development
Mr. Aidan Scott	Patient Engagement & Research Volunteer, International mental health advocate, TEDx speaker, Youth Engagement Specialist, & Founder of Speakbox: social enterprise	Mental health, community resources and programming, client advocacy
Dr. Adrian Taylor	Professor of Health Services Research, Associate Dean for Research, Plymouth University Peninsula Schools of Medicine & Dentistry, UK.	Mental health, physical activity behaviour change

Table 10 Expert panel for toolkit recommendations development group

Toolkit Pages	Topic	Recommendation	Supporting Evidence
Exercise and Depression Introduction Document	Toolkit Development Process, Using the Toolkit, and Additional Action Materials	Title page is important as it's the first thing seen, need to get attention and highlight how this resource will help the clinician and address any pessimism they may have before using it. Promote collaboration and a person-centered approach between HCP & AWD. Create different parts of the toolkit for the intended audience of health care providers, adults with depression, or both to use together. Ensure risks are considered before engagement in an exercise program and physician clearance may be needed. Include all collaborators of the toolkit and their logos. Ensure it is stated that this toolkit is a guide, and it is not meant to be overly prescriptive.	(Cane, O'Connor, & Michie, 2012; Cane et al., 2015; Glowacki et al., 2018; MHCC, 2016)
Pg. 1 Why exercise?	Primary treatment options and facts	Identify all primary treatment options for mild-moderate depression including anti-depressant medication, exercise and psychological treatment. Enhance credibility of exercise as a treatment by stating facts about its effectiveness compared to other treatments.	(Ravindran et al., 2016; Lam et al; 2016; Parikh et al., 2018)
	Benefits of Exercise	Benefits should convey physical, psychological, and psychosocial health benefits of engaging in regular physical activity as well as benefits other treatments don't have (e.g. socialization)	(Canadian PA Guidelines, from CSEP; Rosenbaum, Tiedemann, Sherrington, Curtis, & Ward 2014; Stanton, Happell & Reaburn 2014; Deslandes et al., 2009)
	Potential Mechanisms	Describe potential mechanisms to explain the benefit of exercise in depression including biological factors (e.g., increased neurotransmitters, endorphins, brain-derived neurotrophic factor; reduction in cortisol levels), and psychological factors (e.g., increased self-efficacy)	(Cooney et al., 2013; Philips, C., 2017; Schuch et al., 2016a)
Pg. 2 How are exercise and depression related?	Mood Cycles	Use the behaviour change technique of 'Information about emotional consequences' and incorporate behavioural activation through visual diagrams side-by-side of positive and negative mood cycles. Describe that inactivity and withdrawal can lead to depression, and depression can lead to inactivity which becomes a difficult cycle to get out of. However, changing one thing in this cycle (such as increasing PA) can break the cycle and lead to a positive cycle out of feelings of depression.	(Parikh et al., 2016; Martell et al., 2010; Chalder et al., 2012)
Pg. 3 CANMAT Guidelines at a glance	CANMAT Recommendations, Evidence, and	State the CANMAT recommendations: exercise is recommended as a monotherapy for mild-moderate MDD, and in combination with other treatments. State the recommended evidence	(Ravindran et al., 2016; Krogh et al., 2017; Schuch et al., 2016a)

	evidence- based dose	based ‘dose’ of exercise to aim for if using as a treatment: 2-3 times per week, moderate intensity, 30 minutes duration, and supervised if possible but that it should be individualized based on current activity levels.	
	Glossary of terms	Define and differentiate the terms PA (for general health benefits) and exercise (for the treatment of depression).	(Caspersen, Powell, & Christenson, 1985; Ravindran et al., 2016).
Page 4. Moving More Action Materials (Handout #1-5)	Common Concerns, Actions	Evidence-based barriers (top related to emotion): lack of motivation, low mood, lack of energy, fatigue, lack of confidence in ability to exercise, lack of social support, time, money Evidence-based facilitators: others’ support or attitude, and ongoing support for the exercise itself	(Cane, O’Connor, & Michie, 2012; Glowacki et al., 2017)
	Actions Materials Handout #1-5 (Mood and Activity Diary, SMART Goal setting, Weekly Schedule, Individuals with Lived Experience, Positive Statements)	Recommended behaviour change techniques include: reduce negative emotions, Information about emotional consequences, Self-assessment of affective consequences, Social comparison, Social support (general, practical, and emotional), Information about others’ approval, Restructuring the social environment, Commitment, Behavioural contact, Goal setting (outcome and behaviour, Action planning. Include handouts and resources that clients can use independently: action plan, mood diary, concrete examples of structured & supervised exercise, example of a week schedule to get recommended ‘dose’. Provide ways for individuals to work towards the evidence based ‘dose’.	(Cane, O’Connor, & Michie, 2012; Cane et al., 2015; Glowacki et al., 2017; Michie & Atkins, 2014)
	Layout, Images & Colours	<ul style="list-style-type: none"> -Combination of text & images -Simple messages by using concise & point form wording -Quick facts pull-out -Bright colours and colour code pages to differentiate collaborative pages, pages for the HCP, and resources for AWD - Leave blank spots or boxes to write with prompt to clinician to engage in a conversation and to fill in with the client -Incorporate white space -Simple, clean graphics -Images of real people not necessary -5-10 pages in length 	(Foulan et al., 2012; Arbour-Nicitopolos et al., 2012)
Abbreviations CANMAT= Canadian Network for Mood and Anxiety Treatment HCP= Health Care Provider, MDD= Major Depressive Disorder, PA= Physical Activity, AWD= Adult with Depression			

Table 11 Toolkit recommendations and supporting evidence

Item	Mean (s.d.)	Range	Area(s) of concern	Response to Feedback
Objectives 1. The toolkit is appropriate for use by the intended audience of health care providers working with adults with depression.	6.89 (0.33)	6-7	-Some people may experience low mood and symptoms and not have a clinical diagnosis of depression but could benefit from exercise	Wording changed to incorporate “low mood”
2. Does the toolkit: a. Use concise language? b. Promote collaboration and a person-centered approach between health care providers and individuals with depression? c. Capture the tone/feel of: hopeful + active + journey?	6.56 (0.53)	6-7		
	6.56 (0.53)	6-7		
	6.44 (0.73)	5-7	Some are long-term vs. short-term actions and concerns	Re-ordered actions to progress from more immediate to longer-term actions
3. Discussions at the panel meeting identified the need to tackle clinician’s possible pessimism about individuals with depression engaging in an exercise program. Does the ‘INTRO’ section do this adequately?	5.89 (0.60)	5-7	-Perhaps lengthy with only a minor hook -Further details may be necessary for the ‘action materials’ section -Distinction between PA & exercise not clear	-Title page changed to include CANMAT guidelines & collaborator logos -Further detailed instructions included on each page of the ‘action materials’ section -Included definitions on page 3 of the intro document ‘Using the Toolkit’
Pg. 1 Why Exercise? 4. Does the toolkit present exercise as one treatment option in comparison to other standard treatment options? <i>*n=8</i>	6.13 (1.36)	3-7	-No details or direct comparison provided of other treatments (e.g. side effects) of psychotherapy and medication	-Reference included of CHOICE-D Document to explore details of other treatments -Additional instruction included on page 3 of the intro document ‘Using the Toolkit’
5. Does the toolkit describe a variety of benefits of exercise? (e.g. physical health, psychosocial)	6.44 (0.53)	6-7	-The benefits were presented using wording “side-effects may include” which may have a negative connotation and be misleading	-Wording changed to “Benefits”
Pg. 2 How are exercise and depression related? 6. Does the toolkit provide visuals and diagrams that are easy to follow?	6.56 (0.53)	6-7		

7. The positive and negative mood cycles in the toolkit are helpful for engaging someone in conversation related to exercise as a treatment for depression.	6.56 (0.53)	6-7		
Pg. 3 Guidelines at a Glance. 8. Does the toolkit clearly state the amount, type, and intensity of exercise of the CANMAT guidelines?	6.33 (1.00)	4-7	-Exercise can also be used in conjunction with other treatments and not just stand-alone -The CANMAT guidelines should be page 1 as it is compelling	- Additional recommendation included: Exercise can also be used in combination with other treatments (page 3 & INTRO document) -Wording changed on the title page to include CANMAT guidelines so it is the first thing seen
9. Does the toolkit avoid being overly prescriptive?	6.11 (0.60)	5-7		
Pg. 4 Moving More. 10. Does the toolkit highlight: a. Commonly identified barriers/concerns?				
b. Strategies or actions to take to overcome barriers?	6.44 (0.53)	6-7		
	6.33 (0.50)	6-7		
Images 11. In the panel meeting, a consensus was reached that images of real people may not be necessary. The current icons and figures in the toolkit are: a. Appropriate for health care providers and adults with depression?	6.56 (0.53)	6-7		
b. Adequate as visuals to enhance the narrative of the document?	6.44 (0.53)	6-7		
Consistency was indicated between the panel recommendations and the general content and presentation of the toolkit. Responses were favourable on all items regarding questions about content and format recommendations. (M= 6.42 on a 7-point scale).				

Table 12 Toolkit ratings obtained from expert panel (n=9)

Item	Mean (s.d.)	Range	Comments
12. The toolkit will facilitate clinician-client discussions about exercise, and exercise as a treatment for depression.	6.56 (0.53)	6-7	
13. Use of the toolkit will be consistent with most clinician's usual practice.	4.78 (1.30)	3-7	<p>-This is something new and that is positive: it is easy to use but different</p> <p>-Many clinicians will not currently be promoting PA and this toolkit will help them to do so</p> <p>-Will be beneficial for clinicians and clients</p>
14. The toolkit is easy to understand.	6.67 (0.50)	6-7	
15. Clinicians could observe whether using the toolkit in their practice was beneficial for their clients. (n=7)*	6.00 (1.00)	4-7	-Could measure function and attendance (harder to measure social benefits)
16. The use of the toolkit could be adapted to suit the needs of clinicians. (n=8)*	5.50 (1.31)	4-7	
*Responses to items were removed and considered a non-response if reported they did not understand the question.			

Table 13 Expert panel feedback innovation attributes (n=9)

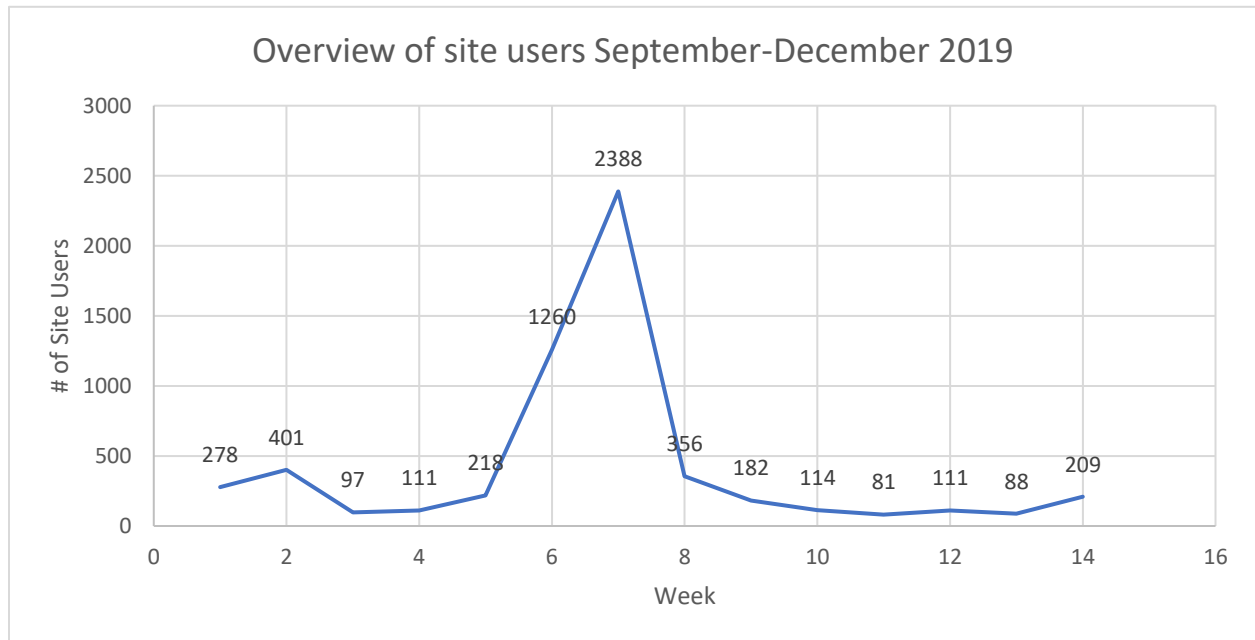


Figure 9 Overview of site users

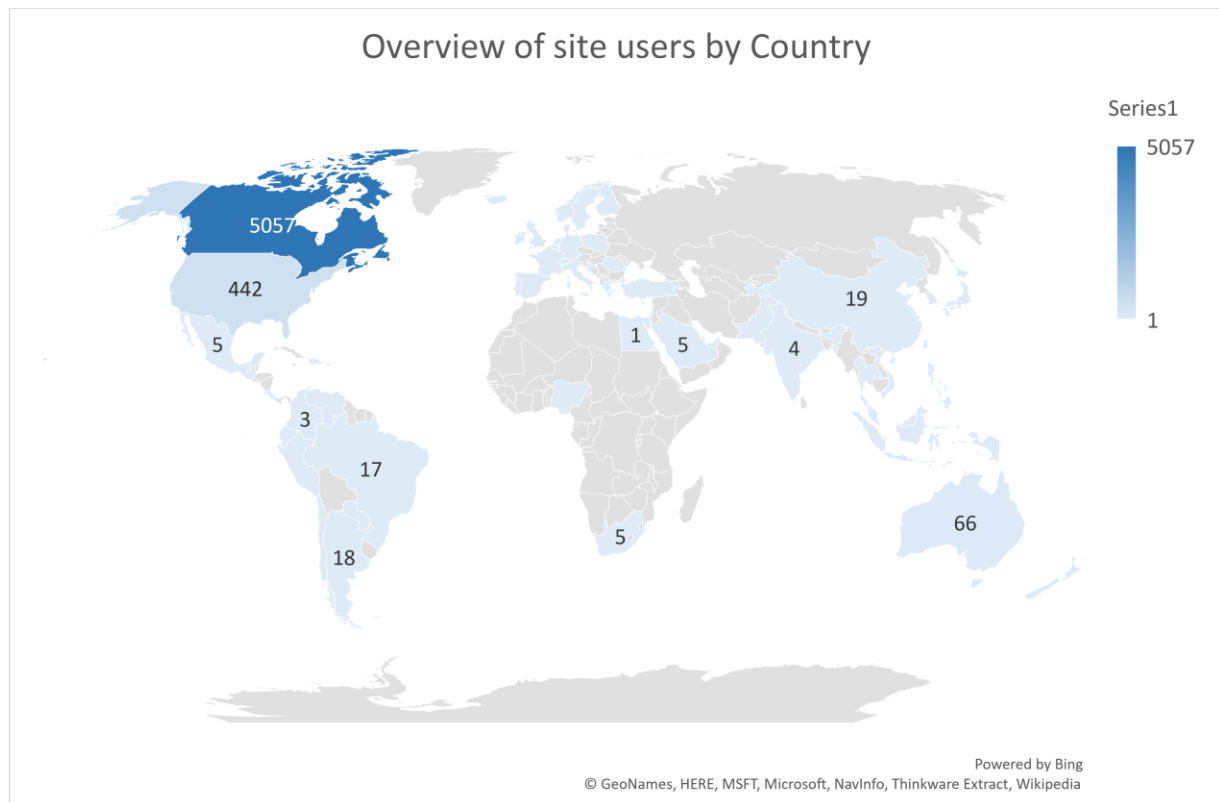


Figure 10 Overview of site users by Country

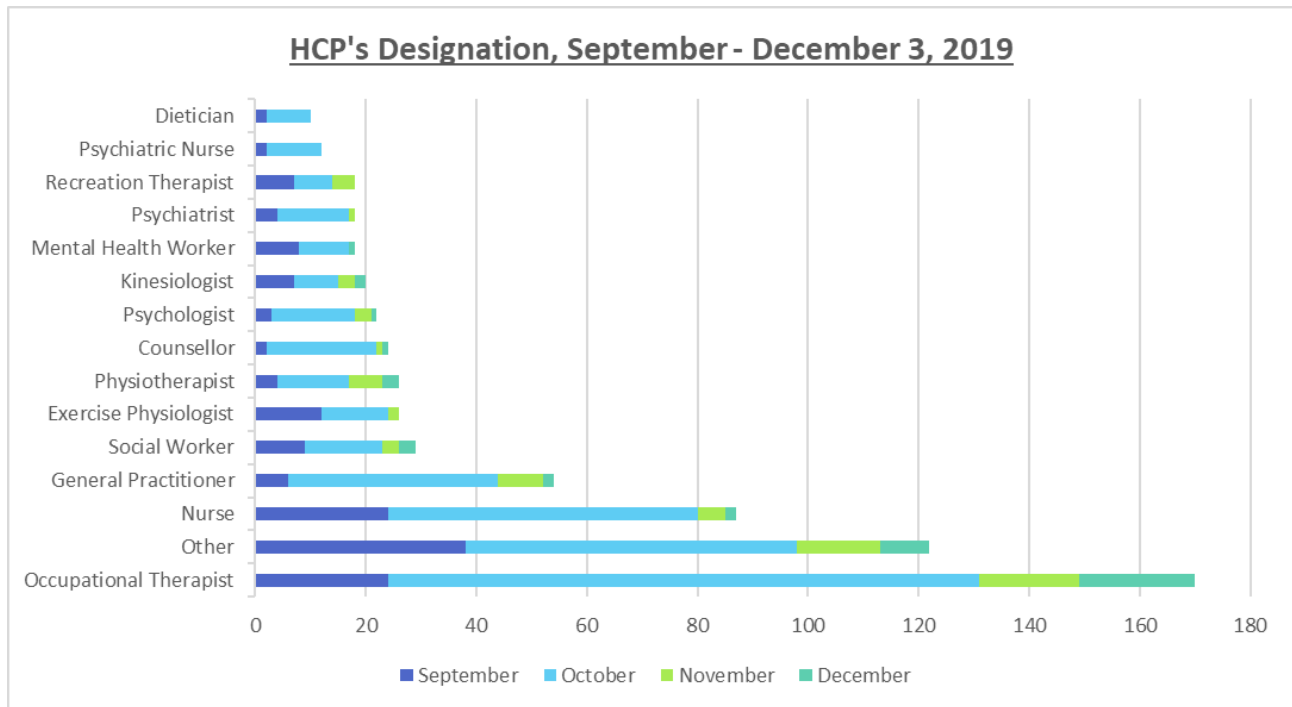


Figure 11 HCP downloads by designation

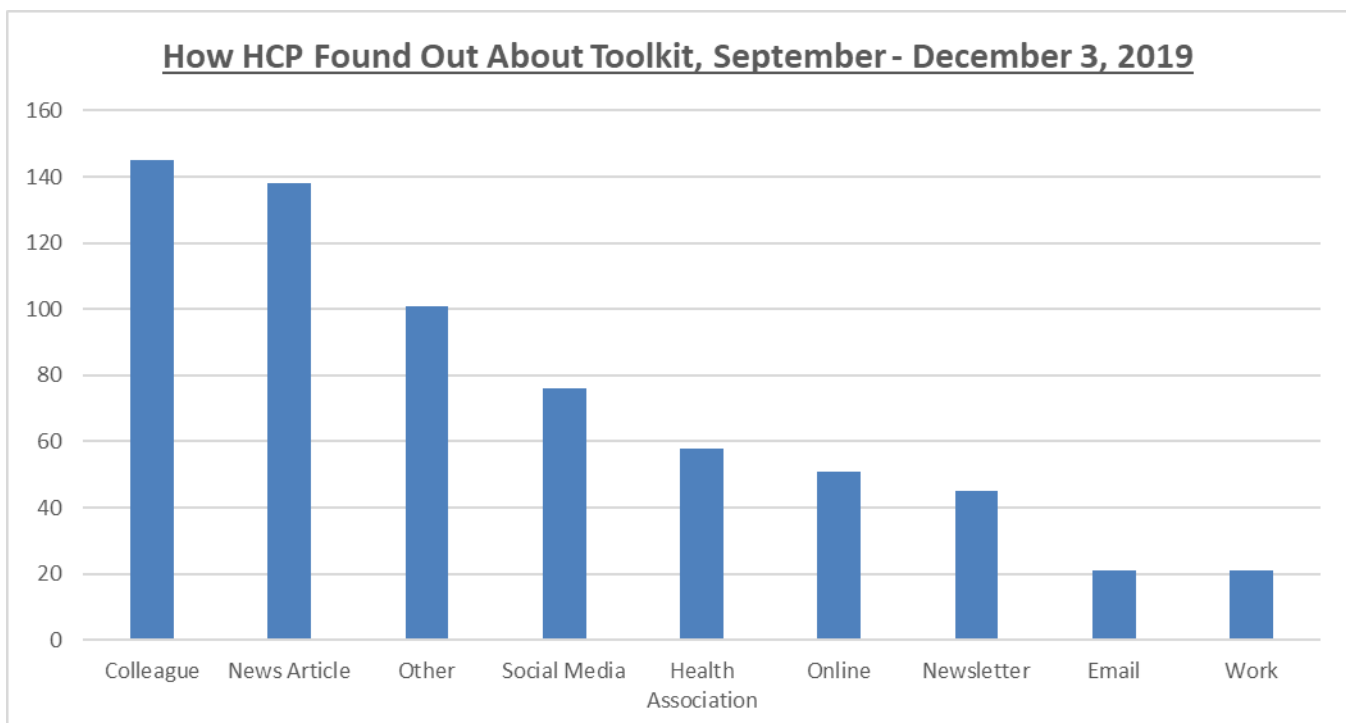


Figure 12 How HCP found out about toolkit

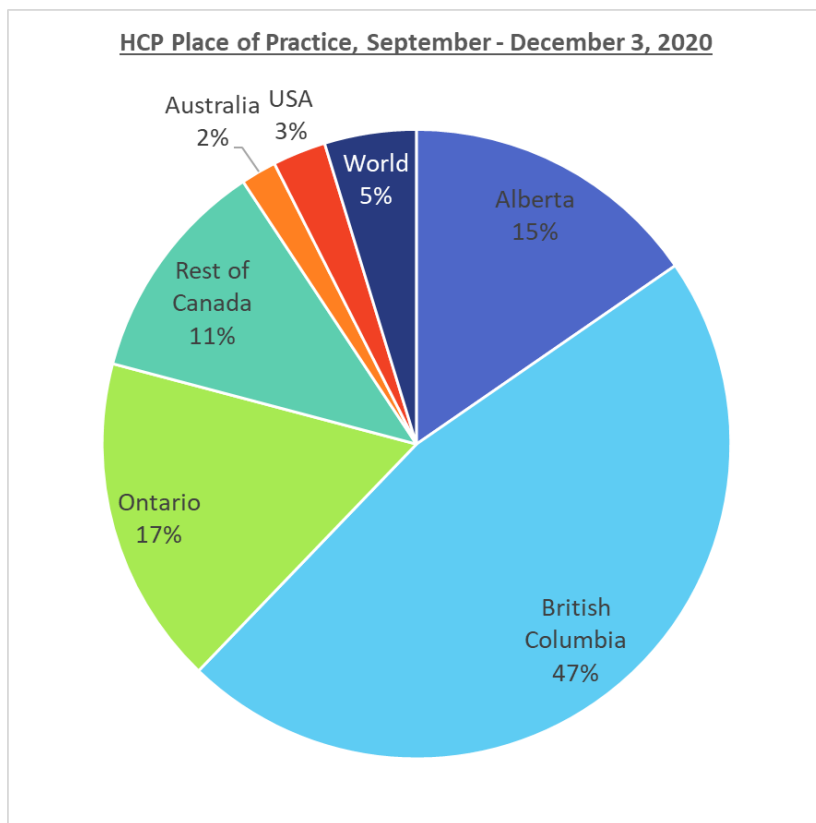


Figure 13 HCP location

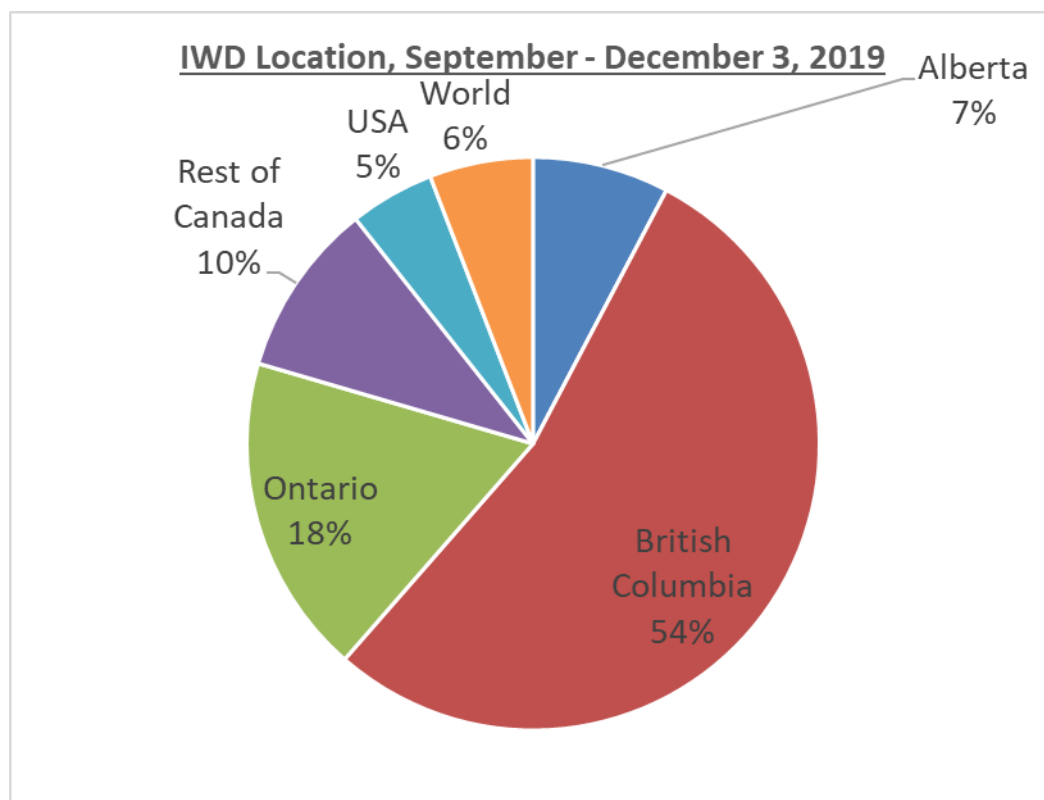


Figure 14 IWD location

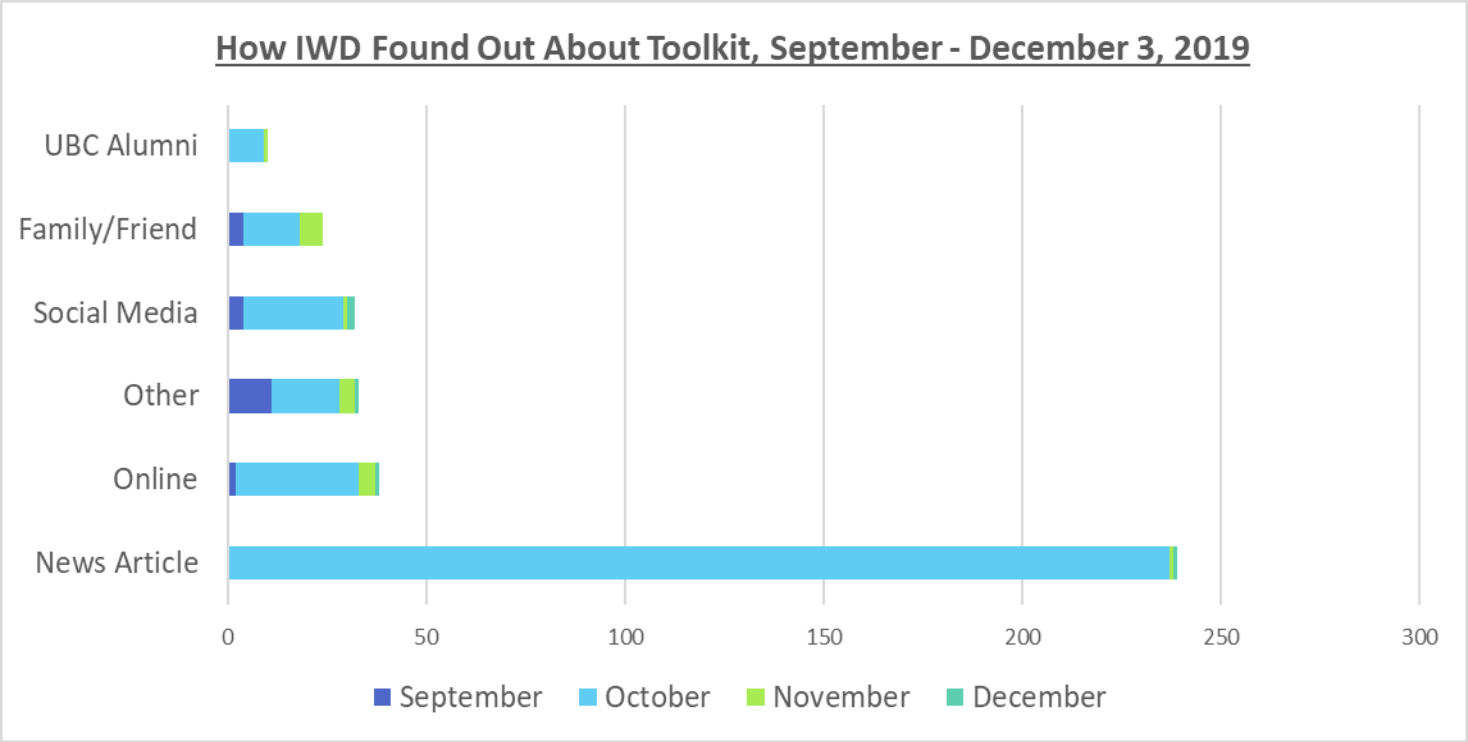


Figure 15 How IWD found out about toolkit

Item	Number of responses	Mean (S.D.)	Range
The toolkit is easy to understand and use.	25	4.6 (0.71)	2-5
The toolkit does not require a lot of time and effort to use in practice.	25	4.3 (0.95)	2-5
Using the toolkit in practice does not interfere with other priorities as a health care provider.	23	4.3 (0.94)	3-5
The toolkit helped me to engage in discussions with adults with depression about exercise/ exercise as a treatment option.	23	4.3 (0.86)	3-5
The toolkit helped improve my confidence to discuss and recommend exercise/ exercise as a treatment option for depression.	23	4.2 (0.83)	3-5
Recommending exercise aligns with my role as a health care professional. For example: as a physician, or as a social worker etc.	23	4.7 (0.63)	3-5
Recommending exercise aligns with my personal beliefs and values.	23	4.9 (0.29)	4-5
I was able to observe positive changes in my clients from using the toolkit. For example: changes in their mood, increased physical activity levels, engagement in an exercise program.	23	3.6 (0.84)	3-5
I could adapt use of the toolkit to suit my needs. For example: only use certain pages such as pg. 3 guidelines at a glance, or action material handouts.	23	4.7 (0.54)	3-5
I will continue to use the toolkit to recommend and discuss exercise/exercise as a treatment for depression in my practice.	23	4.7 (0.56)	3-5

Table 14 HCP survey results

Chapter 6: “If I didn’t have the toolkit, I would never have that conversation”: pilot evaluation of health care providers’ use of the ‘Exercise and Depression Toolkit’.

6.1 Background

The Canadian Network for Mood and Anxiety Treatment (CANMAT) revised treatment guidelines in 2016 for Major Depressive Disorder (MDD; Ravindran et al., 2016). These guidelines recommend exercise as a first-line treatment for mild-moderate MDD, and as an adjunct treatment for moderate-severe MDD. In Canada, little structure exists for mental health professionals to explore exercise as a treatment option for adults with depression. Clinical treatment guidelines such as the CANMAT guidelines were developed to help health care providers implement evidence-based research into their clinical practice (Ravindran et al., 2016). However, releasing guidelines or providing education about guidelines is not sufficient to elicit behaviour change (Pederson et al., 2018). Guidelines help to understand ‘what’ to do, but not ‘how’ to do it (implementation). Thus, ‘The Exercise and Depression Toolkit’ was developed to help health care providers discuss and consider exercise collaboratively with individuals with depression (Glowacki et al., 2019b; Glowacki & Faulkner, 2019).

As described previously in chapter five, reach and dissemination of the toolkit have been evaluated over three months. While results of this evaluation suggest interest in the toolkit, this provides little insight into the use of the toolkit by health care providers in practice. This final study within the Action Cycle of the Knowledge to Action Framework was done to monitor knowledge use and evaluate outcomes (highlighted in Figure 16 adapted from Graham et al., 2006). This is important to help sustain knowledge use and often a missed component within

health care practice research utilizing this framework (Field, Booth, Ilott, & Gerrish, 2014). This falls within the final stages of the Action Cycle.

6.2 Theoretical Perspective

The Diffusion of Innovation (DoI) Theory helps explain the process by which people or groups adopt or reject an innovation which is a new idea, behaviour, or object (Rogers, 2003). This theory is dissemination focused and can help to inform diffusion, the communication, and uptake of an innovation (Tabak, Khoong, Chambers & Brownson, 2012; Rogers, 2003). The innovation itself, as well as its perceived attributes, may impact adoption and use of an innovation. The five attributes of an innovation considered important within this theory are relative advantage, compatibility, complexity, trialability and observability. See Table 15 for definitions of these attributes. If an adopter feels there is no relative advantage in using the innovation, it is not compatible with their values and beliefs or does not meet their needs, has a low degree of trialability and observability, or it is perceived as too complex, then it will not be adopted (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou et al., 2004; Rogers, 2003). These attributes were considered when developing the toolkit.

Studies have been done to better understand different health care interventions, specifically for clinical populations including individuals with alcohol and drug dependence, older adults with dementia, and primary care patients using the DoI Theory for guidance to help understand adoption (Dingfelder & Mander, 2011; Elison, Ward, Davie & Moody, 2014; Olsson, Skovsdahl & Eggstrom, 2016; Zhang, Yu, Yan, & Spil, 2015). Studies have also been done using the DoI theory to help understand adoption of interventions created for health care providers and health service delivery (Faulkner & Biddle, 2001; Greenhalgh, Robert, Macfarlane, Bate & Kyriakidou, 2004; Makowsky, Guirgis, Hughes, Sudowski, & Yuksel, 2013; Scott, Plotnikoff,

Karunamuni, Bize, & Rodgers, 2008). Overall, the studies reviewed using Rogers' DoI theory identified that attributes of the innovation were important factors to consider for the adoption of innovations in health care. For example, Faulkner & Biddle (2001) explain how course directors for doctoral programs in clinical psychology expressed views of exercise being incompatible with what they perceived clinical psychology to be, which likely negatively influenced adoption of exercise into course curriculum.

The DoI theory was developed to help understand the adoption of any innovation and is primarily used for new technologies. More recently, the Theoretical Framework of Acceptability (TFA) was developed to help assess the acceptability of health care interventions (Sekhon, Cartwright, and Francis, 2017). This framework was created through conducting a systematic review of health care interventions that included a focus on acceptability. Prior to this, acceptability has been acknowledged as important but did not have a clear definition or specific materials for operationalizing it within medical research guidance documents (Moore et al., 2015; Sekhon et al., 2017). Acceptability can be defined as a “multi-faceted construct that reflects the extent to which people delivering or receiving a health care intervention consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention” (Sekhon et al., 2017, p. 1). The TFA is made up of seven constructs of acceptability, defined in Table 16. The constructs can be used to understand acceptability either before taking part in an intervention (anticipated), or after (experienced). Acceptability of an intervention will impact successful implementation. If acceptability is considered low, the intervention may not be delivered as intended, which could impact other factors such as overall effectiveness (Diepeveen et al., 2013; Sekhon et al., 2017).

The TFA is a relatively new theoretical framework and was developed specifically for health care interventions. Qualitative studies have applied the TFA to assess intervention acceptability (Murphy & Gardner 2019a & 2019b; Sekhon, Cartwright & Francis, 2016; Sekhon, Cartwright, Wickwar, McBain & Francis, 2018) and all deemed the theory to be helpful for understanding intervention implementation, identifying issues with the program, and informing changes in design to increase uptake. Murphy & Gardner (2019a) describe a mental health promotion program for pharmacists, Headstrong- Taking Things Head On. Headstrong focuses on various mental health topics such as depression and suicide intended to build capacity in pharmacists and pharmacy teams so that they can help men access better services, care, and community supports. Murphy & Gardner (2019b) used the TFA to help understand implementation of the program, and described that anticipated effectiveness was mixed, and concerns were expressed regarding opportunity costs (diverting time and money away from other tasks), which likely impacted participation by some pharmacists.

The Medical Research Council and the CIHR have acknowledged the importance of assessing acceptability and evaluating complex interventions to be delivered in real world settings (CIHR, 2016; Craig, Dieppe, Macintyre, Michie, Nazareth, & Petticrew, 2008; Moore et al., 2015). The DoI theory is helpful for assessing perceived attributes of an intervention and these attributes were considered when creating the toolkit. The TFA adds to this by providing an in-depth conceptualization of acceptability with the consideration of emotional and cognitive responses to an intervention. This hybrid complementary approach provides a framework to evaluate a complex real-world intervention. With addition of the TFA, considerations are given to the concept of burden (the amount of effort required to use an intervention), opportunity cost (what was given up to use an intervention) and self-efficacy (confidence to use an intervention).

Opportunity cost may be particularly important for health care providers to consider (Murphy & Gardner 2019a; 2019b). Often health care providers need to advocate to third party fee payers (e.g. government, insurance companies) to cover costs of allocated treatment. If time is taken away from commonly used and known fee covered services, this may negatively impact uptake. Further, when the toolkit was created it was considered an opportunity to challenge pessimistic assumptions and equip practitioners with strategies and skills to increase confidence to overcome barriers based on a behaviour change analysis (Glowacki, Weatherson & Faulkner, 2019).

Two constructs within the two theories overlap, perhaps indicating a level of higher significance for these specific factors. Relative advantage is if an intervention is perceived as being better than a previous approach, which overlaps with perceived effectiveness, which is if an intervention is considered to achieve its intended purpose. The toolkit was designed to help health care providers discuss and consider exercise collaboratively with individuals with depression (help them do so more than their previous approach). The constructs of compatibility and ethicality also overlap. Both consider a person's values (inclusive of past experiences), and how that aligns with using the intervention.

To the best of this writer's knowledge, no studies have utilized the TFA for a physical activity promotion intervention, and thus using this theory will represent an addition to the mental health and physical activity field. Similarly, no studies have used the complementary approach of Rogers' DoI theory and the TFA to help understand adoption. This hybrid theoretical approach may help to optimize adoption of the intervention developed, the 'Exercise and Depression Toolkit' (also referred to as the toolkit throughout this manuscript). An innovation adoption process is not straight forward. Acceptability of the intervention to both intervention deliverers and intervention recipients will impact successful implementation

(Diepevee, Ling, Suhrcke, Roland & Marteau, 2013; Sekhon et al., 2017). Understanding factors that could influence the adoption of new interventions is an important step for uptake and dissemination of an innovation.

6.3 Purpose

The primary purpose of this study was to evaluate use of the toolkit in practice by health care providers working with individuals with depression. The secondary purpose was to attain feedback on the toolkit to determine necessary modifications and help inform national dissemination and uptake of the toolkit. This study was conceptually informed by Rogers' Diffusion of Innovation theory, and the Theoretical Framework of Acceptability. An exploratory case study methodology was adopted (Yin, 2018).

Several questions were used to guide this evaluation. These questions include: Was the toolkit used by health care providers? When they used the toolkit with individuals with depression, did they perceive these interactions to be successful- why or why not? How do health care providers perceive the attributes of the toolkit? How do health care providers perceive the toolkit with regards to relative advantage, compatibility, complexity, trialability, and observability? How acceptable do health care providers consider the toolkit? How do health care providers view ethicality, affective attitude, burden, opportunity costs, perceived effectiveness, self-efficacy, and intervention coherence of the toolkit? How may this have impacted adoption and dissemination? What modifications, if any, can be made to the toolkit to enhance adoption and dissemination?

6.4 Methods

Ethics and Recruitment: Ethical approval was obtained from the University of British Columbia Ethics Board. Participants were recruited from across Canada through purposive

sampling. Health care providers (HCP) that previously participated in the interviews from study three were contacted and invited to participate in the study. These individuals were considered champions in the field of physical activity and mental health, and likely to be early adopters of the 'Exercise and Depression Toolkit'. Recruitment emails were also shared through private practice networks such as Back in Motion Rehabilitation and Infinity Health in British Columbia (BC). Institutional ethics was also attained from Vancouver Coastal Health, a health authority in the lower mainland of BC. Lead mental health occupational therapists and recreational therapists shared a recruitment email once ethics approval was granted.

Eligibility: To be eligible for participation, HCPs had to currently be working with adults with depression, working a minimum of two days per week, and not have any planned vacation (for more than a week) during the four-week evaluation period. The toolkit was created for a variety of end users, health care providers that work with adults with depression such as Family Physicians, Psychiatrists, Counsellors, Mental Health Workers, Occupational Therapists, Recreation Therapists, Nurses, and Social workers. The aim was to recruit a sample inclusive of the different end users from different professional designations.

Data Collection: Case studies are commonly used to understand and explore professional practice behaviours (Yin, 2018), and in particular nursing practice in Canada (Heale and Twycross, 2018). A case study can be defined as an intensive, systematic investigation of a single individual, group, or community in which the researcher examines in-depth data (Woods & Calanzaro, 1980). Case studies are used to understand a real-world case and assume that such an understanding is likely to involve important contextual conditions pertinent to the case (Yin and Davis, 2007). Case studies are used to explore complex phenomena in a natural setting and are recommended as a research design to address how and why questions, and situations where a

researcher has little control over manipulation of a behaviour (Yin, 2018). Usually, more than one method of data collection is used, and if using multiple cases what is similar and different about the cases to understand the phenomenon is explored (Stake, 2006; Heale & Twycross, 2018). The toolkit was provided to HCP to use in their practice at their discretion, thus behaviour was not considered to be easily manipulated. This writer anticipated recruitment would be difficult due to time commitments required from HCP, so a small sample size was expected. This writer opted for multiple data collection methods to better understand health care providers' practice behaviour in-depth. This writer wanted to be able to consider the individual health care providers and their context (e.g. family physician in primary care), as well as the providers as a group of 'mental health professionals'. Thus, an exploratory case study approach was used based on these factors, and the considerations and recommendations for use of this research design.

Semi-structured phone interviews were conducted by the first author (KG) pre-intervention, and post-intervention (after use of the toolkit for four weeks) scheduled at times convenient for participants. Participants were also given an electronic weekly log (that could be filled out by hand or online). The log was used to track use of the toolkit, as well as satisfaction on how they felt their interactions with individuals with depression went, and details of the 'end point' of what occurred after using the toolkit. Data collection occurred from July 2019-October 2019, with rolling admission into the study. Six health care providers participated in the study, all with different professional designations (see Table 17 for demographic information). There is no 'magic number' for participants in a case study design (Yin, 2018). The number of participants in this study is reflective of exploratory case studies done on nurses' practice behaviour in Canada (Twycross, 2008).

During the pre-interview, a brief overview of what the toolkit is, and an explanation and recommendations on how to use it (based on the ‘INTRO’ document of the toolkit) was provided. Prior to the interview, participants were given the full toolkit and the weekly log to review, and questions on its use or how to fill out the log were addressed in the interview. Participants were given four weekly logs to use at their discretion in their practice settings for four weeks. Reminder emails were sent if weekly logs were not received. In-depth phone interviews were then conducted with all participants at the end of four weeks once all weekly logs were received. Data collected from pre-intervention phone interviews and the weekly logs for each participant were used as prompts for these final interviews. Pre and post-intervention interview guides, as well as the weekly logs can be referenced in the appendix.

Pre-Intervention Interview Guide: This interview guide was developed to help understand health care providers’ practice before using the toolkit. It included general practice questions and prompts such as: Please tell me about your experience in recommending/discussing exercise with adults with depression; What are some of the barriers/facilitators you face currently to recommending or discussing exercise as a treatment for depression? Questions were then asked related to anticipated acceptability, before taking part in the intervention. For example, for the construct intervention coherence, participants were asked: From your perspective, what do you think the ‘Exercise and Depression Toolkit’ is trying to achieve? For the construct of self-efficacy, questions included how confident do you feel to discuss and recommend exercise as a treatment for depression, and how confident do you feel in using the toolkit to do this?

Weekly Provider Log: Acknowledging that health care providers experience time constraints within their usual practice, the weekly log was designed to be simple, easy to use, and quick to complete. Participants had the option of printing and filling it out by hand or completing

it online. The log provided participants with an option to check and track the days that the toolkit was used (and what parts of the toolkit), and if a referral to an exercise program was made. Participants were asked to rate their perceived success of interactions with the individuals they work with when using the toolkit on a scale of 1-7 (1 being extremely low success, and 7 being extremely high success). Prompts were provided to consider usefulness, individual receptiveness and overall satisfaction. With regards to such interactions HCPs were also provided instructions in the pre-interview and were encouraged to consider how they felt about their interactions with people with depression in the context of what they document as a health care provider in practice day to day (e.g. affect, emotional expression, behaviour). Additional space was provided for any other further elaboration and comments.

Post-Intervention Interview Guide: In the follow-up interview, questions addressed experienced acceptability (after taking part in the intervention). Questions and prompts were included for each of the constructs of acceptability and the perceived attributes of an innovation. For example, for the acceptability construct ‘affective attitude’, participants were asked: what did you like about the toolkit, and what did you dislike about the toolkit? For the construct of self-efficacy, the question was asked: How confident do you feel to continue to use the toolkit to discuss and recommend exercise as a treatment for depression? How (if at all) has the toolkit helped improve your confidence to discuss and recommend exercise as a treatment option? Prompts were also used in reference to answers from the pre-interview to stimulate discussion. Example questions for the perceived attributes of an innovation include: do you feel the toolkit is easy to understand and use (simplicity)? Were you able to observe any positive changes in your clients from using the toolkit (observability)? If so, what? This interview guide ends with questions about adoption and the intent to continue using the toolkit, recommending it to

colleagues, and dissemination strategies. A dissemination question included: We hope to share the toolkit with health care providers across Canada to use. Do you have any suggestions for this dissemination of the toolkit?

Data Analysis: All interviews were audio-recorded and transcribed verbatim. Weekly logs were transcribed into one document for each participant. Logs, interviews, and transcriptions were assigned participant ID numbers to maintain confidentiality. Interviews ranged from 30-60 minutes in length. A content analysis was conducted to prepare, organize, and report on the data (Elo & Kyngas, 2008; Elo et al., 2014). A codebook was first created using the seven component constructs in the TFA (Sekhon et al., 2017) as well as the innovation attributes of the DoI (Rogers, 2003) and their respective definitions. The concepts of adoption and dissemination were also included. Although coding was primarily deductive, the authors agreed that if an important topic emerged from the data relevant to the purpose of the study and guiding questions, a new code would be created and discussed. QSR International's NVivo 11 Software was used to manage data and support qualitative data analysis. Coding was conducted collaboratively by the first and second author (KG and DZ) on one transcript and one weekly log to ensure understanding of the codes and concept definitions. After this collaborative approach, KG and DZ coded all transcripts independently and then met to review and discuss all coding. Any discrepancies in coding were discussed until agreement was reached, and when needed, the third author GF was consulted. Units of data were coded as statements which ranged from a sentence to a paragraph. Statements were considered new ideas or concepts, hence the variability in length of what was coded. For the theoretical constructs, the authors coded statements as negative or positive. This was determined based on the participants' description of views, context, and tone. A negative statement was considered something that would negatively impact

adoption, and a positive statement would positively influence adoption. For example, if a participant felt that the toolkit was difficult and hard to understand and use, this was coded under complexity as a negative statement. Neutral statements were coded as negative, as not to over-estimate positive statements which would positively influence adoption, and ambivalence about an intervention was considered negative. The authors attempted to use one code to isolate the meaning of the text, versus double-coding passages of text. For example, participants were asked how they felt about the toolkit (their likes and dislikes). An example of a response commonly heard was “I just liked the simplicity, so, not too many pages, because that gets overwhelming for patients”. Such a response, stating it was simple or easy to use, was coded to complexity (as a positive statement) rather than complexity and affective attitude (how an individual feels about an intervention).

Various criteria were adopted to ensure ‘trustworthiness’ of this qualitative research. Elo and colleagues (2014) provide a checklist for researchers to improve trustworthiness when conducting a content analysis study (Table 1, p. 3), which was consulted throughout the entire process. A critical reference group (KG’s doctoral dissertation committee) was consulted prior to conducting the study for data collection methods, evaluation of interview guide questions, and purposive sampling strategy (Pyett, 2003; Elo et al., 2014). Throughout the analysis process, two independent coders (KG & DZ) utilized a detailed pre-determined codebook and discussed meaning units and categorization throughout the analysis process (Elo et al., 2014). Interpretations were also discussed within the broader research team to challenge the identified meaning units and categorization in a form of peer debriefing (Lincoln & Guba, 1985). Based on recommendations from Elo and colleagues (2014), the authors attempted to describe the analysis process in detail, with results reported systematically and carefully with transparency as to how

connections were made between the data and results. Lastly, to enhance transferability, descriptions of the culture, context, selection, and characteristics of participants are provided in Table 17 (Elo et al., 2014).

6.5 Results

Based on the data collected from weekly logs, all the health care providers (n=6) used the toolkit at least once. Half (n=3) of the participants referred individuals to an exercise program at least once. The number of times the toolkit was used (either part of it or the full toolkit) by each participant during the four-week evaluation period ranged from 1- 40 times (median= 7.5; IQR=5). The Occupational Therapist used it once and identified that she had recently taken on a managerial role splitting half of her working hours overseeing other practicing therapists which reduced her caseload and in turn reduced her opportunity to use it. The Psychotherapist used it 40 times. She explained that she had a low-cost exercise facility right next door to where she worked which reduced many barriers for her to use the toolkit and recommend exercise, thus enabling her to use it with almost all the people she saw with depression. Overall, participants perceived their interactions with individuals with depression when using the toolkit to be successful. They ranked success on a scale of 1-7 (1 being extremely low success, and 7 being extremely high success) considering individuals' receptiveness, usefulness and general satisfaction. The average success score of each participant of all their interactions ranged from 4.1-6.5. The average success score for all participants was 5.5/7. Table 18 provides a summary of results from the weekly logs.

The results from coding of the post-interviews and weekly logs are presented in Table 19 for the theoretical constructs of the TFA and DoI Theory. Coded statements are presented as positive or negative statements to help understand adoption. Overall, all participants (n=6)

viewed the toolkit as having relative advantage and helping them to discuss exercise with individuals with depression. All participants viewed the toolkit as relatively simple and easy to use (not complex) and adaptable to their practice needs (having trialability). Participants liked the toolkit and had mostly positive things to say about it. With regards to observability, all participants identified one positive change they could see as a result of using the toolkit. However, half (n=3) of the participants identified that they were not able to see any changes in some people (either they did not show up to follow-ups or did not follow through with goals). Half (n=3) of participants identified that the toolkit did require some time and effort to use in practice (burden). With regards to self-efficacy, half of the participants (n=3) identified that either the toolkit did not change their confidence to discuss exercise or that they did not feel as confident to use it with individuals who are not as receptive to the consideration of exercise. A more detailed description of findings from the post-interviews and weekly logs as well as quotes that highlight results are provided below.

1. Relative Advantage and Perceived Effectiveness

All participants (n=6) viewed the toolkit as helping them to discuss exercise, and better than previous approaches to doing so. Participants explained that the toolkit reminded them to discuss exercise, that it was something tangible that could be given and used, and the evidence behind the recommendation was clear and laid out. The Social Worker explained, "...if I didn't have it, I wouldn't ask. So, if the goal of the toolkit was to get me to engage with the women and talk about the relationship between exercise and depression, bring it up, have a conversation about it...if I didn't have the toolkit, I would never have that conversation."

2. Compatibility and Ethicality

All participants (n=6) self-reported meeting the Canadian Physical Activity Guidelines. Not surprisingly, all participants viewed the toolkit and recommending exercise to align with their personal beliefs and values, as well as their beliefs and values as health care providers. Some participants also explained that the design (format & layout) and some general content of the toolkit aligned with how they were already practicing so this made it easy to transition into using it regularly. The Family Physician explained:

“The toolkit goes into my style of like how I like to run my office anyways, like I use a lot of drawn diagrams. I do like to make sure people understand, and I usually write down things for them. So, it wasn’t like, for me that whole kind-of process is not like – I prefer to practice like that, so I think – that’s why I found like, I had good, good experience with it.”

3. **Complexity**

All participants stated that the toolkit was easy to use and understand and not complex. Some participants also identified that individuals with depression they were working with found it easy to use and understand as well, which helped them to like and use it more. The Occupational Therapist explained her views, as well as her views on ease of understanding for her clients:

“I liked that it was very simplistic. It’s not complex, it’s not too long, so, when you have a client, or have the client review the information, it’s not too challenging. Especially because a lot of my clients do also have some form of cognitive injury. Whether it’s mild depression, or more of a mild to moderate traumatic brain injury...so, I felt like it was – it had good user...like it was simple to use.”

One participant identified that when she first received the toolkit, she had to concentrate to use it and that it was harder for her to make the connection between exercise and depression. She went on to explain in her post-interview that with time and continued use of it, it became easier.

4. **Trialability**

How health care providers viewed the toolkit as being adaptable to their practice context, as well as use of different parts of the toolkit at their discretion was considered for trialability. All participants identified that the different parts of the toolkit could be used as desired based on their context. The Nurse Practitioner wrote unprompted in her weekly log after using the toolkit, “Individual previously had finances required for gym membership – this no longer the case. We discussed alternative plan which can be done @ home @ 0 cost: i.e. push-ups, crunches, squats, lunges, jump rope, biking, running, fast-paces walking”. This demonstrated her ability to use the toolkit with an individual in her practice, despite the fact that the individual she worked with had financial barriers and she was not able to refer to a structured exercise program or facility.

5. **Observability**

Given the nature of the case study approach it was not possible for participants to see their peers use the toolkit in practice. In this context, the authors defined observability as ‘the extent to which the results of an evidence-based program become visible’ (Dearing, Kee & Tai-Quan, 2017). Accordingly, what health care providers identified as a change they could observe in the individuals they worked with was considered observability. Participants identified that some of the individuals with depression reported they went and tried to exercise whether it was at home or in a structured class. From this, health care providers considered them receptive to the

idea of exercise, and some identified changes in mood and conversations on follow-up visits. The conversation with the Nurse highlighted this:

“I had another patient who wasn’t on the log, who brought me back some of the stuff filled in, yesterday actually.

Interviewer: Oh, really?

Interviewee: Yes, but very basic, like she could only manage once a week walking to go get her kids from school. But that was better than zero, you know?”.

Although the majority of statements within this construct were coded as positive, reasons for not observing any changes included lack of follow-up visits with people, individuals’ state of severity of depression with symptoms such as being unmotivated and tired, and thus, having other priorities such as sleep.

6. Affective Attitude

How the health care providers felt about the toolkit overall was considered important. For this construct, they were asked specifically about their likes and dislikes. An overwhelming amount of positive statements and health care providers’ likes of the toolkit were expressed with and without prompting questions throughout the interviews and the logs. The Family Physician expressed how she feels:

“... the toolkit and like exercise and all that, is a good way to start that kind of – tap into all like the needs of the patient, as well as like, now with like evidence that can actually provide benefits...I think that was interesting. Like there’s something that you can like show them, you know, that it's going to...like it's proven to help, you know? Instead of just saying, ‘you exercise, you’ll feel better, you know?’”

The Psychotherapist also expressed her positive feelings:

“But it was nice to actually have a handout on it, and actual tools that I can actually give to them, rather than say, ‘you know, exercise is great for depression’, it’s actually to have that toolkit at hand... and I think it was very beneficial for the clients too, because then they have something to take home. Because often, we talk about, you know, quite a few things in therapy, and then they go home and go, ‘what did we just do!’”

Three negative statements from two participants were about parts of the toolkit they personally did not use or find helpful, rather than something they specifically disliked about the toolkit. The Nurse explained, “Not ‘didn’t like’, I guess I didn’t really...the part where other people said how they used it wasn’t really, I didn’t find that helpful, for me.” This was in reference to the ‘Individuals with Lived Experience’ and the ‘Positive Statements’ optional handouts.

7. Burden

Views of the health care providers were divided on how much time and effort was required to use the toolkit in practice. Participants were asked if they felt the toolkit required a lot of time and effort to use. Three participants viewed the toolkit as requiring little time and effort, as the Social Worker explained, “No, because it’s just almost like bullet points. So, then when I’m talking to someone, I can say, ‘how does exercise help’, and then, there’s another sentence that I can just follow after that, you know. And when I’m talking to someone, having just those there very short bullet points, makes it a bit easier.”

On the other hand, two participants felt that it does require time and effort, although this was minimal. The Family Physician identified this, “I think it takes a little bit of extra effort, but, worthwhile”. The Occupational Therapist explained her views on the toolkit requiring more time and effort when working with new individuals:

“... where she was as a client, who was brand new, it might take a little – it would probably take a little bit more time in terms of being like, ‘okay, well, you know, this is how you’re feeling, these are the potential benefits of exercise, this is why it can add to your life’. So, the initial explaining part would take a little bit longer, but, I don’t think it would have been challenging.”

The Nurse Practitioner felt that this was not necessarily the issue for herself, but for other health care providers she works with. She acknowledged she asked co-workers to participate in the study, but they were not willing to take the time to do so. This included family physicians and other nurse practitioners in an addiction focused primary care setting.

8. **Opportunity Costs**

For opportunity costs, health care providers were asked if they felt that using the toolkit took away from other priorities they had (what they give up to use the toolkit and discuss exercise). Almost all (n=5) participants felt that the toolkit did not take away from other priorities, and some explained that they felt exercise was a priority that they should be discussing. The Psychotherapist explained her priority of exercise: “Well, I always thought exercise is a priority of treating depression. So, I felt it enhanced that, because I would just have that conversation, and set some, you know, realistic goals with them”. On the other hand, the Nurse Practitioner said she felt that it did take away from other priorities:

“yes, it’s a little bit reprioritizing some of the workload...the time you take – yes. But just even the fact of, you know, pulling out the sheet, that’s – even if it’s embedded in your system, just going through that process of learning that, clicking on the right places, all that does cause some, you know, barriers. You know, we don’t like to change our ways”.

9. **Self-Efficacy**

Health care providers were asked about their confidence in using the toolkit to discuss and recommend exercise, as well as if the toolkit had changed their confidence levels in general to discuss and recommend exercise with individuals with depression. The Family Physician explained that the toolkit helped her gain confidence in discussing exercise by providing conversational pieces:

“Yes, it kind of gives me like the...let’s just call the...‘trigger words’, you know, the important kind-of...like the CANMAT guidelines, like I can use like certain things when I am explaining to patients. And then they can go and do more reading, right. So, I think it explains everything to them.”

Other practitioners did not feel that the toolkit specifically helped to improve their confidence. These practitioners also felt confident to discuss exercise prior to receiving the toolkit. The Nurse acknowledged her ambivalence about a change in confidence, “I don't know if it improved my confidence, but it's helpful”.

10. **Intervention Coherence**

In general, the participants demonstrated at some point in the interview that they understood the purpose of the toolkit. The purpose of the toolkit is twofold for behaviour change in that, first and foremost, the toolkit is designed to help health care providers discuss and consider exercise with individuals with depression. Secondly, if a health care provider adopts it and uses it, it is meant to help individuals with depression in some way to engage in or at least consider utilizing exercise to help manage their mental health. Only one participant did not seem to understand the purpose of the toolkit until the post-interview with the first author. She explained a lack of understanding with regards to the intended population to use the toolkit with

someone (with mild-moderate depression), and in making a connection between exercise and depression:

“So I don’t know if my population is what would normally use this toolkit...because, my population was not as severe as someone that - and my population has some awareness of the relationship between exercise and depression. But I didn’t actually bring that together with the connection using the toolkit”.

Throughout the post-interview she recognized in hindsight how she could better implement the toolkit in her practice and acknowledged she would do so moving forward through promoting the connection between mood and physical activity and not just recommending exercise.

6.5.1 Adoption, Modification and Dissemination

All the participants in this study expressed that they would continue to use the toolkit and that they would recommend it to colleagues. Participants were asked if they felt that the toolkit needed any additional training for health care providers to use it in their practice (e.g. a webinar, or in-person educational session). Only one participant felt that it needed additional training as she said: “...if I went to a webinar for two hours on just a little bit more of exercise, I’d probably be more confident”. Four of the participants suggested modifications to the toolkit, whereas two felt that they liked it as is. Modifications included: adding references to the hosting website, adding a mood and activity diary with a monthly calendar, adding a schedule with a monthly calendar, and adding a weekly schedule example with more realistic activities such as getting out of bed or the home for individuals with severe depression. In addition to the existing toolkit, one participant suggested that the toolkit be created in a smartphone application format, and another

suggested a database of all existing physical activity and exercise programs of different geographical locations across Canada be created for health care providers to use.

With regards to dissemination, several strategies to reach practicing health care providers in Canada were provided. Strategies included: word of mouth, contacting public health units/mental health teams/health authorities in British Columbia, faxing primary care offices, attending and presenting at conferences, contacting educational training programs of health care providers, mailing directly to health care providers' addresses listed on registry bodies, contacting professional registry bodies (e.g. The Canadian Association of Occupational Therapists), optimizing search engines such as google, and reaching out to other specific organizations associated with health care providers in each province.

6.6 Discussion

The primary purpose of this study was to evaluate the use of the 'Exercise and Depression Toolkit' in practice. Using the hybrid approach of the Diffusion of Innovation Theory and the Theoretical Framework of Acceptability was useful in determining the factors that may influence adoption. In summary, all health care providers used the toolkit, and for the most part found their interactions when using it with people with depression to be successful. The toolkit was well-liked, and participants viewed it as having relative advantage and perceived effectiveness, compatibility and ethicality, low complexity and trialability (adaptable to use and suit needs). Some participants did not always see the toolkit as having observability when using it, as they could not always see changes in the individuals they were working with nor did they have an opportunity to see other practitioners implement the toolkit. Participants identified that the toolkit does have some burden, requiring time and effort to use. Feelings were mixed about the toolkit changing self-efficacy to discuss and recommend exercise.

It is promising that the toolkit was well-liked and perceived as having relative advantage and perceived effectiveness. All participants viewed the toolkit as helping them to discuss exercise, and better than previous approaches in doing so. This has been deemed particularly important for the adoption of health care providers' use of educational resources such as a 'toolkit' (Scott & et al., 2008). This includes the importance of adopters viewing the resource as having an advantage over other resources, and that the evidence-base for the resource is clear (Scott et al., 2008). Further, health care providers did view the toolkit as being compatible with their current practice and behaviours, thus having ethicality and aligning with their values. Compatibility and ethicality have been deemed important in other health care provider interventions, with others acknowledging that the innovation being viewed as compatible with current practice behaviours may be most important for providers to use it (Makowsky et al., 2013). On the other hand, interventions have not been adopted due to perceptions of an intervention not meeting preferences or being incompatible with their values or practice behaviours (Faulkner & Biddle, 2001; Zhang, Yu, Yan, & Spil, 2015).

In this study, participants did not believe using the toolkit took their time away from other priorities (opportunity costs). However, participants identified that the toolkit does require time and effort to use, which could negate the feelings of opportunity costs. Pharmacists delivering a mental health promotion program identified concerns about diverting time and money away from other tasks which likely impacted uptake (Murphy & Gardner, 2019b). Lack of time to discuss and recommend exercise has been identified as a barrier by mostly mental health nurses likely because it diverts time away from other tasks (Carlbo et al., 2018; Happell et al., 2012; Verhaeghe et al., 2013; Way et al., 2018). However, a review looking at all barriers and facilitators for health care providers working with individuals with mental illness (study two

and chapter three of this dissertation) did not determine lack of time to be a prominent barrier. Other factors such as lack of training and knowledge about physical activity (Glowacki et al., 2019a) were more prominent and for which the toolkit aims to address. Time, money and effort are important to consider for health care providers delivering any intervention to use in practice. While some participants did view the toolkit as being of some burden, they felt that it was worth the extra effort which is promising for future uptake. Further, participants had strong views on the simplicity of the toolkit, and it being simple and easy to understand and use having precedent over the burden as it is worth the effort and time to implement in practice.

Feelings were mixed about the toolkit changing self-efficacy to discuss and recommend exercise. The sample of participants in this study were all physically active and had discussed or recommended physical activity in some way in previous practice prior to using the toolkit. It is likely that this sample were already self-efficacious in recommending exercise and thus their self-efficacy did not change. Further, Glowacki and colleagues (2019a) identified only two studies in which health care providers felt a doubt in the capabilities to recommend or discuss exercise (Harding, 2013; Kinnafick et al., 2018), and one of which only 6/73 mental health staff agreed that this was a barrier (Harding, 2013). For participants in this study, this also may not have been be a major barrier to discussing and recommending exercise.

There was inconsistency from health care providers in this study about observability. Due to the design of the study, participants were not able to observe actions of their peers using the toolkit which could influence adoption. Thus, observability was considered an expected outcome of using the toolkit, being able to see changes in the individuals they were working with when using the toolkit. These differences were likely due to different areas of practice and context. In addition, exercise programs and referral schemes within mental health care in Canada are

fragmented. The time frame of this study was four weeks, and the Family Physician in primary care explained this was too short of a time frame for her to see her patients for follow-up. On the other hand, the Psychotherapist in an outpatient setting was seeing people daily or weekly and was able to observe various changes such as increased activity levels and improved mood. Canadian treatment guidelines recommend the length of an exercise program to see depression treatment effects be nine weeks, and supervised for adherence (Ravindran et al., 2016). Thus, it is likely that it may take more time than four weeks to see mood effects and changes, and many individuals with depression were not able to be referred to a structured supervised program. While the primary purpose of the toolkit is to enable health care providers to discuss and consider exercise with individuals with depression, observable physical activity and mood changes among individuals may be needed to reinforce the value of the toolkit for professionals.

The secondary purpose of the study was to attain feedback on the toolkit to determine necessary modifications and help inform national dissemination and uptake of the toolkit. The modifications suggested are being considered within the research team with regards to available resources and funding. Seeking additional funding to address such modifications is also being considered. Based on the results of this study, there are no current plans to create additional training for the toolkit. However, recommendations on use of the toolkit and its development are currently being embedded into a training module for exercise professionals to deliver programming to individuals with mental illness inclusive of depression. The creators of the toolkit aimed to create a resource with ease of implementation in practice. The toolkit was designed to be something simple and easy to use that would not require further extensive training, and participants in this study all identified this except for one. With regards to dissemination, all recommendations were considered within available resources (personnel, time,

funding). Various strategies were adopted from the recommendations including: word of mouth (KG emailed various health professional contacts in Canada asking to share the website domain); contacting public health units and mental health teams in British Columbia (DZ called public health units and explained the toolkit with a follow-up email); attending and presenting at conferences (KG has presented results from studies related to the toolkit at various conferences); sharing with professional registry bodies and organizations associated with health care providers (e.g. The Canadian Association of Occupational Therapists, Doctors of BC, & BC Association of Social Workers), and optimizing search engines such as google. The concerns of burden from participants were also considered in the dissemination. Several psychiatrists, psychologists and some family physicians were asked to participate in this study, all declining saying they did not have time. This, combined with the concerns of burden, indicate that these health professionals may not be the best target of dissemination efforts in the short-term. Thus, more efforts were put towards targeting and disseminating to allied health professionals and front-line workers such as social workers and occupational therapists.

6.7 Strengths and Limitations

A strength of this study is the novel theoretical underpinnings using the Diffusions of Innovation Theory and the Theoretical Framework of Acceptability. To the best of the writers' knowledge this the first study of its kind using this hybrid theoretical approach for conceptual guidance which was helpful for understanding acceptability and adoption. Most of the perceptions of the constructs of both theories were positive, which is promising for adoption. Using the hybrid approach was helpful for understanding perceptions of important aspects of the toolkit, as well as cognitive and emotional responses to using it. The DoI theory has been used for over a decade to help understand adoption, and the addition of the TFA provides in-depth

understanding of acceptability, an important factor that also needs to be considered for health care interventions. Further, important factors may have been missed if both theories were not utilized. This is inclusive of burden, and the fact that participants identified that the toolkit does require time and effort to use. This was important in determining a targeted dissemination strategy and which health care providers may be best suited to use the toolkit. Future researchers could use this hybrid design to provide a more in-depth understanding of adoption versus choosing one. This study adds to existing literature looking at the adoption of health care provider interventions as it provides an example of the use of a hybrid theoretical approach for conceptual guidance to evaluate a real-world intervention, and in particular use of the relatively new TFA developed to specifically help understand the adoption of health care interventions (Sekhon et al., 2017).

In terms of limitations, due to the case study design, observability could not be explored in the context of peer to peer behaviour with regards to use of the intervention. Further, some participants did not always observe changes in people with depression they were working with. Thus, little is known about secondary outcomes of the toolkit for individuals with depression such as mood and physical activity changes. This study had a small and homogeneous sample with regards to gender, ethnicity, and age and participants only represented two provinces across Canada. In saying this, all participants had a different health care provider designation which was part of the recruitment strategy to understand use of the toolkit by different providers in different practice settings. This also led to a diverse sample of individuals with depression (although not directly part of this study) in terms of the barriers they faced and opportunities they had as reported by the HCPs (e.g. high financial barriers, no financial barriers, recently gave birth with childminding duties, being illiterate) so the positive response from participants may be

considered a direct reflection of a diverse sample of people with depression. Lastly, various criteria were adopted to enhance trustworthiness as recommended by Elo and colleagues (2014) when conducting content analysis.

6.8 Conclusion

Use of the Theoretical Framework of Acceptability and the Diffusion of Innovation Theory was helpful to explore use of the ‘Exercise and Depression Toolkit’ in practice by health care providers. Overall, it was found to be acceptable. Participants viewed the toolkit as having relative advantage and perceived effectiveness, compatibility and ethicality, low complexity and trialability. The theoretical conceptual guidance helped to identify potential concerns with burden which informed the dissemination strategy and targeted end users. Future work could address observability and the ability for health care providers to see other providers using it, as well as effectiveness considering outcomes for people with depression such as mood and physical activity changes. The results of this evaluation seem promising for uptake and future adoption of the toolkit by health care providers working with adults with depression in Canada.

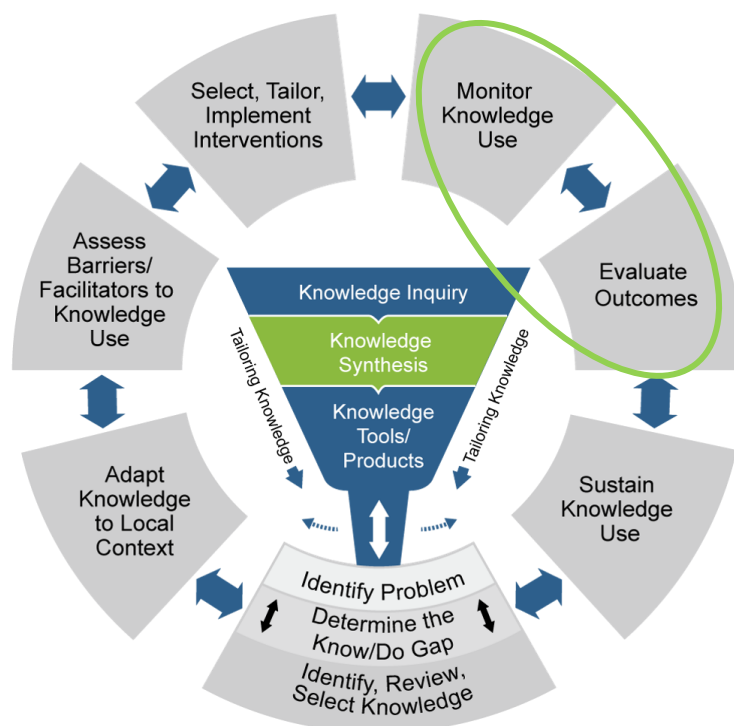


Figure 16 Action cycle steps

DoI Attribute	Definition
Relative Advantage	The degree to which innovation is perceived as better than a previous approach
Compatibility	The degree to which an innovation exists with values, past experiences and needs of potential adopters
Complexity	The degree in which an innovation is perceived as difficult to understand and use
Trialability	The degree to which an innovation may be experimented with or trialled on a limited basis
Observability	The degree to which the effects or results of an innovation are visible or able to be observed by the adopter

Table 15 Diffusion of Innovation definition of attributes

TFA Construct	Definition
Ethicality	The extent to which the intervention has good fit with the individual's value system.
Affective Attitude	How an individual feels about the intervention
Burden	The amount of effort required to participate in the intervention
Opportunity Costs	The benefits, profits and values that were given up to engage in the intervention
Perceived Effectiveness	The extent to which the intervention is perceived to have achieved or to achieve its intended purpose
Self-Efficacy	The participant's confidence that they can perform the behaviour required to participate in the intervention
Intervention Coherence	The extent to which the participant understands the intervention and how it works

Table 16 Theoretical Framework of Acceptability construct definitions

Gender, % (n)	
Female	100 (6)
Age in years	
M (SD)	43 (11)
Range	30-55
Education, % (n)	
Graduate School	100 (6)
Ethnicity, (n)	
Caucasian	5
Chinese	1
Employment Status, (n)	
Full-time	2
Part-time	4
HCP designation, (n)	
Family Physician	1
Nurse Clinician	1
Nurse Practitioner	1
Occupational Therapist	1
Psychotherapist	1
Social worker	1
Area of Professional Practice, (n)	
Outpatient Perinatal Mental Health	1
Primary care	1
Outpatient	2
Addiction Medicine	1
Community Private Practice	1
City Practicing In, (n)*	
Burnaby, BC	1
Squamish, BC	1
Sudbury, ON	1
Surrey, BC	1
Timmins, ON	1
Vancouver, BC	3
Experience w/ Adults w/ Depression in years	
M (SD)	14.2 (10.9)
Range	5-34
Diagnose Adults w/ Depression, % (n)	
No	83 (5)
Adults Seen w/ Depression Frequency, (n)	
Daily	1
Weekly	5
150 min PA/Week Completed, % (n)	
Yes	100 (6)

Table 17 Demographic characteristics

Participant	# times full Toolkit used	# times part of Toolkit used	Total # times Toolkit used	Perceived success (average 1-7)	# of referrals to an exercise program
Nurse Clinician	1	7	8	5.8	1
Family Physician	4	0	4	5.5	0
Social Worker	0	9	9	5	0
Nurse Practitioner	5	2	7	4.1	0
Occupational Therapist	1	0	1	6	1
Psychotherapist	10	30	40	6.5	21

Table 18 Summary of use of the toolkit in practice

Theoretical Construct (DoI¹ and TFA²)	Code Frequency positive (negative)	Number of documents with code positive (negative)	Number of participants with code positive (negative)
Relative Advantage ¹ and Perceived Effectiveness ²	18 (1)	6 (1)	6 (1)
Compatibility ¹ and Ethicality ²	13 (0)	7 (0)	6 (0)
Complexity ¹	19 (2)	7 (1)	6 (1)
Trialability ¹	18 (1)	8 (1)	6 (1)
Observability ¹	23 (4)	8 (3)	6 (3)
Affective Attitude ²	37 (3)	7 (2)	6 (2)
Burden ²	4 (3)	3 (3)	3 (3)
Opportunity Costs ²	5 (1)	5 (1)	5 (1)
Self-efficacy ²	9 (5)	5 (3)	5 (3)
Intervention Coherence ²	5 (4)	4 (1)	4 (1)

Table 19 Coding frequency in the component constructs of the TFA and DoI Theory from HCP documents

(interviews and weekly logs)

Chapter 7: Conclusion

The general purpose of this dissertation was to 1) use a systematic and phased process to develop an evidence-based resource (toolkit) about exercise and depression for health care providers working with adults with depression in Canada, and 2) provide a step by step guide for translating knowledge into action for health care interventions. The main findings from each study of this dissertation are outlined, as well as how the studies build on one another to result in the toolkit and evaluation of its implementation in practice. The theoretical and practical contributions, limitations, and future directions are discussed in this final chapter.

Studies one and two outlined in chapters two and three were scoping reviews of the evidence and these served as the foundations of the toolkit. The focus of the first scoping review was to identify barriers and facilitators to exercise/physical activity for individuals with depression (Glowacki et al., 2017). The use of a behaviour change analysis identified the need to target the emotion and social influences domains for intervention. The second scoping review examined barriers and facilitators of physical activity promotion by health care providers (Glowacki et al., 2019a), and it was determined that the most prominent barriers and facilitators were within the domains of beliefs about the consequences, and environmental context & resources which should be considered for intervention. For both scoping reviews, the Behavior Change Wheel was used for guidance, and linked behaviour change techniques (BCTs) recommended from an expert consensus to the prominent domains (Cane, O'Connor, & Michie, 2012; Cane et al., 2015). These were reviewed by an expert panel process described in chapter five and decisions were made on which to include, and how they could be incorporated within the toolkit.

Chapter four reported a qualitative study done to guide the toolkit development process by exploring the perspectives and experiences on PA and PA promotion of Canadian health care providers, and individuals with lived experience with depression. An important step in knowledge translation is early consultation with end-users. This was done through semi-structured phone and in-person interviews and a thematic analysis. This helped to inform decisions around end users, format and content of the toolkit outlined in chapter five. Three important themes were identified to consider for resource development including motivation, buy-in, and responsibility.

Chapter five described the entire phased and systematic process used to create the toolkit (Glowacki et al., 2019b). This integrated the 1) scoping reviews of the literature (study one and two) 2) consultation with stakeholders (study three) 3) a multidisciplinary expert panel meeting comprised of individuals with lived experience with depression, health care providers, researchers and exercise professionals, and finally 4) toolkit development. This highlighted how findings from studies one to three informed toolkit development. Study one and two guided the selection of BCTs to embed within the toolkit. Study three identified important themes to consider, as well as helped to inform content and format of the toolkit. The expert panel was then consulted about results from studies one to three prior to toolkit development. The rigorous consultation process was also outlined by use of the AGREE II instrument (Glowacki et al., 2019b).

Lastly, chapter six described pilot evaluation of the toolkit through a case study approach with six health care providers currently working with individuals with depression. This study utilized pre and post intervention semi-structured phone interviews, as well as electronic weekly logs to track use over four weeks. Health care providers were asked about innovation attributes

of the toolkit (guided by Diffusion of Innovation Theory; Rogers, 2003), as well as acceptability of the toolkit (guided by the Theoretical Framework of Acceptability; Sekhon et al., 2017). Use of the toolkit, as well as perceived satisfaction of interactions with individuals with depression were tracked through the weekly log. All health care providers used the ‘Exercise and Depression Toolkit’ at least once (with variability and one participant using it 40 times) and found the toolkit to be acceptable and have positive attributes. Some concerns were identified about burden (time and effort required to use the toolkit) which informed dissemination priorities. Results of this final evaluation study are promising for uptake and future adoption of the toolkit. Table 20 outlines each study, objectives, methods, limitations and key findings.

7.1 Contributions

Rosenbaum and colleagues (2018) acknowledge three recommendations in an international consensus statement for the role of physical activity, sport and exercise for people with mental illness: culture change, infrastructure and training. For culture change, exercise professionals have an important role to play on mental health teams, as well as exercise programs in mental health settings. The toolkit could be utilized as an advocacy tool by exercise professionals, or mental health care providers to do this. First steps in culture change were demonstrated as a result from website evaluation outlined in study four by those who identified they downloaded the toolkit to use it to create a group in their practice setting, and team leads who said they downloaded it to discuss it with the other members of their mental health teams. Infrastructure and training are discussed in section 7.3. Beyond these recommendations, this dissertation has resulted in four important practical and theoretical contributions outlined below.

7.1.1 Contribution #1: Importance of behavioural analysis

Within the scoping reviews, a theoretical framework was used to conduct a behavioural analysis to systematically understand the factors influencing behaviour. This was done for two different behaviours: individuals with depression engaging in PA, and health care providers promoting PA using the Theoretical Domains Framework (TDF). The TDF is an integrative framework of behaviour change that can be used to identify modifiable factors to target with intervention and treatment (Cane, O'Connor, & Michie, 2012). The TDF is also part of a larger, meta-framework known as the Behaviour Change Wheel that helps intervention developers select BCTs (observable and replicable components of an intervention designed to change behaviour; Michie & Atkins, 2014). The TDF has been used in previous reviews to understand barriers and facilitators related to health behavior (Dobson et al., 2016; Heslehurst et al., 2014; Weatherson et al., 2017). In the fourth study, we take this a step further and outline how both behavioural analyses were used as a guide to inform the content of the toolkit, and further input was obtained from the expert panel on which BCTs should be incorporated within the toolkit. This highlights the importance of using theory for guidance, but also attaining input from relevant stakeholders when considering real world applications of an intervention. This has been acknowledged more recently as an important consideration for knowledge translation work (Ma et al., 2020). In study four we outline the entire intervention development process and how BCTs were incorporated. Other interventionists considering behaviour change and resource development can replicate this analytical approach for any specific population/behaviour.

The first scoping review highlighted the need to target the emotion domain for individuals with depression, as this may represent a unique barrier with regards to importance and challenge due to the symptomatic nature of mood and emotional dysregulation this

population experiences (Glowacki et al., 2017). However, except as an outcome expectancy, emotion as a determinant of physical activity behaviour has been left out of commonly used theories such as the Social Cognitive Theory (Bandura, 1986), the Health Action Processes Approach (Schwarzer, 2008), Theory of Planned Behaviour (Ajzen, 1991) and Self-Determination Theory (Ryan & Deci, 2000). This important finding highlights that perhaps when considering intervention development, it is necessary to conduct a behavioural analysis and consider specific factors influencing behaviour for specific populations rather than only choosing one generic theory that highlights constructs to target. This is also emphasized by the Medical Research Council and CIHR recommendations, acknowledging the importance of context and tailoring interventions to the specific population when considering real world application (CIHR, 2016; Craig, et al., 2008; Moore et al., 2015).

7.1.2 Contribution #2: A complementary theoretical approach in evaluating acceptability and adoption

The fifth and final study described in chapter six utilized novel theoretical underpinnings incorporating the Diffusions of Innovation (DoI) Theory (Rogers, 2003) and the Theoretical Framework of Acceptability (TFA; Sekhon et al., 2017). To the best of the writers' knowledge this is the first study of its kind using this hybrid theoretical approach for conceptual guidance which was helpful for understanding acceptability of the toolkit and its potential for future adoption. The DoI theory and innovation attributes have been identified as important to consider for the adoption of innovations in health care (Faulkner & Biddle, 2001; Greenhalgh et al., 2004; Makowsky et al., 2013; Scott et al., 2008) and were considered when creating the toolkit. The TFA was chosen to use in addition, as it complements the DoI and was developed specifically to

assess health care intervention acceptability, an important consideration for intervention development (CIHR, 2016; Craig et al., 2008; Moore et al., 2015).

Using the hybrid approach was helpful for understanding perceptions of important attributes of the toolkit, as well as cognitive and emotional responses to using it. The DoI theory has been used for several decades to help understand attributions and adoption but pays less explicit attention to such emotional responses. Using the TFA in tandem addresses this deficiency. Use of this hybrid approach was also important to determine a targeted dissemination and implementation strategy. Future researchers could use this hybrid design to provide a more in-depth understanding of adoption. This study adds to existing literature looking at the adoption of health care provider interventions as it provides an example of the use of a hybrid theoretical approach for conceptual guidance to evaluate a real-world intervention, and is the first application of the relatively new TFA (Sekhon et al., 2017) to specifically help understand the adoption of a physical activity-related resource in health care.

7.1.3 Contribution #3: A guide for translating knowledge to action

This dissertation is considered knowledge translation work with the intent of moving evidence-based findings in health care into practice. This work was guided by The Knowledge to Action (KTA) Framework. This framework is a process model and provides a road map which helps conceptualize knowledge creation and the process (or steps to be taken) to move knowledge into action (Graham et al., 2006; Brownson, 2017). Similar to treatment guidelines, this framework provides valuable information on what to do, but not necessarily how to do it for each stage of the process. Thus, at each stage within the Action Cycle (and the five studies), this writer considered theoretical perspectives and methodologies and chose accordingly for the overall purpose of this dissertation. This was done to ensure a rigorous, systematic process.

Other intervention developers have used and recommended a similar process to develop and refine effective interventions (Ma, 2018; Ma et al., 2020). Brownson (2017) outlines questions to consider when selecting a model or framework which was consulted, and methods were chosen based on research questions and available resources. This dissertation could provide a template for future researchers and interventionists aiming to move health care knowledge and evidence-based findings into action. Below, the decision-making process for each study is summarized for transparency that could be consulted to make decisions within one's own context.

Study 1 and Study 2: Within the Action Cycle, the first stage of the KTA framework is to understand the barriers and facilitators to knowledge use among relevant stakeholders. Thus, the TDF was used as it is an integrative framework of behaviour change to identify important modifiable factors to target with intervention (Cane et al., 2012). The methodology of a scoping review was chosen to synthesize a large amount of existing literature from a variety of settings on such factors. It is helpful to address broader topics and it can include a variety of study designs (including quantitative and qualitative; Arksey & O'Malley, 2005; Leval et al., 2010).

Study 3: The second stage of the Action Cycle of the KTA framework is to adapt to the local setting to determine what is feasible and relevant when moving from one setting to another. Thus, semi-structured interviews (phone and in-person) were conducted with health care providers and adults with depression in Canada. This ensured two relevant stakeholder and knowledge user groups were consulted throughout the intervention development process (CIHR, 2016; Craig, et al., 2008; Moore et al., 2015). Face-to face interviews are commonly used within sport and exercise psychology, and phone interviews are acknowledged as useful within time constraints and physical environmental restrictions (such as reaching stakeholders across a large

geographical area such as Canada; Smith & Sparkes, 2016). Interviews allowed for guided questions to inform toolkit development, but also open conversation to discuss broader contextual issues that may require ongoing consideration in its development and dissemination.

Study 4: The next stage of the KTA framework is to select, tailor, and implement interventions. The entire toolkit development (intervention) process was outlined. Our group followed a similar systematic process used to create a resource to supplement guidelines and support behaviour change used for individuals with spinal cord injury (Arbour-Nicitopoulos et al., 2013; SCI Action Canada 2013). Further, the AGREE II instrument was chosen as it is a tool used to develop quality evidence-based guidelines and to ensure methodological rigour and transparency (AGREE II, 2017). It is typically used in guideline development such as the Canadian 24-hour movement guidelines for children and youth (Tremblay et al., 2016). It has also been adapted and applied to resource development and health promotion (Arbour-Nicitopoulos et al., 2013; Latimer-Cheung et al., 2013; Ma et al., 2020). It was helpful to see adaptations of this instrument by other working groups. It would be beneficial to have an adapted version of this instrument created in the future specifically for resource development. Our group adapted 14 of the 23 items, although most were minor wording changes for relevance to the resource. An example of a more complex adaptation is within Domain 3 (rigour of development) where the original item, “The health benefits, side effects and risks have been considered in formulating the recommendations” was adapted to “The practical implications have been considered in developing the toolkit”. In Domain 5 (applicability) the original item “The guideline provides advice and/or tools on how the recommendations can be put into practice” was adapted to “The recommendations provide advice and/or tools on how the toolkit can be put into practice”. This adaptation could be done through consensus of a working group compiled of

individuals who have adapted its use previously. Considerations could be made about any items that may be missed on the current instrument that are also of relevance.

Study 5: The final stages of the KTA framework are to monitor knowledge use and evaluate outcomes to then sustain knowledge use. To do this, implementation was considered, and a case study approach was adopted as it is commonly used to understand and explore professional practice behaviours in real world natural settings (Heale & Twycross, 2018; Yin, 2018). Multiple data collection methods were used including phone interviews pre and post intervention, and electronic weekly logs. Weekly logs enabled tracking of the actual use of the toolkit. Pre-interviews allowed discussion about the toolkit and to provide instructions prior to use. Post-interviews prompted discussions with participants about their perceptions of the toolkit after use, their experiences and decisions to use or not use the toolkit, as well as gain further details on their logs that tracked use and satisfaction. This study was conceptually informed by a hybrid theoretical approach using a combination of the Rogers' DoI theory (Rogers, 2003), and the TFA (Sekhon et al., 2017). Details of this hybrid approach and reasons for selection of the two theories are described above in Contribution #2.

In summary, studies one to three outline the systematic and phased process to develop the intervention- the toolkit. Study four further outlines use of the AGREE II to enhance methodological rigour and transparency. Study three and four highlight the relevant stakeholder and knowledge user groups consulted throughout the intervention development process. This includes individuals with depression, health care providers, researchers and exercise professionals through interviews and the expert panel meeting. The Knowledge to Action Framework guided this work, and behaviour change theory was used for intervention

development. Once the intervention was developed, evaluation theory from the field of implementation science was utilized in study four and five.

7.1.4 Contribution #4: An intervention to help health care providers and individuals with depression consider the use of exercise as a treatment for depression

This is the final and most important implication, as findings from this work start the process of integrating exercise and clinical treatment guidelines for mental health care providers. This work resulted in an evidence-based resource, the ‘Exercise and Depression Toolkit’. This resource was designed to help health care providers and individuals with depression collaboratively consider exercise as a treatment. In doing so it addresses the ‘how’ to implement treatment guidelines related to exercise and depression. Based on results from study four and five, this intervention is suitable for use in practice. In the first three months of dissemination, the toolkit had an international reach, was downloaded 1262 times and just over half of these individuals identified as health care providers. The health care providers that responded to a survey providing feedback on the toolkit had mainly positive views of the innovation attributes and acceptability of the toolkit, and shared many features they liked including its simplicity, ease of use, visual appeal and strong evidence base. Some health care providers also described use of the toolkit beyond its purpose. One example given was sharing it with their multi-disciplinary team. Although little explanation was provided, some health care providers shared that they developed a group from it, and another said they used it because they had been asked to facilitate the topic of exercise to an anxiety/depression group. In study five that evaluated use of the toolkit in practice by health care providers, all participants viewed the toolkit as relatively simple and easy to use and adaptable to their practice needs. Participants liked the toolkit, found it

acceptable and had mostly positive things to say about it. The toolkit continues to have new downloads every month which are tracked through a custom-built website for sharing the tool globally (www.exerciseanddepression.ca). Preliminary results of evaluation seem promising for uptake and future adoption of the toolkit by health care providers working with adults with depression in Canada. The creation of the first toolkit to consider exercise as a treatment for depression is the most tangible contribution to the field of exercise and depression in Canada.

This work helps move exercise as a treatment for depression from efficacy to effectiveness, as we move from a focus on randomized controlled trials, to implementing exercise interventions into real world settings. Within the traditional translational pipeline, an intervention starts within a preintervention phase (considering could a program work), moves to tightly controlled efficacy trials (considering does a program work), and finally to effectiveness studies (making a program work) in a community or system where it would be delivered (NRCIM, 2009; Brown et al., 2017). Efficacy of exercise for reducing depression symptoms has been established (Krogh et al., 2017; Moores et al., 2019), however pragmatic trials considering effectiveness are scarce. There have been calls to action to consider effectiveness to help translate the results of clinical trials into real world practice settings (Schuch et al., 2017a; Schuch et al., 2017b).

While this work is not a pragmatic trial, it helps advance the field and the consideration of exercise as a treatment for depression by addressing an important, pragmatic question – what would help health care providers and individuals with depression consider exercise as a treatment? In study one and two, we considered important barriers and facilitators to knowledge use by health care providers and individuals with depression. In study three, we consulted stakeholders directly and gained their perspectives and experiences on how exercise as a

treatment could be integrated or utilized in their current practice and in real-world settings in Canada. From this it was determined that in non-optimal conditions of mental health settings (e.g. lack of resources and fragmented or variable access to structured exercise programs), an evidence-based resource would help mental health care providers who may have little knowledge and training of exercise nor awareness of guidelines for the use of exercise as a treatment. The ‘Exercise and Depression Toolkit’ was then created and its use in practice was evaluated. Results from evaluation showed that half of health care providers referred individuals to an exercise program at least once, but all health care providers used the toolkit. Thus, the toolkit may help as a starting point for the consideration of integration of exercise as a treatment in Canada in the current mental health care climate.

7.2 General Limitations

While this work resulted in important theoretical and practical implications, it is important to note limitations. A summary of limitations for each study is provided in Table 20. Limitations seen across more than one study are important to note. The first is that no quality assessment was done for either scoping review. This may have helped to better interpret findings by linking study quality to the relative strength of conclusions offered in each review. The second limitation is that in study three and study five, purposive and snowball sampling was done, and participants self-selected to be in both studies. Thus, likely the sample represents health care providers who already have an interest in exercise and PA. Different approaches could have been considered, such as consultation with health authorities for research to be done collaboratively with hospital units, or with community mental health teams. However, this strategy was chosen to identify ‘champions’ in the field, to help with innovation adoption. It was anticipated that these individuals would be the innovators or early adopters of the toolkit, and

thus may be influential on peers and co-workers for dissemination and adoption of it, and ultimately the ones likely to be at the forefront of integrating exercise in mental health services. Lastly, the views of psychologists and psychiatrists (important mental health professionals) were limited in study three and five. Qualitative methods were utilized, which usually requires more of a time commitment from participants. In study three, semi-structured interviews were chosen to allow a more in-depth exploration of experiences. However, had another method been chosen (e.g. an online survey that required less time), it is possible that a higher number of people in stakeholder groups would have participated, which would have resulted in more diverse perspectives. We were not able to recruit a psychologist in study three or five, and psychiatrists were directly contacted for participation in study five who all declined saying they were not able to commit due to time restraints. However, two psychiatrists participated in study three, and one was part of the expert panel discussed in study four.

More generally, the theoretical underpinnings chosen for intervention development include the TDF which is part of the BCW (Cane et al., 2012; Michie et al., 2013), the DoI Theory and the TFA for evaluation (Rogers, 2003; Sekhon et al., 2017). While these theories were chosen for reasons outlined in each chapter and synthesized above, it is acknowledged that there are other theories and frameworks that exist for similar purposes that could have been used. Without comparison or testing different approaches, I cannot conclude that these are the best theories. In addition, our working group followed the phased and systematic process used for resource development in a different clinical population: individuals with spinal cord injury (Arbour-Nicitopoulos et al., 2013; SCI Action Canada 2013). However, to the best of my knowledge the resource created, the ‘SCI Get Fit Toolkit’, was not evaluated so it is difficult to know how and in what ways this process works. However, more recently a similar process was

replicated and used for toolkit development for physiotherapists working with individuals with spinal cord injury (Ma et al., 2020). After intervention development, this group conducted a randomized controlled trial of intervention training and assessed its effects on implementation determinants amongst physiotherapists. The authors concluded that implementing PA training was feasible in the physiotherapist setting and there were improvements in perceived knowledge, confidence, skills and resources to deliver a spinal cord specific PA intervention (Ma et al., 2020). While we have not yet completed this type of evaluation, preliminary results from study four and five suggest the toolkit is perceived as acceptable and useful in practice and lays the foundation for a more rigorous evaluation in the future. However, these results are specific to our sample, and I cannot make claims they reflect the views of mental health professionals more broadly.

7.3 Future Directions

It is important to consider that the ‘Exercise and Depression Toolkit’ by itself is not the answer to the integration of exercise as a treatment for depression into mental health care. Further advocacy and broader systematic change are needed for exercise to be integrated as part of standard mental health services. This includes education of mental health professionals on exercise, which could be done for current practicing health care providers or embedded within training and education programs. It is acknowledged that infrastructure is recommended as an important consideration for the integration of PA and exercise in mental health services, to address this advocacy will be needed beyond this work regarding exercise referral opportunities, and the incorporation of exercise professionals on mental health teams (Rosenbaum et al., 2018). Thus, exercise professionals will also need tailored training to work with individuals with mental illness inclusive of depression. After a panel meeting held in February 2020 that this writer was a

part of, it is important to note that a working group is currently creating such a training module for the Canadian Society of Exercise Physiology (CSEP) exercise professionals in Canada. The toolkit will be incorporated within the training module, addressing the call to action to consider training of exercise professionals in mental health literacy (Rosenbaum et al., 2018).

As discussed, this work was guided by the KTA Framework and the process steps within the Action Cycle. It should be acknowledged that the steps within the process are iterative and bi-directional in nature. Thus, future work and evaluation should consider moving back and forth between the steps. For example, after the previously mentioned training module is developed there will likely be change needed for a referral pathway to connect with CSEP trained exercise professionals. Future evaluation of the toolkit could include a within-site randomized controlled design, a traditional approach thought to be suitable in the stage of implementation after an intervention has been shown to be effective (Brown et al., 2017). This evaluation could be done within the University of British Columbia Counselling Services. A structured, supervised and individualized exercise program for university students seeking mental health services has been developed and piloted, Mind in Motion. This is a closed referral program so students can only access the program if they are referred by Wellness Advisors (mental health providers responsible for helping students consider and access all avenues of mental health care on campus). Wellness Advisors could be randomized to an experimental group and provided training and access to the toolkit to use, or to a control group, usual care without access to the toolkit. This would help determine if the new strategy (toolkit) produces more efficient or better processes and outputs compared to what currently exists. A primary outcome could be increased referrals to the available exercise program (and ultimately a collaborative decision made between a health care provider and individual seeking mental health services to try exercise as a

treatment). Secondary outcomes could include participant (student) changes in mood and physical activity as a result of the PA intervention. Important considerations for outcomes include the variability in health care providers (individual views and practice and how this may influence discussions around exercise and use of the toolkit) as well as the quality of an exercise intervention and the professionals delivering it. Dependent on evaluation, the exercise program could be improved upon by going back to the stage of considering the barriers and facilitators that individuals with depression face in engaging in PA. This could also help to address and further consider selecting, implementing and tailoring the intervention of exercise. If health care providers were to receive training on the use of the toolkit this could also be addressed by returning to this stage. A hybrid type 2 trial design could also be considered, which considers simultaneously testing of a clinical intervention and an implementation strategy (Curran, Bauer, Mittman, Pyne, Stetler, & 2012).

As noted, an important consideration throughout this work has been the reality that access to structured exercise programs varies within mental health services in Canada. However, after evaluation of the toolkit outlined in study four and five, it was determined that health care providers found use for the toolkit despite not having access to a structured exercise program and found other ways to use it. This demonstrated its adaptability – a positive attribute of an innovation. One example is use in other clinical populations with secondary depressive symptoms (such as individuals with cancer). Some health care providers also identified that it was a useful tool to discuss PA in general, and how one could be active with limited resources (such as walking, or home workouts), and benefits of activity regardless if choosing it as a treatment. Future evaluation could continue monitoring how the toolkit is being used and adapted to different contexts.

The toolkit was created for depression as it is the first and only mental illness in which guidelines exist identifying exercise as a treatment. However, exercise and PA have been shown to have health benefits for other clinical populations such as individuals with schizophrenia (Firth et al., 2015), anxiety (Aylett, Small & Bower, 2018) and bipolar disorder (Thomson et al., 2015). The toolkit in its current form may be a template for similar resources to be developed for other mental health conditions. Finally, the ‘Exercise and Depression Toolkit’ was created based upon guidelines released in 2016 by Ravindran and colleagues. The resource may need to be updated (and perhaps more interactive formats could be explored) in time as treatment guidelines are updated.

7.4 Summary

The series of studies in this dissertation and development of the first ‘Exercise and Depression Toolkit’ have been an important initial step in bridging the gap between treatment guidelines for depression and the consideration of exercise as a treatment option in practice in Canada. Intervention development followed a systematic, rigorous and phased process. Relevant stakeholders and knowledge users were consulted throughout the process. Various theories and frameworks also guided this process (KTA Framework, TDF, Behaviour Change Wheel, AGREE II, DoI Theory, and TFA). Initial evaluation results from monitoring toolkit downloads, reach, dissemination, and use of the toolkit in practice are promising for adoption. Although additional evaluation will be required, it is anticipated that the toolkit will help health care providers integrate evidence-based guidelines into their practice related to exercise and depression and promote PA. This dissertation is a starting point to help exercise become a more accessible treatment option that is integrated into health service delivery to improve the lives of Canadians living with depression.

Study	Purpose	Methods	Limitations	Key Findings
Study 1: Barriers and Facilitators to Physical Activity and Exercise among Adults with Depression: A Scoping Review.	The primary purpose of this review was to identify the barriers and facilitators to engagement in physical activity (PA) and exercise for adults with depression. The secondary purpose was to categorize and analyze the barriers and facilitators within the Theoretical Domains Framework (TDF) to help guide clinicians and exercise interventionists working with this population in the future.	A mixed-methods scoping review was conducted, and the TDF and definitions of each domain were used to categorize the barriers and facilitators extracted from the included studies.	No quality assessment was conducted, a conservative approach was taken of identifying one domain for behaviour factors, no inclusion or exclusion criteria was set on sample populations and depression diagnosis, and no analysis of sub-populations.	Prominent barriers identified were within the emotion domain (low mood, lack of motivation, lack of energy) and facilitators were within the social influences domain (support from others, an exercise professional or a health care provider). The Behavior Change Wheel was used for guidance and linked recommended behaviour change techniques (BCTs) for intervention.
Study 2: Barriers and facilitators to health care providers' promotion of physical activity for individuals with mental illness: A scoping review.	The primary purpose of this review was to identify the barriers and facilitators to PA promotion by health care providers working with individuals with mental illness.	A mixed-methods scoping review was conducted, and the TDF and definitions of each domain were used to categorize the barriers and facilitators extracted from the included studies.	No quality assessment was conducted, no differentiation of terms exercise or PA, we relied on the reporting of barriers and facilitators by original authors for extraction and coding, and difficulty of differentiating health care provider behaviour as it is multi-layered and affected by others' behaviour.	The most prominent barriers and facilitators were within the domains of beliefs about the consequences and environmental context & resources. Barriers: clients face barriers unique to their mental illness and so will not adhere to an exercise program, lack of training and knowledge to discuss PA. Facilitators: numerous benefits of PA and training to enhance knowledge and skills. The Behavior Change Wheel was used for guidance and linked recommended BCTs for intervention.
Study 3: Exploring the acceptability of exercise as a treatment for depression among health care providers and adults with lived experience with depression in Canada.	The purpose of this study was to guide the toolkit development process by exploring the perspectives and experiences of health care providers and individuals with depression on PA and PA promotion in the Canadian context.	Semi-structured phone and in-person interviews were conducted with individuals with lived experience with depression and health care providers in Canada. A thematic analysis was conducted using an inductive and deductive approach.	The participant sample who opted into the study were likely more receptive to exercise, and not all relevant health care provider designations were represented (e.g. no psychologist could be recruited).	Three important themes were identified to consider for resource development which includes motivation, buy-in, and responsibility.

<p>Study 4: It's more than just a referral: Development of an evidence-informed exercise and depression toolkit</p>	<p>The purpose of this study was to describe the systematic and phased process used to develop the evidence-based 'Exercise and Depression Toolkit' for health care providers working with adults with depression. Various stakeholders were involved throughout the process including health care providers, adults who have lived experience with depression, researchers, and exercise professionals.</p>	<p>The four phases of development included: reviews of relevant literature, formative interviews, an expert panel meeting, and final toolkit development. AGREE II was consulted throughout the developmental process and used to guide toolkit content and dissemination strategies. Modifications were made to items for health promotion and resource development rather than guideline development.</p>	<p>Our group did not calculate a quality score by appraisers of each item of the AGREE II instrument, rather opted for a survey to be sent back to panel members with their recommendations and the first draft of the toolkit instead.</p>	<p>The 'Exercise and Depression Toolkit' was created. <i>Objective:</i> To support health care professionals in collaborating with clients to explore exercise as a treatment option for adults (aged 18-65) with mild-moderate depression. <i>Target Population:</i> Adults diagnosed with mild-moderate depression aged 18-65 in Canada not meeting the recommended 150 minutes per week of moderate-vigorous PA per week. <i>End Users:</i> A variety of health care providers who work with adults with depression in a variety of practice settings. <i>Evaluation:</i> preliminary results of reach and dissemination are promising for adoption.</p>
<p>Study 5: "If I didn't have the toolkit, I would never have that conversation": pilot evaluation of health care providers' use of the 'Exercise and Depression Toolkit'.</p>	<p>The primary purpose of this study was to evaluate use of the toolkit in practice by health care providers working with individuals with depression. The secondary purpose was to attain feedback on the toolkit to determine necessary modifications and help inform national dissemination and uptake of the toolkit.</p>	<p>This study was conceptually informed by Rogers' Diffusion of Innovation theory, and the Theoretical Framework of Acceptability. An exploratory case study methodology was adopted. Health care providers working with adults with depression were given the toolkit to use in practice for four weeks. Semi-structured phone interviews were conducted pre and post intervention, and electronic weekly logs were used to track use of the toolkit. A content analysis was conducted.</p>	<p>Due to the case study design, observability could not be explored in the context of peer to peer behaviour with regards to use of the intervention, and the sample was small and homogeneous with regards to gender, ethnicity, and age. Participants only represented two provinces across Canada.</p>	<p>All health care providers used the toolkit at least once, and half of the participants referred individuals to an exercise program at least once. Overall, participants perceived their interactions with individuals with depression when using the toolkit to be successful considering client receptiveness, usefulness and general satisfaction. Overall, all participants (n=6) viewed the toolkit as having relative advantage and helping them to discuss exercise with individuals with depression and it was found to be acceptable. Participants viewed the toolkit as having relative advantage and perceived effectiveness, compatibility and ethicality, low complexity and trialability. Some concerns were seen around burden (effort and time to use), which informed dissemination efforts and end users.</p>

Table 20 Summary of dissertation studies

References

- Abu-Omar, K., Rütten, A., Burlacu, I., Schätzlein, V., Messing, S., & Suhrcke, M. (2017). The cost-effectiveness of physical activity interventions: a systematic review of reviews. *Preventive medicine reports*, 8, 72-78.
- American College of Sports Medicine. (2018). Exercise is Medicine: A Global Health Initiative. Available online: <http://exerciseismedicine.org/>
- American Psychiatric Association (APA). 2013. Diagnostic and statistical manual of mental disorders: Depressive Disorders. 5th ed. Arlington (VA): American Psychiatric Association.
- Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *American Journal of Preventive Medicine*, 10(2), 77-84.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Arbour-Nicitopoulos, K. P., Ginis, K. M., Latimer-Cheung, A. E., Bourne, C., Campbell, D., Cappe, S., ... & Smith, K. (2013). Development of an evidence-informed leisure time physical activity resource for adults with spinal cord injury: the SCI Get Fit Toolkit. *Spinal Cord*, 51(6), 491.
- Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International journal of social research methodology*, 8(1), 19-32.

- Avery, N., & Patterson, S. (2018). Physical Health in Public Mental Health Care: A Qualitative Study Employing the COM-B Model of Behaviour to Describe Views and Practices of Australian Psychologists. *Australian Psychologist*, 53(4), 302-312.
- Aylett, E., Small, N., & Bower, P. (2018). Exercise in the treatment of clinical anxiety in general practice—a systematic review and meta-analysis. *BMC health services research*, 18(1), 559.
- Azaar, D., Ball, K., Salmon, J., & Cleland, V. J. (2010). Physical activity correlates in young women with depressive symptoms: a qualitative study. *International Journal of Behavioral Nutrition and Physical Activity*, 7(3).
- Bandura, A. (1986). Social foundations of thought and action: a social cognitive theory. Englewood Cliffs, N.J: Prentice-Hall.
- Balas, E. A., & Boren, S. A. (2000). Managing clinical knowledge for health care improvement. Yearbook of medical informatics 2000: *Patient-centered systems*, p. 65-70.
- Barth, J., Munder, T., Gerger, H., Nüesch, E., Trelle, S., Znoj, H., ... & Cuijpers, P. (2016). Comparative efficacy of seven psychotherapeutic interventions for patients with depression: a network meta-analysis. *Focus*, 14(2), 229-243.
- Bartlem, K., Bowman, J., Ross, K., Freund, M., Wye, P., McElwaine, K., ... & Wiggers, J. (2016). Mental health clinician attitudes to the provision of preventive care for chronic disease risk behaviours and association with care provision. *BMC Psychiatry*, 16(1), 57.
- Bet, P. M., Hugtenburg, J. G., Penninx, B. W., & Hoogendijk, W. J. (2013). Side effects of antidepressants during long-term use in a naturalistic setting. *European neuropsychopharmacology*, 23(11), 1443-1451.

- Borland, R. (2017). CEOS Theory: A Comprehensive Approach to Understanding Hard to Maintain Behaviour Change. *Applied Psychology: Health and Well-being*, 9 (1), 3-35.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Braun, V. Clarke, V. & Weate, P. (2016). Thematic analysis. In B. Smith & A. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 191- 205). New York: Routledge.
- Brand, S., Colledge, F., Beeler, N., Phse, U., Kalak, N., Bahmani, D. S., . . . Gerber, M. (2016). The current state of physical activity and exercise programs in German-speaking, Swiss psychiatric hospitals: results from a brief online survey. *Neuropsychiatric Disorder Treatment*, 12, 1309-1317.
- Bressington, D., Mui, J., Wells, H., Chien, W. T., Lam, C., White, J., & Gray, R. (2016). Refocusing on physical health: Community psychiatric nurses' perceptions of using enhanced health checks for people with severe mental illness. *International journal of mental health nursing*, 25(3), 214-224.
- Bressington, D., Badnapurkar, A., Inoue, S., Ma, H. Y., Chien, W. T., Nelson, D., & Gray, R. (2018). Physical Health Care for People with Severe Mental Illness: the Attitudes, Practices, and Training Needs of Nurses in Three Asian Countries. *International journal of environmental research and public health*, 15(2), 343.
- Bridle, C., Spanjers, K., Patel, S., Atherton, N., & Lamb, S. (2012). Effect of exercise on depression severity in older people systematic review and meta-analysis of randomised controlled trials. *British Journal of Psychiatry*, 201(3), 180-185.

- Brouwers, M. C., Kho, M. E., Browman, G. P., Burgers, J. S., Cluzeau, F., Feder, G., ... & Littlejohns, P. (2010). AGREE II: advancing guideline development, reporting and evaluation in health care. *Canadian Medical Association Journal*, 182(18), E839-E842.
- Brown, C. H., Curran, G., Palinkas, L. A., Aarons, G. A., Wells, K. B., Jones, L., ... & Tabak, R. G. (2017). An overview of research and evaluation designs for dissemination and implementation. *Annual review of public health*, 38, 1-22.
- Browne, J., Mihas, P., & Penn, D. L. (2016). Focus on exercise: Client and clinician perspectives on exercise in individuals with serious mental illness. *Community Mental Health Journal*, 52(4), 387-394.
- Buckley, B. J. R., Thijssen, D. H. J., Murphy, R. C., Graves, L. E., Whyte, G., Gillison, F. B., ... & Watson, P. M. (2018). Making a move in exercise referral: co-development of a physical activity referral scheme. *Journal of Public Health*, 40(4), e586-e593.
- Burks, R. J., & Keeley, S. M. (1989). Exercise and diet therapy: Psychotherapists' beliefs and practices. *Professional Psychology: Research and Practice*, 20(1), 62.
- Burton, N. W., Pakenham, K. I., & Brown, W. J. (2010). Are psychologists willing and able to promote physical activity as part of psychological treatment? *International Journal of Behavioral Medicine*, 17(4), 287-297.
- Bush, M. A., Ciccolo, J. J., Puspitasari, A. J., Norsat, S., Whitworth, W. J., Stults-Kolehmainen, M.A. (2016). Preferences for exercise as a treatment for depression. *Mental Health and Physical Activity*, 10, 68-72.
- Canadian Institute of Health Research (2016). *Knowledge Translation at CIHR*. Retrieved June 11 2020, from: <http://www.cihr-irsc.gc.ca/e/29418.html#2>

Canadian Institutes for Health Research (2016). *Strategy for Patient-Oriented Research*.

Retrieved June 6 2020, from: <https://cihr-irsc.gc.ca/e/49307.html>.

Canadian Society for Exercise Physiology (2016). *Canadian Physical Activity Guidelines For Adults 18-64 years*. Retrieved from

http://www.csep.ca/CMFiles/Guidelines/CSEP_PAGuidelines_adults_en.pdf

Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(37).

Cane, J., Richardson, M., Johnston, M., Ladha, R., Michie, S. (2015). From lists of behaviour change techniques (BCTs) to structured hierarchies: Comparison of two methods of developing a hierarchy of BCTs. *British Journal of Health Psychology*, 20, 130-150.

Carlbo, A., Claesson, H. P., & Åström, S. (2018). Nurses' Experiences in using Physical Activity as Complementary Treatment in Patients with Schizophrenia. *Issues in mental health nursing*, 39(7), 600-607.

Carpiniello, B., Primavera, D., Piku, A., Vaccargiu, N., & Pinna, F. (2013). Physical activity and mental disorders: A case-control study on attitudes, preferences and perceived barriers in Italy. *Journal of Mental Health*, 22(6), 492-500.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports*, 100(2), 126.

Chalder, M., Wiles, N. J., Campbell, J., Hollinghurst, S. P., Searle, A., Haase, A., ... & Thorp, H. (2012). A pragmatic randomised controlled trial to evaluate the cost-effectiveness of a

physical activity intervention as a treatment for depression: the treating depression with physical activity (TREAD) trial.

Chesney E, Goodwin GM, Fazel S. (2014) Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry, 13*: 153–60.

Cooney, G. M., Dwan, K., Greig, C. A., Lawlor, D. A., Rimer, J., Waugh, F. R., ... & Mead, G. E. (2013). Exercise for depression. *Cochrane database of systematic reviews*, (9).

Cuijpers, P. (2015). Psychotherapies for adult depression: recent developments. *Current opinion in psychiatry*, 28(1), 24-29.

Cuijpers, P., Van Straten, A., Andersson, G., & Van Oppen, P. (2008). Psychotherapy for depression in adults: a meta-analysis of comparative outcome studies. *Journal of consulting and clinical psychology*, 76(6), 909.

Cuijpers, P., Berking, M., Andersson, G., Quigley, L., Kleiboer, A., & Dobson, K. S. (2013). A meta-analysis of cognitive-behavioural therapy for adult depression, alone and in comparison with other treatments. *The Canadian Journal of Psychiatry*, 58(7), 376-385.

Curran, G. M., Bauer, M., Mittman, B., Pyne, J. M., & Stetler, C. (2012). Effectiveness-implementation hybrid designs: combining elements of clinical effectiveness and implementation research to enhance public health impact. *Medical care*, 50(3), 217.

Craft, L. L. (2005). Exercise and clinical depression: examining two psychological mechanisms. *Psychology of sport and exercise*, 6(2), 151-171.

Craft, L. L. (2013). Potential psychological mechanisms underlying the exercise and depression relationship. In P. Ekkekakis, D. B. Cook, L. L. Craft, S. N. Culos-Reed, J. L. Etnier, M. Hamer, K. A. Martin Ginis, J. Reed, J. A. J. Smits, & M. Ussher (Eds.), Routledge

- handbooks. Routledge handbook of physical activity and mental health (p. 161–168).
Routledge/Taylor & Francis Group.
- Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2008). Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ*: 337, a1655.
- Craven, M. A., & Bland, R. (2013). Depression in primary care: current and future challenges. *The Canadian Journal of Psychiatry*, 58(8), 442-448.
- Crisford, P., Winzenberg, T., Venn, A., Schultz, M., Aitken, D., & Cleland, V. (2018). Factors associated with physical activity promotion by allied and other non-medical health professionals: A systematic review. *Patient Education and Counseling*, 101(10), 1775-1785.
- Dauwan, M., Begemann, M. J. H., Heringa, S. M., & Sommer, I. E. (2016). Exercise improves clinical symptoms, quality of life, global functioning, and depression in schizophrenia : A systematic review and meta-analysis. *Schizophrenia Bulletin*, 42(3), 588-599.
- Davidson, L., Drake, R. E., Schmutte, T., Dinzeo, T., & Andres-Hyman, R. (2009). Oil and water or oil and vinegar? Evidence-based medicine meets recovery. *Community mental health journal*, 45(5), 323-332.
- Dearing, J.W., Kee, K.F., & Tai-Quan, P. (2017). *Historical Roots of Dissemination and Implementation Science*. In R.C. Brownson, G. A. Colditz, & E.K. Proctor (Eds.), *Dissemination and implementation research in health: translating science to practice* (2nd ed., pp 48-61). Oxford University Press.
- Deslandes, A., Moraes, H., Ferreira, C., Veiga, H., Silveira, H., Mouta, R., ... & Laks, J. (2009). Exercise and mental health: many reasons to move. *Neuropsychobiology*, 59(4), 191-198.

- Dobson F., Bennell K.L., French S.D., Nicolson P.J.A., Klaasman R.N., Holden M.A., Atkins L., Hinman R.S. (2016). Barriers and facilitators to exercise participation in people with hip and/or knee osteoarthritis: synthesis of the literature using behaviour change theory. *American Journal of Physical Medicine & Rehabilitation*, 95, 372-389.
- Diepeveen, S., Ling, T., Suhrcke, M., Roland, M., & Marteau, T. M. (2013). Public acceptability of government intervention to change health-related behaviours: a systematic review and narrative synthesis. *BMC public health*, 13(1), 756.
- Ekkekakis, P. (2015). Honey, I shrunk the pooled SMD! Guide to critical appraisal of systematic reviews and meta-analyses using the Cochrane review on exercise for depression as example. *Mental health and physical activity*, 8, 21-36.
- Ekkekakis, P., & Dafermos, M. (2012). Exercise is a many-splendored thing, but for some it does not feel so splendid: staging a resurgence of hedonistic ideas in the quest to understand exercise behavior. In E. O. Acevedo (Ed.), *Oxford Handbook of Exercise Psychology* (pp. 295–333). New York, NY: Oxford University Press.
- Ekkekakis, P., Parfitt, G., & Petruzzello, S. J. (2011). The pleasure and displeasure people feel when they exercise at different intensities: decennial update and progress towards a tripartite rationale for exercise intensity prescription. *Sports Medicine*, 41(8), 641–671.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of advanced nursing*, 62(1), 107-115.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE open*, 4(1), 2158244014522633.

- Elison, S., Ward, J., Davies, G., & Moody, M. (2014). Implementation of computer-assisted therapy for substance misuse: a qualitative study of Breaking Free Online using Roger's diffusion of innovation theory. *Drugs and Alcohol Today*, 14(4), 207-218.
- Faulkner, G. (2016). Sweat is the best antidepressant: But where do we go from here? *WellSpring*, 27(3), 1-4.
- Faulkner, G., & Biddle, S. (2001). Exercise and mental health: It's just not psychology!. *Journal of Sports Sciences*, 19(6), 433-444.
- Faulkner, G., & Biddle, S. (2001). Exercise and mental health: It's just not psychology!. *Journal of Sports Sciences*, 19(6), 433-444.
- Faulkner, G., & Biddle, S. (2002). Mental health nursing and the promotion of physical activity. *Journal of Psychiatric and Mental Health Nursing*, 9(6), 659-665.
- Field, B., Booth, A., Ilott, I., & Gerrish, K. (2014). Using the Knowledge to Action Framework in practice: a citation analysis and systematic review. *Implementation Science*, 9(1), 172.
- Firth, J., Cotter, J., Elliott, R., French, P., & Yung, A. R. (2015). A systematic review and meta-analysis of exercise interventions in schizophrenia patients. *Psychological medicine*, 45(7), 1343-1361.
- Firth, J., Rosenbaum, S., Stubbs, B., Gorchynski, P., Yung, A. R., Vancampfort, D. (2016). Motivating factors and barriers towards exercise in severe mental illness: a systematic review and meta-analysis. *Psychological Medicine*, 46, 2869-2881.
- Firth, J., Stubbs, B., Vancampfort, D., Schuch, F., Lagopoulos, J., Rosenbaum, S., & Ward, P. B. (2018). Effect of aerobic exercise on hippocampal volume in humans: a systematic review and meta-analysis. *Neuroimage*, 166, 230-238.

- Foulon, B. L., Lemay, V., Ainsworth, V., & Ginis, K. A. M. (2012). Enhancing physical activity guidelines: a needs survey of adults with spinal cord injury and health care professionals. *Adapted Physical Activity Quarterly*, 29(4), 329-345.
- Fraser, J. S., Chapman, J. J., Brown, J. W., Whiteford, A. H., Burton, W. N. (2015) Physical activity attitudes and preferences among inpatient adults with mental illness. *International Journal of Mental Health Nursing*, 24, 413-420.
- Ganiah, A. N., Al-Hussami, M., & Alhadidi, M. M. (2017). Mental Health Nurses Attitudes and Practice Toward Physical Health Care in Jordan. *Community Mental Health Journal*, 53(6), 725-735.
- Gelenberg, A. J., Freeman, M. P., Markowitz, J. C., Rosenbaum, J. F., Thase, M. E., Trivedi, M. H., ... & Schneck, C. D. (2010). Practice guideline for the treatment of patients with major depressive disorder third edition. *The American Journal of Psychiatry*, 167(10), 1.
- Ginis, K. M., Hicks, A. L., Latimer, A. E., Warburton, D. E. R., Bourne, C., Ditor, D. S., ... & Pomerleau, P. (2011). The development of evidence-informed physical activity guidelines for adults with spinal cord injury. *Spinal Cord*, 49(11), 1088.
- Glowacki, K., Duncan, M., Gainforth, H., & Faulkner, G. (2017). Barriers and Facilitators to physical activity and exercise among adults with depression: A scoping review. *Mental Health and Physical Activity*, 13, 108-119.
- Glowacki, K., & Faulkner, G (2019). Integrating exercise into mental health care: Development of the Exercise and Depression Toolkit. *WellSpring: Centre for Active Living*, 9(30).
- Glowacki, K., Weatherson, K., & Faulkner, G. (2019a). Barriers and facilitators to health care providers' promotion of physical activity for individuals with mental illness: A scoping review. *Mental Health and Physical Activity*, 16, 152-168.

- Glowacki, K., Arbour-Nicitopoulos, K., Burrows, M., Chesick, L., Heinemann, L., Irving, S., ... & Taylor, A. (2019b). It's more than just a referral: Development of an evidence-informed exercise and depression toolkit. *Mental Health and Physical Activity*, 17, 100297.
- Gourlan, P. Bernard, C. Bortolon, A. J. Romain, O. Lareyre, M. Carayol, G. Ninot & J. Boiché. (2016). Efficacy of theory-based interventions to promote physical activity. A meta-analysis of randomised controlled trials. *Health Psychology Review*, 10(1): 50-66.
- Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*, 24(2), 105-112.
- Green, L. W., & Kreuter, M. W. (2005). Health program planning: An educational and ecological approach (4th ed.). New York: McGraw-Hill.
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *The Milbank Quarterly*, 82(4), 581-629.
- Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: time for a map? *Journal of continuing education in the health professions*, 26(1), 13-24.
- Haase, A. M., Taylor, A. H., Fox, K. R., Thorp, H., & Lewis, G. (2010). Rationale and development of the physical activity counselling intervention for a pragmatic TRIal of Exercise and Depression in the UK (TREAD-UK). *Mental Health and Physical Activity*, 3(2), 85-91.

Heale, R., & Twycross, A. (2018). What is a case study? *BMJ Evidence- Based Nursing* 21(1).

Heart and Stroke Foundation of Canada (2020). *Exercising when you have heart disease*.

<https://www.heartandstroke.ca/articles/exercising-when-you-have-heart-disease>

Happell, B., Scott, D., Platania-Phung, C., & Nankivell, J. (2012). Nurses' views on physical activity for people with serious mental illness. *Mental Health and Physical Activity*, 5(1), 4-12.

Happell, B., Platania-Phung, C., & Scott, D. (2013a). Physical health care for people with mental illness: Training needs for nurses. *Nurse Education Today*, 33(4), 396-401.

Happell, B., Scott, D., & Platania-Phung, C. (2013b). Survey of Australian mental health nurses on physical activity promotion. *International Journal of Mental Health Promotion*, 15(3), 148-161.

Happell, B., Scott, D., Platania-Phung, C., & Nankivell, J. (2013). Communication with Colleagues: Frequency of Collaboration Regarding Physical Health of Consumers With Mental Illness. *Perspectives in Psychiatric Care*, 50; 33-43.

Harding, S. L. (2013). Direct care staff perspectives related to physical activity in mental health group homes. *Journal of psychosocial nursing and mental health services*, 51(12), 38-43.

Hébert, E. T., Caughey, M. O., & Shuval, K. (2012). Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *British Journal of Sports Medicine*, 46(9), 625-631.

Heslehurst N, Newham J, Maniatopoulos G, Fleetwood C, Robalino S, Rankin J. (2014). Implementation of pregnancy weight management and obesity guidelines: a meta-synthesis of healthcare professionals' barriers and facilitators using the Theoretical Domains Framework. *Obesity Reviews*, 15, 462-486.

- Hieronymus, F., Emilsson, J. F., Nilsson, S., & Eriksson, E. (2016). Consistent superiority of selective serotonin reuptake inhibitors over placebo in reducing depressed mood in patients with major depression. *Molecular Psychiatry*, 21(4), 523.
- Hoffman, T.C., Glasziou, P.P., Coutron, I., Milne, R., Perera, R., Moher, D... Michie, S. (2014). Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *British Medical Journal*, 348, g1687.
- Huijg, J. M., Gebhardt, W. A., Verheijden, M. W., van der Zouwe, N., de Vries, J. D., Middelkoop, B. J., & Crone, M. R. (2015). Factors influencing primary health care professionals' physical activity promotion behaviors: a systematic review. *International journal of behavioral medicine*, 22(1), 32-50.
- Hyndman, B (2016). Towards the Development of Competencies for Health Promoters in Canada: A Discussion Paper. Health Promotion Canada.
https://www.healthpromotioncanada.ca/wp-content/uploads/2016/07/HP_competenciespaper_Apr_07.pdf.
- Josefsson, T., Lindwall, M., Archer, T. (2014). Physical exercise intervention in depressive disorders: Meta-analysis and systematic review. *Scandinavian Journal of Medicine & Science in Sports*, 24, 259-272.
- Joyce, C. L., & O'Tuathaigh, C. M. (2014). Increased training of general practitioners in Ireland may increase the frequency of exercise counselling in patients with chronic illness: A cross-sectional study. *The European journal of general practice*, 20(4), 314-319.
- Kerr, J., Calfas, J. K., Stien, B. M., Sieber, W., Abascal, B. L., Norman, J. G., Patrick, K. (2008). A pilot study to assess the feasibility and acceptability of community based physical activity intervention (involving internet, telephone, and pedometer support), integrated

- with medication and mood management for depressed patients. *Mental Health and Physical Activity* 1, 40-45.
- Khalil, E., Callaghan, P., Carter, T., Morres, I. (2012). Pragmatic randomized Controlled Trial of an Exercise Programme to Improve Wellbeing Outcomes in Women with Depression: Findings from the Qualitative Component. *Psychology* 3(11), 979-986.
- Kinnafick, F. E., Papathomas, A., & Regoczi, D. (2018). Promoting exercise behaviour in a secure mental health setting: Healthcare assistant perspectives. *International journal of mental health nursing*, 27(6):1776-1783.
- Knoll, A., & MacLennan, R.N. (2017) Prevalence and Correlates of Depression in Canada: Findings from the Canadian Community Health Survey. *Canadian Psychology*, 58(2), 116-123.
- Krogh, J., Hjorthøj, C., Speyer, H., Gluud, C., & Nordentoft, M. (2017). Exercise for patients with major depression: a systematic review with meta-analysis and trial sequential analysis. *British Medical Journal open*, 7(9), e014820.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, 16(9).
- Lam, R. W., McIntosh, D., Wang, J., Enns, M. W., Kolivakis, T., Michalak, E. E., ... & Milev, R. V. (2016). Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 clinical guidelines for the management of adults with major depressive disorder: section 1. Disease burden and principles of care. *The Canadian Journal of Psychiatry*, 61(9), 510-523.

- Larsen, K. (October 12, 2019). Exercise as medicine: UBC researcher unveils new tool to fight depression. *Canadian Broadcasting Corporation*. Retrieved June 12, 2020 from: <https://www.cbc.ca/news/canada/british-columbia/exercise-as-medicine-1.5315447>
- Latimer-Cheung, A. E., Rhodes, R. E., Kho, M. E., Tomasone, J. R., Gainforth, H. L., Kowalski, K., ... & Duggan, M. (2013). Evidence-informed recommendations for constructing and disseminating messages supplementing the new Canadian Physical Activity Guidelines. *BMC public health*, 13(1), 419.
- Leeman, J., Birken, S. A., Powell, B. J., Rohweder, C., & Shea, C. M. (2017). Beyond “implementation strategies”: classifying the full range of strategies used in implementation science and practice. *Implementation Science*, 12(1), 125.
- Lederman, O., Suetani, S., Stanton, R., Chapman, J., Korman, N., Rosenbaum, S., ... & Siskind, D. (2017). Embedding exercise interventions as routine mental health care: implementation strategies in residential, inpatient and community settings. *Australasian Psychiatry*, 25(5), 451-455.
- Leutwyler, H., Hubbard, E. M., Jeste, D. V., & Vinogradov, S. (2012). “We’re not just sitting on the periphery”: a staff perspective of physical activity in older adults with schizophrenia. *The Gerontologist*, 53(3), 474-483.
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: advancing the methodology. *Implementation science*, 5(1), 69.
- Lin TW, Kuo YM. Exercise benefits brain function: the monoamine connection. *Brain sciences*, 3(1):39–53
- Lincoln, YS. & Guba, EG. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.

- Ma, J. (2018). Advancing physical activity intervention measurement and development among people with spinal cord injury: a behaviour change science and integrated knowledge translation approach (Doctoral dissertation, University of British Columbia).
- Ma, J. K., Cheifetz, O., Todd, K. R., Chebaro, C., Phang, S. H., Shaw, R. B., ... & Ginis, K. A. M. (2020). Co-development of a physiotherapist-delivered physical activity intervention for adults with spinal cord injury. *Spinal cord*, 1-9.
- Makowsky, M. J., Guirguis, L. M., Hughes, C. A., Sadowski, C. A., & Yuksel, N. (2013). Factors influencing pharmacists' adoption of prescribing: qualitative application of the diffusion of innovations theory. *Implementation Science*, 8(1), 109.
- McCurdy, A., Lamboglia, C., Lindeman, C., Mangan, A., Wholers, B., Sivak, A., Spence, J. (2020). The physical activity sector within the treatment of mental illness: A scoping review of the perceptions of healthcare professionals. *Mental Health and Physical Activity*, doi.org/10.1016/j.mhpa.2020.100349.
- Mental Health Commission of Canada. (2013). Making the Case for Investing in Mental Health. https://www.mentalhealthcommission.ca/sites/default/files/2016-06/Investing_in_Mental_Health_FINAL_Version_ENG.pdf
- Mental Health Commission of Canada (2016). *Guidelines for Recovery-Oriented Practice*. https://www.mentalhealthcommission.ca/sites/default/files/MHCC_RecoveryGuidelines_ENG_0.pdf
- Mental Health Commission of Canada (March, 2017). *Strengthening the Case for Investing in Canada's Mental Health System: Economic Considerations*. https://www.mentalhealthcommission.ca/sites/default/files/2017-03/case_for_investment_eng.pdf

- Martell CR, Dimidjian S, Herman-Dunn R. (2010). Behavioral activation for depression: a clinician's guide. New York (NY): Guilford.
- Michie S, Atkins L, West R. (2014). The behaviour change wheel: a guide to designing interventions. Great Britain, UK: Silverback Publishing.
- Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., Walker, A., & on, b. (2005). Making psychological theory useful for implementing evidence-based practice: a consensus approach. *Quality & Safety in Health Care*, 14(1), 26–33.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W... & Wood, C.E. (2013) The Behaviour Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions. *Annals of Behavioural Medicine*, 46(1), 81-95.
- Tremblay, M. S., Carson, V., Chaput, J. P., Connor Gorber, S., Dinh, T., Duggan, M., ... & Janssen, I. (2016). Canadian 24-hour movement guidelines for children and youth: an integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology, Nutrition, and Metabolism*, 41(6), S311-S327.
- Michie, S. (2015). The Behaviour Change Wheel: a new method for characterising and designing behaviour change interventions. https://ktcanada.org/wp-content/uploads/2016/03/Susan-Michie-slides_nov_12_2015.pdf
- Ministry of Health and Long-Term Care (January, 2005). Ontario Program Standards for ACT Teams.<http://www.health.gov.on.ca/en/common/ministry/publications/reports/mentalhealth/mentalhealth.aspx#act>

Ministry of Health Services (March 31, 2008). British Columbia Program Standard for assertive Community treatment (ACT) teams. [https://www.act-](https://www.act-bc.com/files/documents/BC_Standards_for_ACT_Teams.pdf)

[bc.com/files/documents/BC_Standards_for_ACT_Teams.pdf](https://www.act-bc.com/files/documents/BC_Standards_for_ACT_Teams.pdf)

Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, 6(7), 1-6.

Moore, G. F., Audrey, S., Barker, M., Bond, L., Bonell, C., Hardeman, W., ... & Baird, J. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *British Medical Journal*, 350:h1258

Morres, I. D., Hatzigeorgiadis, A., Stathi, A., Comoutos, N., Arpin-Cribbie, C., Krommidas, C., & Theodorakis, Y. (2019). Aerobic exercise for adult patients with major depressive disorder in mental health services: A systematic review and meta-analysis. *Depression and anxiety*, 36(1).

National Collaborating Centre for Mental Health UK. (2014). Psychosis and schizophrenia in adults: Treatment and management (updated edition). London, UK: National Institute for Health and Care Excellence.

National Collaborating Centre for Mental Health UK. (2009). Depression: the treatment and management of depression in adults (updated edition). London, UK: National Institute for Health and Care Excellence.

National Institute of Mental Health (2016). Mental Health Information.

<https://www.nimh.nih.gov/index.shtml>

Next Steps Consortium (2017). The AGREE II Instrument [Electronic version]. Retrieved from <http://www.agreetrust.org>.

- Olsson, A., Skovdahl, K., & Engström, M. (2016). Using diffusion of innovation theory to describe perceptions of a passive positioning alarm among persons with mild dementia: a repeated interview study. *BMC geriatrics*, 16(1), 3.
- Parikh, S. V., Quilty, L. C., Ravitz, P., Rosenbluth, M., Pavlova, B., Grigoriadis, S., ... & Milev, R. V. (2016). Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 clinical guidelines for the management of adults with major depressive disorder: section 2. Psychological treatments. *The Canadian Journal of Psychiatry*, 61(9), 524-539.
- Parikh, S.V., Kcomt, A., Fonseka, T.M., Pong, J.T. (Eds). 2018. THE CHOICE-D PATIENT AND FAMILY GUIDE TO DEPRESSION TREATMENT. Toronto, Mood Disorders Association of Ontario.
- Patel, A., Schofield, G. M., Kolt, G. S., & Keogh, J. W. (2011). General practitioners' views and experiences of counselling for physical activity through the New Zealand Green Prescription program. *BMC family practice*, 12(1), 119.
- Patten, S. B., Williams, J. V., Lavorato, D. H., Wang, J. L., McDonald, K., & Bulloch, A. G. (2015). Descriptive epidemiology of major depressive disorder in Canada in 2012. *The Canadian Journal of Psychiatry*, 60(1), 23-30.
- Patten, S. B., Williams, J. V. A., Lavorato, D. H., Wang, J. L., McDonald, K., & Bulloch, A. G. M. (2016). Major depression in Canada: What has changed over the past 10 years? *The Canadian Journal of Psychiatry*, 61(2), 80-85.
- Pedersen, E. R., Rubenstein, L., Kandrack, R., Danz, M., Belsher, B., Motala, A., ... & Hempel, S. (2018). Elusive search for effective provider interventions: a systematic review of provider interventions to increase adherence to evidence-based treatment for depression. *Implementation Science*, 13(1), 99.

- Pentecost, C., Farrand, P., Greaves, J. C., Taylor, S. R., Warren, C. F., Hillsdon, M... Taylor, H.A. (2015). Combining behavioural activation with physical activity promotion for adults with depression: findings of a parallel-group pilot randomized controlled trial (BACPAc). *Trials*, 16(1), 367.
- Pedersen, E. R., Rubenstein, L., Kandrack, R., Danz, M., Belsher, B., Motala, A., ... & Hempel, S. (2018). Elusive search for effective provider interventions: a systematic review of provider interventions to increase adherence to evidence-based treatment for depression. *Implementation Science*, 13(1), 99.
- Phongsavan, P., Merom, D., Bauman, A., & Wagner, R. (2007). Mental illness and physical activity: therapists' beliefs and practices. *Australian and New Zealand journal of psychiatry*, 41(5), 458-459.
- Physical Activity Support Kit Initiative (PASKI, 2016). *Move More, Sit Less*. Retrieved June 11 2020, from: <https://physicaltherapy.med.ubc.ca/physical-therapy-knowledge-broker/physical-activity-support-kit-initiative-paski-move-more-sit-less/>
- Phillips, C. (2017). Brain-derived neurotrophic factor, depression, and physical activity: making the neuroplastic connection. *Neural plasticity*, 2017.
- Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: recommendations for specifying and reporting. *Implementation Science*, 8(1), 139.
- Prochaska, J. O., & Velicer, W. F. (1997). The Transtheoretical Model of Health Behavior Change. *American Journal of Health Promotion*, 12(1), 38–48.
- Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., ... & Hensley, M. (2011). Outcomes for implementation research: conceptual distinctions, measurement

- challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38(2), 65-76.
- Pyett, P. M. (2003). Validation of qualitative research in the “real world”. *Qualitative health research*, 13(8), 1170-1179.
- Radovic, S., Melvin, G. A., & Gordon, M. S. (2018). Clinician perspectives and practices regarding the use of exercise in the treatment of adolescent depression. *Journal of sports sciences*, 36(12), 1371-1377.
- Ratnasingham ,S., Cairney, J., Rehm, J., Manson, H., & Kurdyak, P. (2012). Opening Eyes, Opening Minds: The Ontario Burden of Mental Illness and Addictions Report. An ICES/PHO Report. Toronto: Institute for Clinical Evaluative Sciences and Public Health Ontario.
- Ravindran, A. V., Balneaves, L. G., Faulkner, G., Ortiz, A., McIntosh, D., Morehouse, R. L., ... & MacQueen, G. M. (2016). Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 clinical guidelines for the management of adults with major depressive disorder: section 5. complementary and alternative medicine treatments. *The Canadian Journal of Psychiatry*, 61(9), 576-587.
- Rebar, A.L., Dimmock, J.A., Jackson, B., Rhodes, R.E., Kates, A., Starling, J., & Vandelanotte, C. (2016). A systematic review of the effects of non-conscious regulatory processes in physical activity. *Health Psychology Review*, 10(4), 395-407.
- Rethorst C.D., Wipfli B.M., Landers D.M. (2009) The antidepressive effects of exercise. *Sports Medicine*, 39(6), 491–511.

- Richardson, C. R., Faulkner, G., McDevitt, J., Skrinar, G. S., Hutchinson, D. S., & Piette, J. D. (2005). Integrating physical activity into mental health services for persons with serious mental illness. *Psychiatric services*, 56(3), 324-331.
- Robson, D., Haddad, M., Gray, R., & Gournay, K. (2013). Mental health nursing and physical health care: A cross-sectional study of nurses' attitudes, practice, and perceived training needs for the physical health care of people with severe mental illness. *International Journal of Mental Health Nursing*, 22(5), 409-417.
- Rogers EM (2003): Diffusion of Innovations 5th edition. New York: Free Press.
- Rosenbaum, S., Tiedemann, A., Sherrington, C., Curtis, J., & Ward, P. B. (2014). Physical activity interventions for people with mental illness: a systematic review and meta-analysis. *Journal of Clinical Psychiatry*, 75, 964–974.
- Rosenbaum, S., Hobson-Powell, A., Davison, K., Stanton, R., Craft, L. L., Duncan, M., ... & Ward, P. B. (2018). The Role of Sport, Exercise, and Physical Activity in Closing the Life Expectancy Gap for People with Mental Illness: An International Consensus Statement by Exercise and Sports Science Australia, American College of Sports Medicine, British Association of Sport and Exercise Science, and Sport and Exercise Science New Zealand. *Translational Journal of the American College of Sports Medicine*, 3(10), 72-73.
- Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation. *American Psychologist*, 55(1), 68–78.
- Santarsieri, D., & Schwartz, T. L. (2015). Antidepressant efficacy and side-effect burden: a quick guide for clinicians. *Drugs in context*, 4.

- Saveanu, R. V., & Nemeroff, C. B. (2012). Etiology of depression: Genetic and environmental factors. *Psychiatric Clinics*, 35(1), 51-71.
- Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016a). Exercise as a treatment for depression: a meta-analysis adjusting for publication bias. *Journal of psychiatric research*, 77, 42-51.
- Schuch, F. B., Vancampfort, D., Rosenbaum, S., Richards, J., Ward, P. B., & Stubbs, B. (2016b). Exercise improves physical and psychological quality of life in people with depression: A meta-analysis including the evaluation of control group response. *Psychiatry research*, 241, 47-54.
- Schuch, F. B., Deslandes, A. C., Stubbs, B., Gosmann, N. P., da Silva, C. T. B., & de Almeida Fleck, M. P. (2016c). Neurobiological effects of exercise on major depressive disorder: a systematic review. *Neuroscience & Biobehavioral Reviews*, 61, 1-11.
- Schuch FB, Morres ID, Ekkekakis P, Rosenbaum S, Stubbs B. (2017a). A critical review of exercise as a treatment for clinically depressed adults: time to get pragmatic. *Acta Neuropsychiatry*, 29(2): 65-71.
- Schuch, F. B., Morres, I. D., Ekkekakis, P., Rosenbaum, S., & Stubbs, B. (2017b). Exercise works for depression: Bridging the implementation gap and making exercise a core component of treatment. *Acta Neuropsychiatrica*, 29(2), 124-126.
- Schwarzer, R. (2008). Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. *Applied Psychology*, 57(1), 1–29.
- Searle, A., Calnan, M., Lewis, G., Campbell, J., Taylor, A., & Turner, K. (2011). Patients' views of physical activity as treatment for depression: a qualitative study. *British Journal of General Practice*, 149-156.

- Searle, A., Calnan, M., Turner, K. M., Lawlor, D. A., Campbell, J., Chalder, M., & Lewis, G. (2012). General practitioners beliefs about physical activity for managing depression in primary care. *Mental Health and Physical Activity*, 5(1), 13-19
- Searle, A., Hass, M. A., Chalder, M., Fox, R. K., Taylor, H. A., Lewis, G., Turner, M. K. (2014). Participants' experiences of facilitated physical activity for the management of depression in primary care. *Journal of Health Psychology*, 19(11), 1430-1422.
- Seime, J. R., & Vickers, S. K. (2006). The Challenges of treating depression with exercise: From Evidence to practice. *Clinical Psychology: Science and Practice*, 13, 194-197.
- Sekhan, M., Cartwright, M., & Francis, J. (2016). Application of a theoretical framework to assess intervention acceptability: a semi-structured interview study. *The European Health Psychology Society* (8) Supp. Available online: <https://ehps.net/ehp/index.php/contents/article/view/1918>
- Scott, S. D., Plotnikoff, R. C., Karunamuni, N., Bize, R., & Rodgers, W. (2008). Factors influencing the adoption of an innovation: An examination of the uptake of the Canadian Heart Health Kit (HHK). *Implementation Science*, 3(1), 41.
- Silverman, M. N., & Deuster, P. A. (2014). Biological mechanisms underlying the role of physical fitness in health and resilience. *Interface focus*, 4(5), 20140040.
- Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: Problems and opportunities within sport and exercise psychology. *International review of sport and exercise psychology*, 11(1), 101-121.
- Smith, B. M., & Sparkes, A. C. (Eds.). (2016). *Routledge handbook of qualitative research in sport and exercise*. London: Routledge.

- Soundy, A., Stubbs, B., Probst, M., Hemmings, L., & Vancampfort, D. (2014). Barriers to and facilitators of physical activity among persons with schizophrenia: a survey of physical therapists. *Psychiatric Services*, 65(5), 693-696.
- Stanton, R. (2013). Accredited exercise physiologists and the treatment of people with mental illnesses. *Clinical Practice*, 2(2), 5-9.
- Stanton, R., Franck, C., Reaburn, P., & Happell, B. (2015a). A pilot study of the views of general practitioners regarding exercise for the treatment of depression. Perspectives in *Psychiatric Care*, 51(4), 253-259.
- Stanton, R., Happell, B., & Reaburn, P. (2015b). Investigating the exercise-prescription practices of nurses working in inpatient mental health settings. *International Journal of Mental Health Nursing*, 24(2), 112-120.
- Stanton, R., Reaburn, P. (2014). Exercise and the treatment of depression: a review of the exercise program variables. *Journal of Science Medicine & Sport*, 17:177-182.
- Stanton, R., Reaburn, P., & Happell, B. (2013). Is cardiovascular or resistance exercise better to treat patients with depression? A narrative review. *Issues Mental Health Nursing*, 34: 531-538.
- Stanton, R., Rosenbaum, S., Lederman, O., & Happell, B. (2018). Implementation in action: how Australian Exercise Physiologists approach exercise prescription for people with mental illness. *Journal of Mental Health*, 27(2), 150-156.
- Statistics Canada (2016). Mood & Anxiety Disorders in Canada. Retrieved from <https://infobase.phac-aspc.gc.ca/datalab/mood-anxiety-blog-en.html>
- Stokols, D. (1992). Establishing and maintaining healthy environments. Toward a social ecology of health promotion. *The American Psychologist*, 47(1), 6-22.

- Strom, M., Uckelstam, C. J., Andersson, G., Hassmen, P., Umeåfjord, G., & Carlbring, P. (2013). Internet-delivered therapist-guided physical activity for mild to moderate depression: a randomized controlled trial. *PeerJ*, 1, e178.
- Stubbs, B., Soundy, A., Probst, M., De Hert, M., De Herdt, A., & Vancampfort, D. (2014a). Understanding the role of physiotherapists in schizophrenia: an international perspective from members of the International Organisation of Physical Therapists in Mental Health (IOPTMH). *Journal of Mental Health*, 23(3), 125-129.
- Stubbs, B., Soundy, A., Probst, M., De Hert, M., De Herdt, A., Parker, A., & Vancampfort, D. (2014b). The assessment, benefits and delivery of physical activity in people with schizophrenia: A survey of members of the international organization of physical therapists in mental health. *Physiotherapy Research International: The Journal for Researchers and Clinicians in Physical Therapy*, 19(4), 248-56.
- Stubbs B, Williams J, Gaughran F, Craig T. (2016). How sedentary are people with psychosis? A systematic review and meta-analysis. *Schizophrenia Research*, 71(1):103–9.
- Stubbs, B., Vancampfort, D., Rosenbaum, S., Ward, P. B., Richards, J., Soundy, A., ... & Schuch, F. B. (2016). Dropout from exercise randomized controlled trials among people with depression: A meta-analysis and meta regression. *Journal of affective disorders*, 190, 457-466.
- Sullivan, P. F., Neale, M. C., & Kendler, K. S. (2000). Genetic epidemiology of major depression: review and meta-analysis. *American Journal of Psychiatry*, 157(10), 1552-1562.

- Tabak, R. G., Khoong, E. C., Chambers, D. A., & Brownson, R. C. (2012). Bridging research and practice: models for dissemination and implementation research. *American journal of preventive medicine*, 43(3), 337-350.
- The Royal Australian and New Zealand College of Psychiatrists. (2015). Keeping body and mind together: Improving the physical health and life expectancy of people with serious mental illness. Melbourne: The Royal Australian and New Zealand College of Psychiatrists.
- Thomson, D., Turner, A., Lauder, S., Gigler, M. E., Berk, L., Singh, A. B., ... & Sylvia, L. (2015). A brief review of exercise, bipolar disorder, and mechanistic pathways. *Frontiers in psychology*, 6, 147.
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., ... & Hempel, S. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of internal medicine*, doi: 10.7326/M18-0850.
- Vancampfort, D., Stubbs, B., Mitchell, A. J., De Hert, M., Wampers, M., Ward, P. B., ... & Correll, C. U. (2015a). Risk of metabolic syndrome and its components in people with schizophrenia and related psychotic disorders, bipolar disorder and major depressive disorder: a systematic review and meta-analysis. *World Psychiatry*, 14(3), 339-347.
- Vancampfort, D., Stubbs, B., Ward, P. B., Teasdale, S., & Rosenbaum, S. (2015b). Integrating physical activity as medicine in the care of people with severe mental illness. *Australian & New Zealand Journal of Psychiatry*, 49(8), 681 – 682.
- Verhaeghe, N., De Maeseneer, J., Maes, L., Van Heeringen, C., & Annemans, L. (2011). Effectiveness and cost-effectiveness of lifestyle interventions on physical activity and eating habits in persons with severe mental disorders: a systematic review. *International journal of behavioral nutrition and physical activity*, 8(1), 28.

- Verhaeghe, N., Maeseneer, J., Maes, L., Heeringen, C., & Annemans, L. (2013). *Health promotion in mental health care: perceptions from patients and mental health nurses. Journal of clinical nursing*, 22(11-12), 1569-1578.
- Way, K., Kannis-Dymand, L., Lastella, M., & Lovell, G. P. (2018). Mental health practitioners' reported barriers to prescription of exercise for mental health consumers. *Mental Health and Physical Activity*, 14, 52-60.
- Weatherson, K., Gainforth, H., & Jung, M. A theoretical analysis of the barriers and facilitators to the implementation of school based physical activity policies in Canada: a mixed methods scoping review. *Implementation Science*, 12(41), 1-15.
- Wendt, S. J. (2005). Smoking cessation and exercise promotion counseling in psychologists who practice psychotherapy. *American Journal of Health Promotion*, 19(5), 339-345.
- World Health Organization (2017). Depression. Retrieved May 29 2017 from, <http://www.who.int/mediacentre/factsheets/fs369/en/>.
- World Health Organization (2019). Depression. Retrieved August 1 2019, from https://www.who.int/mental_health/management/depression/en/
- World Health Organization (2020). Depression. Retrieved June 11, 2020, from https://www.who.int/mental_health/management/depression/en/
- World Health Organization (2019). Mental Health: Suicide Prevention. Retrieved from https://www.who.int/mental_health/suicide-prevention/en/
- Wong, S. T., Manca, D., Barber, D., Morkem, R., Khan, S., Kotecha, J., ... & Patten, S. (2014). The diagnosis of depression and its treatment in Canadian primary care practices: an epidemiological study. *CMAJ open*, 2(4), E337.

- Wright, K., Armstrong, T., Taylor, A., & Dean, S. (2011). 'It's a double edged sword': A qualitative analysis of the experiences of exercise amongst people with Bipolar Disorder. *Journal of Affective Disorders*, 136(3), 634-642.
- Yin, R. K. Case Study Research and Applications Design and Methods (Sixth Edition). United States of America: SAGE Publications Inc.
- Zanetidou, S., Belvederi Murri, M., Menchetti, M., Toni, G., Asioli, F., Bagnoli, L... & Masotti, M. (2017). Physical exercise for late-life depression: Customizing an intervention for primary care. *Journal of the American Geriatrics Society*, 65(2), 348-355.
- Zhang, X., Yu, P., Yan, J., & Spil, I. T. A. (2015). Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: a case study in a primary care clinic. *BMC health services research*, 15(1), 71.

Appendices

Appendix A Study 1: Search Terms

Search Terms for Ovid Medline

Aspect Search Terms

Population Terms: (MH "Depression") & (MH "Mental Disorders+") OR "mental illness" OR (MH "Mentally Ill Persons") (MH "Mental Disorders+") OR "mental illness" OR (MH "Mentally Ill Persons") OR exp Bipolar disorder/ or exp mood disorder/ or depression

Behaviour Terms: (MH "Exercise+") OR (MM "Resistance Training") OR (MM "Muscle Stretching Exercises") OR (MH "Motor Activity+") OR exp Exercise/ or Exercise Therapy/ or exp Motor Activity

Barrier/Facilitator

Terms:

(MH "Treatment Refusal") OR (MH "Patient Compliance+") OR "adherence" OR barriers OR facilitators

Note: Terms are Subject headings, unless noted. Quotes indicate keywords. *Indicates a wildcard string of 0 or more characters for a given keyword.

Search Terms for PsycINFO

Aspect Search Terms

Population Terms: DE "Depression (Emotion)" OR DE "Major Depression" OR DE "Anaclitic Depression" OR DE "Dysthymic Disorder" OR DE "Endogenous Depression" OR DE "Late Life Depression" OR DE "Postpartum Depression" OR DE "Reactive Depression" OR DE "Recurrent Depression" OR DE "Treatment Resistant

Depression" OR DE "Affective Disorders" OR DE "Bipolar Disorder" OR DE

"Disruptive Mood Dysregulation Disorder" OR DE "Seasonal Affective Disorder" OR

DE "Mental Health" OR DE "Mental Disorders" OR DE "Chronic Mental Illness" OR

DE "Chronic Psychosis" or mental illness

Behaviour Terms: DE "Physical Activity" OR DE "Active Living" OR DE "Activity Level" OR

DE "Physical Fitness DE "Actigraphy" OR DE "Exercise" OR DE "Aerobic Exercise" OR DE

"Weightlifting" OR DE "Yoga" OR DE "Active Living" OR DE "Activity Level" OR DE

"Physical Fitness" OR barriers OR facilitators

Barrier/Facilitator

Terms:

DE "Treatment Barriers" OR DE "Client Attitudes" OR DE "Client Participation" OR

DE "Health Attitudes" OR DE "Treatment Compliance" OR DE "Treatment Refusal"

Note: Terms are Subject headings, unless noted. Quotes indicate keywords. *Indicates a wildcard string of 0 or more characters for a given keyword.

Search Terms for EMBASE

Aspect Search Terms

Population Terms: exp mental health OR mental disease OR exp depression/ or mood disorder/

or

agitated depression/ or atypical depression/ or major depression/ or masked depression/ or

reactive depression/ or recurrent brief depression/ or seasonal affective disorder/ OR Exp Bipolar

disorder or exp mood disorder

Behaviour Terms: physical activity/ or "physical activity, capacity and performance"/ or

climbing/ or cycling/ or fighting/ or jogging/ or jumping/ or running/ or stretching/ or

swimming/ or walking/ or weight lifting/

Barrier/Facilitator

Terms:

exp patient compliance/ or patient attitude/ OR Exp behavior therapy OR exp

“compliance (physical)”/ OR barriers OR facilitators

Note: Terms are Subject headings, unless noted. Quotes indicate keywords. *Indicates a wildcard string of 0 or more characters for a given keyword.

Search Terms for Cochrane Database

Aspect Search Terms

Population Terms: Mental illness.af. OR Depression

Behaviour Terms: Exercise or physical activity or movement (NOTE: in title)

Barrier/Facilitator

Terms: N/A

Note: Terms are Subject headings, unless noted. Quotes indicate keywords. *Indicates a wildcard string of 0 or more characters for a given keyword.

Search Terms for SPORTDiscus

Aspect Search Terms

Population Terms: DE "MENTAL illness" OR DE "DEPRESSION OR DE "MENTAL depression" OR DE "DEPRESSION in college students") AND (DE "MENTAL illness" OR DE "MENTALLY ill")) AND (DE "MENTAL health" OR DE "PERSONALITY" OR DE "STRESS (Psychology)" OR DE "STRESS management" OR DE "PEOPLE with mental disabilities" DE "AFFECTIVE disorders" OR DE "MENTAL depression" OR "PHYSICAL education for people with mental disabilities")

Behaviour Terms: DE "EXERCISE for middle-aged women" OR DE "EXERCISE for people with disabilities" OR DE "EXERCISE -- Psychological aspects" OR DE "EXERCISE adherence" OR DE "EXERCISE for men" OR DE "EXERCISE for middle-aged persons" OR DE "EXERCISE therapy" OR DE "EXERCISE tolerance" OR DE "THERAPEUTICS"

Barrier/Facilitator

Terms: N/A (NOTE: combined with behaviour terms above)

Note: Terms are Subject headings, unless noted. Quotes indicate keywords. *Indicates a wildcard string of 0 or more characters for a given keyword

Appendix B Study 2: PRISMA-Scr Checklist

Section	Item	PRISMA-Scr Checklist Item	Page
Title	1	Identify the report as a scoping review.	Title
Abstract			
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Abstract of published article (Glowacki et al., 2019a)
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions or objectives lend themselves to a scoping review approach.	Pg. 43-46
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (for example, population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions or objectives.	Pg. 46
Methods			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (for example, a Web address); and if available, provide registration information, including the registration number.	n/a

Eligibility Criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (for example, years considered, language, and publication status), and provide a rationale.	Pg. 47-48
Information Sources*	7	Describe all information sources in the search (for example, databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Pg. 48-49
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Appendix C
Selection of sources of evidence	9	State the process for selecting sources of evidence (that is, screening and eligibility) included in the scoping review.	Figure 6
Data charting process	10	Describe the methods of charting data from the included sources of evidence (for example, calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Pg. 49-50
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Pg. 51
Critical appraisal of individual sources of evidence	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	n/a
Summary measures	13	This item from the original PRISMA is not applicable for scoping reviews because a meta-analysis is not done (that is, summary measures are not relevant).	n/a
Synthesis of results	14	Describe the methods of handling and summarizing the data that were charted.	Pg. 49-51
Risk of bias	15	This item from the original PRISMA is not applicable for scoping reviews because the scoping review method is not intended to be used to critically appraise (or appraise the risk of bias of) a cumulative body of evidence.	n/a
Additional analyses	16	This item from the original PRISMA is not applicable for scoping reviews because additional analyses, including sensitivity or	n/a

		subgroup analyses and meta-regression, are not done.	
Results			
Selection of sources of evidence	17	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure 5
Characteristics of sources of evidence	18	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 5
Critical appraisal within sources of evidence	19	If done, present data on critical appraisal of included sources of evidence (see item 12).	n/a
Results of individual sources of evidence	20	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Table 6 & 7
Synthesis of results	21	Summarize or present the charting results as they relate to the review questions and objectives.	Pg. 51-58
Risk of bias across studies	22	This item is not applicable for scoping reviews. See explanation for item 15.	n/a
Additional analyses	23	This item is not applicable for scoping reviews. See explanation for item 16.	n/a
Discussion			
Summary of evidence	24	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Pg. 58-62
Limitations	25	Discuss the limitations of the scoping review process.	Pg. 63-64
Conclusions	26	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications or next steps.	Pg. 64
Funding	27	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Pg. 64-65

Appendix C Study 2: PsycINFO Search Strategy

Date	Search ID #	Terms	Postings
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Sept 6, 2018	S1	DE "Mental Disorders" OR DE "Adjustment Disorders" OR DE "Affective Disorders" OR DE "Alexithymia" OR DE "Anxiety Disorders" OR DE "Autism Spectrum Disorders" OR DE "Chronic Mental Illness" OR DE "Dementia" OR DE "Dissociative Disorders" OR DE "Eating Disorders" OR DE "Elective Mutism" OR DE "Factitious Disorders" OR DE "Gender Identity Disorder" OR DE "Hoarding Disorder" OR DE "Hysteria" OR DE "Impulse Control Disorders" OR DE "Koro" OR DE "Mental Disorders due to General Medical Conditions" OR DE "Neurosis" OR DE "Paraphilias" OR DE "Personality Disorders" OR DE "Pseudodementia" OR DE "Psychosis" OR DE "Schizoaffective Disorder" OR DE "Affective Disorders" OR DE "Bipolar Disorder" OR DE "Disruptive Mood Dysregulation Disorder" OR DE "Major Depression" OR DE "Mania" OR DE "Seasonal Affective Disorder"	382,929
	S2	DE "Exercise" OR DE "Aerobic Exercise" OR DE "Weightlifting" OR DE "Yoga" OR DE "Physical Activity" OR DE "Actigraphy" OR DE "Exercise" OR DE "Health Promotion" OR "Physical Health"	69,493
	S3	DE "Health Personnel Attitudes" OR DE "Therapist Attitudes" OR DE "Mental Health Personnel"	29,448
	S4	S1 AND S2 AND S3	54
	S5	S2 AND S3	441
	S6	TX mental OR schizo* OR psychiatric OR mood OR psychosis OR affective OR anxiety OR depression OR bipolar	1,301,873
	S7	TX exerc* OR "physical activ*"	100,215
	S8	TX practitioner OR nurs* OR physician OR therap* OR professional OR staff OR clinician	1,396,833
	S9	TX health OR healthcare OR health care OR "mental health services"	1,183,216
	S10	TX promot* OR prevent* OR prescri* OR counsel* OR refer*	849,408
	S11	TX barrier* OR perception* OR perspective* OR attitude* OR belie* OR "Influen* factor*" OR view*	1,402,318

	S12	S6 AND S7 AND S8 AND S9 AND S10 AND S11	2,262
	S13	S5 OR 12	2,676

Appendix D **Study 3: Interview Guide AWD**

Interview Guide: Adults with Depression

My name is Krista, I'm a research assistant and student for the University of British Columbia. Thank you for talking with me today. I have emailed you a consent form explaining your participation in this study. Have you reviewed it? *If No: ask them to read it now, re-send it necessary. Yes: Do you agree to participate? If participant says no, no interview will be conducted.*

What we talk about today is confidential, and your answers will be stored separate from your name so everything remains anonymous.

We are here to talk about developing a resource for professionals to explore exercise as a treatment option for depression – and CANMAT Guidelines.

To start, Canadian Network for Mood and Anxiety Treatment (CANMAT) guidelines now recommend exercise as a primary treatment for mild- moderate depression.

This is the first time in Canada that exercise is recommended for the treatment of depression.

1. What are your initial thoughts about that?
 - i. Have you heard this before?
 - ii. Agree/disagree?
2. What are some barriers you face to engaging in exercise or physical activity?
 - i. Prompt: make it hard or difficult
3. What are some things that help you to engage in exercise or physical activity/ be more active?
4. Have you ever discussed exercise [as a treatment option] with a healthcare provider?
 - i. If so, what kind of health care provider and what was the conversation?
 - ii. In your discussions, was this specific to exercise as a treatment or a general conversation about being more active?
5. Who was the first healthcare provider you saw for help with your depression?

- i. Prompts: Family doctor, nurse practitioner, psychiatrist?
- 6. Who was the first healthcare provider you saw after you received a diagnosis of depression?
 - i. Prompt: who were you referred to
- 7. Would you be interested in an evidence-based resource (toolkit) developed for health professionals to use in collaboration with individuals like yourself to explore exercise as a treatment option for depression?
 - i. Prompts: *Provide SCI Get Fit toolkit as one example*
- 8. How would you want to access a resource once it is developed?
 - i. Prompts: pamphlets, educational sessions, website, app, PDF?
 - ii. Are there any other formats you would like to see it in?
- 9. What would you like to see in this resource?
 - i. Prompts: barriers specific to depression & strategies to address, CANMAT guidelines, ways to increase lifestyle PA
- 10. Which healthcare provider would you want to use the resource with, as well as receive other information on exercise and physical activity?
 - i. Prompts: nurse, occupational therapist, recreational therapist, GP, social worker

Conclusion:

- 10. Overall, how do you feel about using exercise as a treatment for depression?
 - Would you try it as a treatment option (alone, or in conjunction with another option such as antidepressant medication)?

Before we conclude the interview is there anything else you would like to add.

Thank you so much for your participation in this study.

Appendix E Study 3: Interview Guide HCP

Interview Guide: Health care Provider

My name is Krista, I'm a research assistant and student for the University of British Columbia. Thank you for taking the time to talk to me today. I have emailed you a consent form explaining your participation in this study. Have you reviewed it? *If No: ask them to read it now, re-send if necessary. Yes: Do you agree to participate? If participant says no, no interview will be conducted.*

What we talk about today is confidential, and your answers will be stored separate from your name so everything remains anonymous.

We are here to talk about developing a resource for professionals to explore exercise as a treatment option for depression – and CANMAT Guidelines.

Intro: What is your experience working with adults with depression?

The Canadian Network for Mood and Anxiety Treatment (CANMAT) guidelines (2016) now recommend exercise as a primary treatment for mild-moderate depression and secondary for moderate-severe depression.

1. What are your initial thoughts on this?
 - iii. Have you heard this before?
 - iv. How do you feel about that?
 - i. Prompts: agree/disagree, realistic/ not realistic
2. Are you aware of the difference between exercise and physical activity?
 - i. Provide definition. Physical activity- any movement that requires energy. Exercise- Planned, structured activity done with the intention to improve or maintain physical fitness. Discuss difference
3. Do you currently integrate exercise or PA for depression in your practice?
 - iii. If so, how?
 - iv. If not, why?
 - v. What are the barriers you face to doing this?
 - vi. What are the facilitators, what helps you to do this?
4. Do you believe it is your role to help an individual consider exercise for depression?
 - i. If not, who's role is it? Is there a certain health care provider that you believe should be doing this?
5. Would you be interested in an evidence-based resource (toolkit) developed for health professionals to use with clients to explore exercise as a treatment option for depression?

- i. Prompts: *Provide SCI Get Fit toolkit as one example*
- 6. How would you want to access the resource once it is developed?
 - i. Prompts: pamphlets, educational sessions, website, app, PDF?
 - ii. Are there any other formats you would like to see it in?
- 7. What would you like to see in this resource?
 - ii. Prompts: barriers for this population, strategies to address, CANMAT guidelines
- 8. The CANMAT guidelines specify exercise for a treatment option for depression. Do you think the resource should include information about general physical activity?
 - i. Strategies to increase PA in everyday life, examples: gardening, housework, walking
- 10. Would you use a toolkit in your practice to explore exercise as a treatment for depression once it is developed?
 - Why or why not?

Before we conclude the interview is there anything else you would like to add.

Thank you for your time and participation in this study.

Appendix F **Study 5: Interview guide pre-intervention**

Interview Guide 1: The Exercise and Depression Toolkit Evaluation

My name is Krista, I'm a research assistant and student for the University of British Columbia. Thank you for talking with me today. I have emailed you a consent form explaining your participation in this study. Have you reviewed it?

If No: ask them to read it now, re-send it necessary.

Yes: Do you agree to participate? If participant says no, no interview will be conducted.

I have also emailed you the 'Exercise and Depression Toolkit' and the Weekly Log. Have you received these?

If No: Resend it

Yes: You will need both for part of this interview. You can either pull them up on a screen to see, or print it out. Before we continue, do you have these documents available to view? [give time if they do not have it ready].

What we talk about today is kept confidential, and your answers will be stored separate from your name.

We are here to talk about a resource developed for professionals to explore exercise as a treatment option for depression – the ‘Exercise and Depression Toolkit’.

1. In your current clinical practice, do you consider exercise as a treatment for depression?
How do you discuss or recommend exercise/physical activity to your clients?
 - a. *Prompts: How? How often? What do you discuss? Are they certain clients you discuss it with and not others?*
 - b. *Prompt: General physical activity promotion/recommend exercise as a treatment/facilitate any programming? What are you doing currently?*
2. What type of treatment/intervention do you usually provide to adults with depression?
3. What are some of the barriers you face to recommending or discussing exercise as a treatment for depression? What are some of the facilitators you experience to recommending or discussing exercise as a treatment for depression?
4. What are some of the barriers you think may face in using the toolkit in your practice? What will help you to use the toolkit?

TFA: Ethicality-The extent to which the intervention has good fit with an individual’s value system [DoI: Compatibility]

5. Does recommending exercise align with your role as a health care professional (e.g. as a physician, as an occupational therapist etc.)? Why or Why not?
 - a. *Prompt: Do you feel this is part of your role?*
6. Do you feel that recommending exercise aligns with your personal beliefs and values? Why or Why not?

TFA: Intervention Coherence-The extent to which the participant understands the intervention and how it works

6. From your perspective, what do you think the Exercise and Depression toolkit is trying to achieve?

TFA: Self-efficacy- the participant’s confidence that they can perform the behaviour required to participate in the intervention

7. How confident do you feel in discussing and recommending exercise as a treatment option for depression?
8. How confident do you feel in using the toolkit to help such discussions?

Before we review the toolkit and the weekly log, is there anything else you would like to add that we did not discuss or that you think is important?

*Provide explanation of the toolkit and its use and answer any questions about its use. * See 'Intro' Document and read it to them as they pull up each page of the toolkit.*

Now I will briefly review the weekly log with you and how to fill it out.

Read instructions on the weekly log. Do you have any questions as to how to fill this out? Try to fill it out every day, to help you remember any details. Please email it to me at the end of your work week, and if you would like save a blank copy. I will email you with a reminder every Friday to collect your log, and ask if you need me to send you a new blank one. If you would prefer me to call you please let me know.

Thank you so much for your participation thus far.

Appendix G **Study 5: Interview guide post-intervention**

Interview Guide 2: The Exercise and Depression Toolkit Evaluation

Hello again just as a reminder, my name is Krista, I'm a research assistant and student for the University of British Columbia. Thank you for talking with me again today.

I have received your weekly logs from this past month. [If not ask participant to send the logs]. Thank you.

What we talk about today is kept confidential, and your answers will be stored separate from your name.

We are here to talk about your experience with using the 'Exercise and Depression Toolkit'.

1. Please tell me about your experience in general of using the Exercise and Depression toolkit in your practice.
2. When/Why did you use the toolkit?

Prompt: What factored into your decision to use the toolkit? (e.g. only certain types of clients- age, gender, severity of depression etc.) *Refer to provider's weekly log to discuss instances of using the toolkit.

Theoretical Framework of Acceptability Constructs guided questions

General acceptability

3. How acceptable do you think the toolkit is for use in your practice?

Affective attitude- how an individual feels about the intervention

4. In general, how do you feel about the 'Exercise and Depression Toolkit'?
5. What did you like about the toolkit? What did you dislike about the toolkit?
6. Are there any modifications/changes you would make to the toolkit? (e.g. wording, or important content is missing)

Burden- The perceived amount of effort that is required to participate in the intervention

7. How much effort does it take you to use the toolkit? *OR* Do you feel the toolkit requires a lot of time and effort to use in practice?

Opportunity Costs- The extent to which benefits, profits or values must be given up to engage in the intervention

8. Do you think using the toolkit in practice has interfered with your other priorities as a health care provider?

Prompt: e.g. takes time away from other discussions, other treatments

Perceived effectiveness- the extent to which the intervention is perceived to be likely to achieve its purpose [DoI: Relative Advantage]

9. How has the toolkit helped you (if at all) to engage in discussions with adults with depression about exercise/ exercise as a treatment option?

Prompt: Use their log to discuss perceived success

Ethicality-The extent to which the intervention has good fit with an individual's value system [DoI: Compatibility]

10. Does recommending exercise align with your role as a health care professional (e.g. as a physician, as an occupational therapist etc.)? Why or Why not?
11. Does recommending exercise aligns with your personal beliefs and values? Why or Why not?

a. Prompt: Has this changed from before you used the toolkit in practice?

Intervention Coherence-The extent to which the participant understands the intervention and how it works

12. From your perspective, what do you think the toolkit is trying to achieve?

Prompt: Has this changed from before you used the toolkit in practice?

Self-efficacy- the participant's confidence that they can perform the behaviour required to participate in the intervention

13. How confident do you feel to continue to use the toolkit to discuss and recommend exercise as a treatment for depression? **prompt: compare to pre interview*

14. How has the toolkit has helped improve your confidence to discuss and recommend exercise as a treatment option (if at all)? **prompt: compare to pre interview*

Other Questions:

15. What was the most common end point when you used the toolkit?

Prompt: (page 4. 'Moving More': Referral to an exercise program, Engage in PA counselling with yourself or another HCP, Discuss exercise at a later date)?

Prompt (check logs and pre-interview) For those that did not have access or refer to a structured supervised exercise program: Please explain

Diffusion of Innovation Theory

Simplicity:

16. Do you feel the toolkit is easy to understand and use?

Observability:

17. Are you able to observe any positive changes in your clients from using the toolkit?

Prompt: E.g. changes in mood, increased physical activity levels, engagement in an exercise program

Trialability:

18. Do you feel you could adapt the toolkit to suit your needs? *Prompt: e.g. only use certain pages like giving the Guidelines at a glance, or supplementary handouts etc.*

Adoption- intention, initial decision or action to attempt or utilize an innovation or EBP

19. Will you continue to use the toolkit to recommend and discuss exercise as a treatment for depression in your practice? *Prompt: Why or Why not?*

20. What do you think you will primarily use the toolkit for?

a. *Prompt: Discussing exercise as a treatment, PA promotion in general*

21. Would you recommend it to other clinicians/colleagues? *Prompt: Why or Why not?*

Dissemination

22. We hope to share the toolkit with health care providers across Canada to use. Do you have any suggestions for this dissemination of the toolkit?

23. What do you feel the toolkit needs in addition to support its use by other health care providers?

- a. *Prompts: Educational workshops for HC (in-person, online webinar), Conferences, Media campaigns/ Social media or marketing campaigns, Promotional video, Key champions/opinion leaders to connect with*

24. What are some recommended or trusted channels/networks to share the toolkit through?

Prompt: Who would you want to hear about the toolkit from? (E.g. individual such as manager or co-worker, professional licensing body, agencies, etc.)

This brings us to the end of the interview. Before we finish, is there anything else you would like to add that you feel is important or that we have not talked about?

You will be sent an email with a gift card for your participation shortly. If you do not receive it please follow-up with me. We will contact you when the toolkit is available for public use unless you do not wish to be contacted.

Thank you so much for participation in this study.

Appendix H Study 5: Weekly provider log

Weekly Provider Log

ID: _____

Date today: _____

- ✓ Please **check** what day of the week you used the toolkit (Please indicate the number of times you used it if you used it more than once in one day, and if you used it with more than one client), and if you referred any clients to an exercise program.

*Please rate your Perceived Success of your interaction with your client on a scale of 1-7 (1 being extremely low success, and 7 being extremely high success). *Consider usefulness, client receptiveness, and satisfaction. Please also provide the number of clients (adults) with depression you saw that day.*

Please provide any additional comments you have about your experience using the toolkit (e.g. likes, dislikes, etc.).

If you did not use the toolkit, please indicate a reason(s) in the comment section.

	MON	TUES	WEDS	THURS	FRI	SAT	SUN
Used the full toolkit							
Used part of the toolkit (only collaborative pages 1-4 or additional supplementary handouts) <i>*please specify</i>							
Number of individuals with depression seen							
Perceived Success (1-7)							
Referral to structured and supervised exercise program							

If you used the toolkit and did not refer to an exercise program, please explain what you did instead:

Additional Comments (*likes, dislikes, usefulness, satisfaction, details of exercise program etc.*):

Appendix I **The ‘Exercise and Depression Toolkit’**

Exercise & Depression TOOLKIT

Exercise is now recommended as a stand-alone treatment for mild-moderate depression, and an adjunctive treatment for moderate-severe depression¹.

This collaborative toolkit has been specifically designed to help you successfully engage with your clients in considering exercise as a treatment option.

This toolkit was informed by the best available evidence and created in collaboration with adults who have lived experience with depression, health care providers, exercise specialists, and researchers.

Collaborators



Scope and Purpose of the toolkit

Overall objective

- To support health professionals in collaborating with clients to explore exercise as a treatment option for mild-moderate depression.

Population toolkit is targeting

- Adults (aged 18-65) with mild-moderate depression in Canada.

Potential users of the toolkit

- Health care providers who work with adults with depression, inclusive of (but not limited to): Family Physicians, Psychiatrists, Counsellors, Mental Health Workers, Occupational Therapists, Recreation Therapists, Nurses, Social workers
- Community, Primary Care, Inpatient, Outpatient settings

References:

1. Ravindran, AV et al. (2016). Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults with Major Depressive Disorder. *Can J Psychiatry*, 61(9), 576-587.
2. Glowacki, K et al. (2017). Barriers and Facilitators to physical activity and exercise among adults with depression: A scoping review. *MENPA*, 13, 108-119.
3. Glowacki, K et al. (2019). Barriers and facilitators to health care providers' promotion of physical activity for individuals with mental illness: A scoping review. *MENPA*, 16, 152-168.
4. Cane, J et al. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *JS*, 7(37).
5. Cane, J et al. (2015). From lists of behaviour change technique's (BCTs) to structured hierarchies: Comparison of two methods of developing a hierarchy of BCTs. *BJHP*, 20, 130-150.
6. Michie S, Atkins L, West R. (2014). *The behaviour change wheel: a guide to designing interventions*. GB, UK: Silverback Publishing.
7. Parikh, S.V., Kcomt, A., Fonseka, T.M., Pong, J.T. (Eds). 2018. *The Choice—D Patient And Family Guide To Depression Treatment*. Toronto, Mood Disorders Association of Ontario.

Toolkit Development Process

The Canadian Network for Mood and Anxiety Treatment (CANMAT) is an organization of clinical and research leaders who help interpret research to improve clinical practice. CANMAT revised treatment guidelines in 2016, and now recommend exercise as a primary stand-alone treatment for mild-moderate depression, or in conjunction with other treatments¹. This toolkit was developed to help with the implementation of these guidelines into clinical practice. However, the toolkit could be used to discuss exercise with anyone experiencing depressive symptoms.

This resource was developed over four phases to determine needs and preferences for its use within health care. It was developed through systematic review of research evidence and in consultation with adults with lived experience with depression, health care providers, exercise specialists, and researchers.

Phase 1 | Review of the Literature

Two scoping reviews have been conducted concerning the barriers and facilitators to physical activity participation among individuals with depression² and the barriers and facilitators that health care providers experience when promoting physical activity to individuals with a mental illness³.

A behavioural analysis driven by theory was used in both reviews to determine behaviour change strategies. This was done using the Theoretical Domains Framework⁴, and the Behaviour Change Wheel to determine behaviour change strategies to be included in the toolkit^{5,6}.

Phase 2 | Formative Research

Interviews were conducted with adults diagnosed with depression in Canada and health care providers with experience working with adults with depression in Canada.

Phase 3 | Expert panel meeting

A multidisciplinary panel of adults with lived experience with depression, health care providers, exercise specialists and researchers appraised the evidence from phase 1 & phase 2, and provided input to the content of the toolkit.

Phase 4 | Development & Evaluation

Members of the expert panel were consulted to ensure that content and format recommendations were appropriately addressed. Pilot work was conducted with clients and health care providers to evaluate the toolkit.

Using the Toolkit

Below is a description of what is included on each page of the 'Collaboration' part of the toolkit, and how it can be used with your client. Clearance by a physician may be needed prior to starting an exercise program. A physician should be consulted if your client wants to replace any current treatment with exercise. If you are unsure if a physician needs to be consulted, you can use the *Get Active Questionnaire* to help inform your decision (link provided on the last page of this document).

page 1 **Why Exercise?**

This page should be used to discuss treatment options with a client, and what personal factors to consider when choosing a treatment. It provides information on why exercise can be considered, benefits of engaging in exercise and facts about its effectiveness. Exercise should be considered in light of other treatment options. The CHOICE-D document provides information about these options⁷. While the exact mechanism on how exercise works for depression is unknown, some prominent theories about possible mechanisms are presented.

page 2 **How are exercise and depression related?**

This page should be used to have a conversation with a client about their personal current and past experiences related to their depression and activity levels. Two cycles are provided as an educational tool to use with a client.

When using the cycle model, describe to the client that inactivity can lead to depression, and depression can lead to inactivity. But it is possible to break up this cycle by increasing physical activity which can lead to improved mood, and engagement in other meaningful activities. Prompts are provided above the cycles on how this can be explained to a client.

The aim is for the client to reverse inactivity, experience the "feel good" factor when engaging in exercise, and turn the cycle to an upward cycle out of their feelings of depression.

These cycles are included as a critical piece based on the behavioural analysis driven by theory. Using the cycles provides information about emotional and mood consequences of engaging in the behaviour of exercise. This is a recommended behaviour change technique to help adults with depression overcome barriers².

page 3 **CANMAT guidelines at a glance**

This page provides more details on the guidelines, and how much exercise is recommended. The level of evidence from the CANMAT guideline is provided, as well as the evidence based 'dose' of how much exercise is recommended as a treatment for depression. Evidence is strongest for supervised and structured exercise as this may help with adherence.

You as the clinician may need to orient yourself to available exercise programs in your area that are accessible to your client(s) since this varies by province and city. Suggestions for a starting point include contacting your local gym (e.g. community centre or YMCA) or Canadian Mental Health Association to find out about physical activity and exercise programs. The YMCA and CMHA are national associations in Canada. Other resources are provided for use such as Additional Supplementary Material, and the Canadian Physical Activity Guidelines.

page 4 **Moving More**

This page should be used to help a client identify their own personal concerns and barriers to engaging in exercise. A list is provided as a starting point and clients could identify how they relate to this list or identify other barriers. Strategies (or actions clients can take) are also provided as suggestions for clients to help overcome barriers. This is not meant to be prescriptive. The thought of exercise can be daunting to start, especially when mood is low. Empathy, respect and a person-centered approach are recommended.

The toolkit ends with a collaborative decision between clinician and client to try exercise as a treatment option for depression. Three end points to the toolkit are provided:

1. Referral to an exercise program
2. Further physical activity counselling to help someone move more (by the clinician using the toolkit or referral to another clinician for same)
3. Asking clients to think more about whether they would like to be more active, and revisit this issue at a later date

Action Materials

Extra resources are provided as handouts that can be given to clients to help them develop the self-regulatory skills (e.g., monitoring, planning) to increase their activity. These handouts are based on the behavioural analysis and recommended behaviour change techniques⁵. These handouts could be given to clients as desired with an explanation from you on how to use them. Short instructions on their use and tips for success are included in each handout. This is supplementary and can be used at your discretion. Included handouts:

1. **Mood and Activity Diary:** A mood and activity diary can be used to track activity levels, and reflect on how it impacts mood. This can be used by a client as a self-reflective tool or as a collaborative tool to discuss with your client after they fill it out.
2. **SMART goal setting:** This describes SMART goal setting and how to set goals.
3. **Weekly Schedule:** This provides two examples of weekly schedules of exercise to achieve the CANMAT recommended 'dose'. A blank one is also provided for a client to use to fill out and plan their week related to exercise.
4. **Individuals with lived experience:** Quotes are provided from real people in Canada with lived experience with depression and exercise. These can be given to clients for them to relate to and highlight positive experiences with exercise.
5. **Positive statements and behavioural contract:** This can be used to show examples of positive statements about committing to engaging in exercise. Blank space is provided for clients to create their own statements. A date and signature can also be added for your client to make a contract with themselves.

Acknowledgements

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NATIONAL RESOURCES

Get Active Questionnaire
http://www.csep.ca/CMFiles/GAQ_CSEPPATHReadinessForm_2pages.pdf

Canadian Physical Activity Guidelines
<http://csep.ca/en/guidelines/guidelines-other-languages>

If links not available:
<http://csep.ca/home>

Why exercise?

There are 3 primary treatments recommended for mild-moderate depression.

Some things to consider when choosing a treatment:

- The severity of depression
- Preferences & past experiences with treatments
- The availability & cost of treatments where you live
- Special circumstances such as pregnancy
- Consult the CHOICE-D patient and family guide to find out more about different treatment options



Anti-Depressant Medication



Exercise

may be right for you if...



You have a mild-to-moderate case of depression or low mood
You have concerns about side-effects of medication
If psychotherapy is not easily accessible (cost, long wait times, remote location)



Psychotherapy

Benefits of exercise may include



Improved mood & energy



Reduced stress



Social benefits



No negative side-effects



Improved sleep



Reduced risk of diabetes & heart disease

The Facts

- CANMAT guidelines recommend exercise as a primary treatment for mild-moderate depression
- Exercise is as effective as medication or psychotherapy
- Exercise is low risk

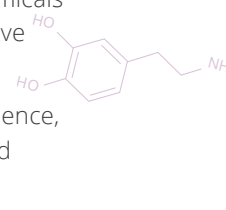


How does exercise help?

Potential mechanisms include

Biological: Increases in serotonin and dopamine—neurotransmitters or “feel-good” brain chemicals that are released while being physically active

Psychological: Increases feelings of confidence, self-esteem and sense of control over mood



Which of the benefits (if any) of exercise are **important** to you?
How can these important benefits be used as **motivation** for you?

Answer highlights: _____

How are exercise and depression related?

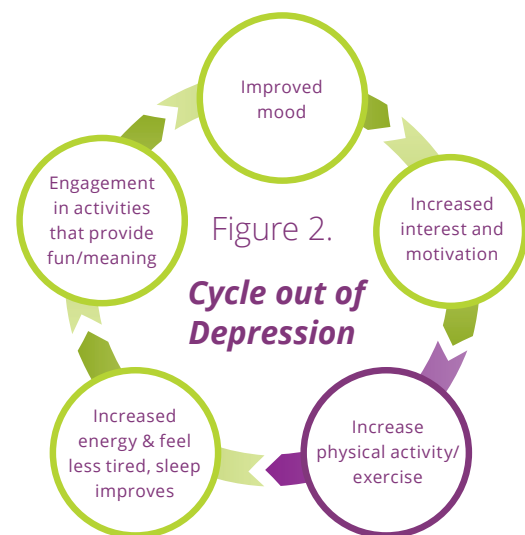
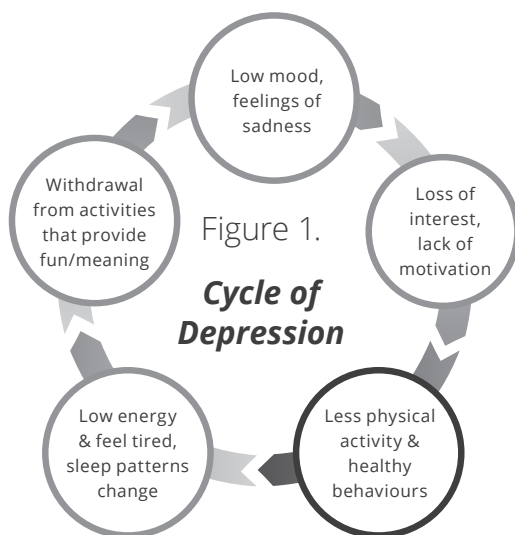
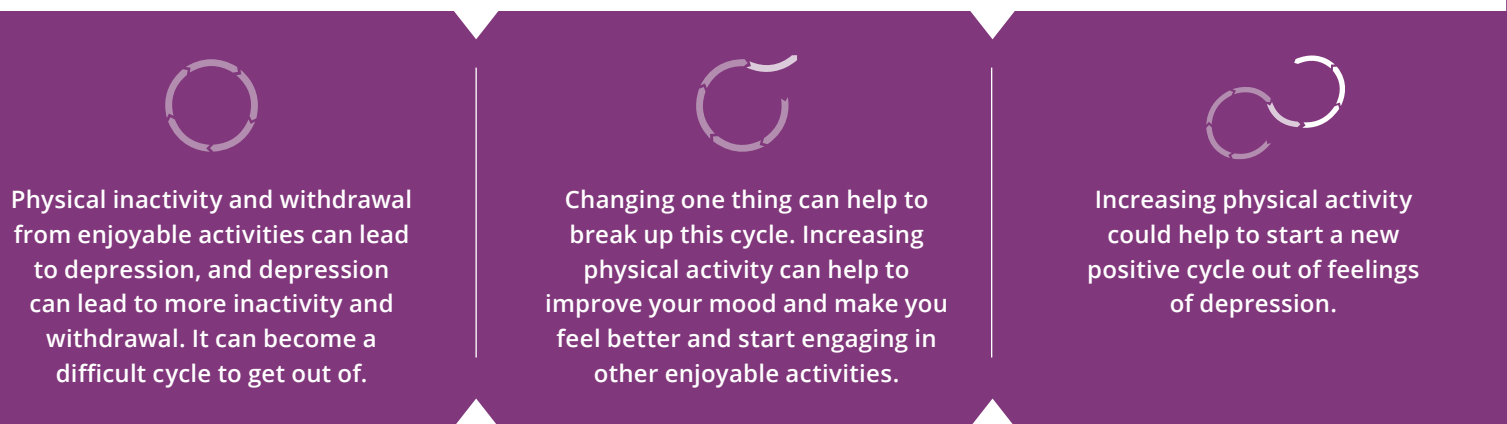


How much physical activity or exercise do you currently do?

Was there a time in your past you were more active?

Have you become less active since you started experiencing feelings of depression?

Answer highlights: _____



How can you relate to the mood cycle above?

Where do you feel you currently fit in the mood cycle?

Answer highlights: _____

CANMAT recommends exercise as a monotherapy (stand-alone treatment) for adults aged 18-65 with mild-moderate Major Depressive Disorder (MDD).

Exercise can also be combined with other treatments.

GLOSSARY OF TERMS

Exercise

structured & planned activity done to improve or maintain fitness/health

**To treat depression*

Physical activity

any movement that requires energy expenditure

**May provide other health benefits*

Moderate Intensity

causes heart rate and breathing to increase

Supervised

With an instructor or exercise specialist



A structured and supervised exercise program is ideal, but this may not always be possible. Actions that can be taken to help increase physical activity are provided as supplementary materials to this toolkit.

What is the evidence?

The evidence to support recommendations is rated as



Level 1

Evidence from randomized controlled trials plus clinical support from experts

What is the evidence-based 'dose' of exercise?



30 minutes

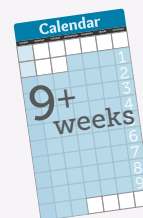


Moderate intensity

(e.g., walking as if late for a meeting)



2-3 times per week



A minimum of 9 weeks

but this should be maintained over time

Structured and Supervised
to help with adherence



Moving More



THE EXERCISE AND DEPRESSION TOOLKIT

page 4

Common Concerns



Actions

1 These symbols refer to additional supplementary material handouts.

- Use a Mood and Activity Diary to record how you feel (mood & energy levels) before/during/after exercise **1**
- Set SMART goals, & celebrate all accomplishments in your journey **2**
- Try different types of exercise to find what you personally enjoy
- Try exercise that does not cost money such as hiking, walking, running, cycling or gardening
- Make a plan for what exercise or physical activity you will do next week **3**
- Determine if you have coverage under extended health benefits for sessions with an exercise professional, or find a local supervised exercise program at low cost with the help of your health care provider
- List any positive benefits you see when others you know have done exercise, or that you see in yourself when you engage in exercise **4**
- Repeat positive statements about exercise and make a commitment to yourself to engage in exercise **5**
- Bring a friend/spouse/partner/health care worker to exercise with you & help with accountability
- Spend time with people who support your decision to exercise and your journey



What are your greatest **concerns**?
Circle them or list others below:

What **actions** could help you?
Circle them or list others below:

What is the best fit at this time?

☐ Referral to an exercise program:

Program Details:

☐ Engage in Physical Activity Counselling
with a health care provider (HCP)

Date of follow-up:

OR Referral to other HCP:

☐ Think about exercise further
and discuss at a later date

Date of follow-up:

Mood and Activity Diary

This diary can be used to track your physical activity and exercise, as well as your mood. This can then be reflected upon by yourself, or in collaboration with someone you trust such as a health care provider. It can be helpful to see if activity has an immediate impact on your mood, and to see what different types of activity you are currently doing to build upon.

Try completing this diary for a week. Track all physical activity & exercise in your day. Also track your mood before and after activity, and on days that you do not do any activity.

Example Activity: Walked the dog in Pacific Spirit Park. **Time**—10am. **Duration**—45minutes. **Intensity**—moderate. It may also be helpful to make notes about whether you enjoyed this activity or not.

For intensity: consider *light* (some effort required, heart rate and breathing may increase slightly), *moderate* (effort required, heart rate and breathing increases) and *vigorous* (a high amount of effort required, out of breath, sweating) levels.

For your mood: use a scale of 1-10. 1 being extremely low mood, and 10 extremely high or good mood. It can also help to make any notes about your energy levels.

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
 Mood Before							
 Activity							
 Time							
 Duration							
 Intensity							
 Mood After							



- This can be left in a place that you will see every day as a reminder to fill it out (e.g. put it on your fridge, or on your night table)
- Choose a place that you will see often
- Ideally you can fill it out throughout the day, but if you are not able to do this try filling it out at the same time each day (e.g. every evening before you go to bed reflect on your day and complete the diary)

SMART Goal Setting

Setting goals is important for any behaviour. This helps you to track progress, and reflect on what helps you achieve what you want. SMART goal setting is a technique to help set goals that you can achieve, and to help guide your goal setting related to physical activity and exercise.

S Specific: Be clear and definitive in what you want to achieve, rather than vague. For example, saying you want to “move more” in a week is not specific. Saying that you want to attend two fitness classes with a trainer for 30 minute sessions in a week is.

M Measureable: You should be able to track whether you have met your goals or not.

A Action Oriented: Your goals should be set around actions and behaviours that you can control, rather than thoughts and feelings. Goals should also be adjustable, so you can make changes as necessary with your progress.

R Realistic: Your goals should be realistic and attainable. This will be different for each person, and should be set around where you are at right now and what is manageable. Your current fitness and activity levels should be considered when setting a realistic goal.

T Timely: Your goal should have a time frame for when you hope to achieve it by, or an end date. Committing to a deadline can help you stay focused and on track.

Examples of SMART goals



I will attend two 30 minute aerobic fitness classes at my community centre in the next week.



I will go for one 30 minute walk around my neighborhood and one 30 minute bike ride every week for one month.

My goal(s) for the week:

My goal(s) for the month:



- This can be left in a place where you will see it every day as a reminder and for motivation (e.g. put it on your fridge, or on your night table)
- Choose a place that you will see often
- You can share it with family, friends or a health care provider to help keep you accountable
- Reward yourself when you achieve your goals (e.g. go to your favourite restaurant, do something that relaxes you like take a bath or watch your favourite TV show/movie, get yourself new exercise clothes)
- Once you achieve your goals, go through the process again and set new ones

Weekly Schedule

It can be helpful to make an action plan for what physical activity and exercise you want to do in a week.

It can be helpful to schedule it into your calendar to help with accountability, and to help you plan your day accordingly.

There are many different ways you can achieve the CANMAT recommended 'dose'. The best 'dose' is individual. Choose what you enjoy and will do! Below are two different examples of weekly schedules.

You should create yours based on where your activity levels are at now. For example, if you are currently not active, plan to start with one activity per week such as a brisk walk.



Example Schedule 1: Less structured or supervised

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	Brisk walk 20-30 mins 1pm			Aerobics class 45 mins at community centre 6pm		Bike ride 45 mins 3pm



Example Schedule 2: More structured or supervised

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	Group fitness class 1 hour with personal trainer 1pm		Group fitness class 1 hour with personal trainer 1pm			Swim laps 30 mins 12pm

Your Planned Schedule:

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Activity Type							
Duration							
Time of Day							



- This should be used for planning your weekly schedule *ahead of time*
- The Mood and Activity Diary (handout #2) can then be used to record what activities you do, and how you feel after them

When creating this toolkit, we spoke to Canadians with lived experience with depression.

Below are quotes from some of these adults about their experiences with physical activity and exercise. These can be used for motivation, or to help you relate to others who have experienced depression.

Exercise for me personally brought me out of depression—**exercise by itself.** I believe in it.

Male, age 49

I think exercise is a great way to help with depression. I find getting out and getting light, and I guess meditating, and the fresh air helps.

And once you get out, you just feel better that you've done something worth feeling better, almost better than medication in a lot of ways. I would just use it alone as a treatment for depression. I find that medication has a lot of poor side effects and it's not easy to take every day for a lot of people including myself.

Female, age 33

I was teaching a class at a college and they [an exercise specialist] suggested I could walk part way or walk home and when I did that, I felt wonderful.

I prefer that method [exercise] of dealing with depression. I think it's wonderful, because it's good for your mind, it's good for your body, it's good for your everything. It helps you have a better attitude. I think it should be used more. And I'm really happy to hear that they're talking about this to treat depression. Because I know I definitely feel better after I exercise.

Female, age 64

I think exercise is a key to... alleviating depression and getting people feeling better if it is done over a long term."

Female, age 56

When I did exercise I noticed I was improving my health and everything. Just everything that I would do, activities. I was just better in my life. It helped me out. Not being lazy. It just got me out it—of my mood.

[Exercise improves] sleep, and my mood and just makes me think clearly. It helps me out because I noticed when I didn't play soccer or I didn't do any exercise I tend to fall back to that depression.

Male, age 32



- This can help you start thinking about exercise and how it might fit into your life
- Consider if you have had any similar positive experiences with exercise or physical activity
- List any positive benefits you see when others you know have done exercise or that you see in yourself when you engage in exercise

Positive Statements

Making positive statements and repeating them to yourself about engaging in physical activity and exercise can help you avoid negative thinking and thoughts around “I can’t...”. This is a great opportunity to reinforce your SMART goals and your action plan.

Example statements:

I will try one group class at my local community centre and one walk next week to see what type of exercise I prefer.

I am committed to going for a walk, and going to one group fitness class at the YMCA weekly.

I am strongly committed to swimming laps once weekly, and going for a bike ride twice weekly for the next six weeks.

Write your own positive statements related to physical activity or exercise in the blank space provided below. Treat this as a commitment to yourself and sign and date it. This can help to motivate you and remind you of what you want to achieve.

Positive Statement #1:

Positive Statement #2:

Date: _____

Name: _____

Signature: _____



- Repeat the statements to yourself at the same time every day (e.g. when you wake up in the morning or before going to bed)
- Using “I” statements and other strong words like “strongly” “will” and “commit” can help
- This can be kept for yourself, and put in a safe place at home or work
- This can also be given to someone you trust such as a friend, partner or health care provider to help you stay committed