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HEALTH OUTCOMES IN A PRIMARY CARE NETWORK INTERDISCIPLINARY TEAM PROGRAM

BY

ALLISON FIELDING

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Approval of Thesis

The undersigned certify that they have read the thesis entitled:

HEALTH OUTCOMES IN A PRIMARY CARE NETWORK INTERDISCIPLINARY TEAM PROGRAM

Submitted by

Allison Fielding

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The thesis examination committee certifies that the thesis
and the oral examination is approved

Supervisor:
Dr. Terra Murray
Athabasca University

Committee Member:
Dr. Kimberley Lamarche
Athabasca University

External Examiner:
Dr. Kharah Ross
Athabasca University

January 22, 2020

Dedication

This thesis is dedicated to my girls, Bronte & Elsie, and my loved ones. Without their patience, love, inspiration and encouragement I would have given up.

Acknowledgement

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Abstract

Optimizing interdisciplinary teams through the advancement of primary care presents an opportunity to support a sustainable health care system. However, there is mixed evidence regarding the impact of interdisciplinary teams on patient outcomes in primary care. The study purpose was to examine the relationship between select patient reported health outcomes following participation in an interdisciplinary team program for adults with chronic disease. Retrospective data was analyzed for 212 patients who had completed indicators of depression (PHQ-9), quality of life (EQ-5D-5L) and self-management (PAM) at program entry and 6-month follow up. The results revealed improvement in depression, overall self rated quality of life and self-management after attendance in the program. However, functional quality of life was generally not improved. This may have been due to a small sample size which lacked statistical power to detect a difference. These findings add to the literature supporting evidence of interdisciplinary teams improving patient outcomes.

Keywords: interdisciplinary team, depression, quality of life, self-management

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List of Symbols, Nomenclature, or Abbreviations

BMI – Body Mass Index

COPD – Chronic Obstructive Pulmonary Disease

EMR – Electronic Medical Record

EQ-5D-5L– EuroQol Five Dimension, Five Level

EQ-VAS – EuroQol Visual Analog Scale

GERD – Gastroesophageal Reflux Disease

HbA1C – Hemoglobin A1c

IBS – Irritable Bowel Syndrome

PAM – Patient Activation Measure

PCN – Primary Care Network

PHQ-9 – Patient Health Questionnaire 9 items

SF-36 – Short Form 36 Dimensions

T1– Time 1, Baseline

T2 – Time 2, Follow Up

Chapter 1. Introduction

Introduction

Primary care refers to the routine health care of patients by a health care provider for the prevention of illness, coordination of care when access to other health care services, such as hospital or specialist care is needed, illness treatment, or chronic disease management (Health Canada, 2012). In Canada, 44% of people over the age of 20 have a chronic disease and 18% of people have two or more chronic disease (Public Health Agency of Canada, 2018). Chronic diseases, such as diabetes, cardiovascular disease and cancer are progressive health conditions associated with disability and increased mortality (World Health Organization, 2014). With aging population trends, unhealthy lifestyles, and increasing prevalence of chronic diseases; demands on the health care system will continue to grow (World Health Organization, 2018).

A more robust primary care system has the potential to mitigate the economic impact of chronic disease and improve the sustainability of the health care system through improved health outcomes, such as quality of life (World Health Organization, 2018). The College of Family Physicians of Canada (2019) released an updated vision to achieve primary care reform through robust physician clinics known as a ‘medical home’. The ‘medical home’ vision is for the provision of comprehensive, patient centered, coordinated and timely care to enable the best possible health outcomes for the individual and patient population. One of the key concepts in achieving this vision is integrated interdisciplinary team-based care (College of Family Physicians of Canada, 2019; Peckham, Ho, & Marchildon, 2018). Improving the understanding of the association between interdisciplinary teams and patient health outcomes may help to guide service delivery and build on good practices to advance primary care reform.

Background

Primary Care Networks in Alberta. Since the early 2000s, when national and provincial ministers agreed to prioritize primary care reform, advancements in primary care service delivery have occurred across Canada (Suter et al., 2017). As health care is largely a provincial jurisdiction, primary care innovations have developed disparately across the country (Peckham et al., 2018). This creates an opportunity to leverage and spread good practices nationwide. An across country review of provincial primary care systems compared key elements in primary care innovation, and Alberta was identified as one of the more advanced provinces in primary care reform (Peckham et al., 2018). In Alberta, primary care reform has largely been implemented through the integration of primary care networks (PCNs) (Report of the Auditor General, 2017).

A PCN is comprised of a group of physicians who agree to work together, and in return, receive funding from the government to run programs and hire other health care providers, such as nurses, pharmacists, psychologists and dietitians, to support their patients' health needs while remaining in the primary care setting (Government of Alberta, 2016). PCNs have created a stronger link between family physicians, who have traditionally been independent service providers, and the broader health care system by supporting physicians to provide team-based care, after hours care, and overall helping to integrate health care services with the care provided by family physicians (Government of Alberta, 2016; Saher, 2017). However, as noted by the Report of the Auditor General, given the amount of public funded investment and the important role in the health care system, there is a paucity of evidence demonstrating whether interdisciplinary teams in PCNs are associated with improvements in health outcomes (Saher, 2017).

Calgary Foothills PCN. The Calgary Foothills PCN connects over 450 family physicians to support the delivery of comprehensive primary health care for more than 379 000 people in north west Calgary and Cochrane (Calgary Foothills Primary Care Network, 2019). Since 2005, through the leadership of family physicians, Calgary Foothills PCN aims to provide enhanced access to integrated and comprehensive primary care engaging interdisciplinary teams in collaboration with the broader health care system (Calgary Foothills Primary Care Network, 2016). Central to this concept is support for comprehensive health homes and requires a coordinated approach organized around patients' needs.

Calgary Foothills PCN has arranged its core service delivery into three layers: The health home, health home community and health home network services. The health home aligns with the concept of the patient centered 'medical home', where patients can access comprehensive, patient-centered, coordinated, timely and team-based care to enable the best possible health outcomes for the individual and patient population (The College of Family Physicians of Canada, 2011). Health home services include co-located health team providers in family physician clinics and providing support for physicians to be leaders through quality improvement advancements to care for their panel of patients. When the patients care need exceeds the resources offered within the health home, physicians and patients can then access services in the larger health home community or health home network. Health home community is intended to facilitate the integration of care between providers and provides services and structure based on community needs, strengths, and composition. Health home community refers to local PCN team services of dietitians and community social workers and linkages with other local health services and social service providers, i.e. physiotherapy, community pharmacy, family community services, seniors' services, community associations, and not-for-profit organizations in the community where the health home is located. Health home networks are additional integrated services accessible to physicians, found in a central location for their patients and support people with distinct health needs, such as an after-hour care clinic, a low-risk maternity clinic and a complex chronic disease management clinic called the Extended Health Team program.

The Extended Health Team Program. The Extended Health Team program is comprised of a team of interdisciplinary health professionals who support and empower people 18 years of age and older, to better manage a variety of chronic diseases. The team consists of physicians, pharmacist, registered nurses, dietitians, social workers, occupational therapists, kinesiologists, mental health consultants and physiotherapists working in a patient partnered, goal-oriented model of care. Additionally, the team works in partnership with specialty physicians to support capacity building in primary care and manage the complex care needs of patients in the primary care setting.

The aim of the Extended Health Team program is to support people to build self-management skills to help them to manage their chronic diseases. As people who attend the Extended Health Team program present with a variety of chronic diseases, there is not a unified clinical marker that would be a representative measure of health outcome across participants of the program. Therefore, the Extended Health Team program administers three patient reported outcome measure surveys to patients to support the understanding of potential impact of the program on meaningful patient health outcomes. Patient reported outcome measures are tools that try to capture the patients’ subjective experience of the treatment or care that they are receiving (Weldring & Smith, 2013). The patient reported outcome measure surveys used by the Extended Health Team program includes assessments of depression, quality of life and self-management. These three measures were selected by the program for a variety of reasons.

Measures of quality of life and depression were selected as both are adversely impacted in people with a chronic disease and therefore may be a meaningful measure of patient outcome (DeJean, Giacomini, Vanstone, & Brundisini, 2013). A self-management measure was selected as self-management skills are a recognized component in chronic disease care and supporting patients to better manage their health (Davy et al., 2015). Patient's self-efficacy to manage their health may be a precursor or more proximal outcome to changes in quality of life or depression (Musekamp et al., 2017). Additionally, the Extended Health Team Program aim is to support people in self-management skills and therefore was thought to be an important potential patient outcome.

Purpose

The purpose of this study was to examine the relationship among select patient reported health outcomes of depression, quality of life and self-management over time among patients with chronic disease who have attended an interdisciplinary primary care program.

Research Question

The research question is do health outcomes of depression, quality of life and self-management improve over 6-months time among patients with chronic disease who have attended an interdisciplinary primary care program?

Chapter 2. Conceptual Framework

Figure 1 illustrates the conceptual framework and situates the current study in the context of primary care interdisciplinary teams.

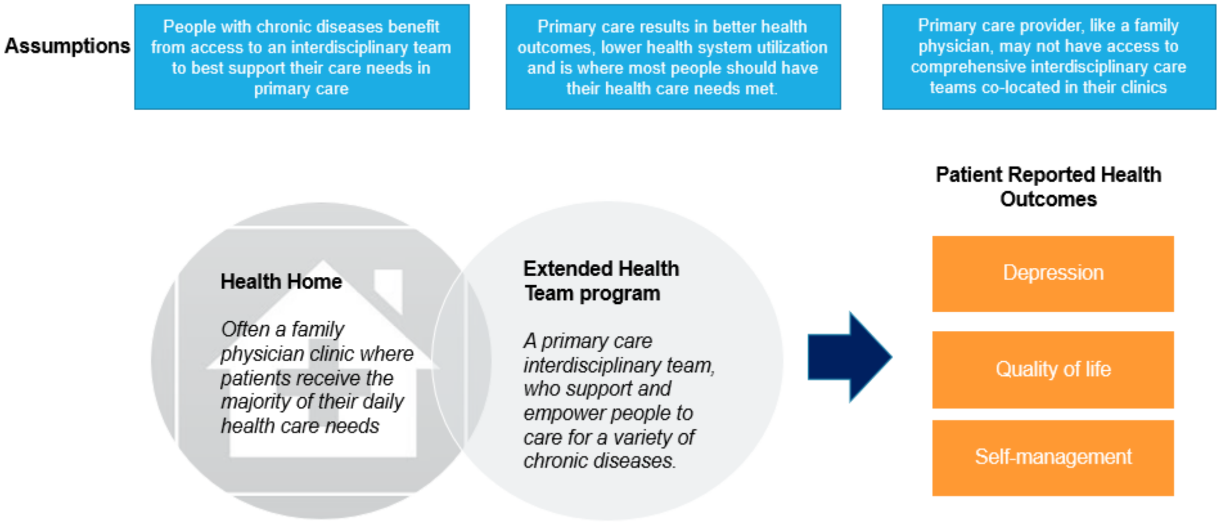

Figure 1. Conceptual Framework of Interdisciplinary Teams in Primary Care

Primary care is where people go first to get their health care needs met, like a family physician clinic or a health home. Primary care providers deliver 68% of all patient care including care for acute symptomatic conditions, management of chronic disease and screening and prevention for health promotion (Korownyk, McCormack, Kolber, Garrison, & Allan, 2017). Health systems with more robust primary care services result in better patient health outcomes and lower health system utilization, such as reduced hospital admissions and reduced emergency department visits (McAlister, Bakal, Green, Bahler, & Lewanczuk, 2018; World Health Organization, 2018).

People with a chronic disease could benefit from an interdisciplinary team of providers to care for their complex health needs (Peckham et al., 2018). However, as primary care has developed in Canada, health homes do not necessarily have access to co-located interdisciplinary teams (Carter, Riverin, Levesque, Gariepy, & Quesnel-Vallee, 2016). Interdisciplinary teams may be accessible in central locations and can work in conjunction with the primary care provider to offer more support to people with chronic disease.

The current study observes an interdisciplinary team called the Extended Health Team program. The team consists of pharmacists, nurses, dietitian, occupational therapists, social worker and physiotherapists who help patients to self-manage and cope with multiple chronic diseases. The overall philosophy is that the patients' need for augmented time and team support is for a short period of time (up to 12 months) and the long-term care of the patient still resides with the family physician. Therefore, the program works in close connection with the health home to care for patients alongside the primary care provider. This study will examine select patient reported health outcomes of depression, quality of life and self-management after attendance in the Extended Health Team program.

Chapter 3. Review of the Literature

Introduction

A review of the literature was conducted in PubMed, ScienceDirect and ProQuest Nursing and Allied Health Source. National and Provincial health websites were also searched for position papers and reports on primary care interdisciplinary teams. Search terms included ‘chronic disease’, ‘multidisciplinary teams’, ‘interdisciplinary teams’, ‘clinical outcomes’, ‘self-management’, ‘self-efficacy’, ‘depression’, and ‘quality of life’. The search was limited to the English language and adult samples, and excluded in-patient hospital setting and included articles published between 2014 to 2019.

Interdisciplinary Teams

An interdisciplinary team is comprised of a variety of health professionals, such as physicians, nurses, occupational therapists, physiotherapists, pharmacists, dietitians, psychologists and social workers, who work collaboratively and in conjunction to support a patient in achieving their health goals (Saher, 2017; World Health Organization, 2018). Interdisciplinary team care has long been recognized as an important element in the coordination and care of patients with chronic disease (Davy et al., 2015; Provost et al., 2017). Interdisciplinary teams provide more integrated care, as there are more opportunities for collaboration and coordination of care, as well as a wider range of skill sets and services available to provide to patients (Bonciani, Schäfer, Barsanti, Heinemann, & Groenewegen, 2018; Peckham et al., 2018).

In Canada, integration of interdisciplinary teams into primary care is recognized as an important innovation in primary care reform to improve access and quality of care (Peckham et al., 2018). The provinces and territories are responsible for the delivery of health care and, as such health care services have developed with variations between jurisdictions (Peckham et al., 2018). Interdisciplinary teams in primary care consist of a mix of interdisciplinary team members, such as nurse practitioners, physician assistants, exercise specialists, pharmacists, mental health workers, social workers, spiritual care providers, dietitians, occupational therapists, physiotherapists or respiratory therapists. While most jurisdictions across the country have created team-based models of care, the delivery, funding, location, and accessibility to the team is disparate. For example, Quebec's 'Family Medicine Groups' have physician-led access to interdisciplinary team whereas interdisciplinary teams in the Northwest Territories consist of registered nurses that are the clinic lead and technology is used to leverage access to physicians.

Interdisciplinary Teams and Clinical Health Outcomes

The literature examining the influence of interdisciplinary teams in primary care largely demonstrates a positive clinical health outcome with team care (Chwastiak et al., 2017; Nagelkerk et al., 2018; Proia et al., 2014; Provost et al., 2017; Siaw et al., 2017; Somayaji et al., 2017; Wright, Zarnegar, Hermansen, & McGavin, 2017); however, this finding is not always consistent (Montoya, Sole, & Norris, 2016; Nagelkerk et al., 2018; Reichert et al., 2017). For example, a retrospective study of primary care clinics in Ontario, found no relationship between health outcomes and an interdisciplinary care team intervention in a patient population with diabetes (Reichert et al., 2017). In this study, Reichert et al. (2017) examined the impact of a team-based quality improvement (QI) initiative targeting diabetes management in 406 patients under the care of 34 family physicians compared to a control group without quality improvement training. While there were some diabetes process improvement outcomes found, such as improved lipid blood test monitoring and eye exams; the primary outcome of improved blood sugar hemoglobin A1C (HbA1C) or blood pressure control was not observed. The results may have been confounded as interdisciplinary teams were already working with the control group clinics. It is possible that even without formal quality improvement training, the control group clinics had coordinated their care approach and made an impact to diabetes health outcomes.

Similarly, Montoya et al. (2016) found no improvements to health outcomes in the evaluation of a nurse practitioner facilitated interdisciplinary group visit versus usual nephrologist care in 26 patients with chronic kidney disease in a Florida nephrology clinic. Knowledge, self-efficacy, disease management and physiologic measures were assessed at baseline, 6-months and 9-months. The nurse practitioner facilitated six monthly visits in conjunction with interdisciplinary team members. The intervention included education, assessment and/or physical exam with nephrologists, dietitian, social worker and pharmacist. Clinical outcomes included lab values, such as serum creatinine, glomular filtration rate as a measure of kidney function, blood pressure. Patients in usual care arm, received regular follow up from the nephrologist and had opportunity to attend one or two education sessions on chronic kidney disease. No statistically significant changes were observed in clinical outcomes in the intervention group compared to the usual care. The small sample size may have limited the ability to detect differences between the two groups.

Conversely, there is evidence that interdisciplinary teams positively impact health outcomes in people with chronic diseases, such as diabetes and cardiovascular disease (Chwastiak et al., 2017; Nagelkerk et al., 2018; Proia et al., 2014; Provost et al., 2017; Siaw et al., 2017; Somayaji et al., 2017; Wright et al., 2017). For example, a systematic review of 80 studies over 32 years examined the effectiveness of interdisciplinary teams in primary care on hypertension management (Proia et al., 2014). The review concluded that compared to usual care, interdisciplinary team care resulted in improved blood pressure control and higher medication adherence.

Likewise, Siaw et al. (2017) conducted an interdisciplinary team intervention for people with uncontrolled diabetes in four outpatient clinics in Singapore. Patients were randomized to interdisciplinary collaborative care (n=214) which included care with a nurse, dietitian and regular 4-6 week pharmacist visits or usual care (n=197), where physicians provide care and make referrals to nurse or dietitian as needed. Results showed a statistically significant reduction of HBA1c in intervention arm at 6 months and no change in control arm; however, blood pressure and lipid values remained unchanged.

A retrospective cohort study considered health outcomes in 49 diabetic patients with foot ulcers who were referred to an Ontario wound healing clinic (Somayaji et al., 2017). The team consisted of physician, nurses, chiropodist and a certified diabetes educator. Patients were assessed by interdisciplinary team members and follow up care scheduled as needed. Patients had an average of 3.5 clinic visits per week over a 3-month period in the program. Results found statistically significant improvements in precision of diagnosis, wound healing and infection identification and treatment following the interdisciplinary intervention. Mean pain scores and quality of life trended towards improvement but did not reach significance.

Additionally, positive outcomes were reported from a retrospective cohort study in 634 primary care patients with uncontrolled diabetes that were assigned to an interdisciplinary team care program (Chwastiak et al., 2017). Primary outcomes were HbA1C and blood pressure. The care team consisted of physician, case manager (nurse or dietitian), psychiatric consultant, medical consultant and medical assistant. Interdisciplinary team intervention included weekly caseload review with the team education, motivational interviewing, behavioral activation and medication monitoring. The 151 patients referred in the first 18-months of the program were more likely to have higher HbA1C, depression & anxiety than the 483 patients not referred. After 18 months, results showed a statistically significant improvement in HbA1C and blood pressure in those referred compared to patients not referred to the program. Patient referred to the program had more visits to the clinic and team, 15 visits compared to 8 visits, during the 18-month period.

Further supportive evidence of the impact of interdisciplinary teams on health outcomes was also found by Provost et al. (2017) in the setting of a Montreal centralized primary care interdisciplinary team cardiometabolic risk program for patients with diabetes and hypertension. Participants (n=1689) were followed over a two-year period with frequent interventions by a nurse, dietitian and/or other interdisciplinary team members; with regular communication and a shared disease registry with the family physician. The study revealed positive associations between better visit attendance in the program and improved patient health outcomes, such as better blood sugar and blood pressure control.

Nagelkerk et al. (2018) found mixed results in the evaluation of an interdisciplinary collaborative program which aimed to improve clinic practice efficiencies and health outcomes of adults with diabetes in a primary care clinic in Michigan. The interdisciplinary team consisted of physician, nurse, dietitians, and pharmacy, medical and physician assistant students. Training and education were provided to the interdisciplinary team on safety, inter-professional practice and quality of care. Program implementation included daily huddles, collaborative care plans, interdisciplinary visits, patient education, and focused activities, such as medication reconciliation. Health outcomes were evaluated in 250 patients with diabetes including HbA1C, lipids, blood pressure and body mass index (BMI), last recorded pre and one-year post program.

The results were mixed. There was no change in HbA1C or blood pressure, but there were statistically significant improvement in lipid values, and statistically significant worsened BMI. In a subgroup analysis, those patients with elevated HbA1C saw statistically significant improvement in HbA1C and lipid values. Patients with uncontrolled diabetes appeared to benefit more than patients within diabetes targets. However, it is unclear the number of interventions and interactions received by patients in this program and any comparison to pre-program clinic interventions.

Finally, Wright, Zarnegar, Hermansen and McGavin (2017) conducted an evaluation of an interdisciplinary care intervention composed of a community based integrated care program in conjunction with a chronic pain program in 24 patients with chronic pain. The 18-month program began with a one-hour assessment to determine patient goals and aspirations, followed by regular appointments tailored to the patients identified needs. Follow-up appointments may have included physician, social worker, spouse or other health professionals; and medical and non-medical interventions, such as massage delivered 7-8 weekly sessions; medication management or groups activities, such as horticulture, music and art therapy. Pain intensity, quality of life and depression were captured at time of referral and 19-months post intervention. Statistically significant improvement was found in all measures after participation in the program. There is not a clear description of the chronic pain program, and with two simultaneous running interventions it is unclear if results are attributable to both or in combination; regardless team approach appeared to have positive impact on health outcomes.

While the majority of evidence supports that interdisciplinary teams improve clinical health outcomes (Chwastiak et al., 2017; Nagelkerk et al., 2018; Proia et al., 2014; Provost et al., 2017; Siaw et al., 2017; Somayaji et al., 2017; Wright et al., 2017), improvement is not always consistent (Montoya et al., 2016; Nagelkerk et al., 2018; Reichert et al., 2017). This perhaps reflects the heterogeneity in how interdisciplinary teams provide care, such as the geographic location and specific healthcare systems, integration and coordination of team care, diversity in the settings, patient population, such as diabetes, chronic pain or hypertension; different care components offered, such as group versus one on one appointments; variety in the number of touch points or the amount of coordination of care with the family physician. Nonetheless, the evidence suggests that interdisciplinary teams could play and important role in improving patient outcomes.

Patient Reported Outcome Measures

In programs that offer services to disease specific populations, clinical markers can be used as a measure of patient health outcomes to understand the effectiveness of treatment over time. For example, HbA1C blood sugar level may help to assess whether people in a diabetes program are being treated to an optimal target level. However, clinical markers are objective measures that do not include the patient's subjective experiences of the illness or treatments. The patients' subjective experience of the course of illness is important in assessing the effectiveness of a given treatment. For example, if a treatment cure for cancer would result in a person not being able to eat or breathe independently; a patients' subjective experience of the resulting disability may outweigh the patient's decision to undergo the treatment. Use of patient subjective experiences to evaluate program effectiveness is more useful for programs that cater to a variety of clinical populations, and for which there are no common clinical markers to assess treatment effectiveness.

In order to improve patient experience, there has been a growing recognition of the importance of getting the patients perspective of the care they receive (Canadian Institute for

Health Information, 2017). The patient experience of care can add valuable information to clinicians and administrators on the quality of care and meaningful effectiveness of the treatment on the health of their patients (Holmes, Lewith, Newell, Field, & Bishop, 2017). Self-reported questionnaires, called patient reported outcome measures, allow the patient to provide information about their experience of their health status, such as physical symptoms, ability to function, self-care, pain, coping and mental health (Canadian Institute for Health Information, 2017). This information can be used to tailor programs to better meet the needs of patients, aligning with a patient-centered approach to health care services (Holmes et al., 2017).

The following literature review will examine the evidence around interdisciplinary team care for people with chronic disease and the three patient reported outcome measures of interest: depression, quality of life and self-management.

Depression

Depression is a mood disorder where people feel sadness, anxiety, irritability, inability to sleep, or a loss of interest in usual hobbies or activities (World Health Organization, 2016). People with chronic disease are at an increased risk of experiencing depression (DeJean et al., 2013; Li, Ge, Greene, & Dunbar-Jacob, 2018), with prevalence rates of 5-54% of people post stroke, 30-45% cardiovascular disease, 7-50% cancer patients and 6-43% in diabetes (Li et al., 2018). Depression is associated with premature mortality, a worse prognosis, poorer quality of life and poorer ability to self-manage their health (Craig et al., 2016; Hadi, McHugh, & Closs, 2019; Holt, de Groot, & Golden, 2014; Kawai, Kawai, Wollan, & Yawn, 2017).

Interdisciplinary Teams and Depression

The evidence around the effectiveness of team care for patients with depression is evidenced by two systematic reviews and meta-analyses (Li et al., 2017; Panagioti et al., 2016).

A systematic review of eight randomized controlled trials of standard depression treatment or depression treatment with intervention by an interdisciplinary collaborative team-based care (nurse or social worker, primary care provider and psychiatrist) for patients with cancer suggested that collaborative team-based care model was more effective than usual care in reducing depression for up to 12 months (Li, M. et al., 2017). Likewise, a meta-analysis of 31 randomized controlled trials compared the effectiveness of collaborative care with usual care in 10 962 patients with depression as a single diagnosis or with multiple co-morbidity (Panagioti et al., 2016). The results indicated that collaborative care was effective at reducing depression symptoms for patients with both depression alone or with co-morbidity at 6 months post intervention.

The improvement in depression could be attributed to the care team or simply more opportunities for individual education provided by the team members. For example, Emery-Tiburcio et al. (2019) recruited 250 minority adults (African American or Hispanic older adults) with depression (Patient Health Questionnaire 9 items (PHQ-9) scores ≥8) and obesity (BMI ≥25) from primary care centres for a team based intervention and education program for a one year period compared to education program alone. Patients in the intervention arm received an assessment, care plan, psychotherapy and ongoing monthly calls with a care provider. Both groups showed statistically significant improvements in primary endpoint of depression at 6 and 12 months. However, at 12 months significantly more patients in the treatment group had a 50% or more reduction in depressive symptoms, in other words more patients had a larger improvement in depressive symptoms with the team-based care model. Likewise, Katz, Patterson and Zacharias (2019) examined associations pre and post participation in an 8-week interdisciplinary team program for people with chronic pain, offering 3 hour weekly sessions to

129 patients with topics, such as exercise, self-management, psychoeducation and relaxation. The results revealed that after attendance in the program patients improved their depression and self-efficacy.

Brendbekken, Harris, Ursin, Eriksen and Tangen (2016) also found improvement in depression in both arms of a randomized controlled trial which compared an interdisciplinary team intervention against a brief intervention program in 284 Norwegian patients with chronic musculoskeletal pain, such as low back pain or fibromyalgia. The team intervention included social worker, physician and physiotherapist and included a comprehensive collaborative assessment and follow ups with the team over a 3-month period. The brief intervention comparison group included one assessment with physician and physiotherapist, and one follow up appointment with the physiotherapist. At 3 months the team intervention group had statistically significant improvements in anxiety and depression. At 12 months both intervention and control demonstrated statistically significant improvements in anxiety and depression. Given that both groups had some team intervention the results may be confounded or the intensity of treatment in the brief interdisciplinary may be enough to achieve improvement in depression in this patient population.

Bekelman et al. (2015) did find evidence of collaborative care team having a positive effect on depression, even though the usual care arm may have had access to other services and supports. The multisite randomized controlled trial aimed to determine the effectiveness of interdisciplinary collaborative care team program (n=187) consisting of a nurse coordinator, cardiologist, psychiatrist, family physician; as compared to usual care (n=197) in 392 patients with heart failure. For patients in the intervention arm, the collaborative care team reviewed weekly clinical symptoms and depression to update and implement care recommendations.

Patients with depression, indicated by the PHQ-9 ≥ 10, received up to 11 counselling session, education and medication management by nurse and psychiatrist. Usual care included regular follow up with physician and regular telehealth tele-monitoring nurse; additional services, such as cardiology or mental health clinic may have been accessed based on patient need. Depressive symptoms were examined at baseline, 3 months, 6 months and at one-year post program. There was a statistically significant greater improvement in depressive symptoms in the intervention group at one year for patients diagnosed with depression.

While Bekelman et al. (2015), was able to demonstrate significant impact of an interdisciplinary team intervention on depression, despite comparison to a usual care arm which may have accessed a broader range of team and medical intervention; Jonsdottir et al. (2015) was not. Jonsdottir et al. (2015) conducted a comparison of an interdisciplinary team program (n=48) in Iceland which provided a 6 month intervention including self-management, smoking cessation, nurse assessments and interdisciplinary family meetings versus usual care. Usual care (n=52) was provided by family physician who may have accessed other supports in the clinic as needed. Outcome data included exacerbations, smoking status, depression and quality of life measured at baseline, 6 month and 12 months. Patients in the intervention arm did not have fewer exacerbations or better smoking status or less depression, than the usual care group.

Overall there seemed to be good evidence for interdisciplinary teams helping to improve depressive mood for patients as evidenced by the recent Li et al. (2017) and Panagioti et al. (2016) systematic review and meta-analyses. There appeared to be heterogenicity in the literature regarding team composition in the shared collaborative team care model (Bekelman et al., 2015; Brendbekken et al., 2016; Emery-Tiburcio et al., 2019; Jonsdottir et al., 2015). Self-management education supports and brief interventions seemed to have associations with improvement in depression (Brendbekken, Harris, Ursin, Eriksen, & Tangen, 2016; Emery-Tiburcio et al., 2019; Katz et al., 2019). It is further possible that evidence was confounded by interdisciplinary team supports available to the control arm of studies (Bekelman et al., 2015; Brendbekken et al., 2016). It is therefore possible a combined approach in a program to improve self-management and team-based care would also find positive results.

Quality of Life

With advances in medicine, prevention and infection control, people are living longer with chronic diseases (Makovski, Schmitz, Zeegers, Stranges, & van den Akker, 2019). However, chronic diseases have deleterious health side-effects over time due to treatments or the natural course of the disease (Makovski et al., 2019). Chronic disease not only shortens life expectancy, but also results in reduced quality of life, increased disability, reduced function and higher health care costs (Makovski et al., 2019). Health related quality of life refers to an individuals' self-perception, including their expectations and satisfaction, of their health status on their ability to function in life (Makovski et al., 2019; Megari, 2013). The effectiveness of treatment on life expectancy (quantity of life) is not as relevant without the additional understanding of the impact of the treatment on the patients perceived health status and wellbeing (quality of life) in making informed patient medical decisions (Makovski et al., 2019; Megari, 2013). Furthermore, quality of life can be a meaningful measure to understand associations with health care services as a patient reported outcome measure.

Interdisciplinary Teams and Quality of Life

The evidence on interdisciplinary teams on quality of life has been mixed. The studies by Bekelman et al. (2015), Jonsdottir et al. (2015) and Somayaji et al. (2017) described earlier, all failed to find statistically significant improvement in quality of life after interdisciplinary team care programs for patients with heart failure (n=392), chronic obstructive lung disease (n=100), and diabetes (n=49), respectively. Similarly, Angeles et al. (2013) examined quality of life in 63 patients after attendance in an interdisciplinary chronic pain management program in a primary care setting. The program consisted of an 8-week interdisciplinary group intervention. Overall there was no change in quality of life as measured by the short form 36 item (SF-36), with the exception of the bodily pain domain which was significantly improved and physical functioning domain which was significantly decreased in the intervention group as compared to control. Given the program was focused on pain management, it is not surprising that the bodily pain domain improved. Physical functioning domain refers to the extent to which patients perceive the ability to participate in work and activities. This may have declined as pacing is a central concept in pain management programs, where patients are taught to reduce or breakdown activities into smaller amounts to prevent pain flare ups.

Other studies have found improved patient reported quality of life with interdisciplinary team programs. For example, Cannon et al. (2016) examined an interdisciplinary team-based weight management program. Participants (n=80) attended the program for 4 weeks with a 2-hour group session per week. The interdisciplinary team consisted of dietitians, social workers and physiotherapists. Statistically significant improvements in quality of life was found at 4 weeks, 6 months and 12 months post intervention.

Provost et al. (2017) looked at patient outcomes, including quality of life, pre and 12 months follow up in a centralized primary care interdisciplinary team cardiometabolic risk program for 1689 patients with diabetes and hypertension. They found associations between attendance in the program and improvement in quality of life. Furthermore, the study found that the frequency of communication between the interdisciplinary team with the family physician and greater coordination of care were associated with greater patient participation in the program, better blood pressure control and quality of life scores.

Similarly, Aryani et al. (2016) examined 693 patients with a chronic disease who received usual care (i.e. control group) or care by an interdisciplinary team (i.e. intervention group) with a patient centered approach encouraging patient self-management of their health. The primary outcome was quality of life, as measured through the patient self-reported EuroQol five dimension, five level (EQ-5D-5L) pre and 6 months post intervention. Results showed there was a statistically significant improvement in overall self-rated quality of life and overall functional quality of life in the intervention group and not in the usual care group.

Furthermore, a study by Carron et al. (2017) examined a chronic obstructive pulmonary disorder (COPD) integrated team care program which provided a combination of 8 group sessions plus regular individual team intervention to patients (n=57) over a 12-month period of time. This program had both group education and individual care in a combined care approach. Quality of life was a primary outcome measured at baseline and 12 months after the program. The results revealed trends toward improvement in quality of life at 12 months. However, statistically significance was only reached in select quality of life domains of disease mastery, social functioning and emotional coping.

Uhlig et al. (2016) conducted an observational study of patients admitted to hospital for rheumatological conditions (such as arthritis) who accessed an interdisciplinary team of nurses, social workers, dietitian, psychologist, pharmacist, orthopaedic surgeon, rheumatologist, physiotherapist or occupational therapist (two or more providers). Quality of life was one of the outcomes of interest as measured by the health assessment questionnaire, the SF-36 physical and mental health component scores and overall functional quality of life (SF-6D). Results showed statistical significant improvement at discharge from hospital. However, at 3 and 6 months the general health assessment questionnaire and SF-36 physical component scores no longer showed significant results; whereas the SF-36 mental component score and the overall functional quality of life SF-6D remained significant.

Overall, the effect of interdisciplinary teams in primary care on quality of life outcomes has been mixed. Some studies have been able to demonstrate an improvement in quality of life for patients (Aryani et al., 2016; Cannon et al., 2016; Carron et al., 2017; Provost et al., 2017; Uhlig et al., 2016), while others have failed to see an effect (Angeles et al., 2013; Bekelman et al., 2015; Jonsdottir et al., 2015; Somayaji et al., 2017). It could be that quality of life is a more distal outcome for patients. For example, Uhlig et al. (2016) looked at people admitted to hospital, therefore likely in a poor state of health. At discharge, with an average of 14 days stay in hospital, the patients had significant improvements in quality of life. However, the effects wore off and were largely insignificant at 3 and 6 months. In most of the other studies where positive associations were found with team intervention, the intervention included at least 6 months of interaction with an interdisciplinary team. This suggests that it make take more time to see improvements in quality of life, except perhaps when there is a major health change.

Self-management

Self-management refers to the knowledge, skills and self-efficacy for someone to manage their own health (Brady, Sacks, Terrillion, & Colligan, 2018; Hibbard, Stockard, Mahoney, & Tusler, 2004). Patients' self-management of their health is thought to be a key element in effective chronic disease management (Brady et al., 2018). Literature has demonstrated that people who are more involved in their own care have better health outcomes and lower health care costs (James, 2013). Interventions which aim to improve self-management skills have been associated with improved health outcomes (Reynolds et al., 2018; Sacks, Greene, Hibbard, Overton, & Parrotta, 2017). For example, Sacks et al. (2017) reviewed longitudinal data from ~56000 patients over 4 years to examine whether self-management, termed patient activation, predicted the course of diabetes disease progression. They explored the progression from no diabetes status to the presence of prediabetes or diabetes over time by examining blood sugar and blood lipid indicators. Results found higher patient activation levels (i.e. better self-management) were associated with lower odds of developing prediabetes. Additionally, higher patient activation levels predicted better blood sugar and blood lipid levels in people with prediabetes. Of note, self-management has most often been measured in the literature as self-efficacy, which as described above, is likely only one component of self-management. Self-efficacy is the personal belief or confidence that one is capable of performing a particular action or behavior (Brady et al., 2018). Whereas, self-management is a broader concept which includes personal confidence (self-efficacy) as well as knowledge and skills (Brady et al., 2018). For example, the self-management concept would suggest that to manage a chronic disease a person would need a certain level of knowledge about the disease, skills to self-monitor symptoms and also a personal belief or confidence in their own ability to take care of their health.

Interdisciplinary Teams and Self-Management

The evidence for the impact of interdisciplinary teams on patient self-management is mixed, where some studies have found no effect or mixed effects (Odgers-Jewell et al., 2017; Spoorenberg, Wynia, Uittenbroek, Kremer, & Reijneveld, 2018), and others have found positive effects (Almutairi, Hosseinzadeh, & Gopaldasani, 2019; Cannon et al., 2016; Carron et al., 2017; Katz, Patterson, & Zacharias, 2019; Rahman, Daniel, & Grahame, 2014).

In a year long study, Spoorenberg et al. (2018) conducted a randomized controlled trial of an integrated care approach with interdisciplinary team including family physician, nursing home physician, and nurse or social worker case managers for 1456 elderly people (age 75+). Participants were categorized based on level of complexity of disease (such as number of chronic conditions, social supports and mental health) and frailty (such as mobility) as complex care needs, frail or robust. The complex care patient group was at highest risk of admission to hospital or needing a higher level of care (such as nursing home); and robust patient group was at lowest risk. The goal was to examine the effectiveness of this community team-based care compared to usual care on patient outcomes including self-efficacy at baseline and 12 months. All participants attended an education session. In addition, participants categorized as complex care needs and frail, had regular connections with the case managers and physicians, at least 2 months for a total duration of 6-12 months. The results found that overall compared to the usual care (control) group, there was not a statistically significant improvement in self-efficacy in the complex care needs group. However, the frail patient group did realize a statistically significant increase in self-efficacy compared to the control group. A potential reason that only the frail patient group realized a change in self-efficacy may be because the complex care needs group was already accessing health care services (like homecare) and the frail patient group had received little support prior the intervention. Additionally, the usual care group may have had access to interdisciplinary team supports which may have moderated any effects of the intervention.

Additionally, a systematic review and metanalysis of 47 studies in patients with diabetes reviewed the effectiveness of group-based intervention compared to control in improving outcomes, such as self-efficacy (Odgers-Jewell et al., 2017). Five studies looked at self-efficacy at three time points 6, 12, and 24 months but did not find any statistically significant difference between group-based intervention or control (Odgers-Jewell et al., 2017).

Conversely, three studies described an interdisciplinary team intervention provided in group format (Cannon et al., 2016; Katz et al., 2019; Rahman et al., 2014) and examined patient health outcomes including self-efficacy. In the first study, Rahman et al. (2014) examined a team-based group program which was 8 days in length over a 6-week time period in a rheumatological patient population (n=87). Self-efficacy was measured at baseline, 1 month and 5 months (Rahman et al., 2014). In the second study, Cannon et al. (2016) had a team-based group program that was 4 weeks long with a 2-hour group session per week in patients with obesity (n=80). Self-efficacy was measured at baseline, 4 weeks, 6 months and 12 months (Cannon et al., 2016). In the third study, Katz et al. (2019) examined an interdisciplinary team-based group program among a chronic pain population (n=129). The intervention was 8 weeks long with a 3-hour group session per week. Self-efficacy was measured at baseline and 8 weeks (Katz et al., 2019). All three studies found statistically significant improvement in measures of self-efficacy which suggests that team-based care may be effective in helping people to better self-manage their health.

It may be difficult to ascertain if the team-based care or group education format was the component that was associated with changes in self-efficacy. For example, Carron et al. (2017) looked at an integrated team care program which provided combined care approach with both group education and individual care for patients (n=57) with COPD. Self-efficacy was a secondary outcome measured at baseline and 12 months after the program. The results revealed a statistically significant improvement in self-efficacy in patients who attended the team-based program. It could be that both group and individualized team care contribute to improvement in patient self-management.

Furthermore, perhaps assessing self-efficacy alone and not including the other components of self-management (knowledge and skills), does not adequately capture changes in patient self-management. The change in behavior is perhaps the outcome of improvement in self-efficacy, knowledge and skills (Do, Young, Barnason, & Tran, 2015). Therefore, it may be better to use a measure which captures all three components of self-management or the outcome (a self-management behavior change. For example, in the systematic review by Almutairi et al. (2019) of 10 randomized controlled trials in people with diabetes to understand the effectiveness of self-management interventions on blood sugar control and self-management behaviors. In this case, the interdisciplinary team approach resulted in statistically significant improvement blood sugar control as well as improvement in self-management behaviors, such as medication adherence, self-monitoring of blood sugars and diet compliance. It may be that the impact of interdisciplinary team care was better captured by using measures other than or in addition to self-efficacy.

In summary, the evidence for interdisciplinary teams and self-management was mixed (Almutairi et al., 2019; Cannon et al., 2016; Carron et al., 2017; Katz et al., 2019; Odgers-Jewell et al., 2017; Rahman et al., 2014; Spoorenberg et al., 2018). A systematic review of group-based team care found no effect of team care on patient self-management (Odgers-Jewell et al., 2017). As well, a one-year study of older adults in the community found mixed results of team-based intervention on patient self-efficacy (Spoorenberg et al., 2018). The results may have been diluted due to existing access to local health services and team care. Also, the population was described as frail elderly where patients had on average two comorbidities, however from the study description it is unclear which areas may have been targeted for improvement in self-management.

Interventions where self-management was measured beyond self-efficacy, such as capturing patient medication adherence or self-monitoring of blood sugars, were able to demonstrate an improvement in self-management (Almutairi et al., 2019). Additionally, interdisciplinary teams who provided a combination of group education and individual support revealed positive associations with patient self-management (Almutairi et al., 2019; Carron et al., 2017). Therefore despite finding studies demonstrating no change in self-efficacy (Odgers-Jewell et al., 2017), it appears the evidence is growing in support of the positive impact of team intervention on improving patient self-management (Almutairi et al., 2019; Cannon et al., 2016; Carron et al., 2017; Katz et al., 2019; Rahman et al., 2014). It may be worthwhile to consider other measure of self-management to better capture patient outcomes beyond self-efficacy.

Summary

In summary, there appears to be good evidence for interdisciplinary teams helping to improve clinical health markers (Chwastiak et al., 2017; Nagelkerk et al., 2018; Provost et al., 2017; Wright, Zarnegar, Hermansen, & McGavin, 2017) and depressive mood for patients (Bekelman et al., 2015; Emery-Tiburcio et al., 2019; Katz et al., 2019; Li et al., 2017; Panagioti et al., 2016). There is mixed evidence on interdisciplinary team effect on quality of life (Angeles et al., 2013; Aryani et al., 2016; Bekelman et al., 2015; Cannon et al., 2016; Carron et al., 2017; Jonsdottir et al., 2015; Provost et al., 2017; Somayaji et al., 2017; Uhlig et al., 2016) and self-management (Almutairi et al., 2019; Cannon et al., 2016; Carron et al., 2017; Katz et al., 2019; Odgers-Jewell et al., 2017; Rahman et al., 2014; Spoorenberg et al., 2018). However, it appears interdisciplinary teams which provided a combination of group education and individual support had positive associations with patient self-management (Almutairi et al., 2019; Carron et al., 2017). Overall, there is heterogenicity in how interdisciplinary teams provide care, such as the diversity in the settings, patient population (such as type of disease condition) and collaboration between providers, making it a challenge to generalize the findings. Understanding the extent to which interdisciplinary team care may support positive patient health outcomes may help to guide service delivery and build on good practices to advance primary care reform.

Therefore, the overall purpose of this study is to examine the relationship among select health outcomes (i.e., quality of life, self-management and depression) among patients who have attended an interdisciplinary primary care program. Specifically, this study will investigate if depression, quality of life and self-management patient reported outcome measures improve over a 6-month time period among patients who have attended an interdisciplinary primary care program.

Chapter 4. Methodology

Research Design

The study utilized a retrospective design leveraging existing program data from an Extended Health Team program, based in a large, urban city in Alberta. The Extended Health Team program aims to support the health home to manage the needs of adults (≥18 years) with complex health conditions where more time, expertise and an interdisciplinary team approach would be beneficial. People who attend the program have at least one chronic disease, such as chronic pain or irritable bowel syndrome (IBS), which is often accompanied by a mental health diagnosis, such as depression. To access the program people are referred by their family physician.

The Extended Health Team program takes a biopsychosocial approach to care and offers a combination of individual appointments with interdisciplinary team members and group appointment, such as chronic pain management, cognitive behavioral therapy and nutrition to build self-management, locus of control, coping skills and resiliency. The length of time a patient may access the program varies between three months to one year, based on individualized needs. However, the overall philosophy is the patients' need for extra support is for a short period of time, up to 12 months, and the long-term care of the patient still resides with the family physician. In order to support a good collaboration with the family physician, the Extended Health Team program provides regular communication through fax of completed patient care records, and to a lesser extent via telephone or in-person care conferences.

Participants. Eligible participants in this retrospective chart review included any adult (≥18 years) patient with a chronic disease who attended a first appointment in the Extended Health Team program between March 1, 2017- April 30, 2018 and completed at least one paired baseline (T1) and 6-month follow up (T2) of depression, quality of life and/or self-management measure. During the specified time period, a total of 212 participants attended the Extended Health Team program who had completed at least one paired T1 and T2 outcome measure for depression PHQ-9 (n=126), quality of life EQ-5D-5L (n=112) and/or self-management PAM (n=183). Table 1 lists demographic and clinical characteristics of participants. The majority of participants were female (73%), the median age was 54, and on average patients attended the program for a 10-month duration. The most common reason for referral to the program was chronic pain.

Table 1

Participant Demographics and Characteristics at Baseline

	N	%	M	SD
Sample Size	211			
Gender				
Female	153	73		
Male	57	27		
Age			53	17.1
Reason for Referral				
Chronic Pain	179	84		
IBS	21	10		
GERD	5	2		
Geriatrics	4	2		
Length of Time in Program (Days)			314	175
0-6 Months	51	24		
6 Months- 1 Year	69	33		
1 Year – 1.5 Year	50	24		
1.5+ Year	16	8		
Total Number of Appointments			8	23

Note. N= number of participants. % = percentage of the sample. M = Mean. SD = Standard Deviation. IBS = Irritable bowel syndrome. GERD = Gastroesophageal reflux disease.

Sampling. This study utilized a convenience sample of patients who attended the Extended Health Team program. Approximately 1200 patients attend the Extended Health Team program each year. Given the timeline for a baseline and follow up survey, the maximum sample size was 651 patients which was the number of admissions to the program over a 6-month time period. In order to help determine an appropriate sample size, power analysis was performed using G*Power. As previous studies have generally found smaller effect sizes (Panagioti et al., 2016), smaller effect sizes were anticipated in this study and used in the power analysis. For a one group, repeated measures (with 2 measurements) t-test, with an effect size f =.10, power (1 - β) set at 0.80 and α = 05, two-tailed, total sample estimates were N = 200. The final total sample size for this study was 212. However, as we were collecting matched T1 and T2 data, sample sizes did vary across constructs, as not all participants completed all measures at T1 and T2. The final sample size for depression PHQ-9 was 126 matched pairs, quality of life EQ-5D-5L was 112 matched pairs and self-management PAM was 183 matched pairs. The final sample size was lower than anticipated especially for depression and quality of life and this may have affected power. However, this illustrates the difficulty of collecting ‘real world’ data. For example, while the Extended Health Team program reported that every patient was asked to complete the survey at T1 and T2; there may or may not have been checks in place to ensure the surveys were fully completed. Patients who attend the Extended Health Team program have complex medical histories. On entry to the program, patients are given lots of information, asked to share their story, and are given a number of forms to complete. An overwhelm of information and collection of data may result in overwhelm for patients and survey fatigue. These factors may have contributed to missing data and lower total sample size.

Ethical considerations. The main ethical considerations were confidentiality and responsible data management. Ethics review and approval was granted through the Health Research Ethics Board of Alberta Community Health Committee, Ethics ID: HREBA.CHC-19-0027 and the Athabasca University Research Ethics Board, File Number 23528. The project had written endorsement from the PCN and completed the PCN internal processes for approval and access to the data.

Measures

Depression. The nine-item patient health questionnaire (PHQ-9) is a widely used self-reported multipurpose instrument used for screening, diagnosing, monitoring and measuring the severity of depression and is based on Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition criteria for major depression (Manea, Gilbody, & McMillan, 2015). Each individual is asked to rate the frequency they have experienced symptoms of depression over the previous two weeks on a scale (0=not at all, 1=several days, 2=more than half the days, or 3=nearly every day) for each of the nine items (Manea et al., 2015). A summed score is generated by adding the responses, where a scores represent 5=mild, 10=moderate, 15=moderately severe and 20=severe depression (Kroenke, Spitzer, & Williams, 2001). PHQ-9 scores of ≥ 10 is indicative of depression, with a sensitivity of 88% and a specificity of 88% for major depression (Levis, Benedetti, Thombs, & DEPRESsion Screening Data (DEPRESSD) Collaboration, 2019).The tool has demonstrated internal reliability (Cronbach α = 0.89) and validity (≥ 10 on the PHQ-9 was shown to have a specificity of 0.88) (Kroenke et al., 2001). Construct validity has previously been established through demonstrated strong associations between the PHQ-9 and functional status, disability days and difficulty managing symptoms via the short form 20 item quality of life tool (Kroenke et al., 2001).

Quality of Life. Quality of life was measured by the EuroQol five dimension and five level tool (EQ-5D-5L) which is a commonly used generic measure of health-related quality of life (McClure, Sayah, Xie, Luo, & Johnson, 2017). The EQ-5D-5L has people report on five dimensions of quality of life (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) over five levels of measurement (no problems = 1, slight = 2, moderate = 3, severe = 4 or extreme problems = 5) (McClure et al., 2017). Individuals indicates their health state for each of the five dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression. As a result, there are a possible 3125 unique health state codes. For example, an individual may select ‘no problems’, which equates to a ‘1’, on the mobility, self-care and usual activities dimensions and ‘moderate problems’, which equates to a ‘3’, on the pain/discomfort and anxiety/depression. This would be referred to as health state code ‘11133’ (Xie et al., 2016). Each health state is linked to an index score which represents the value of a given health state based on the preferences of the general Canadian population. The index score is scaled where 0 denotes a health state equivalent to death and 1 denotes full health (Xie et al., 2016). Index scores less than 0 are possible and denote health states that people consider worse than death (Xie et al., 2016).

The EuroQol quality of life measure also includes the EQ-VAS, which is an overall visual assessment of overall self-rated quality of life (Devlin & Brooks, 2017; McClure et al., 2017). On the EQ-VAS scale the individual is asked to mark an ‘X’ on a 20cm vertical scale regarding their overall general assessment of their self-rated health with endpoints labelled 100 ‘the best health you can imagine’ and 0 ‘the worst health you can imagine’ (McClure et al., 2017).

The EQ-5D-5L has been found to be a reliable and responsive tool with the ability to detect clinical change across a variety of chronic diseases (Buchholz, Janssen, Kohlmann, & Feng, 2018; Obradovic, Lal, & Liedgens, 2013; Payakachat, Ali, & Tilford, 2015).

Self-Management. The Patient Activation Measure (PAM) is a validated patient reported outcome measure which describes the knowledge, skills and confidence a person has in managing their own health care (Hibbard, Stockard, Mahoney, & Tusler, 2004). The PAM categorizes patients into four levels of activation based on their personal perception of how well they self-manage their health. The PAM consists of 10 items. Patients rate the items on a four-point Likert scale from strongly disagree to strongly agree or not applicable. A unique PAM score between 0 to 100 is generated, proprietary of Insignia Health. Each PAM score corresponds to a level of activation. Patients in Level 1 (0-46.9) and 2 (47-55.9) are considered low activated and patients in level 3 (56-74.9) or 4 (75-100) are considered highly activated (Roberts et al., 2016). As a patient progresses across the levels of activation from low (level 1) to high (level 4) they are described as more engaged, better self-advocates and better able to take positive actions in their care management (Roberts et al., 2016). Higher activation has been associated with better health related outcomes (such as preventive screening, self-monitoring activities or eating more fruits and vegetables), better patient experiences and lower admissions to hospital and emergency department visits (Hibbard & Greene, 2013). The PAM has demonstrated validity and reliability (Cronbach $\alpha = 0.76$) and has been used in a variety of populations including those with chronic disease (Skolasky et al., 2011).

Data Collection Procedure

The data source for this study is the Extended Health Team program electronic medical record (EMR). The EMR is used to capture demographic, administrative and clinical charting and information within the Extended Health Team program by health care providers and administrative staff of the program.

Data collection encompassed conducting a search in the Extended Health Team program EMR to identify patients who attended the program between March 1, 2017- April 30, 2018 and completed both baseline T1 and follow up T2 measures of depression (PHQ-9), quality of life (EQ-5D-5L) or self-management (PAM). Data was exported and saved in an excel file onto a secure PCN server by trained PCN staff. The EMR data identified unique patients by personal health number who attended a first appointment in the program within the specified study period. Data included the main reason for referral to the program, age, gender, amount of time spent in the program, number of appointments attended; and completed T1 and T2 PHQ-9, EQ-5D-5L and/or PAM.

Data Management. Data collected within the program are entered directly into the EMR. A staff member from the Extended Health Team program, who is at arms' length from the primary researcher, was asked by their manager and conducted a search to identify the specified list of participants and data elements in the EMR. Data was extracted from the EMR through generation of an excel file and saved to a folder on the PCN secure server. System access to the folder is set by restricted permissions to select PCN evaluation and team members. Then the PCN evaluation team member anonymized the data by removing personal identifiers. The anonymized data file was transferred via password protected data stick to the primary researcher. The data file was password protected on secure USB stick, stored onto a password protected computer and kept in a locked cabinet. All data will be stored for 5 years post publication and then securely destroyed.

Statistical Analysis

Statistical analyses were completed using SPSS (version 26, 2019, IBM). Data was reviewed for missing data and outliers; two cases were excluded due to missing data. Normality of the distribution of scores was assessed using the Kolmogorov-Smirnov (K-S) statistic, examination of skew and kurtosis and by visual examination of the detrended normal quantile-quantile (Q-Q) plots and histograms. PAM scores at T2, EQ-5D-5L index scores at T2, EQ-5D-5L dimensions of mobility and self-care at T1 and T2, and dimension of anxiety/depression at T2 all demonstrated some skew and/or kurtosis. The decision was made to maintain the data without transformation given the size of the sample (Field, 2013). Continuous variables were summarized as means and standard deviations, while frequencies and percentages were derived for categorical variables. Descriptive statistics were conducted for all variables. Pearson’s correlations were used to examine associations between variables. The sample size was adequate to overcome assumptions of normality and therefore t-tests were used to examine dependent variables for comparison of T1 to T2 endpoints (Field, 2013).

Chapter 5. Results

A total of 212 participants attended the Extended Health Team program and completed at least one paired T1 and T2 outcome measure for depression PHQ-9 (n=126), quality of life EQ-5D-5L (n=112) and/or self-management PAM (n=183) were included in the analysis.

Table 1 provides the demographic and clinical characteristics of participants. The most common reason for referral to the program was chronic pain. The majority of participants were female 73%, which is a consistent with other research of people who attended a chronic pain program (Rayner et al., 2016). The median age was 54 with a range from 19-91 years, and on average patients attended the program for a 10-month duration. Table 2 lists the means and standard deviations of the variables for quality of life, depression and self-management at T1 and T2.

Depression Difference from T1 to T2

A t-test was performed to look for any potential differences in depression, as indicated by the PHQ-9, between T1 and T2. There was a statistically significant difference between depression as indicated by the PHQ-9 between T1 and T2 $t(125) = 1.75$, $p = < .001$, with a medium effect size, $d = 0.30$ (Field, 2013). Inspection of the means showed that participants reported lower depression scores at T2.

Quality of Life Differences from T1 to T2

EQ-5D-5L dimensions. A t-test was used to look for any potential differences in functional quality of life based on the five EQ-5D-5L dimensions of mobility, self-care, usual activities, anxiety/depression and pain/discomfort, between T1 and T2. There were no significant differences found between T1 and T2 in four dimensions of quality of life: mobility $t(115) = -0.02$, $p = .812$, $d = 0.02$; self-care, $t(114) = -0.07$, $p = .367$, $d = 0.08$; pain/discomfort $t(116) = -$

0.13, *p* = .124, *d* = 0.15; and anxiety/depression, *t*(114) = 0.11, *p* = .316, *d* = 0.10. However, there was a statistically significant difference in the dimension of usual activities *t*(115) = 0.35, *p* = .001, and represented a medium-sized effect, *d* = 0.31 (Field, 2013). Examination of the descriptives showed that for usual activities the mean score improved over time.

Table 2

Descriptive Statistics of Dependent Variables: Quality of Life (EQ-5D-5L), Depression (PHQ-9) and Self-Management (PAM)

Variable	N	Time 1		Time 2	
		M	SD	M	SD
PAM	183				
Score		58.8	12.0	60.6	12.9
Level		2.6	0.9	2.7	0.8
EQ-5D-5L	112				
EQ-VAS		52.2	18.7	57.5	17.7
Dimensions					
Mobility		2.5	0.9	2.5	1.0
Self-care		1.7	0.9	1.7	0.9
Usual Activities		3.1	1.1	2.8	1.0
Pain/Discomfort		3.5	0.8	3.3	0.9
Anxiety/Depression		2.7	1.1	2.6	1.1
Index score		0.52	0.2	0.56	0.2
PHQ-9	126				
Score		13.3	5.9	11.5	6.4

Note. PAM = Patient activation measure. EQ-5D-5L = EuroQol 5 dimension, 5 level measure. EQ-VAS = EuroQol visual analog scale. PHQ-9 = Patient health questionnaire 9 items. N= Number of participants. M = Mean. SD = Standard deviation.

EQ-5D-5L index score. A t-test was used to look for any potential differences in quality of life, as indicated by the EQ-5D-5L index score, between T1 and T2. The values obtained from the five EQ-5D-5L dimensions generated a unique health state. The health states were then converted into the index score. The t-test revealed no significant difference in the EQ-5D-5L index score between T1 and T2, *t*(112) = 0.04, *p* = .063, *d* = 0.16.

EQ-VAS. A t-test was used to look for any potential differences in quality of life, as indicated by the EQ-VAS score where patients' self-rate their overall quality of life, between T1 and T2. Participants reported a significant difference in self-rated overall health as indicated by the EQ-VAS from T1 to T2 $t(87) = 4.43$, $p = .041$, and represented a small-sized effect, $d = 0.24$ (Field, 2013). Examination of the descriptive showed that for overall self-rated health the mean score improved over time.

Self-Management Differences from T1 to T2

A t-test was used to look for any potential differences in self-management, as indicated by the PAM score, between T1 and T2. From T1 to T2, there was a significant difference, $t(182) = 1.82$, $p = .048$, $d = 0.15$, in patient self-management as indicated by the PAM. Inspection of the descriptives (see Table 2) showed that patients reported an increase in activation from T1 to T2.

Correlations Among Depression, Quality of Life and Self-Management

Table 3 and Table 4 list the correlation matrices at T1 and T2 for depression, quality of life and self-management. Pearson's correlation revealed that depression (PHQ-9) and quality of life (EQ-VAS and index score) were negatively associated with each other, where higher quality of life scores was associated with less reported symptoms of depression and vice versa. Depression (PHQ-9) and functional quality of life (EQ-5D-5L dimensions of mobility, usual activity, pain/discomfort, anxiety and depression) were all positively associated with one another. Participants who reported less problems with walking around, washing or dressing, performing usual activities, such as housework or leisure activities, pain and discomfort, and anxiety and depression were associated with less reported symptoms of depression or vice versa.

Self-management (PAM) and depression (PHQ-9) were negatively associated with each other, where higher self-management was associated with less reported symptoms of depression or vice versa. Self-management (PAM) and overall quality of life (EQ-VAS at T1 and T2 and index score at T2) had a positive association with each other, where a higher self-management was associated with higher overall self-rated health and overall function or vice versa. Self-management (PAM) and three dimensions of functional quality of life (self-care, pain/discomfort and anxiety/depression dimension at T1 and pain/discomfort dimension at T2) were negatively associated with each other, where higher self-management was associated with less reported problems in washing or dressing, pain and discomfort, and anxiety and depression or vice versa.

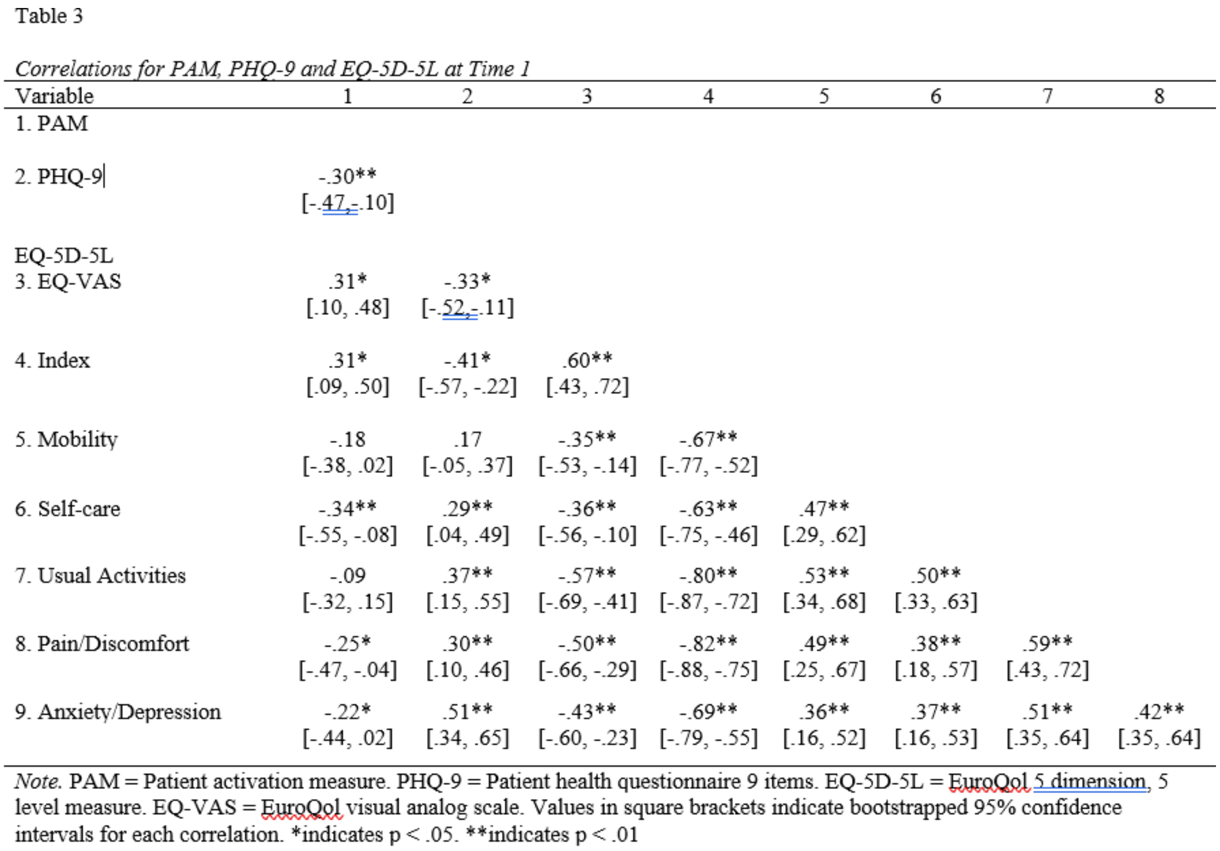

Table 3

Correlations for PAM, PHQ-9 and EQ-5D-5L at Time 1

Variable	1	2	3	4	5	6	7	8
1. PAM								
2. PHQ-9	-.30** [-.47, -.10]							
EQ-5D-5L								
3. EQ-VAS	.31* [.10, .48]	-.33* [-.52, -.11]						
4. Index	.31* [.09, .50]	-.41* [-.57, -.22]	.60** [.43, .72]					
5. Mobility	-.18 [-.38, .02]	.17 [-.05, .37]	-.35** [-.53, -.14]	-.67** [-.77, -.52]				
6. Self-care	-.34** [-.55, -.08]	.29** [.04, .49]	-.36** [-.56, -.10]	-.63** [-.75, -.46]	.47** [.29, .62]			
7. Usual Activities	-.09 [-.32, .15]	.37** [.15, .55]	-.57** [-.69, -.41]	-.80** [-.87, -.72]	.53** [.34, .68]	.50** [.33, .63]		
8. Pain/Discomfort	-.25* [-.47, -.04]	.30** [.10, .46]	-.50** [-.66, -.29]	-.82** [-.88, -.75]	.49** [.25, .67]	.38** [.18, .57]	.59** [.43, .72]	
9. Anxiety/Depression	-.22* [-.44, .02]	.51** [.34, .65]	-.43** [-.60, -.23]	-.69** [-.79, -.55]	.36** [.16, .52]	.37** [.16, .53]	.51** [.35, .64]	.42** [.35, .64]

Note. PAM = Patient activation measure. PHQ-9 = Patient health questionnaire 9 items. EQ-5D-5L = EuroQol 5 dimension, 5 level measure. EQ-VAS = EuroQol visual analog scale. Values in square brackets indicate bootstrapped 95% confidence intervals for each correlation. *indicates p < .05. **indicates p < .01

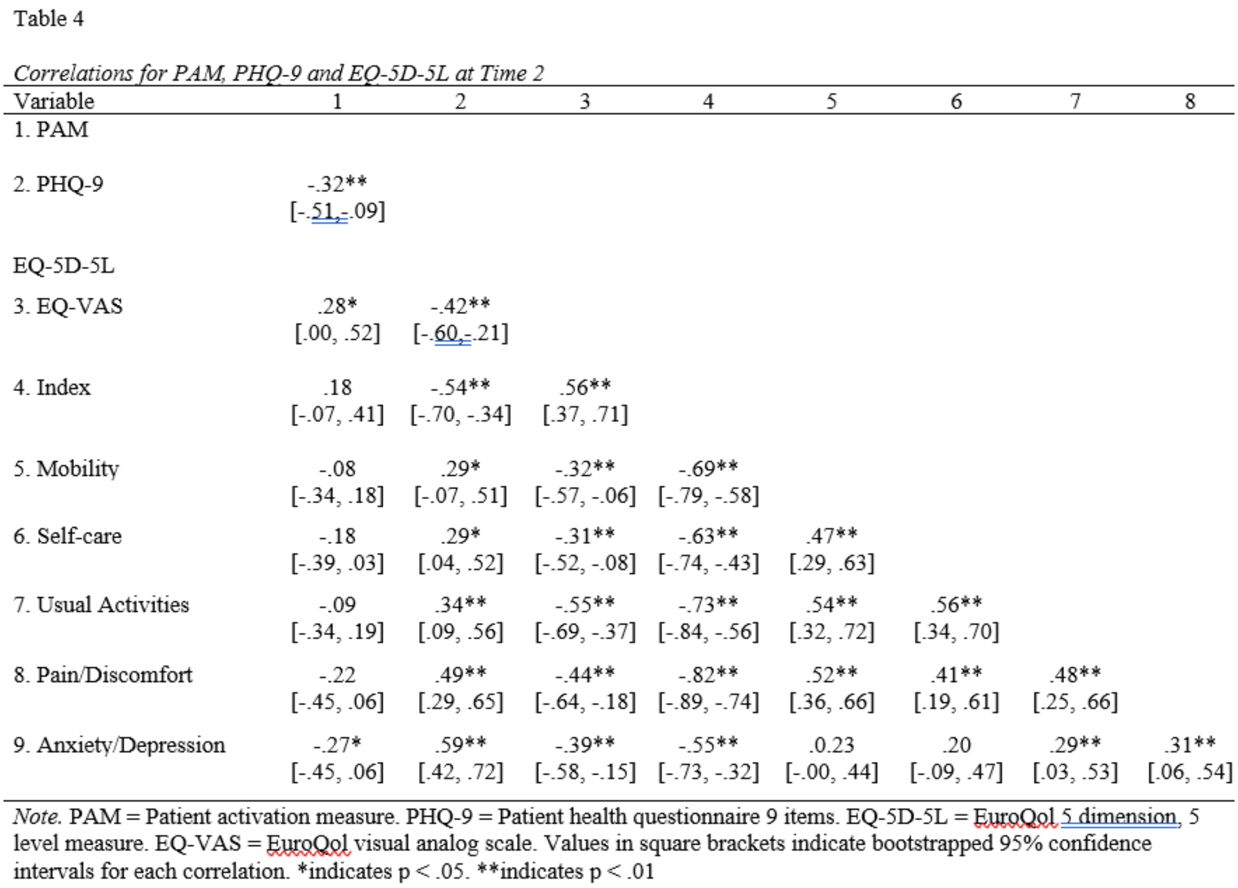

Table 4

Correlations for PAM, PHQ-9 and EQ-5D-5L at Time 2

Variable	1	2	3	4	5	6	7	8
1. PAM								
2. PHQ-9	-.32** [-.51, -.09]							
EQ-5D-5L								
3. EQ-VAS	.28* [.00, .52]	-.42** [-.60, -.21]						
4. Index	.18 [-.07, .41]	-.54** [-.70, -.34]	.56** [.37, .71]					
5. Mobility	-.08 [-.34, .18]	.29* [-.07, .51]	-.32** [-.57, -.06]	-.69** [-.79, -.58]				
6. Self-care	-.18 [-.39, .03]	.29* [.04, .52]	-.31** [-.52, -.08]	-.63** [-.74, -.43]	.47** [.29, .63]			
7. Usual Activities	-.09 [-.34, .19]	.34** [.09, .56]	-.55** [-.69, -.37]	-.73** [-.84, -.56]	.54** [.32, .72]	.56** [.34, .70]		
8. Pain/Discomfort	-.22 [-.45, .06]	.49** [.29, .65]	-.44** [-.64, -.18]	-.82** [-.89, -.74]	.52** [.36, .66]	.41** [.19, .61]	.48** [.25, .66]	
9. Anxiety/Depression	-.27* [-.45, .06]	.59** [.42, .72]	-.39** [-.58, -.15]	-.55** [-.73, -.32]	0.23 [-.00, .44]	.20 [-.09, .47]	.29** [.03, .53]	.31** [.06, .54]

Note. PAM = Patient activation measure. PHQ-9 = Patient health questionnaire 9 items. EQ-5D-5L = EuroQol 5 dimension, 5 level measure. EQ-VAS = EuroQol visual analog scale. Values in square brackets indicate bootstrapped 95% confidence intervals for each correlation. *indicates p < .05. **indicates p < .01

Chapter 6. Discussion

The purpose of this study was to examine the relationship among select patient reported health outcomes of depression, quality of life and self-management among patients with chronic disease who have attended an interdisciplinary primary care program. The results revealed overall that participation in the Extended Health Team program was positively associated with select patient health outcomes, namely depression, self-management, and overall self-rated quality of life. There were mixed results in regard to participation in the Extended Health Team program and improvement in the functional abilities of quality of life as measured by the EQ-5D-5L index score and the five dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression.

Correlations Among Depression, Quality of Life and Self-Management

Overall, people who reported more symptoms of depression were more likely to report lower quality of life and lower ability to self-manage their health. Chronic pain interferes with peoples' ability to perform regular activities of daily living, such as cooking or washing; go to work or enjoy activities with friends and family (Hadi, McHugh, & Closs, 2019). People with chronic pain may reduce their activities of daily living to avoid pain, which is a negative cycle that in turn, lowers their self-confidence to perform daily activities (Karasawa et al., 2019; Kawai, Kawai, Wollan, & Yawn, 2017). This finding is consistent with the literature which has reported relationships between depression, quality of life and self-management, where improvements in depression were associated with better quality of life and better self-management abilities (Craig et al., 2016; Hadi et al., 2019; Holt, de Groot, & Golden, 2014; Kawai et al., 2017).

Correlations Among Quality of Life and Self-Management

The relationship between self-management as measured by the PAM and quality of life as measured by the EQ-VAS, five dimensions of mobility, self-care, usual activities, pain/discomfort and anxiety/depression, and the index score varied.

Self-management as measured by the PAM, was found to have a moderate positive correlation with quality of life as measured by the EQ-VAS score, where people who reported a better ability to self-manage their health were also more likely to report better overall self-rated health.

Self-management and the functional abilities of quality of life as measured by the EQ-5D-5L five dimensions of mobility, self-care, usual activities, pain/discomfort, anxiety/depression and the index score were found to have inconsistent associations. Anxiety/depression and self-management demonstrated an inverse relationship, where higher self-management scores were associated with improved anxiety/depression scores. This finding is consistent with the correlations noted between self-management and depression as measured by the PHQ-9, where people who had rated higher self-management abilities reported less symptoms of depression. Quality of life as measured by the dimensions of self-care, pain/discomfort and the index score, demonstrated correlations with self-management as measured by the PAM when comparing T1s for each measure but not when comparing T2s for each measure.

The finding of a variable relationships between self-management and quality of life may have been found because of the difference in the 3 measures (EQ-VAS, five dimensions, and index score) of quality of life when administering the EQ-5D-5L. The EQ-VAS is the individuals' overall assessment of their health status on the given day of completing the survey and is a more subjective measure than the EQ-5D-5L index score. For example, the EQ-VAS score may be more influenced by the patient feeling supported in their care by the clinician or health care provider in addition to how well they feel they are able to manage their own health care. While that health care provider care may add to a patient feeling cared for, it may not translate into the patients' actual ability to function in daily activities as measured by the EQ-5D-5L dimensions and index score (Aung, Donald, Williams, Coll, & Doi, 2016).

Depression

One purpose of this study was to examine changes in depression following participation in the Extended Health Team program. Results of the analysis revealed there was an overall significant difference in depression scores from T1 to T2, after attendance in the Extended Health Team program. Inspection of the descriptives showed that depression scores improved over time (i.e., patients reported fewer depressive symptoms after 6 months participation in the program). This may suggest the program contributed to improvement in depression symptoms in this patient population.

This finding of improvement in depressive symptoms over time is consistent with other studies which have reported significant improvements in depression when examining shared collaborative care team models (Bekelman et al., 2015; Emery-Tiburcio et al., 2019; Katz et al., 2019; Li et al., 2017; Panagioti et al., 2016). For example, when Katz et al. (2019) examined patient health outcomes for 129 patients after participation in an 8-week interdisciplinary pain program, they also found that participants in the program also improved symptoms of depression. Clinically meaningful results for patients with depression is typically a 5-point improvement in PHQ-9 score (Kroenke, Yu, Wu, Kean, & Monahan, 2014). In the current sample, 37% (n=34) of participants self-reported at least a 5-point improvement in depression symptoms. Together, these findings suggest that participants in collaborative care programs, like the Extended Health Team program, may benefit patients' mental health by reducing symptoms/severity of depression.

At baseline, 73% (n =91) of participants reported symptoms that met the threshold for moderate to severe depression according to the PHQ-9, and 5% (n=6) of participants did not have symptoms that met the threshold for depression. This finding is comparable to depression scores noted by other chronic pain programs which utilized a similar self-reporting methodology (Anamkath et al., 2018; Racine et al., 2019; Rayner et al., 2016). For example, Rayner et al. (2016) found that among their sample of patients who participated in a chronic pain program, 61% met the threshold for moderate to severe depression. Further, the finding of high rates of self-reported depression symptoms were not necessarily unexpected given the higher rates of depression among people with chronic disease and more specifically chronic pain (Hadi, McHugh, & Closs, 2019). In the current study at T2, the sample population who met the threshold for moderate to severe depression had decreased to 60% (n=75) and 16% (n=20) of people did not have symptoms that met the threshold for depression. When Rayner et al. (2016) looked at the prevalence and impact of depression in chronic pain, they found that people with chronic pain who have depression were more likely to have worse pain and more likely for pain to interfere with their ability to function in daily activities. This finding is particularly important given the high frequency of depressive symptoms reported in the current study, as it emphasizes the need for mental health supports in interdisciplinary team programs who are serving this patient population.

The Extended Health Team program offers mental health supports, such as cognitive behavioral group therapy, acceptance commitment group therapy and individual counselling with mental health providers. Once a patient enters the program the care components are individualized with the patient through a case manager. This study was not able to ascertain the extent to which patients with moderate to severe depression attended these therapeutic group appointments, however individual and group counselling support being part of the program may be beneficial in terms of reducing symptoms of depression for this patient group.

Quality of Life

This study also examined if there were changes in quality of life following participation in the Extended Health Team program. Quality of life was assessed by the EQ-5D-5L in three different ways. One, quality of life was assessed functionally, with respect to five dimensions including mobility, self-care, usual activities, pain/discomfort and anxiety/depression (i.e., the EQ-5D-5L dimensions). The patient rated their ability to function on a five-level scale from no problems to extreme problems. Two, an overall index score (i.e., the EQ-5D-5L index score) was derived from the values obtained from the responses to the EQ-5D-5L five dimensions. This generated a five-digit patient health state. The health states were then converted into the Canadian preference-based index score which reflects the country specific value or quality given to the remaining years of life in each health state. The index score is scaled where 0 denotes a health state equivalent to death and 1 denotes full health (Xie et al., 2016). Index scores less than 0 are possible and denote health states that people consider worse than death (Xie et al., 2016). Three, participants provided an overall self-rated health assessment on a visual analog scale (i.e., the EQ-VAS).

Functional quality of life (EQ-5D-5L dimensions). Differences from T1 to T2 were assessed for each of the five quality of life dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. There was a positive difference found in the usual activities dimension, where people reported being more able to participate in their usual activities, such as housework and leisure activities at T2 compared to T1. This may be attributed to some of the group classes offered at the Extended Health Team program, which provide education and practical skills to improve coping and self-management of chronic diseases. One example of this is a group called Activity Basics which teaches patients concepts around pacing and increasing tolerance to participate in daily activities and exercise over time.

There were no significant differences found in quality of life as measured by the dimensions of mobility, self-care, anxiety/depression or pain/discomfort between the two time periods. Self-care was the least problematic dimension, where over half (56%) of participants reported no problems at baseline. It could be that no differences were seen over time because there was generally not a lot of room for improvement. The current study also failed to see an improvement in the dimension of anxiety/depression, despite the improvement seen on the depression PHQ-9 score. This may be the result of a small sample size for this measure (n=112). As a result, we may have lacked statistical power to detect a difference. However, the results did show a small effect size, indicating that indeed this may be an important finding. Had there been a larger sample of people who completed both T1 and T2 for the EQ-5D-5L, we likely would have seen statistical significance. Additionally, it has been noted that quality of life EQ-5D-5L measure shows limited responsiveness to changes in depression symptoms, as the EQ-5D-5L is a general measure relating more to quality of life surrounding anxiety and depression, and does not have the same level of specificity and sensitivity of a depression measure like the PHQ-9 (Crick, Al Sayah, Ohinmaa, & Johnson, 2018). Additionally, it was unexpected to not see a change in the pain/discomfort dimension as the majority of patients participating in the program were referred due to chronic pain. Similar to lack of changes in the anxiety/depression dimension, it could be that the pain dimension on the generic quality of life measure was not sensitive enough to respond to change (Beaudart et al., 2018) or lacked sufficient statistical power. Given the majority of patients attending this program have a chronic pain diagnosis, in the future it may be a consideration to assess pain using a symptom specific measure, such as the brief pain inventory.

Overall, participants most frequently reported experiencing the least problems in the self-care dimension, where 56% of people reported no problems in managing daily activities, such as washing and dressing oneself compared to the frequencies of reporting no problems in mobility (19%), usual activities (9%), pain/discomfort (2%) and anxiety/depression (16%). In other words, people in the current study reported more frequent functional impairment in performing activities in the dimensions of pain/discomfort (98%), usual activities (91%), anxiety/depression (84%) and mobility (81%) than in performing activities around self-care (44%).

Overall functional quality of life (EQ-5D-5L index score). Quality of life was also indicated by the EQ-5D-5L overall functional index score which was derived from the participant responses to the five dimensions. There was no significant difference noted between time periods for the index score. This is not surprising given the index score is derived from the five dimensions, of which there were non-significant differences reported in all dimensions, except the usual care dimension. This may be a result of a small sample size for the index score (n= 112) which may have lacked statistical power to detect a difference. There was a small effect size noted for the index score which may indicate an important finding. A statistically significant difference may have been found with a larger sample size. In the current study, T2 was measured at 6-month follow up and not at the end of the episode of care. It is possible a change in functional quality of life may have occurred after completion of the program.

Participants in the sample population reported an index score of 0.52 at baseline which suggests a lower overall functional quality of life. In other studies in chronic disease populations, the mean index score was noted to range from 0.47 to 0.93 (Aryani et al., 2016; Torrance et al., 2014; Turner, Anderson, Wallace, & Bourne, 2015). The mean index score difference was 0.04 which has been found to be the minimally important difference for the index score. The minimally important difference is described at the smallest point at which the change in an outcome, in this case an improvement or decline in overall functional quality of life, would be noticeable and valuable to patients (McClure et al., 2017). In the current study, 52% of patients who improved their index score, attained the minimally important difference. Therefore, although we did not see statistical significance, some people may have experienced a noticeable and valuable improvement in their overall functional quality of life.

Overall self-rated quality of life (EQ-VAS). The EQ-VAS is a visual analog scale from 0-100 where patients self-rate their overall health. There was a significant difference found between T1 and T2 for overall self-rated health (i.e., EQ-VAS). Participants at T2 reported a higher score on their self-rated health as compared to at T1, indicating improvement in overall quality of life. Overall, 51% of people improved their EQ-VAS score. The minimally important difference is the smallest point at which the change, an improvement or decline in self-rated health status, would be perceptible to patients (McClure et al., 2017). The minimally important difference for the EQ-VAS is an increase in 7 points (Pickard, Neary, & Cella, 2007; Zanini et al., 2015). In this sample, 38% patients who improved their scores attained the minimally important difference for the EQ-VAS, where they would have experienced a perceptible improvement in their overall self-rated health.

Participants in the sample population reported EQ-VAS mean score of 52.2 at T1 which suggests an overall lower quality of life. For example, the Canadian population norms for overall quality of life is a mean EQ-VAS score of 78. This finding of lower overall quality of life rating was not unexpected as previous research has found chronic disease to be associated with worse quality of life (Makovski et al., 2019). Further, the T1 score reported in this study is within range of baseline scores noted in other chronic disease populations (Aung, Donald, Williams, Coll, & Doi, 2016; Hadi, McHugh, & Closs, 2019; Turner, Anderson, Wallace, & Bourne, 2015). For example, Turner et al. (2015) examined a self-management program for people (n= 486) with a variety of chronic diseases, such as COPD, diabetes, depression and chronic pain where baseline EQ-VAS was reported to be 55.9.

Summary of Quality of Life Findings. Overall, the literature for interdisciplinary team care on quality of life has been mixed, where some studies report improvements in quality of life for patients (Aryani et al., 2016; Cannon et al., 2016; Carron et al., 2017; Provost et al., 2017; Uhlig et al., 2016), while others have not seen an effect (Angeles et al., 2013; Bekelman et al., 2015; Jonsdottir et al., 2015; Somayaji et al., 2017). Given the limitations regarding the study design, there could be confounding factors not accounted which influenced the results. For example, the patients participating in the Extended Health Team program may have experienced acute disease exacerbations which may have further impacted their ability to function. In the current study disease progression was not captured. Additionally, there may be other factors to consider which may have contributed to the results, such as the sample size, length of the intervention and the program design.

The current study failed to see an improvement in the dimensions of anxiety/depression, pain/discomfort and index score. This may be the result of a small sample size for the measure (n=112), where we may have lacked statistical power to detect a difference. However, the results showed small effect sizes, indicating that indeed these may be important findings.

Regarding length of the intervention, in this study there was a significant association found for improved overall self-rated quality of life and improved function in usual activities after 6-month participation in the program. The other functional quality of life measure as indicated by the index score and dimensions of mobility, self-care, pain/discomfort, and anxiety/depression did not show any significant change over time. Functional quality of life changes may take longer to show improvement (Turner et al., 2015). Research generally seems to show more positive results of interdisciplinary team on patient quality of life in studies where the intervention was 6 months or longer for people with chronic diseases (Aryani et al., 2016; Cannon et al., 2016; Carron et al., 2017; Provost et al., 2017). People on average participated in the program for 11 months, however, EQ-5D-5L was measured at the 6-month follow up when the episode of care was not yet complete. In the future it may be better to repeat the measures to assess functional quality of life again at end of the episode of care (11 months), in addition to the measurements at 6 months follow up (T2), to determine if functional changes in quality of life take longer to realize. The Extended Health Team program cares for patients with chronic diseases. By their definition, chronic diseases are considered progressive illnesses, generally without a cure. Treatment goals center around minimizing or moderating the impact of the disease. A patients' ability to function in their daily life are important considerations for their satisfaction in life (Makovski, Schmitz, Zeegers, Stranges, & van den Akker, 2019). Quality of life measures aim to reflect important factors to patients in health-related quality of life. The Extended Health Team program may benefit from incorporating in specific discussion with patients around quality of life. For example, at a group or individual provider appointment to review and write down with the patient functional goals to work towards, such as being able to dress oneself independently or being able to go for a walk.

The Extended Health Team program aims to support people to build self-management skills to help them to manage their chronic diseases. The Extended Health Team program works in collaboration with the health home and the family physicians to support continuous patient centered care by maintaining a close connection through phone calls and written communication back and forth between the health home and the program. A study by Provost et al. (2017), described similar characteristics of an interdisciplinary team program which emphasised collaboration with the family physician and found that greater care coordination between the program and primary care physicians was associated with greater participation and improved health outcomes including quality of life. While not measured specifically in the current study, this program design element may be a factor that contributed to why the current study saw an improvement and others failed to see significant change in quality of life.

Self-Management

Finally, this study examined changes in self-management following participation in the Extended Health Team program. There was a significant difference found between T1 and T2 for self-management as measured by the PAM, where participants reported an improvement in their ability to self-manage their health after participation in the Extended Health Team program. This may suggest the program contributed to improvement in self-management abilities in this patient population. Literature has suggested that an increase in 3 points represents a clinically meaningful improvement in activation for a patient and an increase in PAM by one level has been associated with lower costs to the health care system (Hibbard et al., 2017; Lindsay et al., 2018; Turner, Anderson, Wallace, & Bourne, 2015). In this study, 33% of patients increased their level of activation, such as increasing from PAM level 1 to a level 2, and 50% of people increased their PAM score by at least 3 points, where the patient would have experienced a noticeable and valuable improvement in their abilities to self-manage their own health. The findings of a positive difference after an interdisciplinary team intervention is similar to a growing body of research (Almutairi et al., 2019; Cannon et al., 2016; Carron et al., 2017; Rahman et al., 2014). The PAM is an indicator which aims to assess all the self-management concepts of self-efficacy, knowledge and skills, and it could be this is a better measure when examining self-management in interdisciplinary team intervention (Do et al., 2015). As well, there may be features of the Extended Health Team program to consider which may have contributed the current study finding an improvement in self-management abilities after 6-month attendance in this interdisciplinary team care program, such as length of the intervention and the program design.

In the Extended Health Team program, the length of the intervention is tailored based on the needs of the patient, however, most people participated in the program for 11 months. The follow up T2 survey was measured after about 6 months in the program. Other studies which found positive associations with interdisciplinary team care also had at least a 6-12 month length of intervention and measured self-management at the end of the episode of care (Almutairi et al., 2019; Carron et al., 2017; Spoorenberg et al., 2018). An increase in self-management involves an improvement in knowledge, confidence and a resultant change in behavior, to elicit new skills in managing one’s own health. This may take time and exposure to the intervention to see a change.

The Extended Health Team program leverages the expertise of a mix of interdisciplinary team members to provide a variety of individual and group appointments. Improvement in self-management with interdisciplinary team care was similarly found in a study by Carron et al.

(2017), where team supports were offered to patients in a mix of group and individual appointments; and conversely not seen where only an education approach was taken (Odgers-Jewell et al., 2017). Similarly, in the systematic review by Almutairi et al. (2019), which examined effectiveness of interventions to improve self-management in diabetes care, found the interdisciplinary team approach resulted in improved blood sugar control, as well as better self-management behaviors, such as medication adherence, self-monitoring of blood sugars and diet compliance. Furthermore, the Extended Health Team program interdisciplinary team members are trained in behavior change methodologies and practical self-management techniques for patients. These self-management methodologies are incorporated in the many supports and interventions which may benefit this patient population, such as an introduction to pain management, activity and pacing, acceptance and commitment therapy, and other groups to support patients in reframing their thought processes, dealing with emotions and changing behavior patterns.

Self-management as measured by the PAM is converted into a PAM score and a PAM level. PAM scores correspond to the PAM level as follows: Level 1 (0-46.9) and 2 (47-55.9) are considered low activated and level 3 (56-74.9) or 4 (75-100) are considered highly activated (Roberts et al., 2016). As a patient progresses across the levels of activation from low (level 1) to high (level 4) they are described as more engaged, better self-advocates and better able to take positive actions in their care management (Roberts et al., 2016). Many patients, 42%, who attended the program self-reported a level 3 of activation at baseline T1, indicating they were starting to take an active role in managing their own health. This finding is consistent with Nost, Steinsbekk, Bratas, & Gronning (2018) who conducted a randomized controlled trial in people with chronic pain to examine the effects of a self-management intervention. Similarly, they found half (51%) of their participants self-reported a PAM level 3 at baseline (Nost et al., 2018). This finding makes sense because people who are ready to self-manage their health may be more likely to seek out and be motivated to attend a health education program, such as the Extended Health Team program.

However, previous research has found that people with lower levels of activation (PAM level 1 and level 2) are more likely to be diagnosed with subsequent chronic diseases and are more likely to use the health care system (Hibbard, Greene, Sacks, Overton, & Parrotta, 2017). In the current study, at baseline, 16% of participants were classified as a PAM level 1 and 24% of people were classified as a PAM level 2. This is finding is slightly higher compared to the findings by Nost et al. (2018), who reported 13% of participants at PAM level 1 and 10% at PAM level 2. It may be valuable for the Extended Health Team program to continue to consider how to draw in more patients with lower levels of activation as they may benefit more from the program. It is possible that patients with a lower level of activation may not be referred by their physician to the program, however, these patients may benefit from earlier intervention with the care team in the physician clinic. Due to the design of the study it is unclear if there may have been lower activated patients (level 1 or level 2) who entered the program but did not stay enrolled long enough to complete a follow up T2. Patients with lower activation levels may not understand the need to play a role in managing their own health and tend to be less adherent to treatment (Lindsay, Hibbard, Boothroyd, Glaseroff, & Asch, 2018).

Limitations

The study design limited the ability to draw causal inference on associations between participation in the program and the health outcomes of depression, quality of life and self-management. There may have been confounding variables in the environment, settings or events, which may have co-occurred during the time of the study and were not adequately controlled for without a control group. For example, as there was no control population, the study was therefore not able to conclude whether any changes in patient health outcomes was due to participation in the Extended Health Team program or other factors, such as access to specialist provider care or better medication control or adherence. While an experimental study design would have allowed the determination of cause and effect relationship between attendance in the Extended Health Team program and the select patient reported health outcomes; time and process constraints rendered this study design unfeasible. Additionally, it may be argued that a strength of this study was the real world setting and the outcomes found here may be more generalizable for patients with chronic disease compared to an experimental design.

This study leveraged a convenience sample of patients who had completed paired T1 and T2 measures for depression (PHQ-9), quality of life (EQ-5D-5L) and self-management (PAM). While this was very helpful from a time and resources perspective to complete the research, there was the potential for bias. For example, it is possible that participants who completed baseline T1 measures, but not follow up T2 measures, were less activated in managing their own health than the group that completed the T2 measures. This may have overestimated our findings. It may have been possible to explore this further by examining the patient characteristics and outcomes for those who only completed T1 measures. However, we did not request that data as part of the current study. Despite the retrospective design of the study, we were able to obtain completed paired sample records for a total of 212 patients. Additionally, the findings in the current study demonstrated a positive impact of interdisciplinary teams in improving patient health outcomes, which is congruent with the literature for depression (Bekelman et al., 2015; Emery-Tiburcio et al., 2019; Katz et al., 2019; Li et al., 2017; Panagioti et al., 2016), quality of life (Aryani et al., 2016; Cannon et al., 2016; Carron et al., 2017; Provost et al., 2017; Uhlig et al., 2016) and adds to the growing literature base in self-management (Almutairi et al., 2019; Carron et al., 2017; Spoorenberg et al., 2018), therefore the results seem to be generalizable to other populations. Another strength of the study may have been in the indicator administered for self-management (PAM) which measured self-efficacy, knowledge and skills instead of self-efficacy alone.

Given the real-world design of this study and the original data collection methods, there may be some data limitations. Though the total sample size was 212, the number of paired sample record was less for each measure: PHQ-9 (n = 126), EQ-5D-5L (n = 112) and PAM (n = 183) and therefore the study may have lacked sufficient statistical power. For example, despite seeing a small effect size there was a non-statistically significant finding for quality of life index score and the dimensions of pain/discomfort and anxiety/depression. This may indicate that the program was effective at helping patients to improve their overall functional quality of life and pain/discomfort, but the study was underpowered to detect any statistically significant difference. While the design of this study made it less time and resource intensive to conduct and allows us to see how interdisciplinary team care performs in a real-world setting; one limitation included being unable to alter sample size. This retrospective chart review entailed going back into patient records to examine data that had already been collected for participants who are no longer in the program. The data was limited by what was collected during the specified time period. For example, there were not paired samples for each participant for all three of variables of interest depression, quality of life and self-management indicating that some participant measures were lost to follow up, had missing data, or just never completed a T2 measure. A larger sample of patients may have helped to provide sufficient power for the study to detect a finding. Overall it may be worthwhile to conduct a prospective study to obtain a larger sample size and add to the literature regarding interdisciplinary team care and quality of life.

While there were positive associations found between participation in the program and improvements in depression, quality of life and self-management, the data collected for T2 was at approximately 6-month in the program. However, the majority of patients attend the program for approximately 11 months. It may have been worthwhile to repeat the depression, quality of life and self-management measures again at the end of the episode of care (11 months), to understand if there were any additional observations at completion of the program, such as associations with improvement in functional quality of life. Conversely, it could be that a 6-month or shorter program may suffice, which would have resource and staffing implications for the program. Finally, the source of data entered into the EMR included information the physician provided on the Extended Health Team program referral form, and any additional data gathered from the patient by interdisciplinary team members. The information did not provide a complete medical history and there may be missing data or variation in data collected. Therefore, while the participants appeared to have multiple chronic diseases, the decision was made to only include the main reason for referral to the program as a more accurate description of the participant population. While the main reason for referral data sufficed for the current study, the Extended Health Team program may want this information in future to help the program tailor appointments or group classes to their patient population.

Recommendations for Future Research

The results of this study provide valuable insights into interdisciplinary team care, such as the positive associations found between an interdisciplinary team intervention and depression, overall self-rated quality of life, and self-management. The heterogeneity of how interdisciplinary teams provide care, such as the variety of patient populations and the interventions, such as type of care program delivered, can make it difficult to understand the extent to which the results found may be generalized. However, the results of this study contribute to the growing body of evidence for interdisciplinary care and positive effects on patient health outcomes (Almutairi et al., 2019; Aryani et al., 2016; Cannon et al., 2016; Carron et al., 2017; Li et al., 2017; Panagioti et al., 2016; Provost et al., 2017; Spoorenberg et al., 2018). More comprehensive details and examination of the interventions, such as quality of the patient encounters, measures of other clinical markers of health, and contacts with the health home may be beneficial in advancing the understanding of interdisciplinary team impacts on patient care. Future research, such as randomized controlled trials which examine measures of depression, quality of life and self-management over an extended period of time would help to determine whether patients benefit from a chronic disease program to increase patient coping and self-management are sustained over time.

From a program service delivery perspective, it was positive to see that the resources put into an interdisciplinary team primary care program working in conjunction with the health home had a positive impact on patient outcome measures of depression, overall self-rated quality of life, functional usual care activities and self-management abilities in a patient population with chronic disease. In the future it would be valuable to explore the relationship between the Extended Health Team program and the health home, to further the understanding of how interdisciplinary team programs can contribute to better patient care coordination and continuous care in a chronic disease population. Furthermore, it would be interesting to understand more characteristics of the patient population, severity of symptoms (such as depression) and length of the program to explore opportunities stratify patient needs and optimize program resources and supports. For example, patients with lower self-management (PAM level 1 and level 2) and more depression symptoms may need more intensive one on one provider care tailored to their needs; as opposed to patients who may still have depression symptoms but have a higher self-management skills. It may also be worthwhile to consider the addition of a disease specific symptom measure, such as a pain measurement tool, which may be more sensitive to changes in this intervention, given the majority of patients were referred to the program for chronic pain management. Finally, exploring if the positive associations found after this interdisciplinary team intervention further translate into other health system considerations, such as reductions in hospital or urgent care admissions, and overall reductions in health costs would be valuable.

Chapter 7. Conclusion

The purpose of this study was to examine the relationship among select patient reported health outcomes of depression, quality of life and self-management among patients with chronic disease who attended an interdisciplinary primary care program. The results revealed participation in the Extended Health Team program was associated with improvement in depression, overall self rated quality of life, functional abilities in performing usual activities, and self-management. However, there were no changes noted in the other functional abilities of quality of life as measured by the EQ-5D-5L index score and the dimensions of mobility, self-care, pain/discomfort and anxiety/depression. It is possible this was due to the small sample size given the small effect size noted for the index score and the dimensions of pain/discomfort and anxiety/depression. Additionally, it may be worthwhile to repeat the study and complete the follow up T2 measures at the end of the episode of care. Overall the findings of the current study add to the growing body of literature supporting the important role of interdisciplinary teams in helping to improve patient health outcomes. From a program service delivery perspective, the Extended Health Team program should be acknowledged for providing care, through a variety of interdisciplinary team members with a mix of group and individual appointments, that improves health outcomes for patients. The findings of this study and previous research suggest that moving forward health care system administrators should consider integrating more interdisciplinary team programs into primary care to support better patient care.

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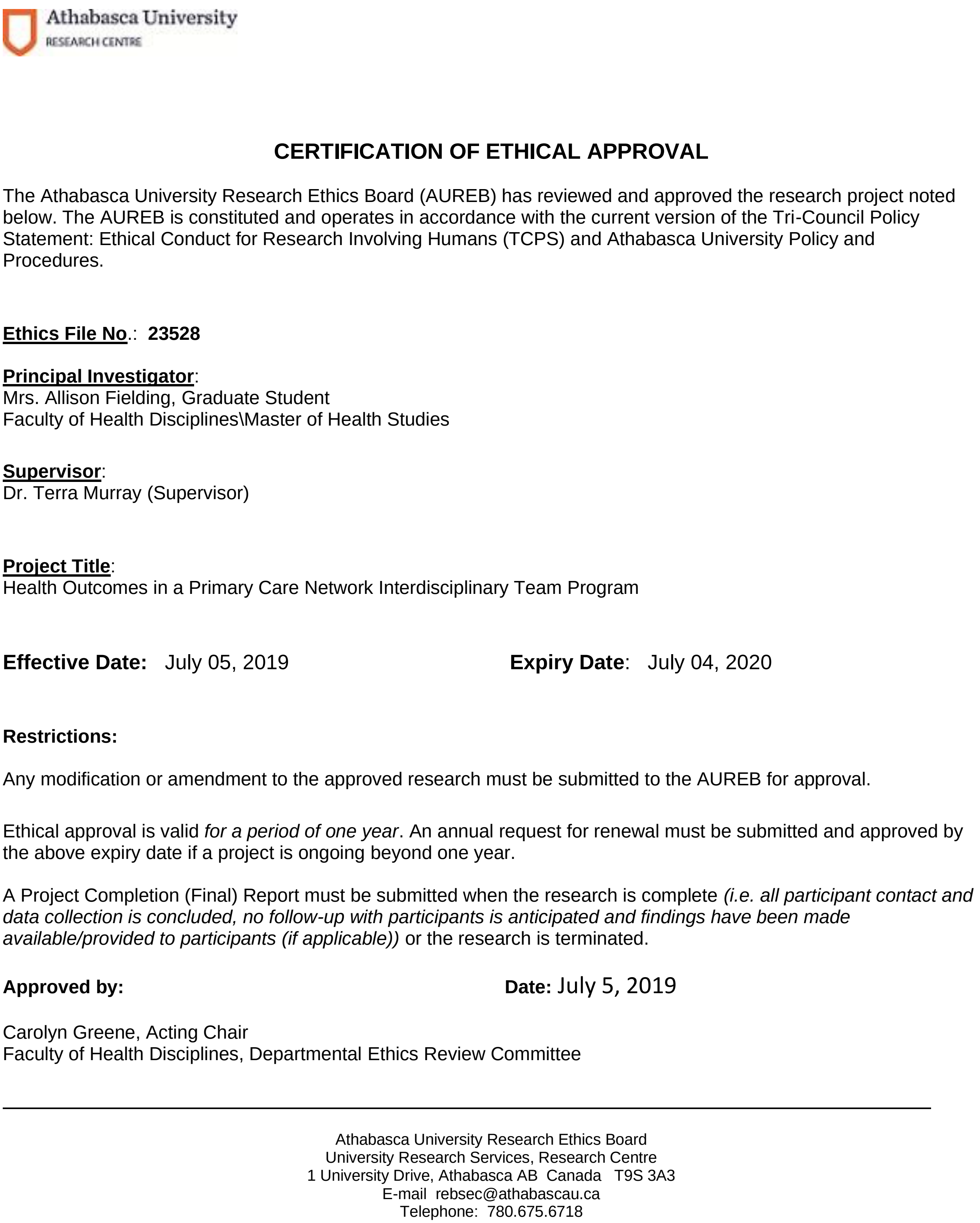
Appendix A: Letters of Ethics Approval



Athabasca University
RESEARCH CENTRE

CERTIFICATION OF ETHICAL APPROVAL

The Athabasca University Research Ethics Board (AUREB) has reviewed and approved the research project noted below. The AUREB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and Athabasca University Policy and Procedures.

Ethics File No.: **23528**

Principal Investigator:
Mrs. Allison Fielding, Graduate Student
Faculty of Health Disciplines\Master of Health Studies

Supervisor:
Dr. Terra Murray (Supervisor)

Project Title:
Health Outcomes in a Primary Care Network Interdisciplinary Team Program

Effective Date: July 05, 2019 **Expiry Date**: July 04, 2020

Restrictions:

Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e. all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date:** July 5, 2019

Carolyn Greene, Acting Chair
Faculty of Health Disciplines, Departmental Ethics Review Committee

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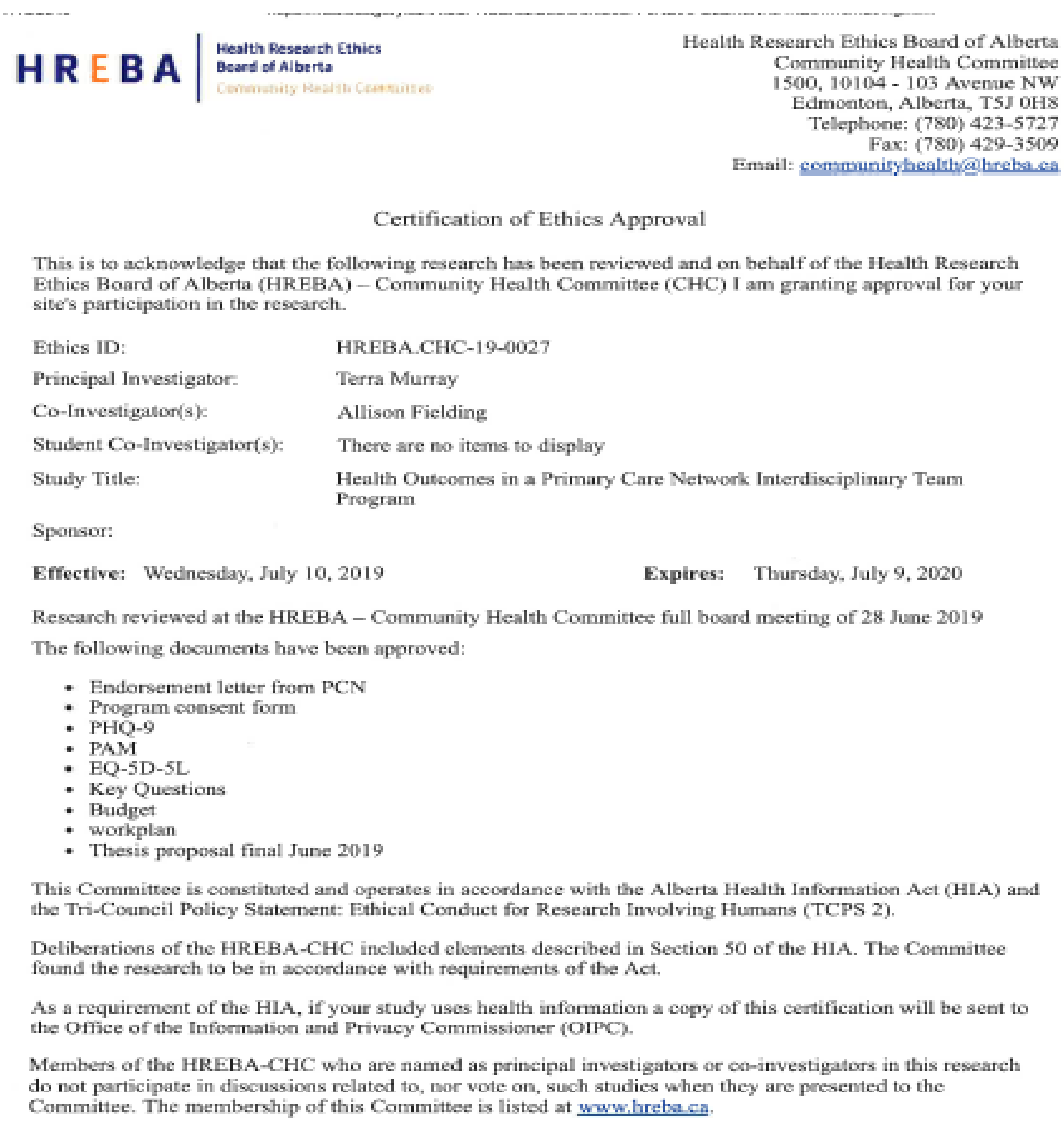
Athabasca University Research Ethics Board
University Research Services, Research Centre
1 University Drive, Athabasca AB Canada T9S 3A3
E-mail rebsec@athabascau.ca
Telephone: 780.675.6718



HREBA | Health Research Ethics Board of Alberta
Community Health Committee

Health Research Ethics Board of Alberta
Community Health Committee
1500, 10104 - 103 Avenue NW
Edmonton, Alberta, T5J 0H8
Telephone: (780) 423-5727
Fax: (780) 429-3509
Email: communityhealth@hreba.ca

Certification of Ethics Approval

This is to acknowledge that the following research has been reviewed and on behalf of the Health Research Ethics Board of Alberta (HREBA) – Community Health Committee (CHC) I am granting approval for your site's participation in the research.

Ethics ID:	HREBA.CHC-19-0027
Principal Investigator:	Terra Murray
Co-Investigator(s):	Allison Fielding
Student Co-Investigator(s):	There are no items to display
Study Title:	Health Outcomes in a Primary Care Network Interdisciplinary Team Program
Sponsor:	

Effective: Wednesday, July 10, 2019 **Expires:** Thursday, July 9, 2020

Research reviewed at the HREBA – Community Health Committee full board meeting of 28 June 2019

The following documents have been approved:

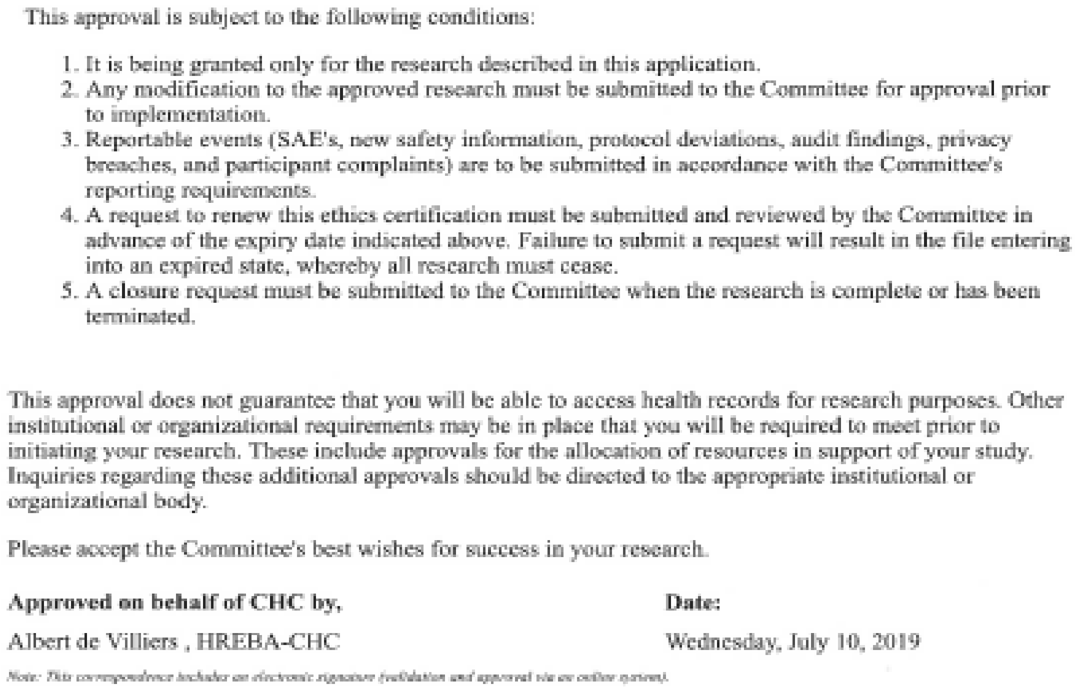
- Endorsement letter from PCN
- Program consent form
- PHQ-9
- PAM
- EQ-5D-5L
- Key Questions
- Budget
- workplan
- Thesis proposal final June 2019

This Committee is constituted and operates in accordance with the Alberta Health Information Act (HIA) and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2).

Deliberations of the HREBA-CHC included elements described in Section 50 of the HIA. The Committee found the research to be in accordance with requirements of the Act.

As a requirement of the HIA, if your study uses health information a copy of this certification will be sent to the Office of the Information and Privacy Commissioner (OIPC).

Members of the HREBA-CHC who are named as principal investigators or co-investigators in this research do not participate in discussions related to, nor vote on, such studies when they are presented to the Committee. The membership of this Committee is listed at www.hreba.ca.



This approval is subject to the following conditions:

1. It is being granted only for the research described in this application.
2. Any modification to the approved research must be submitted to the Committee for approval prior to implementation.
3. Reportable events (SAE's, new safety information, protocol deviations, audit findings, privacy breaches, and participant complaints) are to be submitted in accordance with the Committee's reporting requirements.
4. A request to renew this ethics certification must be submitted and reviewed by the Committee in advance of the expiry date indicated above. Failure to submit a request will result in the file entering into an expired state, whereby all research must cease.
5. A closure request must be submitted to the Committee when the research is complete or has been terminated.

This approval does not guarantee that you will be able to access health records for research purposes. Other institutional or organizational requirements may be in place that you will be required to meet prior to initiating your research. These include approvals for the allocation of resources in support of your study. Inquiries regarding these additional approvals should be directed to the appropriate institutional or organizational body.

Please accept the Committee's best wishes for success in your research.

Approved on behalf of CHC by,	**Date:**
Albert de Villiers , HREBA-CHC	Wednesday, July 10, 2019

Note: This correspondence includes an electronic signature (validation and approval via an online system).