THE HEALTH-PROMOTING POTENTIAL OF OCCUPATIONS: AN EXPLORATORY STUDY OF ADULTS WITH AND WITHOUT INFLAMMATORY ARTHRITIS

by

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Abstract

Introduction: Inflammatory arthritis (IA) can limit everyday occupations, yet engaging in valued occupations is believed to promote health. This dissertation explores the relationship between occupation and health in adults with IA and a healthy comparison (HC) group, and the impact of public health restrictions on occupation and health during the first wave of the COVID-19 pandemic.

Methods: A cross-sectional design was employed with participants recruited through community advertising. Occupations were elicited and occupational characteristics measured using Personal Projects Analysis; and aspects of health assessed using the SF-36 Health Survey (Physical and Mental Component Scores), Occupational Balance Questionnaire, Satisfaction with Life Scale, and telomere length (from dried blood spots). During the first "stay home" phase of the pandemic, all self-report measures were repeated online to compare with pre-pandemic ratings. Data were analyzed with content analyses, Chi-square tests, t-tests, linear regressions, and ANCOVAs.

Results: 143 adults (76 HC, 67 IA) participated in the cross-sectional study; a subset of 71 (37 HC, 34 IA) participated in the pandemic before-and-after study. Participants engaged in six major categories of occupations related to health, leisure, home, community, relationships, and life planning. These categories did not differ between IA and HC groups. The IA group rated occupational characteristics higher than the HC group, with between-group differences in three of the 19 characteristics after controlling for demographic covariates. Different occupational characteristics were associated with physical health for the two groups; among the more salient characteristics were the perceived *Difficulty, Importance, Stress, Progress, Others' view*, and *Control* attributed to one's occupations. Occupational balance was higher in the HC group than the IA group, but not statistically significant when adjusted for physical health. There was no between-group difference in telomere length, or associations between occupational characteristics and telomere length. Mental health scores decreased compared to pre-pandemic ratings in the HC group only, and the IA group engaged in fewer social occupations than the HC group.

Conclusion: These findings help fill a gap in the literature with a nuanced understanding of the association between occupation and health, which may inform recommendations on the kinds of occupations likely to promote health.

Lay Summary

This dissertation examined the relationships between specific kinds of life activities and health among adults with and without arthritis. Using questionnaires, I asked 143 people about their activities, the balance across different types of activities, and their physical and mental health. Blood tests were used to measure telomere length, a measure of cellular aging. Questionnaires were repeated with 71 participants during the first wave of COVID-19.

Although people with arthritis reported lower physical health, I found that people with and without arthritis engaged in similar activities. The two groups did not differ in telomere lengths. A satisfying balance of activities is related to better mental health. Both groups reported greater balance of activities during COVID-19 (compared to pre-pandemic), and only the non-arthritis group had lower mental health. Findings provide a better understanding of relationships between people's activities and health and inform recommendations for living well with arthritis.

Preface

The research conducted for this dissertation took place in the Greater Vancouver area, British Columbia, based out of the University of British Columbia (UBC) and Arthritis Research Canada (ARC). For purposes of future research publication, the dissertation is divided into four studies. I was responsible for research design, execution, data collection, and analysis for all four studies. Dr. Catherine Backman (supervisor) along with thesis committee members (Dr. Susan Forwell and Dr. Eli Puterman) provided guidance and mentorship for the full dissertation. The UBC Clinical Research Ethics Board provided ethic approval for the dissertation research (H18-00321).

Chapter 2 will be submitted for publication with co-authors Dr. Catherine Backman and Dr. Sue Forwell.

Chapter 3 will be submitted for publication with co-authors Dr. Catherine Backman, Dr. Sue Forwell, and Dr. Eli Puterman.

A version of Chapter 4 has been submitted for publication. To-Miles, F., Håkansson, C., Wagman, P., & Backman, C.L. (2021). Accepted pending minor revisions. Exploring the associations among occupational balance and health of adults with and without inflammatory arthritis.

Chapter 5 will be submitted for publication with co-authors Dr. Catherine Backman, Dr. Carita Håkansson, and Dr. Petra Wagman.

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List of Abbreviations

BC	British Columbia
DLW	Do-Live-Well
HC	Healthy comparison
IA	Inflammatory arthritis
JIA	Juvenile idiopathic arthritis
MCS	Mental Component Score (from SF-36)
OBQ	Occupational Balance Questionnaire
OSOT	Occupational Science and Occupational Therapy
PCS	Physical Component Score (from SF-36)
PPA	Personal Projects Analysis
PSS	Perceived Stress Scale
qPCR	Quantitative polymerase chain reaction
RA	Rheumatoid arthritis
SWLS	Satisfaction with Life Scale
TL	Telomere length

Glossary

Activity: A thing that someone does, such as a pastime, domestic chore, or work task. Activity may be synonymous with pursuit or occupation, especially as used outside the occupational science and occupational therapy literature. However, activity is distinct from occupation. Activity is more discrete and does not reflect the personal and cultural meaning that occupations do. For example, an activity might be 'cooking oatmeal', while the occupation would be 'preparing breakfast for one's family'. In this dissertation, the term 'occupation' will be mainly used; yet it is sometimes necessary to use the term 'activity' interchangeably with occupation when citing literature or communicating information outside the disciplines of occupational science and occupational therapy.

Creative occupations or projects: While there are many facets of creativity and operational definitions of creativity (Hennessey & Amabile, 2010), creative occupations in this study include (but are not limited to): coming up with novel ideas, expressing oneself in an original or useful way, or engaging in artistic activities (e.g., art, music, writing, etc.). It is recognized that what may constitute a creative occupation to one person may not be creative to someone else. When responding to the Personal Projects Analysis tool, participants use their own interpretation of a creative project.

Health: "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946, p. 1).

Occupations: Groups of activities or tasks of everyday life that people do to occupy themselves (CAOT, 1997). Occupations are characterized by active participation, and hold personal and sociocultural meaning. In the Canadian Model of Occupational Performance and Engagement

(Polatajko et al., 2007), occupations are categorized according to three primary purposes: self-care, productivity, and leisure.

Occupational balance: The subjective perception of having "the right amount of occupations and the right variation between occupations" (Wagman et al., 2012, p. 324).

Occupational deprivation: "A state in which a person or group of people are unable to do what is necessary and meaningful in their lives due to external restrictions" (Whiteford, 2016, p. 1).

Occupational science: A rigorous, scientific discipline dedicated to the study of human occupations (Yerxa, 1990), stemming from a diverse range of disciplines (Zemke, 2016). Research in this field may inform practice (e.g., occupational therapy) and/or it may contribute knowledge to aspects of human occupation.

Occupational therapy: "A client-centred health profession concerned with promoting health and well being through occupation" (WFOT, 2012, para. 1). Occupational therapy is an art and science with the goal of enabling people to perform occupations that foster health and well-being; occupational therapists work with people to enable participation in their daily occupations (Townsend et al., 2007).

Personal projects: A concept originating from personality psychology, personal projects are goal-directed activities that occupy our daily lives and are highly individual (Little, 1983).

Personal projects analysis (PPA): A tool to identify and examine the content and characteristics of people's personal projects, consisting of three self-reported modules (Little, 1983), which are project elicitation, project (dimensions) ratings matrix, and cross-impact matrix; a fourth module was later added: project nesting (laddering) matrix (Little, 2014).

Project dimensions: The 17 characteristics that describe individual projects in the PPA (Little, 1983), upon which participants rate their projects on these project dimensions on a scale from 0-

10. Examples of project dimensions are *Importance, Stress*, *Absorption*, and *Progress*. One of the strengths of PPA is its flexibility, allowing researchers to add project dimensions as appropriate according to the research question, which has been previously done (e.g., Vroman et al., 2009). In this dissertation, two project dimensions (*Social* and *Creative*) were added for a total of 19 project dimensions. Because PPA is used as the tool to assess occupation (Christiansen et al., 1998), project dimensions are synonymous with the term **occupational characteristics** in this dissertation for broadly describing occupations' traits.

Social occupations or projects: Derived from the concept of 'social integration' (Cohen, 2004), social occupations are participation or active engagement that involves a cognitive sense of identification with others. It is recognized that what may constitute a social occupation to one person may not be social to someone else. When responding to the Personal Projects Analysis tool, participants use their own interpretation of a social project.

Stress: A subjective experience when "individuals simultaneously appraise events as threatening or otherwise harmful and their coping resources as inadequate" (Cohen et al., 2016, p. 458). Note that for the *Stress* project dimension in the Personal Projects Analysis tool, participants were asked to rate their projects on "how stressful is it to for you to carry out this project?" without a specific definition of the concept.

Telomeres are made of DNA molecules with protein structures that cap the ends of chromosomes (Blackburn & Chan, 2004; Blackburn & Gall, 1978; Szostak & Blackburn, 1982). Since telomeres shorten with cell replication and division, telomere length (TL) is proposed as a marker of biological aging (Blasco, 2005).

Well-being: An internal construct, describing "a state of contentment – or harmony – with one's: physical/mental health… emotional/spiritual health…" (Hammell & Iwama, 2012, p. 387). While there is overlap between health and well-being, the concept of well-being is considered to be more subjective and overarching.

Acknowledgements

Completing a PhD is not unlike running a marathon. It requires hard work, time, grit, and focused energy. But perhaps more importantly, it requires a team of people who will cheer you on along the way. The completion of this dissertation would not have been possible without the support and contributions of many people and organizations.

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As a first-generation secondary and post-secondary education graduate, it was sometimes not understood why I would do a PhD when I already had a professional degree. Despite this, my family showered upon me love and support as I charted my own life course. Thank you to my parents for their unwavering belief in my ability to complete a PhD.

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To my children (my PhD babies),

for always reminding me of the important things in life.

Chapter 1: Review of Literature

Approximately 2% of the Canadian population has inflammatory types of arthritis (Statistics Canada, 2018), a group of chronic diseases with debilitating symptoms such as pain, joint swelling, and fatigue. Inflammatory arthritis (IA) is an overarching term that includes several conditions including rheumatoid arthritis (RA), spondyloarthritis, psoriatic arthritis, lupus, and juvenile idiopathic arthritis (JIA). The age of onset varies depending on the specific arthritis diagnosis (Eriksson et al., 2013; McLaughlin & Ostör, 2014; Sullivan et al., 1975), but a majority of people with IA are young to middle-aged adults at a life stage where productive roles like employment and parenting/caregiving are at their peak. IA symptoms can affect one's ability to engage in everyday activities associated with these roles; yet, regular participation in a variety of activities promotes well-being and decreases arthritis symptoms (Katz & Yelin, 2001; Tench et al., 2003). People with IA need self-management strategies that include guidelines for activities that can enhance health and increase quality-of-life.

To date, "healthy lifestyle" recommendations related to activities focus primarily on the benefits from engaging in physical activities (Gewurtz et al., 2016). While physical activity is important to living well with arthritis (Katz et al., 2018; Larkin et al., 2016), there is a lack of research on the health benefits associated with engaging in other types of activities, such as activities that people consider important or perceive as enjoyable. Examining the important association between activities and well-being may lead to improved interventions for people living with arthritis and inform public health messages to promote health through activity engagement. Applying an occupational lens, I will refer to daily activities that structure people's day-to-day lives as "occupations".

The overall aim of this dissertation was to explore the relationships between occupations and health in adults with and without inflammatory arthritis (IA). The indicators of health selected for the dissertation include both self-reported health status and a biomarker: telomere length. Therefore, this background is organized into five sections: 1) occupations, activities, and health; 2) inflammatory arthritis; 3) health; 4) telomere length; and 5) occupations and well-being during the COVID-19 pandemic.

Occupations, activities, and health

The theoretical and philosophical underpinnings of this dissertation arise from the disciplines of occupational science and occupational therapy. Both share occupation as their core focus and view occupation as fundamental to human health and well-being. Occupational science is an academic discipline that studies human occupation (Yerxa, 1990), while occupational therapy is a profession in which therapists use occupation therapeutically to achieve health and well-being outcomes (Polatajko et al., 2007). Occupational therapists also apply therapeutic strategies to support clients to engage effectively in their chosen occupations. While occupational science *studies* occupation and occupational therapy *uses* occupation therapeutically, they are both built upon the assumption that occupation is a powerful determinant of health (Hammell & Iwama, 2012; Law et al., 1998; Wilcock, 2007; Yerxa, 1990).

Occupation has been defined as "groups of activities and tasks of everyday life…everything people do to occupy themselves" (Canadian Association of Occupational Therapists [CAOT], 1997, p. 34) and described broadly as everything that an individual does in life (Law & Baum, 2005). Occupation is distinct from activity, although there is little consensus in how they are distinct and where they overlap, and the terms are often used interchangeably. Some sources state that occupation is contextual and given specific meaning by a person and/or culture (Crepeau et al., 2014; Polatajko et al., 2007), while activity is typically devoid of individual or cultural meaning. In other words, one key differentiator between occupation and activity is the personal nature and subjectivity of occupation (Pierce, 2001).

Activity is often subsumed under occupation, as in the Taxonomic Code for Occupational Performance which places movement, task, activity, occupation, and occupational groupings into a hierarchy (Polatajko et al., 2004, 2007). In this instance, making oatmeal is one of the activities contributing to preparing breakfast for the family, and preparing meals is one of the occupations of a parent. In this taxonomy, activities are more discrete than occupations, and somewhat consistent with the definition of activity as used in the International Classification of Functioning (ICF): "execution of a task or action by an individual" (World Health Organization [WHO], 2002, p. 10). Occupations and occupational groupings, as used in the taxonomy, are collectively consistent with the ICF definition of participation: "involvement in a life situation" (WHO, 2002, p. 10). For this dissertation, I am interested in the complexities and intricacies of people's occupations, including the activities that comprise occupations. **Therefore, while the term 'occupation' will be used throughout this dissertation, it is sometimes necessary to use the term 'activity' interchangeably with occupation when citing literature or communicating information outside the disciplines of occupational science and occupational therapy.** In addition, one of the assumptions underpinning occupational therapy is that people can carefully choose and orchestrate their everyday occupations (Wilcock & Hocking, 2015). However, this neglects the fact that due to various systemic and inequitable factors (e.g., poverty, racism, sexism, disablism, among many others), not everyone has equal opportunities to 'choose' their preferred occupations (Murthi & Hammell, 2020). In this dissertation, while I use the term 'occupational choice', the reader must keep in mind that there may be populations that are unable to actually choose their desired occupations (Hammell, 2020).

To illustrate the relationship between occupation and health, Moll and colleagues (2015) developed a theoretical framework where the central message is "what you do every day matters to health and well-being" (p. 3). As a guiding conceptual framework, Do-Live-Well (DLW) is evidence-based and emphasizes the importance of occupation choices on health. DLW is intended to help guide population health interventions and policies to promote public health with a focus on occupational engagement. The DLW illustrates how *dimensions of experiences* and *activity patterns* impact *health and wellness outcomes*, while accounting for the various *personal and social forces* that affect this relationship (Moll et al., 2015). See Figure 1.1. 'Doing' is the central concept of this framework, and the word 'activity' refers to both activities and occupations so that the framework is readily understood in public health applications with the general population.

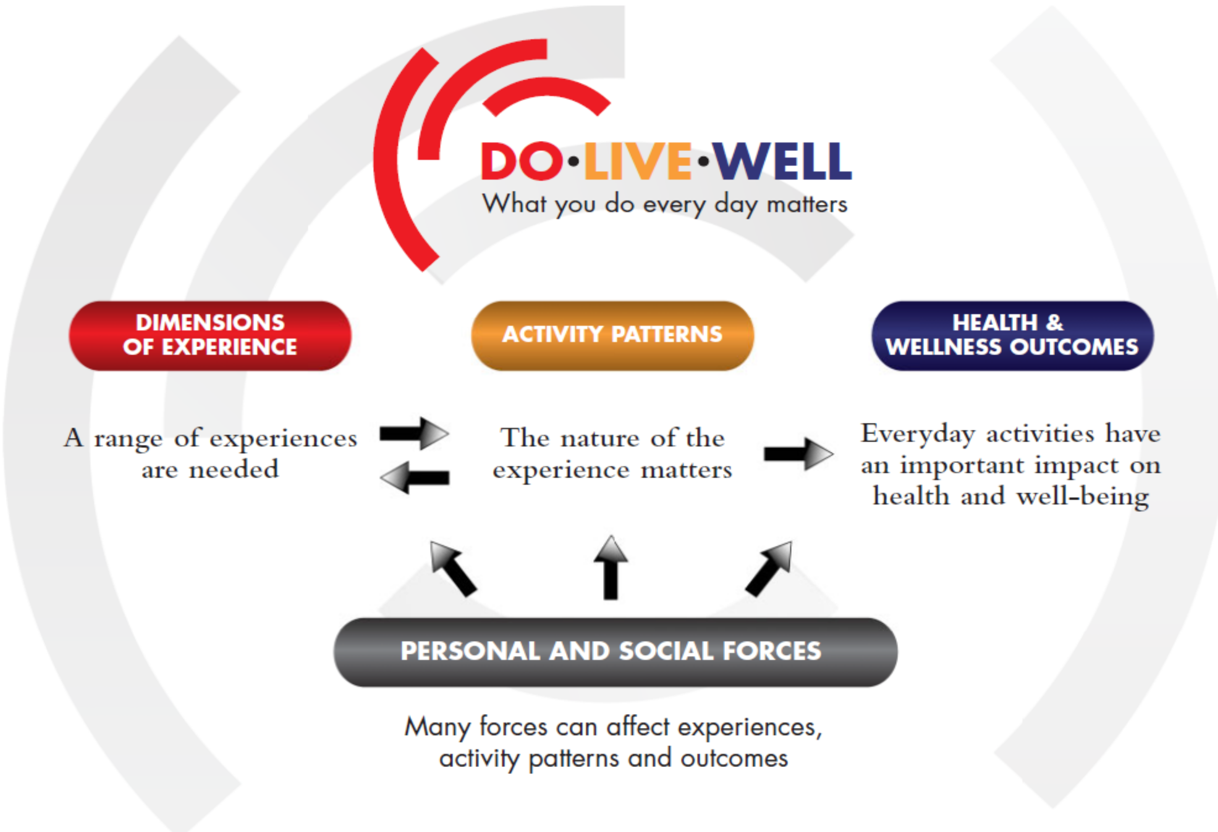


Figure 1.1

The Do-Live-Well Framework, from © Moll et al. (2015). "Do-live-well": A Canadian framework for promoting occupation, health, and well-being. *Canadian Journal of Occupational Therapy*, *82*(1), 9-23. By permission from author.

In the DLW framework, *dimensions of experience* and *activity patterns* are personal and subjective. As illustrated by the directional arrows in Figure 1.1, dimensions of experience and activity patterns influence each other and together influence health and wellness outcomes. Thus, to appropriately study occupation as a determinant of health, we need to examine the subjective and personal experiences of engaging in the occupation (Hocking, 2009). This examination includes exploring the individual perceptions of occupations, specifically the characteristics of the occupations and how they are experienced. Consequently, DLW is a useful conceptual framework that proposes a mechanism for how occupation contributes to health. The Do-Live-Well model summarizes the theoretical assumptions underlying the studies contained in this dissertation. As such, this dissertation contributes to the evolution of DLW: by empirically testing this theoretical model, findings may then be translated into future occupation-focused practice to promote health.

Occupational engagement

In order to discuss people's participation in occupations, it is necessary to discuss occupational engagement. Different definitions of occupational engagement exist (Morris & Cox, 2017). Sutton and colleagues (2012) defined occupational engagement broadly as "*the subjective state of being 'involved' or 'occupied' in everyday activity*" (p. 143). The various ways in which people connect with and find meaning in occupations result in differences in occupational engagement, ranging from complete disengagement to full engagement. Disengagement occurs when one is completely disengaged and disconnected from daily life and its occupations; full engagement occurs when one is so absorbed in occupations that there is a perceived rich interaction between the person with his or her environment and this leads to increased attention and enjoyment. This state of full engagement is akin to Csikszentmihályi's concept of "flow" (1990) where engaging in a challenging, yet doable, activity leads to positive experiences and well-being. Occupational engagement is a "complex, subjective and multifaceted concept" (Morris & Cox, 2017, p. 162); therefore, while the term has yet to be defined consistently and clearly, for this dissertation, I will use Sutton and colleagues' broader definition of occupational engagement which is inclusive of one's subjective experiences.

While full engagement may appear to be more desirable than disengagement (Morris & Cox, 2017), it is sometimes useful to have bouts of disengagement. These mellower times of retreating from everyday occupations allow for reflection and reconnecting with the self that can be rejuvenating. Sutton et al.'s study (2012) focuses on how occupational engagement provides insight on the mental health recovery process; however, they also outline that a range of occupational engagement experiences are meaningful for humans, with or without mental health conditions. Within a well-balanced occupational life, "relaxation, boredom and apathy are experienced as well-deserved sources of new energy and other positive emotional experiences" (Jonsson & Persson, 2006, p. 67). Restorative or restful occupations can help improve or maintain physical and mental health (Howell & Pierce, 2011). Bejerholm and Eklund (2007) describe occupational engagement as "the extent to which a person has a balanced rhythm of activity and rest, a variety and range of meaningful occupations and routines" (p. 21). Therefore, not only do we need a balance of various types of activities, but a range of occupational engagement experiences is also needed for promoting well-being.

Occupational engagement is closely linked with well-being (Polatajko et al., 2007). This claim has been tested in a few studies in populations of people with schizophrenia (Bejerholm & Eklund, 2007; Chugg & Craik, 2002; Sutton et al., 2012) as well as older adults (Clark et al., 2012; Stav et al., 2012). Jonsson & Persson (2006) argue that a variety of occupational engagement experiences contribute to occupational balance, which is essential for well-being. The importance of occupational engagement in promoting health and well-being is reflected in the revised version of the Canadian Model of Occupational Performance and Engagement (CMOP-E; Polatajko et al., 2007). This version is updated from the original Canadian Model of Occupational Performance (CAOT, 1997) and encourages occupational therapists to think more broadly about occupational performance in their practice and consider multiple modes and levels of engagement in occupations. In the CMOP-E, occupational engagement and performance is the result of the intersections of the person, occupation, and the environment. Therefore, occupational engagement aligns with the DLW model, whereby DLW components such as dimensions of experience and activity patterns, as shaped by personal and social forces, explain how occupation is a determinant of health.

Occupational balance

Historically, occupational balance has been referred to as a balance of engaging in different occupational categories, including work, play, rest, and sleep (Meyer, 1922), with later categorizations of physical, mental, social, and rest occupations (Stamm et al., 2004). This categorization of occupational areas led to early studies that explored how a distribution of time use among these areas (occupational balance) was related to measures of well-being and life satisfaction (Marino-Schorn, 1986; Seleen, 1982; Wilcock et al., 1997). While these descriptions of occupational balance helped propel this research area forward, using occupational categories and time allotment to define occupational balance may be too simplistic and inadequately capture subjective experiences (Pierce, 2001; Hammell, 2004). Doble and Caron Santha (2008) argue that how a person perceives and achieves occupational balance is highly personal. One person may view themself as being overworked and experiencing occupational imbalance; yet, another person engaging in similar kinds and amount of occupations may perceive this experience as a satisfying balance across their occupations. Eklund et al.'s (2017) review of literature on occupational balance summarized occupational balance as "a subjective result from an interaction between personal preferences and environmental influences" (p. 41). Specifically, there are three highly personal and subjective components that enable occupational balance: a harmonic mix of occupations; perceived ability and resources to manage one's occupational repertoire; and occupations that are congruent with own values and personal meaning (Eklund et al., 2017). Consistent with that summary, I will use the following definition throughout this dissertation:

occupational balance is a subjective perception of having "the right amount of occupations and the right variation between occupations" (Wagman et al., 2012, p. 324).

Occupational balance, health, and well-being are interrelated concepts. The DLW model highlights how the collective repertoire of what we do over time is important to our well-being and promotes health, regardless of age or ability. Not only are a "range of [dimensions of] experiences are needed" (Moll et al., 2015, p. 4), occupational balance and associated concepts are one of the five activity patterns that impact health and well-being in the DLW framework. For example, in a sample of Swedish adults, Wagman and Håkansson (2014) found a significant relationship between occupational balance and self-reported health as well as life satisfaction. Occupational balance was related to self-rated global quality-of-life, well-being, and greater sense of coherence in a sample of people with schizophrenia (Bejerholm, 2010). Occupational imbalance is a risk factor for perceived stress and stress-related disorders in a sample of working Swedish adults (Håkansson & Ahlborg, 2018). Yu et al. (2018) found that occupational balance was highly correlated with self-reported stress and mental health in healthy Canadian adults. In a sample of 682 adults with rheumatoid arthritis, occupational balance was found to be associated with greater life satisfaction (Wagman et al., 2020). Collectively, the above studies have shown a simple relationship, but have not fully explored the predictive relationship between occupational balance and health; they have used different measures of health and did not always consider other variables that account for health status. Overall, there is a need to examine measures of physical and mental health, well-being, and biological measures with occupational balance. Because "occupational balance is one important construct that links – in the view of occupational therapists – 'occupation' and health" (Dür et al., 2014, p. 2), studies exploring the predictive power of occupational balance to health would greatly contribute to the discourse in occupational balance as well as to the field of occupational science and occupational therapy.

Social and creative occupations

People are social and creative beings, and engaging in activities that allow for social or creative expression has been considered health-promoting. Previous research shows that creative activities are associated with increased positive affect and a sense of flourishing (Conner et al., 2016) as well as increased feelings of calmness, happiness, and stress relief (Riley et al., 2013). In addition, engaging in creative activities was found to decrease the odds of mild cognitive impairment (Geda et al., 2011) and improve mental health scores (Caddy et al., 2012). In a qualitative study exploring the engagement in creative activities of elderly people dealing with life-threatening illnesses, la Cour et al. (2005) found that creative activities enabled the creating of "connection to life" (p. 104) and sparked a sense of joy. Participants also found that the creative process became a vehicle for increased social interactions and sharing in companionship (la Cour et al., 2005).

Research highlights the role of social support and groups in maintaining health (Jetten et al., 2014). There is increasing emphasis on social support as a determinant of health, especially among older adults (Ong et al., 2016). Specifically, loneliness appears to have a strong relationship with decreased health (Cornwell & Waite, 2009; Coyle & Dugan, 2012; Jessen et al., 2018; Tomaka et al., 2006), as well as increased health care utilization (Gerst-Emerson & Jayawardhana, 2015). Social support may be especially important in managing long-term conditions like arthritis (Zyrianova et al., 2006). While Bajaj et al. (2016) found that social support itself was not associated with decreased inflammation (measured by C-reactive protein (CRP) level and interleukin-6), positive social interactions were correlated with lower levels of the inflammatory marker interleukin-6. Engaging in occupations that are characterized as social is different from receiving social support—would such occupations confer the same health benefits? There is increasing support for ‘social prescription’ with the aim of connecting people with social and creative activities to maintain health (Mercer, 2018). Exploring if and how social and creative types of occupations are associated with health in adults with chronic illness would build upon the research summarized above.

Subjective nature of occupation

Occupational engagement, occupational balance, and social and creative occupations – as summarized in this chapter – all centre around the subjective nature of occupations. As illustrated by DLW’s *dimensions of experience* and *activity patterns,* occupational experiences and patterns are highly personal and subjective. Researchers studying occupation should seek out and clarify experiential differences for a given occupation, and not presume uniformity when describing occupation (Hocking, 2009). In other words, to appropriately study occupation as a determinant of health, we need to examine the subjective and personal experiences of engaging in the occupation. DLW illustrates how subjective, occupational components (dimensions of experiences and activity patterns) influence health and wellness outcomes.

Even though “occupation is a very personal thing” (Polatajko et al., 2007, p. 22), there is limited in-depth research on the personal meaning and subjective experiences of occupation (Reed et al., 2011). Jonsson (2008) argues that there are problems with the current categorization of occupation, which limits a fuller exploration of the subjective experiences of occupations. For example, the profession of occupational therapy in Canada categorizes occupations into self-care, leisure, and productivity (Polatajko et al., 2007). By doing so, these categories are connected to a type of human experience that may not reflect a person’s actual experience and the meaning they ascribe to that occupation (Hammell, 2004; Hammell, 2014; Jonsson, 2008). Indeed, "some of the most meaningful occupations cannot be made to fit any of the three categories" (Hammell, 2004, p. 297). For instance, being a caregiver (to a child, pet, spouse, or parent) may not be exclusively experienced as a self-care, productive, or leisure occupation. While these three categories have served a purpose in defining occupational therapy and supporting practice, rigid adherence to the categorizations neglect the personal nature of occupation and deter the exploration of subjective occupational experiences.

Research on occupation recognizes the need for alternate methods to categorize and assess occupation subjectively, yet recommendations remain theoretical. Hammell (2004) suggests that instead of categorizing occupations into prescriptive categories, they should be categorized by dimensions of meaning that are personally identified. Doing so may provide more accurate and comprehensive information on occupation. Jonsson (2008) offers an experience-based conceptualization of occupation, where occupations are categorized based on people's experiences (e.g., engaging, relaxing, social). Through seven experience-based categories of occupation, Jonsson (2008) describes the relationship between each of these categories and well-being. This novel categorization of occupation was used in a research project examining the process of retirement in 32 participants (Jonsson, 2011). Specifically, Jonsson (2011) used his experience-based categorization to analyze participants' interviews and narratives, and subsequently found that meaningful occupations were important to experience a satisfying life as a retiree. Other than in the aforementioned research project, this conceptualization has not been used nor empirically tested elsewhere. Even though such experience-based models and conceptualizations are a step in the right direction, Hammell (2014) argued that little practical guidance or recommendations exist on how to tangibly apply these concepts to occupational science or occupational therapy. Similarly, while the DLW framework emphasizes the importance of subjective occupational experiences, this framework is designed only as "a springboard for discussion" (Moll et al., 2015, p. 9). The next steps are to apply and evaluate the framework empirically (Gewurtz et al., 2016). This dissertation seeks to contribute to the empirical support of elements in the DLW framework and its impact on informing occupational science and occupational therapy.

To further understand the relationship between occupation and health requires a tool that captures occupations' rich subjective meaning. The Personal Projects Analysis (PPA) can be used to analyze people's different occupations along with the (perceived) dimensions of these occupations. Using PPA can therefore assist in empirically testing the DLW framework and its subjective occupational components (*dimensions of experience* and *activity patterns*). PPA is a tool developed out of personality psychology to capture precise information on personal projects (Little, 1983), which are analogous to occupations and patterns of occupation. The following section describes PPA, how it is congruent with DLW constructs and therefore appropriate for studies on occupation.

Measuring occupation – Personal projects analysis

Over the past three decades, the PPA method has been refined and used in a wide range of studies. Personal projects can range from broad, long-term endeavours (e.g., "be a better sister") to more short-term, specific ones (e.g., "run 5k this week"). While occupation and personal projects are both about what people do, personal projects may be more goal-oriented than occupation (Arcand-Dusseault & Egan, 2015a). The concept of personal projects is a subset of occupation, revealing the underlying motivations and goals of occupation (Arcand-Dusseault & Egan, 2015a). Goal-oriented personal projects (e.g., complete a PhD) can be broken down into more concrete projects, or occupations (e.g., write dissertation for 30 minutes each day) (Egan et al, 2016). Overall, PPA is a useful tool for the study of occupation (Christiansen et al., 1998) and **the terms 'personal projects' and 'occupation' can and will be used interchangeably in this dissertation.**

PPA provides a structured way to elicit information about people's occupations while allowing for flexibility depending on the research question, and specific details of the methodology will be discussed in later chapters. Briefly, the approach requires one to generate a list of personal projects in which they are currently engaged or about to initiate, choose 10 projects from that list, and rate the projects on a number of dimensions such as *Importance*, *Difficulty*, and *Identity*. In the research context, then, it is possible to analyze both the kinds of occupations in which participants engage (using content analysis) and their perspectives on project characteristics or personal experiences when engaging in a cluster of occupations (using quantitative methods).

A word about terms

PPA uses the term **project dimensions** to describe the qualities upon which participants rate their projects. In this and subsequent chapters, to discuss specific findings from PPA, I will use the terms 'projects' and 'project dimensions'. However, when describing how those findings generalize to occupations more broadly, I will use the term **occupational characteristics**. In short, we are able to glean information about occupations and occupational characteristics more broadly by specifically using PPA's projects and project dimensions.

Previous research in occupational therapy using PPA

PPA allows researchers to 1) explore occupations of anyone with sufficient literacy to use the tool, including clinical populations seen in occupational therapy; 2) examine the relationship between occupational characteristics and health; and 3) track and analyze occupations over time.

Comparing the types of occupations between groups provides insights that could inform clinical practice. In a cross-sectional study that used PPA to explore the difference in occupations between boys with and without developmental coordination disorder (DCD), Poulsen et al. (2011) found that boys with DCD had significantly fewer occupations that were physical in nature; fewer friends with whom to engage in occupations; more solitary leisure occupations; and fewer occupations that were personally meaningful, compared to the non-DCD group. Brooke et al. (2007) used PPA to compare the personal projects of adults with and without multiple sclerosis. These personal projects were categorized by the study participants themselves and by external raters (student occupational therapists). They found that participants without multiple sclerosis listed more personal projects in the 'home and vehicle maintenance' category than those with multiple sclerosis. Interestingly, the researchers also found that 15-20% of the personal projects that were categorized by participants did not match the raters' categorizations, illuminating the uniqueness of participant perspectives on occupations. These two studies show that PPA project elicitation has been successfully used to further understand the nature and type of occupation and compare between groups.

Several studies explored the relationship between occupational characteristics (project dimensions) and health using PPA. In a sample of 152 undergraduate students, Lecci et al. (1994) found that personal projects rated high in the dimensions of *Stress* and *Difficulty* and low in *Structure*, *Control*, perceived *Skills*, and positive *Outcome Expectancy* were associated with self-reported depression and anxiety. Vroman et al. (2009) explored the personal projects of adults with low back pain and the associations between project dimensions and several health, function, and well-being measures. They found that that personal projects rated high in *Pain Salience* strongly predicted functional outcomes, and that projects rated high on the *Stress* dimension most strongly predicted measures of well-being. The dimension *Pain Salience* was specific to this study, showing the flexibility of PPA to include occupational characteristics relevant to a research topic, in addition to the core set of dimensions from the original tool. In another study of healthy adults (aged 19-79 years old), several PPA project dimensions were found to be highly associated with measures life satisfaction and affect (Christiansen et al., 1999), offering support to the earlier claim in this introduction that occupation is associated with elements of health and well-being.

Finally, PPA allows the study of changes in occupations over time. Davis et al. (2013) explored the personal projects of community dwelling stroke survivors in a two-year longitudinal study. They compared pre- and post-stroke projects (6-, 9-, 12-, 18-, and 24-months post stroke) and found that six project dimensions differed at 6-months poststroke. For example, early post-stroke projects were rated as more stressful and challenging compared to prestroke projects. However, by 12-18 months poststroke, project ratings returned to baseline (prestroke) indicating recovery. In a similar study, Arcand-Dusseault et al. (2015) found a significant inverse relationship between poststroke project completion and the recollection of prestroke project dimension of pleasure (*Enjoyment*). Arcand-Dusseault and colleagues (2015) relied on participants' recall in their study; assessing people's occupations in real time at both timepoints (e.g., before-and-after or longitudinal study designs) would minimize recall bias in occupations. This consideration is particularly important in chronic conditions (e.g., arthritis) where symptoms may fluctuate over time and can subsequently affect occupational engagement.

Overall, Arcand-Dusseault and Egan's (2015b) scoping review of fifteen studies in the occupational therapy literature demonstrates that using PPA as a methodology and system of analysis holds promise to study the relationship between occupational engagement and health, in both general and clinical populations. However, with PPA used in only a small number of occupational therapy studies, it has not been fully exploited for its value in examining occupation. More notably, in light of this dissertation, PPA has not been used with people with inflammatory arthritis to explore occupational engagement, how occupations may change over time, and if perceived occupational characteristics or changes in them over time relate to health. Therefore, by using PPA for an in-depth occupational analysis, the dissertation will make a unique contribution to understanding occupation and the impact of arthritis on occupation.

Inflammatory arthritis

Over six million Canadians have arthritis (The Arthritis Society, 2018), an umbrella term for over 100 different conditions, and almost one million of them have a type of inflammatory arthritis (IA). The main types of IA include rheumatoid arthritis (RA), psoriatic arthritis, systemic lupus erythematosus, juvenile idiopathic arthritis (JIA), and spondyloarthritis – conditions with which people often experience joint swelling and deformities, systemic features in skin, lung, heart and other organs, and fluctuating levels of pain, fatigue, stress, and depression, leading to disruptions in their daily occupations. Across all types of IA, women are affected more than men, but it varies with each disease. For example, there are twice as many women with RA than men (Arthritis Alliance of Canada, 2011; Health Canada, 2003), but men are three times more likely to have spondyloarthritis (Health Canada, 2003). In 2010, 272,299 Canadians (about 1% of the population) live with rheumatoid arthritis alone, and this is expected to rise to 549,218 in 2040 (Arthritis Alliance of Canada, 2011). IA encompasses chronic diseases for which there is no cure, and although the target of medical intervention is near remission, people living with IA often are managing their disease for their lifetime.

Inflammatory arthritis and occupations

People with IA report higher activity losses, such as experiencing employment challenges like absenteeism, job disruptions, and productivity loss at work (Jetha et al., 2015). Activity disruptions due to symptoms from IA are not limited to employment; Katz and Morris (2007) found that increased functional limitations due to RA symptoms were associated with more time spent engaging in obligatory activities (e.g., resting, personal care) and less time in committed (e.g., household work, paid work) and discretionary activities (e.g., enjoyable leisure activities) than those with fewer functional limitations. They also found that people who spent no time in discretionary activities had higher levels of perceived stress and depressive symptoms, and lower life satisfaction. In a qualitative study of 540 participants with IA, psoriasis, or inflammatory bowel diseases, more than half the sample reported that pain and fatigue were the antecedent to disrupted activities (Macdonald et al., 2018). As a result of activity reduction or losses due to arthritis symptoms, people's occupational identities may be disrupted and redefined, with potential negative emotional impact (McDonald et al., 2012). For example, joint pain due to arthritis may prevent a mother from directly playing with and holding her baby, impacting her view of herself as a mother. It is not surprising, then, that people with IA are at a higher risk of experiencing anxiety (Watad et al., 2017) and depression (Xue et al., 2020). In sum, IA symptoms can result in major disruptions in patients' occupational repertoires and negatively impact well-being.

IA symptoms are episodic, leading to fluctuating symptoms that affect one's overall sense of occupational balance (Stamm et al., 2004). In a survey of 86 Canadians, Yu et al. (2018) found that people who had chronic health problems reported lower occupational balance than did healthy study participants. Forhan and Backman (2010) found that occupational balance is associated with self-efficacy, bodily pain, general health, and social function in a survey of 169 Canadians with

RA. Due to their symptoms, people with arthritis may not be able to engage in everything that they want or need to do, leading to occupational imbalance (Ahlstrand et al., 2012). In semi-structured interviews with nine women with RA and JIA, Ottenvall Hammar and Håkansson (2013) found that it was important for people with IA to practice occupational balance (defined as a "balance between different occupations and balance between occupation and rest", p. 86) in order to perceive good health. Although these latter studies show a relationship between occupational balance and health among people with IA, comparing occupational balance between people with and without IA would illustrate the impact of IA on occupational balance and its relationship to health. In their scoping review, Wagman et al. (2015) called for more studies exploring potential differences in occupational balance between groups (e.g., people with and without IA).

While arthritis symptoms are associated with occupational imbalance, conversely, occupational balance may enhance health. Dür and colleagues (2016) provided evidence on the contribution of daily activities to overall health in people with rheumatoid arthritis, supporting previous assumptions regarding the benefits of balanced and varied activities on well-being. For example, their findings found that engaging in a *variety of activities* (a subscale in their occupational balance measure) was associated with cytokines and CRP levels (biological markers of health) as well as SF-36 health survey scores (a self-reported health measure) among unemployed people with RA. Dür and colleagues' (2016) study is exploratory in nature and the first of its kind to use inflammatory measures in addition to self-reported health status.

Perceived occupational balance is just one aspect of how occupations may be health-enhancing; engaging in meaningful occupations may also promote health despite the presence of arthritis. Researchers have used participation in valued life activities as an indicator of functioning and disability (Katz & Morris, 2007; Katz et al., 2008). *Valued life activities* include 26 activities from three domains (obligatory, committed, and discretionary) (Katz et al., 2006). For example, a decrease in valued life activities is associated with later depressive symptoms among adults with RA (Katz & Yelin, 2001). While such research is useful, research exploring the health benefits (as opposed to disability or functional loss) of specific occupations in the IA population is scarce and is largely limited to the health-promoting effects of physical activity (e.g., Larkin et al., 2016; Tench et al., 2003). In a randomized controlled trial, Katz et al. (2018) found that a pedometer step target exercise program reduced fatigue in people with RA compared to control groups. Yoga also appeared to confer physical and psychosocial benefits in a sample of 17 people with RA (Greysen et al., 2017). Since physical activity can sometimes be difficult to sustain especially during exacerbations of arthritis symptoms, it would be helpful to people with arthritis if other activities were found to alleviate symptoms and promote overall health. This would expand self-management strategies for living well with IA. Therefore, more research is needed to explore the types of occupations that people with IA do and how *other* forms of occupation can promote health in the IA population. Since there is growing research on the health benefits of social and creative occupations in the general population, future research on how social and creative types of occupations are related to health in the IA population is warranted.

Health

The definition of health has a long-standing history. Hippocrates' concept of health originated in fifth century BCE, focusing on disease and the balance or imbalances of bodily fluids (Tountas, 2009). The disease-oriented and biomedical perspective of health has been maintained up until 1948 when the World Health Organization (WHO) proposed a new definition of health, which defines health as "a state of complete physical, mental and social well-being, not merely the absence of infirmity or disease" (WHO, 1946, p. 1). This definition focuses on quality-of-life and achieving well-being, recognizing psychosocial, behavioural, and environmental considerations (Badash et al., 2017). Thus, a holistic concept of health includes person-level or subjective evaluations of health.

Many types of subjective ratings of health exist. Such scales may ask about people's overall sense of well-being and health; symptoms and complaints; mood and feelings; and life satisfaction. Self-rated measures of health and well-being are indicators of subjective health. There is good correlation between self-reported ratings of health and other indicators of overall health; for example, self-reported health is a good predictor of future disease and longevity (DeSalvo et al., 2006; Idler & Kasl, 1991; Lyubomirsky et al., 2005).

Health services and population health research typically measure health using self-reported health surveys. Several well-designed and validated tools exist for this purpose and allow for comparisons across studies. Self-reported health surveys are useful for gaining insight into participants' perspectives about their own health; however, they may be susceptible to bias (e.g., memory biases, skewed evaluation of one's overall life) (Spitzer & Weber, 2019). Therefore, even though subjective health outcomes provide rich data, people (including patients, the general public, scientists, and policymakers) may be equally interested in objective indices of health such as mortality, disease incidence, and biological measures.

Telomeres

Biological indicators can both stand alone and substantiate self-reported health status measures; examining health from different angles provides a comprehensive assessment and may lead to new insights. In the aforementioned study by Dür and colleagues (2016), self-reported health and biological indicators (cytokines and CRP) were used to study the association between daily activity patterns and health in adults with RA, as well as in a comparison group of people without RA. By using both self-reported health *and* biomarkers, their study provided a fuller understanding of how occupational patterns contribute to health.

Recent discoveries in measuring cellular aging and health offer another biomarker: telomere length. Telomeres are made of DNA molecules with protein structures that cap the ends of chromosomes (Blackburn & Chan, 2004; Blackburn & Gall, 1978; Szostak & Blackburn, 1982). Their role is to protect chromosomal DNA from damage and degradation (de Lange, 2005); telomeres also shorten with each cell division until a critical point, when cell senescence or death occurs (Wright & Shay, 2001). Since telomeres shorten with cell replication and division, telomere length (TL) is argued to be a marker of biological aging (Blasco, 2005).

In general, research suggests that the older one is, the shorter their telomeres. Various health conditions (e.g., due to diseases, exposure to toxins or drugs, trauma, or certain behaviours) have also been associated with telomere shortening. Meta analyses and systematic reviews among people with cancer (Ma et al., 2011), atherosclerosis (Aviv et al., 2015), and coronary heart disease (Haycock et al., 2014) show that these conditions are associated with shorter telomeres. Observational studies suggest that shorter telomeres are associated with adult obesity (Zannolli et al., 2008), cancer (Rode et al., 2015), atherosclerosis and cardiovascular disease (Benetos et al., 2004; Willeit et al., 2010), inflammation (Glei et al., 2015), and dementia (Grodstein et al., 2008). Rheumatoid arthritis has also been found to be associated with shorter telomeres (Barkovskaya et al., 2017; Lee et al., 2018; Steer et al., 2007).

Shorter telomeres are associated with lifestyle behaviours that have negative health consequences such as smoking and alcohol consumption (Bendix et al., 2014). In a prospective analysis of 8165 adults from a large longitudinal study in the Netherlands, Deelen and colleagues (2014) found that shorter telomeres were associated with an increase in all-cause mortality. Finally, longer TL was found to be significantly associated with higher ratings of self-reported health status and years of healthy living in a nested analysis of a community-based cohort of 3,075 adults (Njajou et al., 2009).

Telomeres and occupations

Recent literature provides evidence on how certain occupations can maintain telomere length. Several observational studies document the relationship between physical activities and preserving TL (e.g., Garland et al., 2014; Kim et al., 2012). Sjögren and colleagues (2014) conducted a 6-month randomized controlled trial involving 101 participants who were 68 years old, overweight, and sedentary. Telomere lengthening was significantly associated with reduced sitting time for participants who participated in the physical intervention (involving a physical activity lecture by a physician, motivational counselling by a health-care professional, and a written physical activity prescription). Although not as widely-studied, meditation-type activities that reduce stress are also associated with longer telomeres (Conklin et al., 2018; Hoge et al., 2013) and telomere maintenance (Schutte & Malouff, 2014). However, the relationship between TL and occupations other than physical and meditative types of activities has not been studied (To-Miles & Backman, 2016).

One proposed mechanism in how physical and meditative types of activities influence TL is through stress reduction. The deregulated allostatic load model suggests that chronic stress influences the regulation of the hypothalamic-pituitary-adrenal (HPA) axis through increased cortisol secretion. This wear-and-tear of continuous physiological responses to stress leads to allostatic load and eventually, suboptimal health outcomes including impaired telomere maintenance (Tomiyama et al., 2012). Therefore, through stress reduction, TL can be maintained or preserved. Puterman and colleagues (2010; 2015) have explored the prospective associations between stress, lifestyle, and telomeres. For example, Puterman and colleagues (2015) found that among 239 postmenopausal women who engaged in less healthy behaviours, stress was significantly associated with shorter telomeres. The more participants engaged in healthy behaviours, the less stress was related to TL shortening, leading the authors to conclude that healthy behaviours could protect people from the negative health effects of stress (Puterman et al., 2015). In another study (Puterman et al., 2018), highly stressed, sedentary caregivers exercised 3-5 times per week over a 24-week period. Their TLs increased compared to the control group who did not participate in the exercise program.

Other activities that reduce stress may be similarly beneficial to telomeres and overall health. As discussed above, studies show that meditation-type activities maintain or preserve TL, possibly through a stress-reduction mechanism, suggesting that physical activity is not the only way to reduce stress and preserve telomeres. In reviewing different studies, it is important to account for additional lifestyle habits and personal characteristics that are also associated with TL. A recent study of 749 adults found that sex and race/ethnicity interact in the association between lifestyle factors (physical activity, alcohol consumption, smoking) and TL (Vyas et al., 2020). These findings provide initial insights to how personal factors, stress, lifestyle, and telomeres are related, although further research is required to explore how different variables contribute to the relationship between lifestyle behaviours and telomeres.

The interrelations between lifestyle and telomeres can be framed as a perspective on occupational balance. The DLW framework emphasizes that 1) ‘doing’ encompasses a broad range of occupations, and 2) occupational engagement in the extreme ends of *activity patterns* may be associated with health risks. A balance across activity patterns is crucial to health; for example, a lack of balance is associated with increased stress, and over-engagement can lead to burnout or exhaustion (Moll et al., 2015). In addition, engaging in a *variety* of occupations and maintaining a pattern of the ‘*right amount’ of each occupation*, i.e., occupational balance, contributes to health. Hernandez et al. (2020) proposes that lifestyle balance influences health and well-being through physiological activation pathways. Specifically, engaging in excessive amounts of strenuous occupations coupled with too little of restful occupations can lead to a physiological activation of the autonomic nervous system and allostatic load (or metabolic ‘wear and tear’). Over time, this cascade of physiological responses may result in negative health effects. From an occupational perspective, it is of interest to explore the interrelationships between occupations, balance, and health outcomes including biological markers like TL.

Occupations and health during COVID-19

The above sections reviewed the literature on health and occupations under ‘normal’ circumstances. Health and occupations can change during extraordinary times, such as the current novel coronavirus pandemic (COVID-19). The SARS-COV-2 virus, which originated from Wuhan, China in December 2019, spread rapidly across the world in the following weeks (WHO, 2020). To decrease the spread of the virus, public health officials in British Columbia ordered large-scale physical distancing measures starting on March 16, 2020 (CBC, 2020 April 3). Across BC and the world, physical distancing measures meant school and business closures, banning of large gatherings, curfews, stay-at-home orders, travel restrictions, and quarantine measures (Gostin & Wiley, 2020).

Because the pandemic is still relatively new during the time of writing this dissertation, research examining changes in people’s lifestyles exists but is limited. Through an online survey of 7753 adults from the general population, Flanagan et al. (2020) found that people’s physical activity level had decreased, healthy eating increased, and anxiety scores increased. Cellini et al. (2020) also found decreased sleep quality, increased digital media use, and an elongated sense of time in a sample of 1310 adults from Italy. While these studies compared results of two timepoints (before and during the pandemic), data collection only occurred at one timepoint (during the pandemic) which may lead to recall bias as participants tried to remember their pre-pandemic health behaviours. The popular press and opinion pieces spoke to the global scale of occupational disruption, such as working from home, online school and socializing. Emerging research will identify the range of people's occupational experiences during COVID-19, and how occupations changed during the pandemic (Kamalakannan & Chakroborty, 2020). Research using an occupational lens is especially important to gain a rich understanding of people's occupations during this unique time and prepare for future public health emergencies.

The physical distancing measures associated with the pandemic were also suspected to lead to decreased mental health (Balasubramanian et al., 2020; Galea et al., 2020; Kaufman et al., 2020; Sani et al., 2020). For example, a Polish study explored the mental health of adults in the early months of the pandemic and found a high probability of mental health disorder in over 26% of respondents (Talarowska et al., 2020). While this study provided a glimpse of the mental health landscape during COVID-19, it did not provide a comparison to mental health status before the pandemic started. Interestingly, another study among 316 lupus patients (a type of IA) found increased mental and emotional well-being during COVID-19 compared to prior to the pandemic (Lim et al., 2020). Further research is needed to explore how mental health and well-being changed during COVID-19, and how this relationship compares between the IA population and the general population. Lifestyle factors such as disrupted sleep patterns and increased social media use (Cellini et al., 2020) along with psychological stressors related to the pandemic (e.g., social isolation, financial insecurities, fear of infection) (Saxena & Gautam, 2020) can contribute to people's decreased well-being during COVID-19. Because previous public health emergencies and events have shown that negative long-term effects persist in people after the event (Agyapong et al., 2019; North & Pfefferbaum, 2013; Tang et al., 2014), it is important to understand how mental health and well-being have changed throughout COVID-19.

Purpose

The overall purpose of this dissertation was to explore the occupations of adults with and without IA, and examine the relationship between occupation and health. Specifically, I aimed to address the following purposes of each dissertation chapter, among adults with and without IA:

- *Chapter 2*: To explore occupations and occupational characteristics.
- *Chapter 3*: To examine the relationship between occupational characteristics and health.
- *Chapter 4*: To explore the relationship between occupational balance and health.
- *Chapter 5*: To explore the pandemic's impact on occupation and health.

Rationale and significance

People with IA experience debilitating symptoms that can greatly impact their daily occupations. They utilize self-management strategies, including lifestyle or activity modification, to promote their health. Research that illuminates the relationships between various occupations or occupational characteristics and health could inform self-management strategies and therapeutic interventions used by occupational therapists and other rehabilitation providers. Currently, there is limited research on the health benefits associated with engaging in activities other than physical activity. Related to this, there are very few studies that explore how occupational balance differs between the IA and non-IA population and how occupational balance predicts health outcomes. While there is increasingly more research on how physical and meditative types of activities can maintain telomere length, there are few studies on how other types of occupations are associated with TL. Overall, this dissertation aimed to fill a gap in the research literature on the relationship between occupation and health.

Given the DLW framework and theoretical assumption that what we do matters to our health, this dissertation first explores the occupations of people with IA and how they differ from the general population using PPA. Additionally, collecting both self-reported and biological health measures provided a comprehensive health evaluation. As a lifelong condition that currently has no cure and is typically diagnosed in early adulthood, people with IA engage in ongoing self-management in conjunction with traditional health care services. Therefore, activity recommendations can be a part of effective self-management. By exploring occupational characteristics that are most associated with well-being, we aim to generate activity recommendations for future studies and interventions to improve health and quality of life among people with IA.

Originally, the study was planned to be a one-year longitudinal design, following occupations and health over time. However, the COVID-19 pandemic resulted in the university pausing all in-person research activities. I had collected one-year follow-up data for 48 participants, and it was not possible to predict when data gathering could resume. However, with baseline data in hand, it was possible to amend the original plan, convert the self-reported measures into an online survey, and examine the impact of reduced social gatherings on occupations and well-being. As with any new phenomenon or event, there was little research on the impact of the pandemic on occupations and health. Addressing this knowledge gap can contribute to understanding how public health emergencies influence occupations and well-being, and inform future preventative and intervention measures.

Organization of the dissertation

This dissertation is organized into five additional chapters. A single, multi-variable cross-sectional study is reported in Chapters 2 through 4. Chapter 2 explores the occupations and occupational characteristics between participants with and without IA and includes the detailed methods and measures that are also applicable to Chapters 3 and 4. Chapter 3 explores how occupational characteristics are related to health and Chapter 4 explores how occupational balance is related to health. The COVID-19 pandemic occurred during the conduct of this doctoral research and changed the original study plan. By using baseline data (from Chapters 2-4) and gathering new data during COVID-19, Chapter 5 is therefore a before-and-after analysis of how occupations and health changed during the first wave of the pandemic.

Chapters 2-4 use the same set of participants and overall study procedures. Chapter 5 uses a subset of participants from Chapters 2-4. Consequently, there is overlap in these chapters, especially in the Introductory and Methods sections so that each chapter can stand alone in anticipation of future manuscript submission. Finally, Chapter 6 reflects upon the entire body of research conducted for the thesis, lessons learned, implications, and suggestions for future research.

Chapter 2: Exploring occupations of people with and without inflammatory arthritis

Introduction

Inflammatory arthritis (IA) is a group of chronic diseases marked by fluctuating levels of pain, fatigue, and joint stiffness, often leading to disruptions in daily occupations. These disruptions limit participation in life, such as paid work, childcare, and hobbies (Katz et al., 2006). People with IA experience employment challenges including absenteeism, job disruptions, and productivity loss (Jetha et al., 2015). Katz and Morris (2007) found that increased functional limitations due to rheumatoid arthritis (RA, a type of IA) symptoms were associated with more time spent engaging in obligatory activities (e.g., personal care, rest) and less time in committed (e.g., house care, paid work), with even less time in discretionary activities (e.g., enjoyable leisure activities) than those with fewer functional limitations. Another study found that people with RA have reduced ability to carry out household chores and had decreased or ceased participating in at least one leisure activity (Leino et al., 2015). Using the same definitions outlined above by Katz and Morris (2007), having good physical function and psychological well-being influence engagement in committed and discretionary activities, for women with RA (Reinseth et al., 2012). Overall, IA symptoms can result in major disruptions in patients' occupational repertoire.

Because of symptoms like fatigue and pain, many people with IA seek coping strategies so they can engage in meaningful daily occupations (Ottenvall Hammar & Håkansson, 2013). Such coping strategies include planning, using assistive devices, and avoiding certain occupations in order to engage in other occupations. Other strategies are more attitudinal, such as learning to stay positive, accepting their diagnosis and limitations, and taking charge in ways that accommodate those limitations (Grønning et al., 2011; Ottenvall Hammar & Håkansson, 2013). While symptoms may make certain occupations difficult, by implementing different strategies, people with IA may continue to engage in valued occupations. IA can limit occupational choice to some degree, but it is unclear how occupations may differ between those with and without IA.

The aim of the present study was to explore possible differences in occupations between adults with and without IA. A comparison of occupations between groups will clarify the relationship between IA and occupational choices. Leino et al. (2015) found that leisure *types* of occupations were reduced or had ceased in people with IA, perhaps because they were more discretionary, and energy needed to be devoted to more obligatory occupations. Consequently, people with IA may engage in different *types*, or categories, of occupations compared to those without IA. Additionally, little is known about the perceived occupational *characteristics* (e.g., importance, difficulty, enjoyment) of what people with IA do compared to those without IA. **Occupational characteristics,** for the purpose of the present study, are the attributes of occupations, as perceived by the person doing that occupation. *Occupational type* is broader and encompasses multiple related occupations, while *occupational characteristics* describe perceptions of the particular occupation and are person dependent. Exploring occupational characteristics in addition to occupational types can provide more in-depth information about how people experience their occupations. For example, do people with and without IA engage and characterize their occupations as equally *important*? A leisure type of occupation may be characterized as *important* for one person but may be characterized as *difficult* to another. The same type of occupation may be perceived differently in term of its characteristics (e.g., importance, difficulty) depending on the person, the occupation, and the context. Using both occupational type and characteristics provide more information than type or characteristic alone.

This chapter explores occupations of adults with and without IA. This aim is broken down into four specific **research questions**:

1. What types of occupations do all participants engage in?
2. Do the types of occupations differ between groups (IA vs. healthy comparison [HC])?
3. How do participants characterize their occupations, and do occupational characteristics differ between groups (IA vs. HC)?
4. After controlling for selected covariates, do any differences in occupational characteristics still exist?

Method

We conducted an exploratory, cross-sectional study of adults with and without IA. The clinical research ethics board at the University of British Columbia reviewed and approved this study and all participants provided informed consent.

Participant eligibility and recruitment

Inclusion criteria were adults (19 years or older), and ability to read and write English. Participants in the IA group required a rheumatologist-confirmed diagnosis of an inflammatory type of arthritis such as (but not limited to): rheumatoid arthritis, psoriatic arthritis, ankylosing spondyloarthritis, systemic lupus erythematosus, and juvenile idiopathic arthritis; on a stable drug regimen for at least three months, confirmed by the participant through a phone screen. Exclusion criteria included a history of cancer in the last five years and current smoking status (defined by smoking at least 100 cigarettes in one's lifetime plus smoked at least one cigarette during the past 30 days), as cancer and smoking have been found to affect a blood biomarker collected from participants and reported in Chapter 3. The following co-morbidities were excluded: long-term neurological conditions (e.g., multiple sclerosis, stroke) and respiratory conditions (e.g., chronic obstructive pulmonary disease). Participants reporting common medical conditions (e.g., diabetes, depression, and hypertension) were not excluded if they confirmed the condition was controlled by medication and/or self-management strategies and did not restrict engagement in daily occupations. Diagnosis and medication were recorded when applicable.

Participants were recruited via convenience sampling method: 1) a database of past study participants who indicated willingness to be contacted for future studies; 2) notices posted on social media channels (e.g., Twitter, Facebook, webpages) through UBC Occupational Science & Occupational Therapy (OSOT), Arthritis Research Canada (ARC), and arthritis community groups (Arthritis Society, Arthritis Consumer Experts, Lupus BC, Canadian Spondylitis Association); 3) bulletin board postings in the community, ARC, OSOT, Mary Pack Arthritis Program; 4) local newspaper advertisements (Vancouver Sun Digital, Richmond Sentinel, Craigslist, etc.); 5) in-person recruitment at gyms, community centres, arthritis patient board meetings and conferences, rheumatology clinics, and Mary Pack Arthritis Program classes; and 6), word of mouth as participants chose to share recruitment notices with friends and family.

Procedures

Upon receipt of expressions of interest, researchers explained the study and screened (via phone) participants for eligibility. Study sessions were scheduled with eligible participants. Because acute illness can affect participation in typical occupations, potential participants who were recovering from activity-limiting surgery, infections, or injuries who were otherwise eligible were scheduled for data collection on a date after their self-reported return to usual activities. Finally, two days prior to data collection, participants were reminded via email to reschedule if they had a current illness (e.g., cold, urinary tract infection, etc.) because we wanted them to feel well when collecting health measures (reported in Chapters 3-5). Data collection took place from October 2018-December 2019 in group sessions of up to 15 participants, taking 60-120 minutes for participants to complete the study procedures. Sessions were held at Arthritis Research Canada in Richmond, Surrey Memorial Hospital, and the University of British Columbia's Vancouver campus.

Upon arrival at the session, researchers reiterated and answered any questions about the study procedures and collected signed informed consent forms. After participants completed the study questionnaires, researchers reviewed the questionnaires to ensure participants completed each measure (or omitted items intentionally, which is their right). Questionnaires were labelled with unique ID codes that protect participants' identities and stored in a locked cabinet.

Variables and measures

Participants completed a single packet containing the following measures (see Appendix A for a list of content):

1) **Personal projects analysis (PPA)** was used to measure occupation type and occupational characteristics by eliciting participants' salient projects and rating 19 project dimensions. PPA demonstrates adequate construct validity (Christiansen et al., 1999), and reliability (Little et al., 1992) for research with adults of different ages and health status. Participants first list projects they are currently doing (PPA elicitation phase). Then they select 10 most relevant projects from that list and rate each one on 19 dimensions, i.e., the extent to which projects are important, absorbing, and so on, on 0-10 scales (0 = dimension is not at all characteristic of the project, 10 = dimension is highly characteristic of the project). The definitions of PPA project definitions are found in Appendix C. For this study, the core 17 dimensions (Little, 1983) plus two additional dimensions (*Creative* and S*ocial* characteristics) were rated. The labels of the 10 most salient projects comprise the data for

occupational type; the ratings of the 19 dimensions comprise the data for occupational characteristics.

Since chosen occupations and occupational characteristics may be associated with or influenced by a variety of health and personal variables, potential covariates were measured as follows:

2) **Demographic** data collected from participants included age, sex, marital status, ethnicity, employment status, income (household annual income), and diagnosis.

3) **IA activity status**. To describe the IA sample, disease activity was measured using the Rheumatoid Arthritis Disease Activity Index (RADAI; Fransen et al., 2000); higher scores indicate greater disease activity. Fatigue was measured on a 10 cm visual analogue scale, pain was noted from the SF-36 bodily pain subscale (Ware, 1993), and disease duration was noted (number of years since diagnosis).

4) The **SF-36 Health Survey** consists of 36 items, eliciting participant-reported information on health status (Ware, 1993). It is a generic measure designed for the general population and a wide range of conditions. It yields two summary scores or eight subscale scores. For the present study, the Physical (PCS) and Mental (MCS) Component summary scores were used to measure self-rated health. Normalized scores range from 0-100, with higher scores indicating better health. The SF-36 Health Survey has demonstrated reliability and validity in studies involving people with arthritis (Kvien et al., 1998; Linde et al., 2008) and the general population (Jenkinson, 1994). Both the PCS and MCS were used in correlation analyses. The PCS and MCS are composite scales for which internal consistency is not reasonably applied (Ritvo et al., 1997) because they use weighting and aggregation of the

eight subscales in the SF-36. Cronbach's alpha in the present sample for the eight subscales ranged from .78 to .92.

Data analyses

1. **What types of occupations do all participants engage in?**

To answer the first research question, a content analysis (Hsieh & Shannon, 2005) of the projects generated in the PPA project elicitation phase were used to categorize participants' occupations. Project labels were read and re-read, then categorized by hand for the sample as a whole and the two groups separately. Two researchers (FTM, and supervisor CB) independently reviewed and categorized projects by clustering similar types of projects together. Then they met to discuss and refine categories by consensus. QSR International NVivo 12 qualitative data analysis software was used to verify that each project was accounted for in the final analysis.

2. **Do the types of occupations differ between groups (IA vs. HC)?**

Frequency counts (number of projects in each category) were tabulated for the sample as a whole and the two groups (IA and HC). Chi-square analyses were used to determine significant differences between groups with regard to the proportion of projects assigned to each category.

3. **How do participants characterize their occupations, and do occupational characteristics differ between groups (IA vs. HC)?**

Data were entered into SPSS (IBM SPSS Statistics for Windows, version 25) and double-checked for accuracy. Descriptive statistics summarized participant demographics, and correlation analyses explored relationships between selected demographics and project dimensions. Mean scores were computed for each project dimension for each participant across their 10 projects. Between-group differences in project dimensions were analyzed using independent groups t-tests.

4. **After controlling for selected covariates, do any differences in occupational characteristics still exist?**

Separate ANCOVAs were conducted for each of the project dimensions that were found to be different between groups (from question 3). Self-reported physical health (PCS), age, and sex were selected covariates in determining stability of the between-group differences. Analyses controlled for these three variables because theoretically, it makes sense that age and sex influence occupational choice, and physical health (PCS) was statistically significantly different between groups.

Significance level was set at $p < .05$ for all analyses.

Missing data. Four of the 143 participants did not list the requested 10 projects (one person listed six projects, another eight projects, and two people listed nine projects). This did not affect the content analysis nor the mean ratings for occupational characteristics, but explains why the total number of projects is eight fewer than expected. One person chose not to disclose income, three did not report disease duration, and two people from the IA group did not complete the RADAI. These were left as missing data. For the SF-36, two participants each omitted one item, but this did not affect the calculation of means for the subscale with the missing item.

Sample size estimates

Two sample size estimates were considered. Between-group comparisons required a minimum of 64 participants per group, using the parameters alpha = .05, beta = .8, and a moderate effect size d = .5. The research questions in Chapter 3 used multivariate regression analyses which could have included up to 23 variables, requiring 115 to 230 participants (5 to 10 participants per variable) (Norman & Streiner, 2000). The target for recruitment was 150 participants, 75 with arthritis and 75 without.

Results

Participant demographics

A total of 273 individuals expressed interest in the study (see Figure 2.1). Fifty-nine declined participation after learning more about the study and were not screened for eligibility. Of the 214 people who were screened, 37 eligible persons declined to participate, 34 were ineligible, leaving 143 people who were eligible and agreed to participate. Sixty-seven of the 143 participants had inflammatory arthritis, and the rest (n = 76) comprised the healthy comparison group.

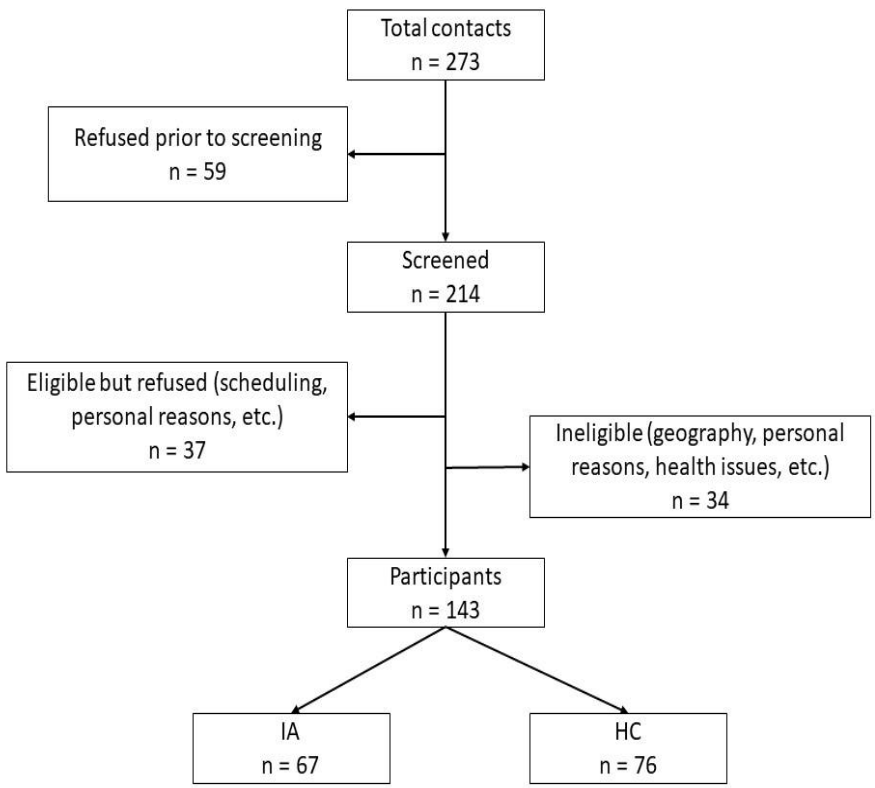


Figure 2.1

Participant Flow Chart

Participants (n = 143 adults, 32 males, 111 females) are described in Table 2.1. They had an overall mean age of 50 years old (SD = 16.3), with a range of 22-88 years old. Two-thirds had a university degree. The mean disease duration of the IA group was approximately 13 years (SD

= 13.10); 57% had RA, 16% psoriatic arthritis, 13% lupus, 10% spondyloarthritis, 6% JIA, and 3% polyarthritis not yet confirmed; mean RADAI score was 3.10 (SD = 2.07). Through between-group t-tests and Chi-square tests, we found no statistically significant differences in age and sex between the IA and HC groups

Table 2.1

Participant Demographics, Count (%) Unless Otherwise Noted

	Overall sample (n = 143)	IA (n = 67)	HC (n = 76)	p-values (IA vs. HC)
Sex*				.11
Male	32 (22%)	11 (16%)	21 (28%)	
Female	111 (78%)	56 (84%)	55 (72%)	
Age, mean (SD)	50.42 (16.31)	53.01 (15.88)	48.13 (16.45)	.07
Education level				.87
Completed some high school/high school graduate	19 (13%)	8 (12%)	11 (15%)	
trade or vocational school or community college graduate (diploma/certificate)	30 (21%)	16 (24%)	14 (18%)	
University bachelor's degree	58 (41%)	25 (37%)	33 (43%)	
Master's or doctoral degree	36 (25%)	18 (27%)	18 (24%)	
Marital status				.32
Married/living with partner	85 (60%)	41 (61%)	44 (58%)	
Widowed/separated/divorced	19 (13%)	10 (15%)	9 (12%)	
Single	39 (27%)	16 (24%)	23 (30%)	
Employment status				.14
Part-time	22 (15%)	9 (13%)	13 (17%)	
Full-time	58 (41%)	31 (46%)	27 (36%)	
Retired	34 (24%)	12 (18%)	22 (29%)	
Other	29 (20%)	15 (22%)	14 (18%)	
Income				.03
Under $40,000	37 (26%)	14 (21%)	23 (30%)	
$40,000-59,999	18 (13%)	7 (11%)	11 (15%)	
$60,000-79,999	10 (7%)	9 (13%)	1 (1%)	
$80,000-99,999	22 (15%)	14 (21%)	8 (11%)	
$100,000-119,999	20 (14%)	9 (13%)	11 (15%)	
$120,000 and over	35 (25%)	14 (21%)	21 (28%)	
Ethnicity				.24
White/Caucasian	105 (73%)	56 (85%)	49 (65%)	
Chinese	13 (9%)	3 (4.5%)	10 (13%)	
Mixed race	9 (6%)	2 (3%)	7 (8%)	
Latin American	5 (4%)	3 (4%)	2 (3%)	
South Asian	4 (3%)	1 (2%)	3 (4%)	
Other	7 (5%)	2 (3%)	5 (7%)	
Co-morbidities/health conditions				< .01
0	60 (42%)	17 (25%) (no conditions other than IA)	43 (57%)	
1	41 (29%)	19 (28%)	22 (29%)	
2	20 (14%)	15 (22%)	5 (7%)	
3	12 (8%)	10 (15%)	2 (3%)	
4 or more	10 (7%)	6 (9%)	4 (5%)	
BMI, mean (SD) (median)	25.22 (5.33) (23.96)	25.76 (5.31) (24.9)	24.75 (5.33) (23.30)	.26
PCS, mean (SD) (median)	47.00 (11.33) (50.41)	40.23 (11.44) (41.30)	52.97 (7.14) (54.00)	< .01

**Non-binary (LGBTQ+) was an option on the questionnaire. No participants selected it.*

What types of occupations do all participants engage in?

Overall, there were 1422 projects generated by participants. Six major project categories were identified, listed in Table 2.2 in descending order of frequency.

The category *Holistic health* contained the most projects, which focused on physical activity, self-management, consuming healthier (foods/beverages), reflection and spirituality, and managing health-related appointments. Participants listed a variety of different physical activities, ranging from broad, such as "exercise more often," to specific ones like dance, boxing, curling, snowshoeing, biking, along with projects with precise measurables such as "exercise class 3-4 times a week". Projects were categorized under reflection and spirituality if they involved formal religious or spiritual practices (e.g., "go to church," "meditate") or indicated some sort of life- or self-reflection (e.g., "philosophize", "complain less").

Leisure and enjoyment included creative hobbies, travel, reading, cooking for fun, entertainment, learning a new language, clubs, and shopping. Examples of creative hobbies are textile arts (quilting, knitting, sewing, etc.), visual arts (drawing, painting), music, photography and scrapbooking, and writing. Travel included traveling itself as well as projects that were travel-related (e.g., saving money for a trip, or arranging hotels in which to stay).

Around the home projects included gardening and home improvement tasks, decluttering and home organization, house chores, and making meals. There were many projects that focused on organizing photos and these were categorized under *Decluttering and home organization*. However, projects that focused on taking photos and creating collages, displays, or scrapbooks with these photos (projects with a certain creative element) were instead categorized under *Leisure and enjoyment* (*Creative hobbies* sub-category).

Projects that involved others or expressed a social element were categorized as *Relating to others* and included spending time with friends and family, helping or nurturing family and friends through various ways, romantic relationships, and pets. Projects under this category were about relationships and connections, as well as how we make or maintain the immediate, meaningful relationships around us.

Participants listed projects *Around the community*, such as work-related tasks, volunteering, schooling and courses, as well as projects that focused on accessing the community. In general, *Around the community* projects are about contributing to society, being productive, and being a citizen of their larger community.

Finally, *Life planning and organizing* projects included financial planning, moving, retirement planning, starting/ending long-term romantic relationships, and family planning. This category reflects the natural lifespan, with projects from planning for babies to planning end-of-life and everything in between.

Post-hoc analysis. After reaching consensus on the six categories outlined above, we made an additional observation when confirming the relationships among projects, sub-categories, and categories. Some projects stood out due to an explicit reference to *Learning* in the way the project was labelled by participants, such as a focus on learning a new skill. Therefore, a post-hoc *Learning* category includes projects that concurrently exist in the above six categories. For example, the project “learn to swim” was placed in both the *Physical activity* sub-category as well as in this *Learning* category. However, there were eight projects that did not fit in any of the six categories (e.g., “speak louder”) and were categorized in *Learning* alone.

Table 2.2

PPA Projects Grouped into Occupational Categories

Category (Total # of projects; # in HC and IA groups, respectively)	**Sub-category** (Total # of projects; # in HC and IA groups, respectively)	**Verbatim examples**
1) *Holistic health* *(404; 213, 191)*	Physical activity (214; 102, 112)	Exercise more often, curl, box, complete the Grouse grind, improve flexibility, start volleyball
	Self-management (80; 46, 34)	Lose about 8 pounds, take a nap, reduce screen time on phone, self-care, maintain health
	Consume healthier (57; 32, 25)	Less junk food, drink more water, cook healthier
	Reflection and spirituality (44; 29, 15)	Read bible daily, journaling, pray everyday
	Managing health-related appointments (9; 4, 5)	Doctor's appointment, physiotherapy, book spa massage appointment
2) *Leisure and enjoyment* *(321; 155, 166)*	Creative hobbies (115; 41, 74)	Drafting sewing patterns, play my guitar, paint watercolours, create new things, make custom gifts, write a book, make photo books, photography lessons
	Travel (78; 43, 35)	Travel with family, family vacation, plan trip to Portugal
	Reading (47; 24, 23)	Read more, read a novel a month
	Cooking for fun (30; 17, 13)	Bake more cookies, try new recipes, make bread pudding
	Entertainment (21; 12, 9)	Playing video games, watch a TV series, concerts, computer scrabble
	New languages (14; 9, 5)	Improve German, speak Italian, learn English
	Clubs (11; 6, 5)	Join a book club, join Toastmasters club, learn to play bridge with friends, social men's group
	Shopping for fun (5; 3, 2)	Shopping, go to an outlet
3) *Around the home* *(230; 116, 114)*	HGTV (home improvement and gardening) (71; 38, 33)	Prep garden, get more house plants, kitchen renovation, house repairs
	Decluttering and organizing the home (71; 35, 36)	Reduce clutter, organize basement, organize photos, clean out closet
	House chores (55; 27, 28)	Laundry, clean my apartment, wash my dishes
	Making meals (33; 16, 17)	Making dinner, prepare meals, grocery shopping, menu plan
4) *Relating to others* *(210; 117, 93)*	Socializing and spending time with friends and family (128; 74, 54)	Have meaningful chat with parents, enlarge circle of friends, socialize more, keep in touch with friends, visit brother and parents, dinners with family, make turkey dinner for friends, family gatherings, entertaining, buy gifts for nieces, writing Christmas letter, holiday planning
	Tend and befriend (nurturing and helping friends and family) (39; 19, 20)	Help/support 86-year old mom, babysit grandkids, help other sister move into basement suite, helping son with homework, Halloween party for kids

	Romantic partners – aspirations and activities (23; 14, 9)	Make my partner happier, enjoy and deepen my relationship with boyfriend, outdoors with partner, plan a nice outing with girlfriend, sex
	Pets (20; 10, 10)	Walk dog, chill with my cats, get a cat
5) Around the community *(202; 114, 88)*	Work-related tasks (102; 53, 49)	Find a new job, work less, studying for real estate license
	Volunteering (47; 27, 20)	Volunteering at my kids' school, working at civic election, volunteer at school, engage in charity, helping community, advocacy work for arthritis and women's health, board member skills
	Schooling and courses (30; 20, 10)	Take business writing course, finish degree, finish bio class, take med school pre-req's
	Accessing and getting around the community (23; 14, 9)	Practice driving, buy a new car, fixing brakes on bike, get full driver's license, go out on my own, carpool more, obtaining Canadian citizenship, new passport, learn more about politics, outfit my jeep
6) Life planning *(76; 44, 32)*	Finances (32; 25, 7)	Manage investments, organize my finances, pay off debt, reduce spending
	Moving (15; 8, 7)	Live in my hometown, find a house, get ready to move
	Retirement planning (14; 6, 8)	Make estate plan and will, retirement planning, gather will/funeral info, age in good condition
	Family planning (12; 4, 8)	Family planning, have a family, get mentally and physically healthy to get pregnant, have children, reading books on childrearing
	Starting/ending romantic relationships (3; 1, 2)	Lawyer for separation, plan divorce and assets, have talk about long term with girlfriend
Post-hoc category		
Learning *(54; 33, 21)*		Learn to use Photoshop, learn a new language, learn more stock market, learn to spend more time reflecting, learn to go with the flow, learn to juggle and unicycle, learn to rock climb, assertiveness, speak louder

Do the types of occupations differ between groups?

Except for the *Leisure and enjoyment* category, the number of projects in each category was higher in the HC group than the IA group. Because the groups were not equal size, we compared the distribution across occupational categories, and Chi-square tests showed that there were no statistically significant between-group differences. See Table 2.3 for details.

Table 2.3
Project Categories Between Groups, Chi-square (2-sided)

Project categories	**Total number of projects**	**IA group** Count (%)	**HC group** Count (%)	**p-value (2-sided)**
Holistic health	404	191 (47%)	213 (53%)	.89
Leisure and enjoyment	321	166 (52%)	155 (48%)	.05
Around the home	230	114 (50%)	116 (50%)	.39
Relating to others	210	93 (44%)	117 (56%)	.29
Around the community	202	88 (44%)	114 (56%)	.40
Life planning	76	32 (42%)	44 (58%)	.38

How do participants characterize their occupations, and do occupational characteristics differ between groups (IA vs. HC)?

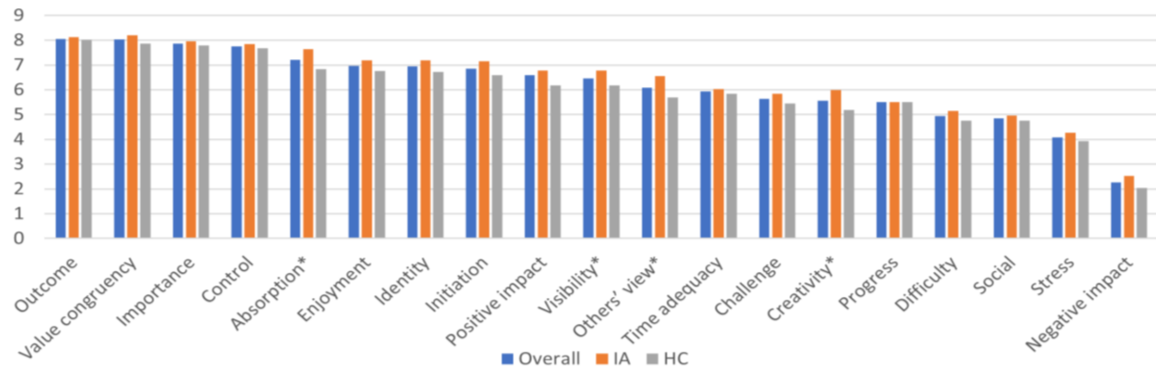
Mean occupational characteristic scores are in Table 2.4. The highest mean ratings for the total sample were: *Outcome* (8.06), *Value congruency* (8.03), and *Importance* (7.87).

Table 2.4

Project Dimensions Ratings by Overall Sample (n = 143)

Project dimensions	**Mean**	**Standard deviation**	**Minimum** (lowest possible = 0)	**Maximum** (highest possible = 10)	**Range**
Outcome	8.06	1.35	2.20	10.00	7.80
Value congruency	8.03	1.36	3.80	10.00	6.20
Importance	7.87	1.18	4.50	10.00	5.50
Control	7.76	1.51	1.70	10.00	8.30
Absorption	7.21	1.65	1.80	10.00	8.20
Enjoyment	6.96	1.52	2.90	9.80	6.90
Identity	6.94	1.59	1.20	10.00	8.80
Initiation	6.86	2.03	1.10	10.00	8.90
Positive impact	6.60	2.20	.90	10.00	9.10
Visibility	6.46	1.67	.60	10.00	9.40
Others' view	6.09	1.84	.50	9.60	9.10
Time adequacy	5.94	1.75	1.70	10.00	8.30
Challenge	5.64	1.50	1.90	9.00	7.10
Creativity	5.56	1.83	.50	9.10	8.60
Progress	5.51	1.78	1.70	10.20	8.50
Difficulty	4.94	1.66	.20	8.90	8.70
Social	4.85	1.73	.40	9.60	9.20
Stress	4.09	1.66	.00	7.80	7.80
Negative impact	2.27	1.72	.00	7.10	7.10

The highest mean ratings for the IA group were: *Value congruency* (8.20), *Outcome* (8.13), and *Importance* (7.96), respectively. The highest mean ratings for the HC group were *Outcome* (8.01), *Value congruency* (7.87), and *Importance* (7.79), respectively. There were statistically significant between-group differences for four dimensions, all of which were rated higher by the IA group. See Figure 2.2 and Table 2.5. Both groups had the same top seven dimensions and the lowest four dimensions.



*significant between group results

Figure 2.2

Project Dimension Ratings by Groups

Table 2.5

Between-Group Differences in Project Dimensions by IA and HC Groups

Project dimensions (ordered by mean for total sample)	**IA (n = 67)**		**HC (n = 76)**		**Mean difference**	**95% CI Mean difference**		**t**	**p**
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
Value Congruency	8.20	1.40	7.87	1.32	-.33	-.78	.12	-1.47	.14
Outcome	8.13	1.38	8.01	1.32	-.12	-.56	.33	-.52	.61
Importance	7.96	1.22	7.79	1.14	-.17	-.56	.22	-.87	.39
Control	7.85	1.21	7.68	1.73	-.17	-.67	.33	-.69	.49
Absorption	7.65	1.38	6.83	1.78	-.81	-1.35	-.28	-3.03	.003
Enjoyment	7.20	1.61	6.75	1.41	-.45	-.95	.05	-1.76	.08
Identity	7.19	1.40	6.73	1.73	-.46	-.98	.07	-1.73	.09
Initiation	7.15	1.90	6.60	2.12	-.55	-1.22	.12	-1.64	.10
Visibility	6.79	1.62	6.17	1.67	-.62	-1.16	-.07	-2.22	.03
Positive impact	6.61	2.30	6.58	2.13	-.03	-.76	.70	-.08	.94
Others' view	6.55	1.59	5.69	1.95	-.86	-1.46	-.26	-2.85	.01
Time adequacy	6.04	1.76	5.85	1.75	-.19	-.77	.39	-.64	.52
Creative	5.99	1.71	5.18	1.86	-.81	-1.40	-.22	-2.71	.01
Challenge	5.85	1.47	5.46	1.50	-.39	-.88	.10	-1.57	.12
Progress	5.51	1.74	5.51	1.82	.00	-.59	.59	-.01	.99
Difficulty	5.14	1.71	4.76	1.60	-.39	-.94	.16	-1.40	.17
Social	4.96	1.68	4.75	1.78	-.20	-.78	.37	-.70	.49
Stress	4.27	1.68	3.93	1.63	-.34	-.89	.21	-1.23	.22
Negative impact	2.53	1.80	2.04	1.62	-.49	-1.06	.07	-1.72	.09

* shaded rows indicate between-group differences in dimensions

After controlling for selected covariates, do any differences in occupational characteristics still exist?

The dimensions *Absorption, Others' view*, and *Creative* remained statistically significantly different between groups after controlling for each of PCS, age, and sex. These three dimensions also remained different when controlling for PCS, age, and sex together. The dimension *Visibility* did not remain different between groups when controlling for each of PCS and age, nor when combining PCS, age, and sex (*Visibility* only remained different between groups when controlling for age). See Table 2.6 for details. We completed ANCOVA analyses on the other dimensions that did not show significant between-group differences, and they remained non-significant after adjusting for PCS, age, and sex.

Table 2.6
Between-Group Differences in Project Dimensions, ANCOVA Results

Covariate(s)	Project dimensions	Adjusted means (IA group)	Adjusted means (HC group)	*F*	*P*
PCS	*Absorption*	7.59	6.89	4.63	.03
	Others' view	6.61	5.63	7.21	.01
	Creative	5.98	5.20	4.59	.03
	Visibility	6.78	6.18	3.17	.08
Age	*Absorption*	7.61	6.87	7.56	.01
	Others' view	6.54	5.69	7.72	.01
	Creative	5.95	5.22	5.83	.02
	Visibility	6.75	6.21	3.87	.05
Sex	*Absorption*	7.63	6.85	8.19	.01
	Others' view	6.55	5.68	8.01	.01
	Creative	6.02	5.16	8.28	.01
	Visibility	6.77	6.19	4.29	.04
PCS, age, and sex	*Absorption*	7.56	6.91	3.95	.05
	Others' view	6.61	5.63	7.10	.01
	Creative	6.00	5.17	5.21	.02
	Visibility	6.75	6.21	2.66	.11

*shaded rows denote statistically significant between-group differences

Discussion

The purpose of this study was to explore possible differences in occupations between adults with and without IA, using Personal Projects Analysis, a tool that allows for analyzing *type* and *characteristics* of a set of occupations that are relevant to the individual. A thematic analysis of the 10 most salient projects elicited from this sample of 143 adults identified six major categories describing what participants do; the IA group reported a similar distribution of types of occupations as those without IA. As a combined sample, participants characterized a cluster of occupations (occupational characteristics) similarly across the IA and HC groups: the participants chose to identify occupations that were subsequently rated as highly congruent with their values

(*Value congruency*), important (*Importance*), and likely to lead to a successful outcome (*Outcome*). However, three of the 19 occupational characteristics showed statistically significant different means between groups after controlling for PCS, age, and sex. Each of these main findings will be discussed in turn.

Occupational categories: What types of occupations do people do?

The frequency of type of occupations makes intuitive sense in daily life: participants listed more occupations related to maintaining *Health* and *Leisure and enjoyment* – occupations that tend to be done daily or weekly. *Life planning* occupations were the least frequently reported, likely because these occupations are completed more periodically (a few times a year to only once every few years).

Our finding that the distribution of type of occupations is similar between the IA and HC groups suggests that having IA is not preventing participants from engaging in the kinds of occupations in which adults typically engage. This finding aligned with previous research which found that occupations are similar between people with and without chronic illnesses (Brooke et al., 2007; Helgeson & Takeda, 2009). Despite this finding, it is important to note that PPA does not evaluate performance. Therefore, it is possible that IA may still affect which occupations are done in each category and/or how they are done, as shown in prior literature demonstrating occupational limitations due to IA. For example, Katz et al. (2006) found through a panel survey that about 40% of their sample (of 548 participants with RA) had given up or no longer engage in leisure types of occupations. Another study also reported that 238 women with RA in Norway had significant decreases in participation in committed and discretionary occupations over a 10-year period (Reinseth et al., 2012). Differences between our findings and those of other studies could be due to using different measures and questionnaires to examine what people do in their everyday life. Leino et al. (2015) used telephone interviews asking about participants' current *ability* to perform tasks as well as their ability to perform the same tasks if they did not have RA, and found that people with RA who gave up or had decreased leisure activities had greater disability scores. By exploring *time* spent on activities, Katz and Morris (2007) found that as the functional limitations of women with RA increased, their time spent on committed (e.g., household chores) and discretionary activities (e.g., leisure activities) decreased. In other words, our study explored what people do, while other studies focused on ability or time use. In addition, neither of these two studies used a healthy comparison group; Katz and Morris (2007) also used a longitudinal design. Different study designs and measures may yield different results and our study may be measuring a different facet of occupational engagement. Since occupational engagement is partially subjective (Sutton et al., 2012), it could be that none of these previous studies have adequately captured the full impact of IA on occupation, but each one, including the present study, contributes to understanding the bigger picture.

Personal projects are closely related to happiness and well-being (Christiansen et al., 1999; Vroman et al., 2009), and because IA participants in the present study engaged in similar personal projects (occupations) as the HC group, they may be sustaining their health in some way; however, this speculation requires further exploration and will be studied in subsequent chapters. *Learning*, a category that emerged through a post-hoc analysis, speaks to how our sample as a whole was interested in advancing their knowledge and skills – a mindset that is also related to health (Yamashita et al., 2019).

Occupational characteristics: How do people perceive their occupations?

The link between personal projects and well-being is especially true if participants rated their projects as possessing more of the positive occupational characteristics of the tool (e.g., *Importance*, *Enjoyment*). Indeed, we found that in the study sample, the top three project dimensions were the same across both groups and these dimensions were highly desirable characteristics (*Importance*, *Value congruency*, *Outcome)*. This finding may speak to the universal nature of occupations. Occupation is a basic human need (Polatajko et al., 2007) and perhaps certain occupational characteristics are universal regardless of the presence of chronic illness. Occupations give meaning to our lives and engaging in valued and important occupations is central to our identity and personhood (Christiansen, 1999; Hammell, 2004; Ottenvall Hammar & Håkansson, 2013); our findings reinforce how such occupations are core to who we are as humans. Overall, the occupations that participants chose to list were rated not only important and congruent with one's values, but were also anticipated to have a desirable outcome. Despite these commonalities, participants with IA rated three dimensions (*Creative*, *Absorbing*, and *Others' view*) significantly higher than the HC group.

There is a strong relationship between *Creativity* and *Absorption* and that lies in the theory of "flow". Briefly, Csikszentmihalyi coined the term "flow" to describe the pleasurable, subjective experience of being entirely engrossed (absorption) when doing a task that is balanced between appropriately challenging and matching one's skillset (Csikszentmihalyi, 1990). Typically, but not exclusively, flow is used to describe the experiences felt during creative pursuits (Csikszentmihalyi, 1996). While there are many reasons for why people engage in creative and absorbing pursuits, one possible reason for why people with IA may engage in them is to distract themselves from pain (Ahlstrand et al., 2012). This aligns with research showing that enjoyable and leisure activities like mindfulness, meditation, and relaxation can help alleviate arthritis symptoms and improve well-being (Greysen et al., 2017; Pradhan et al., 2007; Zangi et al, 2012).

The construct of disability is shaped by society and social norms (Mitra, 2006) and may explain why the IA group ranked their occupations as important to others (*Others' View*), more so than the HC group. By engaging in occupations that are valued by society, IA participants may want others to see them as more able (or at least less dis-abled). They may feel that society perceives them as weak or dysfunctional due to their arthritis (Macdonald et al., 2018). Through interviews with 26 people with IA, Grønning et al. (2011) found that nearly all the participants stated it was "important to be seen as 'normal'" (p. 1427). Normalcy was expressed through the occupations that these participants were doing on a daily basis (e.g., work, leisure activities). People with IA may desire to hide their disease, or at least engage in 'normal' occupations (Macdonald et al., 2018). Our findings reinforce how close friends and family may positively or negatively influence the occupational choices of those with IA (Bergström et al., 2020; Nyman & Lund, 2007), with their attitudes and perspectives towards different occupations, i.e., whether they think certain occupations are important. To support occupational participation that is not at odds with people's occupational identities, health care providers can encourage patients with IA (and perhaps their caregivers) to reflect upon the motivations and reasons underlying their occupations.

Overall, these three between-group differences in occupational characteristics may or may not be spurious; this is the first study comparing PPA occupational characteristics in adults with and without IA and additional research is needed to confirm findings as well as the above interpretations. Even after controlling for age, sex, and physical health (PCS), these between-group differences remained, suggesting that IA accounts for these differences and provoking future research questions. For example, do people with IA intentionally choose occupations that are creative, absorbing, and viewed as important by others? Do they derive benefit from occupations with these characteristics, and if so, what are the benefits? Future research exploring such questions would lead to greater understanding of the motivation behind occupational choice for those with IA.

Strengths and limitations

Using a healthy comparison group allowed for a comparison of occupations and occupational characteristics between participants with and without IA, helping to demonstrate the impact of IA on occupations. PPA's advantage is its open-ended nature, asking participants to list and rate their own projects while other studies typically use a pre-defined list of occupations that may or may not be applicable to the rater. This resulted in a more individualized exploration of what participants do, from their own perspective.

PPA's open-ended nature carries some limitations in its generalizability. For example, what one participant defines as *Creative* may be different from how another participant (or researchers) define creativity; we minimized this by providing definitions of each project dimension. In addition, member checking of the content analysis would add to the rigour of findings. For example, participants may have categorized their projects differently from how the researchers categorized them (Brooke et al., 2007); however, we endeavoured to remain as methodical and objective as possible when categorizing participants' projects to minimize subjectivity and bias (e.g., having two researchers independently reviewing and categorizing them, and refining the categories by consensus), increasing dependability. Administering the PPA also assumes that participants will choose and list their most current or representative projects. Participants may instead have listed projects that were more grandiose, as the term 'project' may connote larger, more concrete, goal-based activities as opposed to everyday, more mundane occupations, both of which interested us. Also, participants may have listed projects that they wanted or planned to do, as opposed to things in which they currently engage. We tried to mitigate this by providing clear written and verbal instructions on the definition of projects. Finally, PPA requires participants to have a relatively high level of literacy and introspection (ability to reflect on own's projects). Therefore, the validity of PPA (and subsequently, comprehensive and accurate information on people's occupations) is restricted by participants' literacy level and ability to introspect. Overall, the interpretation of results needs to be guarded against these considerations. Future studies should replicate our study, and then repeat our research questions using a different measure of occupation, such as the Experience Sampling Method (Hektner et al., 2006; Kimhy et al., 2006).

Findings are limited to the perspectives of adults with similar characteristics (e.g., 73% of our study sample was white, 66% university educated), in which the privilege of these groups afford the choice of and ability to select certain occupations. People of higher SES or those who are not of a racialized group may have fewer barriers to engaging in desired occupations (Beagan & Etowa, 2009).

Norms are available for the SF-36 for the general population and diagnostic groups, and both groups exceeded the PCS mean, showing they have higher than average physical health, possibly due to excluding smokers and co-morbidities that affect occupational participation. (Health data presented in Chapter 3 will further show that our sample is indeed physically healthier than the general population). These factors, along with the potential participant selection bias, led to a sample of healthy and likely highly motivated (in terms of activity participation) participants. Participants needed to attend the data collection sessions in person which may further contribute to selection bias. However, we provided a variety of data collection times and locations for participants from which to choose, to attract a wider range of participants.

Future directions

These findings contribute to occupational science and occupational therapy by providing a more nuanced understanding of occupations. To test the theoretical assumption (that what we do everyday matters) of the Do-Live-Well framework (Moll et al., 2015), it was first necessary to explore what people do. Our findings revealed common occupations and occupational characteristics between the IA and HC groups. Future replication studies are needed to determine whether the six occupational categories would result in different samples (e.g., samples from other geographical areas, sociocultural backgrounds, or other demographic traits) and different investigators. Similarly, future research may reveal different results in occupational characteristics by using another disease group. It is possible that a different disease group may engage in different types of occupations than observed in the present study due to different disease presentations and symptoms. In addition, future studies can invite participants to categorize their own occupations (Brooke et al., 2007) which may lead to novel and different results.

Conclusion

Using Personal Projects Analysis, a tool that allows for analyses of *type* of occupation and occupational *characteristics* for a set of occupations that are relevant to the individual, we were able to explore the impact of IA on occupation. In this sample, adults with and without IA engaged in a wide array of occupations, with similar distribution in type of occupation. Both IA and HC groups chose to report occupations that were important to them, congruent with their values, and likely to result in a satisfying outcome. The IA group rated their occupations higher than the HC group in the three characteristics (*Absorption*, *Creative*, and *Other's view*), raising a future research question that perhaps having IA may lead to intentionally choosing occupations of certain characteristics. Future research could examine the motivation behind certain occupational choices, as well as the relationship between these occupations and health status. Overall, our results suggest that having IA or its symptoms does not negatively impact the types of occupations done, challenging the general assumption that occupational choice is dictated by medical condition or disability.

Chapter 3: Exploring the relationship between occupational characteristics and health of adults with and without inflammatory arthritis

Introduction

Engagement in a variety of activities has generally been associated with better health outcomes (Wagman et al., 2020; Yu et al., 2018), yet limited attention has been given to the specific *kinds* of activities that may promote or sustain health and well-being. In their presentation of a population health framework, the Do-Live-Well model, Moll and colleagues (2015) expanded on healthy lifestyle recommendations with careful attention to people's activities. Typical lifestyle recommendations cite diet, physical activity, and stress reduction approaches, but the Do-Live-Well model uniquely proposes the importance of doing activities, with the tag line "what you do everyday matters" (p. 11). Do-Live-Well explains that activity characteristics such as connecting with others, expressing preferences, identifying through cultural activities, and establishing a just right balance of different kinds of activities collectively contribute to people's health and well-being. To further validate frameworks like Do-Live-Well and inform activity recommendations, we need more studies that explore how health is associated with specific kinds of activities and the characteristics that activities share.

Activity recommendations can be particularly important for people living with chronic diseases like arthritis. People with inflammatory arthritis (IA) experience symptoms (e.g., fatigue, joint pain, and inflammation) that limit participation in life, such as paid work, childcare, and hobbies (Katz et al., 2006). As such, IA can lead to significant life challenges (Macdonald et al., 2018), possibly contributing to the high prevalence of anxiety (Watad et al., 2017) and depression (Xue et al., 2020) in this population. Physical activities have been shown to alleviate arthritis symptoms (Larkin et al., 2016), but there is a lack of research on the health benefits of the range of activities that make up people’s day-to-day lives. A focus on occupational characteristics and their association with health outcomes is one way to explore the potential benefits of different activities. Occupational characteristics refer to a person’s perception of an activity being creative, social, important, stressful, among many other features.

Health can be measured in different ways, and population health and health services research frequently use self-reported surveys. While patient-reported outcomes are critical to understanding health, other indicators such as vital signs (e.g., heart rate, blood pressure) and inflammatory markers (e.g., interleukin-6) have also been used (Bajaj et al., 2016; Schwerdtfeger & Gerteis, 2014). Recent discoveries in measuring cellular aging provide a new tool to supplement self-reported health: telomere length (TL). Telomeres are on the tips of chromosomes (Blackburn, 2000; Blackburn & Gall, 1978; Szostak & Blackburn, 1982) and shorten over time as people age (Wright & Shay, 2001). TL is considered a biomarker of health and is increasingly used in applied and psychosocial research. Some behaviours and life experiences have been associated with accelerated telomere shortening, such as smoking (Astuti et al., 2017) and chronic stress (Epel et al., 2004). Other behaviours such as eating healthily (Leung et al., 2018) and physical activity (Puterman et al., 2018) are associated with preserving TL. TL reflects the interrelated psychosocial, environmental, and behavioural factors that influence health status (Epel, 2009) and potentially offers an objective and novel measure of the health impact from engaging in different types of occupations that goes beyond self-report and vital signs.

Identifying the important associations between occupational characteristics and well-being may lead to new interventions to promote health through occupational participation for people with and without chronic conditions. The aim of the present study was to examine the relationship between the characteristics of occupations and health, in adults with and without inflammatory types of arthritis. From this aim, we derived three **research questions**:

1. Do self-reported physical and mental health, satisfaction with life, and telomere length differ between the inflammatory arthritis (IA) and healthy comparison (HC) groups?
2. What occupational characteristics (as represented by personal projects dimensions) are most strongly associated with self-reported health and telomere length, after accounting for demographics?
3. Do occupations individually characterized as creative or social add explanatory power to predicting health measures, above and beyond demographics?

Method

A cross-sectional study was conducted. Details on participant recruitment, procedures, and measures were described in Chapter 2. The following is a brief summary.

Participant eligibility and recruitment

Inclusion criteria were adults (19 years or older) able to read and write English. Participants in the IA group required a rheumatologist-confirmed diagnosis of an inflammatory type of arthritis such as (but not limited to): rheumatoid arthritis, psoriatic arthritis, spondyloarthritis, systemic lupus erythematosus, and juvenile idiopathic arthritis; and on a stable drug regimen for at least three months prior to the data collection session. Exclusion criteria were a history of cancer in the last five years and smoking status (defined as smoking at least 100 cigarettes in one's lifetime and has smoked at least one cigarette during the past 30 days), because these two characteristics affect telomere biology (Ma et al., 2011; Bendix et al., 2014). The following co-morbidities were excluded: long-term neurological conditions (e.g., multiple sclerosis, stroke) and respiratory conditions (e.g., chronic obstructive pulmonary disease). Participants reporting common medical conditions (e.g., diabetes, depression, and hypertension) were not excluded if they confirmed the condition was controlled by medication and/or self-management strategies and did not restrict engagement in daily occupations. Diagnosis and medication were recorded when applicable.

Participants were recruited via convenience sampling method (e.g., clinic and community advertising), and word of mouth as participants shared recruitment notices with friends and family.

Procedures

Study sessions were scheduled in small groups for data gathering. Two days prior to data collection, participants were reminded via email to reschedule if they had a current illness (e.g., cold, urinary tract infection, etc.) because we wanted them to feel well when collecting health measures. Data collection took place from October 2018-December 2019, and group sessions occurred for up to 15 participants, taking 60-120 minutes for participants to complete the study procedures. Participants completed questionnaires individually (each packet pre-labeled with a unique ID code; see Appendix A for a list of content), and a researcher (FTM) completed blood draws one participant at a time throughout the session, along with measuring participants' height and weight in a private location (different room or behind a screen). A lancet was used to prick a fingertip and fill five blood spots on Whatman blotting papers and left to dry for a minimum of four hours, or overnight. Once dried, papers were placed in individual biohazard foil bags labelled with participants' ID codes, along with a desiccant, and stored in a -80°C freezer until analysis for telomere length.

Variables and measures

Predictor variable.

1) **Personal Projects Analysis** (PPA; Little, 1983) was used to measure occupational characteristics. After listing their repertoire of projects/occupations, participants rated

their 10 most salient occupations on 19 project dimensions/occupational characteristics (defined in Appendix C), on a scale of 0-10. Two of the 19 characteristics were novel to the present study: *Social* and *Creative*. The characteristic score was the average rating for that characteristic across all 10 projects.

Health outcome variables.

2) **Physical Component Score** (PCS) is a summary score derived from the SF-36 Health Survey (Ware, 1993). Normalized scores range from 0-100, with higher scores indicating better health. The SF-36 Health Survey has demonstrated reliability and validity in both the arthritis (Kvien et al., 1998; Linde et al., 2008) and general population (Jenkinson, 1994).

3) **Mental Component Score** (MCS) is also a summary score derived from the SF-36 Health Survey, and higher scores indicate better mental health. The PCS and MCS are composite scales for which internal consistency is not reasonably applied (Ritvo et al., 1997) because they use weighting and aggregation of the eight subscales in the SF-36. Cronbach's alpha in the present sample for the eight subscales ranged from .78 to .92.

4) **Satisfaction with Life Scale** (SWLS; Diener et al., 2013) contains five items summed for a possible score range of 5-35; higher scores reflect greater life satisfaction. The scale has demonstrated good internal consistency (Maroufizadeh et al., 2016; Vázquez et al., 2013), convergent validity (Maroufizadeh et al., 2016), construct validity (Vázquez et al., 2013), as well as concurrent validity (Di Fabio & Gori, 2016). The SWLS has a Cronbach's alpha of .90 in our study.

5) **Telomere length** (TL). TL was measured from dried blood spots following the protocol used by Hsieh et al. (2016) with intra-run and inter-run coefficients of variation for the

internal controls at 5-10%. The quality control cut off for the TL analyses was <15 ABS% diff and one participant's TL did not pass this quality control (Ratio, ABS % diff = 15.79). Because the difference was so small, the lab director recommended retaining the participant in the TL analyses (Cote lab, personal communication, August 7, 2020). DNA was extracted from participants' blood and then analyzed for TL in bundles of 40 samples. TL was measured as a T/S ratio (relative telomere to single copy gene). In this study, the range of values entered in analyses was 5.05-15.40.

Since the health variables may be associated with or influenced by a variety of personal variables, potential covariates were measured as follows:

6) **Demographic** data collected from participants included age, sex, income, BMI, and diagnosis. We measured height and weight during the study session to calculate BMI. Age, sex, IA diagnosis, and BMI are associated with TL (Gielen et al., 2018; Rode et al., 2015; Steer et al., 2007); income and health are strongly associated with each other (Mackenbach et al., 2005).

Data analyses

For the SF-36, two participants each missed one item (out of 36 items) and these were left as missing. PCS and MCS scale scores are the averages for all items that the respondent answered.

We used SPSS (IBM SPSS Statistics for Windows, version 27) for all data analyses. First, descriptive statistics (measures of central tendency, spread, histograms) were used to become familiar with the data. Data were normally distributed, so Pearson correlation coefficients were calculated to explore bivariate associations among all variables. Highly correlated pairs of potential predictor variables (> .70) were flagged to guide decisions for multivariable analyses regarding potential multicollinearity, described below. Normality was assessed prior to proceeding with linear regression analyses. Residual analyses confirmed assumptions were satisfied for each model. Significance level was set at $p < .05$ for all analyses except where indicated in building stepwise models.

1. **Do self-reported physical and mental health, satisfaction with life, and telomere length differ between IA and HC groups?**

Independent t-tests were used to analyze between-group (IA vs HC) differences for each of the four outcomes: PCS, MCS, SWLS, and TL.

2. **What occupational characteristics are most strongly associated with self-reported health and telomere length, after accounting for demographics?**

Multiple linear regressions were used. For each of the four outcomes (PCS, MCS, SWLS, and TL), a stepwise regression procedure used the 17 original PPA dimensions (Little, 1983), i.e., all dimensions except *Creative* and *Social,* as we wanted to explore whether these two dimensions added explanatory power over and beyond the other variables in question three. Diagnosis was included as a covariate in all the regression models to determine the contribution of IA status to predicting each outcome. Four more demographic variables (age, sex, income, BMI) were considered as covariates, but were only entered in the models if they had a statistically significant bivariate relationship with the outcome variable or if they were previously shown in literature to be associated with the health outcome. For example, age, BMI, and diagnosis were chosen to be covariates in the models predicting PCS because they were significantly correlated with PCS in our study. Income was also selected because literature shows that it is related to health (Zhang & Xiang, 2019).

Because the dimensions *Stress* and *Difficulty* were highly correlated, stepwise regressions were repeated for each outcome with the *Stress* dimension excluded, and again with the *Difficulty* dimension excluded, to assess any changes to the model. F-to-enter was set at .10 to retain consideration of variables close to the conventional level of significance ($p \leq .05$).

When diagnosis was a significant predictor, separate multiple regressions were conducted for each group (IA and HC, respectively) to determine if the variables associated with the outcome variable within each group differed from those identified in the analysis with the total sample.

3. **Do occupations individually characterized as creative or social add explanatory power to predicting health measures, above and beyond demographics?**

Using hierarchical regression (Norman & Streiner, 2000), we entered variables in blocks for each outcome measure as follows:

Effect of social dimension. The predictors (significant demographics and project dimensions) from the final model from question two were entered in blocks one and two, respectively (base model). The *Social* project dimension was entered in the third block (Model 1). Inputting the *Social* dimension at the last step allowed for an assessment of the degree to which it added explanatory power to the prediction of health outcomes. F-to-enter was set at .10.

An interaction variable *Social**Diagnosis was added as a fourth block to assess whether the effects of diagnosis on health outcomes depended on the presence of IA.

Effect of creative dimension. We repeated the above procedures using *Creative* project dimension instead of *Social* dimension for the third block and *Creative**Diagnosis for the fourth block.

Sample size calculation

A useful guideline for determining the sample size for multivariate regression is to have five to 10 times as many cases as variables (Norman & Streiner, 2000). With a possible maximum of 23 variables (17 variables for PPA dimensions, four covariates, one for IA/HC status, and one for health measure), we require a minimum of 115 participants. However, not all variables are simultaneously entered into regression analyses, as they may be eliminated from consideration after reviewing descriptive and correlational statistics.

For detecting a between-group difference (t-tests), the estimated sample size is 64 participants per group, using the parameters alpha = .05, beta = .8, and a moderate effect size d = .5.

Results

Please see Chapter 2 (Table 2.1) for details on participant demographics. The sample comprised 143 adults (32 males, 111 females), with a mean age of 50 years old (SD = 16.3). Between-group t-tests and Chi-square tests demonstrated no statistically significant differences in age and sex between the IA and HC groups.

Bivariate correlations among PPA dimensions are reported in Table 3.1; PPA dimensions and health measures in Table 3.2; PPA dimensions, age, and BMI in Table 3.3; and health measures, age, and BMI in Table 3.4.

Stress and *Difficulty* were highly correlated (r = .72), as were *Difficulty* and *Challenge* (r = .73) (Table 3.1). *Absorption* was the only dimension significantly correlated with PCS (r = -.18). The dimension *Stress* was correlated with MCS (r = -.43), and *Difficulty* was inversely correlated with SWLS (r = -.34). *Enjoyment* (r = -.22) and *Creativity* (r = -.19) were the dimensions with the strongest correlation with TL; although they were low, both were inversely related to TL. See Table 3.2. Correlation coefficients between project dimensions and age were r = .24 or lower; the two strongest associations indicated that as age increased so did perceived *Enjoyment* (r = .22, p = .01) and *Time adequacy* (r = .24, p = .003). Correlations among health measures, age, and BMI revealed that TL had the highest correlation with age (r = -.58; Table 3.3).

Table 3.1

Bivariate Correlation Coefficients (Pearson's r) between PPA Dimensions, n = 143

	Social	Importance	Enjoyment	Value congruency	Identity	Absorption	Control	Initiation	Time adequacy	Progress	Outcome	Visibility	Others' view	Stress	Difficulty	Challenge	Negative impact	Positive impact
Creative	.43	.33	.58	.43	.47	.48	.20	.38	.22	.34	.23	.42	.49	.10	.13	.34	.04	.37
Social		.29	.46	.34	.44	.19	.01	.18	.26	.41	.04	.44	.48	-.03	-.01	.09	-.07	.33
Importance			.49	.62	.43	.42	.20	.33	.26	.33	.48	.48	.34	-.03	-.04	.12	-.09	.44
Enjoyment				.49	.61	.54	.24	.49	.41	.46	.38	.41	.44	-.23	-.15	.12	-.21	.29
Value congruency					.53	.51	.32	.31	.38	.31	.45	.47	.46	.08	.10	.20	-.08	.25
Identity						.63	.26	.57	.41	.47	.43	.53	.55	-.07	-.09	.17	-.07	.19
Absorption							.50	.58	.40	.37	.49	.45	.46	-.00	.06	.28	-.03	.09
Control								.46	.33	.23	.47	.30	.34	-.01	.03	.20	-.10	.04
Initiation									.48	.49	.38	.29	.33	-.13	-.16	.06	-.06	.08
Time adequacy										.66	.34	.41	.36	-.18	-.26	-.07	-.23	.15
Progress											.35	.35	.42	-.25	-.36	-.12	-.21	.35
Outcome												.43	.30	-.15	-.10	.05	-.25	.22
Visibility													.65	.02	-.01	.22	-.02	.26
Others' view														.16	.03	.14	-.01	.38
Stress															**.72**	.53	.45	.01
Difficulty																**.73**	.34	-.01
Challenge																	.29	.12
Negative impact																		-.27

Grey cells denote significance at ≤ 0.01 level (2-tailed).
Yellow cells denote significance at ≤ 0.05 level (2-tailed).

Table 3.2

Bivariate Correlation Coefficients (Pearson's r) between PPA Dimensions and Health, n = 143

	PCS	MCS	SWLS	TL
Creative	-.14	.09	.10	-.19
Social	-.01	.08	.15	-.12
Importance	-.07	.23	.24	-.09
Enjoyment	-.13	.28	.25	-.22
Value congruency	-.10	.06	.12	-.10
Identity	-.12	.15	.20	-.13
Absorption	-.18	.14	.05	-.16
Control	-.09	.16	.01	.03
Initiation	-.11	.16	.13	-.16
Time adequacy	-.12	.24	.07	-.14
Progress	.07	.18	.14	-.01
Outcome	-.02	.25	.12	-.03
Visibility	-.11	.19	.20	-.07
Others' view	-.09	.06	.18	-.18
Stress	-.08	-.43	-.23	.08
Difficulty	-.16	-.41	-.34	.03
Challenge	-.13	-.21	-.17	.02
Negative impact	-.08	-.13	-.02	-.03
Positive impact	-.07	.03	.02	.03

Grey cells denote significance at ≤ 0.01 level (2-tailed).
Yellow cells denote significance at ≤ 0.05 level (2-tailed).

Table 3.3
Bivariate Correlation Coefficients (Pearson's r) between Health, Age, and BMI, n = 143

	PCS	MCS	SWLS	TL	Age
MCS	-.08				
SWLS	.25	.48			
TL	.15	-.17	.01		
Age	-.26	.42	.13	-.58	
BMI	-.21	-.02	-.16	-.23	.19

Grey cells denote significance at ≤ 0.01 level (2-tailed).
Yellow cells denote significance at ≤ 0.05 level (2-tailed).
PCS: Physical Component Score (from SF-36); **MCS**: Mental Component Score (from SF-36); **SWLS**: Satisfaction with Life Scale; **TL**: Telomere length; **BMI**: Body Mass Index

Do self-reported physical and mental health, satisfaction with life, and telomere length differ between IA and HC groups?

Of the four health outcomes, only PCS significantly differed between groups: the IA group, on average, scored 12.7 points below the HC group (Table 3.4). Even after controlling for age, there were no between-group differences in MCS, SWLS, and TL (PCS remained different between groups even after controlling for age).

Table 3.4
Between-group Differences in Health Outcomes

Measures	IA Group (n = 67)		HC Group (n = 76)		Mean difference	95% CI Mean Diff		t	p
	Mean	*SD*	*Mean*	*SD*		*Lower*	*Upper*		
PCS	40.23	11.44	52.97	7.14	12.74	9.63	15.85	8.09	< .001
MCS	47.70	9.76	48.76	9.58	1.06	-2.14	4.26	.66	.51
SWLS	22.51	7.43	24.18	6.35	1.67	-.60	3.95	1.46	.15
TL	7.89	1.51	8.21	1.41	0.32	-.17	.80	1.29	.20

PCS: Physical Component Score (from SF-36); **MCS**: Mental Component Score (from SF-36); **SWLS**: Satisfaction with Life Scale; **TL**: Telomere length

What occupational characteristics are most strongly associated with self-reported health and telomere length, after controlling for demographics?

Predicting PCS. This regression had 21 candidate variables: 17 dimensions, age, BMI, diagnosis, and income. Diagnosis, age, *Difficulty*, and income were significant coefficients in the regression equation and together accounted for approximately 38% of the variance in PCS (R^2 = .38, $p < .001$). See Tables 3.5 and 3.6 (Model 1).

The significant predictors and proportion of variance explained did not change when the analysis was repeated with the *Stress* dimension excluded (Model 2, data not shown). When the *Difficulty* dimension was excluded (Model 3), diagnosis, age, and BMI were significant coefficients, accounting for 37% of the variance in PCS (R^2 = .37, $p < .001$), see Tables 3.5 and 3.7.

Because diagnosis accounted for most (32%) of the variance in PCS scores, we ran the same regression analysis for each of the IA and HC groups, to explore whether the relationship between dimensions and PCS differ for the two groups.

In the multiple regression tables that follow, for rows listing more than one variable, note that the beta coefficient reflects the additional contribution for the last variable listed after accounting for variables already in the equation.

Table 3.5

Regression Model Summaries for PCS as outcome variable (Overall Sample, n = 143)

Model	R^2	Source	Sum of Squares	Df	MnSq	F	p
1	.38	Regression	6849.97	4	1712.49	20.93	< .001
		Residual	11127.66	136	81.82		
		Total	17977.63	140			
2	.38	Regression	6849.97	4	1712.49	20.93	< .001
		Residual	11127.66	136	81.82		
		Total	17977.63	140			
3	.37	Regression	6575.26	3	2191.75	26.33	< .001
		Residual	11402.37	137	83.23		
		Total	17977.63	140			

Model 1= Diagnosis, age, *Difficulty*, and income were significant coefficients
Model 2 = Excluded *Stress;* diagnosis, age, *Difficulty*, and income were significant coefficients
Model 3= Excluded *Difficulty*; diagnosis, age, BMI were significant coefficients

Table 3.6

Model 1: Regression Model for PCS as outcome variable (Overall Sample, n = 143)

Variables	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	62.60	3.78	--	16.55	< .001	55.12	70.08
Diagnosis	.32	-11.68	1.56	-.52	-7.49	< .001	-14.77	-8.60
Diagnosis, age	.35	-.16	.05	-.22	-3.19	.002	-.25	-.06
Diagnosis, age, *Difficulty*	.37	-.96	.47	-.14	-2.04	.04	-1.89	-.03
Diagnosis, age, *Difficulty*, income	.38	.69	.39	.12	1.75	.08	-.09	1.47

Table 3.7
Model 3: Regression Model for PCS as outcome variable (Overall Sample, n = 143)

Variables	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	65.16	4.12	--	15.83	< .001	57.01	73.30
Diagnosis	.32	-11.92	1.56	-.53	-7.63	< .001	-15.00	-8.83
Diagnosis, age	.35	-.11	.05	-.16	-2.28	.02	-.21	-.02
Diagnosis, age, BMI	.37	-.28	.15	-.13	-1.87	.06	-.57	.02

In the HC group (n = 76), age, *Importance*, *Progress, Enjoyment, Others' view*, and *Identity* were significant coefficients and accounted for 37% of the variance in PCS scores ($R^2 = .37$, $p < .001$, Tables 3.8 and 3.9). Age accounted for 17% of the variance and occupational characteristics for 20%, each one explaining between 3% and 6% of the variance, with inverse relationships for *Importance*, *Enjoyment*, and *Others' View*. Excluding each of *Stress* and *Difficulty* dimensions in turn did not alter the results.

Table 3.8
Regression Model Summary for PCS as outcome variable (HC Group, n = 76)

Variables	R^2	Source	Sum of Squares	Df	MnSq	F	p
Age, *Importance, Progress, Enjoyment, Others' view*, and *Identity*	.37	Regression	1375.47	6	229.26	6.51	< .001
		Residual	2394.66	68	35.22		
		Total	3770.22	74			

Table 3.9
Regression Model for PCS as outcome variable (HC Group, n = 76)

Variables	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	69.39	4.93	--	14.09	< .001	59.56	79.22
Age	.17	-.14	.05	-.31	-3.01	.004	-.23	-.05
Age, *Importance*	.21	- 1.10	.73	-.18	-1.50	.14	-2.55	.36
Age, *Importance, Progress*	.27	1.52	.47	.39	3.23	.002	.58	2.46
Age, *Importance, Progress, Enjoyment*	.31	-1.54	.70	-.30	-2.21	.03	-2.92	-.15
Age, *Importance, Progress, Enjoyment, Others' view*	.34	-1.01	.45	-.28	-2.26	.03	-1.90	-.12
Age, *Importance Progress, Enjoyment, Others' view, Identity*	.37	.95	.56	.23	1.71	.09	-.16	2.06

In the IA group (n = 67), the dimensions O*thers' view* and *Positive impact* were significant, each explaining 7% of the variance in PCS (R^2 = .14, p = .01), but no demographic variables remained as statistically significant predictors. See Tables 3.10 and 3.11. Excluding each of *Stress* and *Difficulty* dimensions in turn did not alter the results.

Table 3.10
Regression Model Summary for PCS as outcome variable (IA Group, n = 67)

Variables	R^2	Source	Sum of Squares	Df	MnSq	F	p
Others' view, Positive impact	.14	Regression	1212.13	2	606.06	5.24	.01
		Residual	7291.05	63	115.73		
		Total	8503.17	65			

Table 3.11
Regression Model for PCS as outcome variable (IA Group, n = 67)

Variables	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	30.74	5.83	--	5.27	< .001	19.09	42.38
Others' view	.07	2.96	.95	.41	3.11	.003	1.06	4.87
Others' view, Positive impact	.14	-1.50	.66	-.30	-2.27	.03	-2.81	-.18

Predicting MCS. This regression had 20 candidate variables: 17 dimensions, age, diagnosis, income. *Stress*, age, *Control* and *Difficulty* were significant coefficients in this regression equation and together accounted for approximately 36% of the variance in MCS scores (R^2 = .36, p < .001), with most of the variance explained by *Stress* (18%) and age (14%). When the *Stress* dimension was excluded (Model 2), age, *Difficulty*, and *Outcome* were significant coefficients and together accounted for approximately 33% of the variance in MCS (R^2 = .33, p < .001). When the *Difficulty* dimension was excluded (Model 3), *Stress*, age, and *Control* were significant coefficients and together accounted for approximately 34% of the variance in MCS (R^2 = .34, p < .001). See Tables 3.12 and 3.13. Diagnosis was not a significant variable, so we did not run separate regressions for IA and HC groups.

Table 3.12

Regression Model Summaries for MCS as outcome variable (Overall Sample, n = 143)

Model	**R^2**	**Source**	**Sum of Squares**	**Df**	**MnSq**	**F**	**p**
1	.36	Regression	4626.40	4	1156.10	18.70	< .001
		Residual	8408.52	136	61.83		
		Total	13032.91	140			
2	.33	Regression	4256.99	3	1419.00	22.15	< .001
		Residual	8775.92	137	64.06		
		Total	13032.91	140			
3	.34	Regression	4435.20	3	1478.40	23.56	< .001
		Residual	8597.71	137	62.78		
		Total	13032.91	140			

Model 1 = *Stress*, age, *Control*, *Difficulty* were significant coefficients

Model 2= Excluded *Stress*; age, *Difficulty*, and *Outcome* were significant coefficients

Model 3= Excluded *Difficulty*; *Stress*, age, *Control* were significant coefficients

Table 3.13

Models 1-3: Regression Models for MCS as outcome variable (Overall Sample, n = 143)

Independent Variables	**R^2**	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**p**	**95% CI for B**	
		B	**Std. Error**				**Lower**	**Upper**
Model 1								
(Constant)	--	41.18	4.56	--	9.00	< .001	32.13	50.23
Stress	.18	-1.48	.58	-.25	-2.54	< .001	-2.62	-.33
Stress, Age	.32	.21	.04	.36	5.12	< .001	.13	.29
Stress, Age, *Control*	.34	.96	.44	.15	2.18	.03	.09	1.84
Stress, Age, *Control, Difficulty*	.36	-1.02	.58	-.18	-1.75	.08	-2.17	.13
Model 2								
(Constant)	--	38.01	5.12	--	7.42	< .001	27.88	48.14
Age	.18	.20	.04	.34	4.81	< .001	.12	.29
Age, *Difficulty*	.30	-1.97	.41	-.34	-4.77	< .001	-2.79	-1.16
Age, *Difficulty, Outcome*	.33	1.21	.51	.17	2.37	.02	.20	2.21
Model 3								
(Constant)	--	39.11	4.45	--	8.78	< .001	30.30	47.91
Stress	.18	-2.20	.41	-.38	-5.41	< .001	-3.01	-1.40
Stress, age	.32	.22	.04	.37	5.30	< .001	.14	.30
Stress, age, *Control*	.34	.92	.44	.14	2.07	.04	.04	1.80

Predicting life satisfaction (SWLS). This regression had 19 candidate variables: 17 dimensions, diagnosis, and income. *Difficulty*, income, and *Importance* were significant coefficients in this regression equation, and together accounted for approximately 27% of the variance in SWLS (R^2 = .27, p < .001). See Tables 3.14 and 3.15 (Model 1). Excluding the *Stress* dimension in turn did not alter the results (Model 2; data not shown). When the *Difficulty* dimension was excluded (Model 3), income, *Importance, and Challenge* were significant coefficients and together accounted for approximately 21% of the variance in SWLS (R^2 = .21, p < .001). See Tables 3.14 and 3.16. Diagnosis was not a significant variable, so we did not run separate regressions for IA and HC groups.

Table 3.14

Regression Model Summary for SWLS as outcome variable (Overall Sample, n = 143)

Model	**R^2**	**Source**	**Sum of Squares**	**Df**	**MnSq**	**F**	**p**
1	.27	Regression	1767.63	3	589.21	16.48	< .001
		Residual	4897.43	137	35.75		
		Total	6665.07	140			
2	.27	Regression	1767.63	3	589.21	16.48	< .001
		Residual	4897.43	137	35.75		
		Total	6665.07	140			
3	.21	Regression	1399.27	3	466.422	12.14	< .001
		Residual	5265.80	137	38.44		
		Total	6665.07	140			

Model 1 = *Difficulty*, income, and *Importance* were significant coefficients

Model 2 = Excluded Stress; *Difficulty*, income, *Importance* were significant coefficients

Model 3 = Excluded *Difficulty*; income, *Importance, and Challenge* were significant coefficients

Table 3.15

Model 1: Regression Model for SWLS as outcome variable (Overall Sample, n = 143)

Variables	**R^2**	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**p**	**95% CI for B**	
		B	**Std. Error**				**Lower**	**Upper**
(Constant)	--	15.18	3.92	--	3.88	< .001	7.44	22.92
Difficulty	.11	-1.39	.30	-.34	-4.58	< .001	-2.00	-.79
Difficulty, income	.21	1.11	.26	.32	4.31	< .001	.60	1.62
Difficulty, income, *Importance*	.27	1.42	.43	.24	3.31	.001	.57	2.27

Table 3.16
Model 3: Regression Model for SWLS as outcome variable (Overall Sample, n = 143)

Variables	**R^2**	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**p**	**95% CI for B**	
		B	**Std. Error**				**Lower**	**Upper**
(Constant)	--	12.43	3.98	--	3.12	.002	4.56	20.30
Income	.09	1.18	.27	.34	4.39	< .001	.65	1.71
Income, *Importance*	.15	1.67	.45	.29	3.72	< .001	.78	2.55
Income, *Importance, Challenge*	.21	-1.12	.36	-.24	-3.15	.002	-1.82	-.42

Predicting telomere length. This regression had 21 candidate variables: 17 dimensions, age, BMI, sex, and diagnosis. Age and sex were significant coefficients in this regression, accounting for 34% and 3%, respectively, of the variance in TL ($R^2 = .37$, $p < .001$). Females are associated with longer TLs. Excluding each of *Stress* and *Difficulty* dimensions in turn did not alter the results. Diagnosis was not a significant variable, so we did not run separate regressions for IA and HC groups. See Tables 3.17 and 3.18.

Table 3.17
Regression Model Summary for TL as outcome variable (Overall Sample, n = 143)

Variables	**R^2**	**Source**	**Sum of Squares**	**Df**	**MnSq**	**F**	**p**
Age, sex	.37	Regression	109.81	2	54.91	40.03	< .001
		Residual	7291.05	63	115.73		
		Total	8503.17	65			

Table 3.18
Regression Model for TL as outcome variable (Overall Sample, n = 143)

Variables	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	9.55	.56	--	17.11	< .001	8.45	10.66
Age	.34	-.05	.01	-.56	-8.26	< .001	-.06	-.04
Age, sex	.37	.58	.24	-.17	2.46	.02	.12	1.05

Do occupations individually characterized as creative or social add explanatory power to predicting health measures, above and beyond demographics?

Social dimension. Adding the *Social* dimension to the regression models added no explanatory power to predicting PCS (R^2 change = .002, p = .53), MCS (R^2 change = .00, p = .83), SWLS (R^2 change = .003, p = .42), and TL (R^2 change = .002, p = .70). Adding an interaction term of *Social**Diagnosis did not alter results.

Creative dimension. The addition of the *Creative* dimension added no explanatory power to predicting PCS (R^2 change = .002, p = .55). Adding an interaction term (*Creative**Diagnosis) as the fourth block, resulted in a small and significant change in R^2 (R^2 change = .02, p = .03, Table 3.19), so we repeated the hierarchical regression by groups. However, the *Creative* dimension added no explanatory power to predicting PCS in either HC (R^2 change = .00, p = .85) or IA groups (R^2 change = .02, p = .29).

Table 3.19
The Impact of Creative Dimension over and beyond Demographics and Other Project Dimensions on PCS (Overall Sample, n = 143)

Model	R^2	R^2 change	*F* change	p
Base model	.39	--	--	--
1	.39	.002	.35	.55
2	.42	.02	5.03	**.03**

Base model = Demographics (age, sex, diagnosis, BMI, income) and project dimensions (*Difficulty)*
Model 1 = Demographics, project dimensions, *Creative*
Model 2 = Demographics, project dimensions, *Creative*, *Creative**Diagnosis

Creative dimension added no explanatory power to MCS (R^2 change = .001, p = .62), SWLS (R^2 change = .003, p = .45), and TL (R^2 change = .01, p = .26). Adding an interaction term of *Social**Diagnosis did not alter results.

Discussion

In this chapter, we explored the relationships between occupational characteristics and four measures of health: subjective physical health (PCS), subjective mental health (MCS), life satisfaction (SWLS), and telomere length (TL) in adults with and without IA; and the potential added explanatory contribution of *Social* and *Creative* occupational characteristics.

Different occupational characteristics were associated with PCS in the IA and HC groups. Specifically, *Importance*, *Progress, Enjoyment, Others' view,* and *Identity* were associated with PCS in the HC group, while *Others' view* and *Positive impact* were associated with PCS in the IA group. Not surprisingly, in the total sample, higher mean ratings of perceived *Stress* across participants' cluster of personal projects (along with age) were associated with lower mental health scores. This finding suggests that perception of occupations is important; health professionals could encourage clients to recognize occupational characteristics and ensure a balance of occupations to enhance mental health. In a previous study of adults with low back pain, higher ratings of PPA *Stress* dimension were associated with more depressive symptoms (CES-D scale) and lower SWLS scores, suggesting that projects characterized as stressful could be a predictor of well-being (Vroman et al., 2009). Our findings confirm that the *Stress* dimension predicts MCS but not SWLS scores in the present sample. We also found that projects that were ranked as more *Important* and less *Difficult* contributed to higher life satisfaction (with *Difficulty* explaining almost twice as much variance to life satisfaction than *Importance*). No occupational characteristics were associated with TL.

PCS and MCS differences between groups

The HC group reported scores slightly above the Canadian average in PCS (score of 51.3), but lower in MCS (score of 51.4) (Hopman et al., 2000). Similarly, the IA sample reported comparable or higher scores in PCS (but not MCS) compared to other IA study samples in similar age cohorts (Klooster et al., 2013; Liu et al., 2017; Wolfe et al., 2010). Therefore, the present sample was physically healthier than other samples, which needs to be considered when interpreting findings and comparing to prior literature.

The HC group had statistically significantly higher PCS scores than the IA group, but there were no between-group differences in the other health measures. Since some people with IA report severe symptoms and functional and physical impairments (Ahlstrand et al., 2012), it is not surprising the PCS is lower in the IA group compared to their healthy counterpart. However, physical impairments could have an indirect effect on mental health, so the finding that there were no between-group differences in MCS in our sample is unexpected. A few potential explanations for this lack of MCS difference between groups are discussed below.

Age appears to be an important factor in mental health; correlation analyses showed that in our sample, older people had better subjective mental health. Research shows that people undergoing "successful aging" or "healthy aging" use effective coping strategies, and that this time period can be a time of energy and health (Bowling, 2007; Jeste et al., 2013; Reed & Carstensen, 2012). Therefore, our sample may have included a high proportion of people experiencing "successful aging" even though the age range of our sample was large (approximately 36% of our sample was aged ≥ 60 years old). Given that our IA sample is older, on average, they may be experiencing "successful aging", which may help explain the lack of between-group differences in MCS.

People with IA tend to report more mental health issues such as depression and anxiety (Marrie et al., 2019; Xue et al., 2020). MCS is a component score of mental health and perhaps depression in the IA group was minimal and masked in the component score. In addition, the eligibility criteria for our IA group included a stable drug regimen, likely leading to a group in which their disease is well-controlled. Another reason for why people with IA in our study may not differ significantly in MCS compared to the HC group is their learned coping skills. Those with IA may have learned to adopt a more positive mindset to help cope with their diagnosis (Grønning et al., 2011; Macdonald et al., 2018; Ottenvall Hammar & Håkansson, 2013; Shaw et al., 2020; Townsend et al., 2014). It is possible that the IA group, given their average disease duration of 13 years, had learned coping skills that sustained MCS scores similar to HC group. However, these conjectures should be explored with future research.

Different PPA dimensions predict PCS scores across the two groups

Since almost all of the variance in PCS in the total sample was explained by IA diagnosis, exploring potential occupational characteristic predictors of physical health needed to be done in the two samples separately. While occupational characteristics explained 37% of the variance in physical health for the HC group, led by the dimension *Progress*, occupational characteristics explained only 14% of the variance in physical health for the IA (equal contributions from *Others' view* and *Positive impact*). The characteristic *Progress* is defined as the level of success one has been in a particular project. As explained in Chapter 2, participants across the two groups reported doing the same types of occupations, but their perceptions of occupational characteristics show different associations with physical health. In the quest for occupational (activity) recommendations to promote health, these findings offer suggestions for future research – to test whether or not these characteristics are, in fact, contributors to physical health, and that different characteristics are important to sustaining health for different people.

Others' view is defined as the level of importance of a project perceived by one's social circle. For the IA group, *Others' View* was associated with PCS such that the more occupations are characterized as important by others, the higher was physical health. This finding contradicts Helgeson and Takeda's (2009) study which found that engaging in projects that were highly wanted by other people were associated with worse health outcomes such as metabolic control (as measured by A1c levels) in a sample with diabetes. The researchers postulated that when people engage in projects that are highly invested by others (and perhaps not so to the person engaging in the project), their health suffers. Possibly, what others view as *important* is conceptually different from what others *want*, and this may explain the difference in findings between Helgeson and Takeda's (2009) study and ours. It is also possible that participants with IA or other chronic illnesses may spend their limited energy on occupations that they perceive to be important to others, i.e., prioritizing these obligatory occupations (Katz et al., 2006).

Overall, our results show that certain occupational characteristics are associated with physical health. Public health promotion messages typically focus on the health benefits of physical exercise, diet, and not smoking. More recent studies have explored the potential health benefits of other types of activities such as yoga, which can provide physical as well as psychosocial benefits (Greysen et al., 2017). People with arthritis often seek nonpharmacologic management strategies (e.g., exercise, heat, assistive devices) to reduce symptoms and promote health (Gong et al., 2013). Based on our study, engaging in occupations that are deemed highly important to others or themselves predict better physical health. Consistent with the Do-Live-Well message, everyday activities or occupations play an important role on our health and well-being

(Moll et al., 2015); future health promotion messages might be enhanced by the addition of occupational characteristics that promote health.

Social and creative occupations

In general, *Social* and *Creative* occupations did not contribute to health over and beyond selected demographics and other occupational characteristics. Previous studies have demonstrated an association between social and creative types of activities with well-being, especially creative activities (Conner et al., 2016; Riley et al., 2013), using self-reported measures of affect, moods, feelings, and flourishing. However, these studies focused primarily on creative activities (rather than a composite of everyday occupations as we did), and so their assessments or measures were specific to creative activities. For example, Conner et al. (2016) asked participants to fill out a daily diary for 13 days and to rate their level of creative activity on a five-point Likert scale, along with completing well-being measures. It is possible that the tool (PPA) we used to explore participants' occupations was not appropriate in thoroughly understanding people's social and creative occupations.

Telomere length

Consistent with prior literature, TL was associated with age in the present sample. However, we did not find between-group (IA vs. HC) differences in TL. Previous studies found that the TLs of participants with RA were significantly shorter than those without RA (Barkovskaya et al., 2017; Lee et al., 2018; Steer et al., 2007). There was one study that did not find any between-group TL differences in people with RA compared to healthy controls (Ormseth et al., 2016). To our knowledge, ours is the first study that examined TL in a sample with mixed IA conditions. Steer et al.'s study (2017) included participants who smoked, and the RA participants were older than participants in the present study, which may explain in part the difference in study findings. Future replication studies are needed to confirm whether or not adults with different types of IA have different TLs than healthy controls.

While there was at least one occupational characteristic that was associated with each of physical health, mental health, and life satisfaction outcomes, none of the occupational characteristics were associated with telomere length. This absence of any associations between occupational characteristics and TL does not mean there would not be an association if occupations were measured with a different tool or in different samples. For example, the scores for occupational characteristics are the average across 10 occupations; some data about specific occupations and their potential association with TL may be lost in this approach. Repeating the study with a different measure of occupation may yield a different conclusion.

Another explanation for our findings could be that the pathway between occupation and TL does not include characteristics as measured in this study. While some studies demonstrate a link between physical (e.g., Puterman et al., 2018) and meditative (e.g., Alda et al., 2016) types of activities with TL maintenance, other studies found inconsistent results (e.g., Mason et al., 2013). There may be many unclear and complex pathways involved in the relationship between occupational characteristics and TL, and any conclusions and implications from this study need to be considered against the limited understanding of telomere mechanisms (Sanders & Newman, 2013). Various health factors such as (but not limited to) smoking, alcohol consumption, body mass index, and physical activity have shown associations with TLs, yet Sanders and Newman (2013) critique that only age, gender, and race have been *consistently* associated with telomeres across studies. Specifically, shorter telomeres are related to being older and male (Rode et al., 2015), as well as Caucasian (Hunt et al., 2008). Even so, age appears to have a ceiling effect (Cawthon et al., 2003; Martin-Ruiz et al., 2005). We have accounted for known covariates such as age, smoking, BMI, and cancer history; however, there may be other as-yet-unknown confounders that limit research using TL as a biomarker of health. This is especially true due to study designs used – randomization is the standard approach to addressing known and unknown confounders (Hill, 1952) yet the present study was observational and cross-sectional and could not account for all confounders, especially confounders that are not yet identified as impacting TL. In general, there is wide inter-individual variability in TL and longitudinal studies are more useful because rates of change may provide more information (Mather et al., 2011). We had a large age range among our study participants which may have made the inter-individual variability in TL more apparent. To determine the relationship between occupational characteristics and TL, it may be better to conduct longitudinal assessments, over decades, as TL is an “ideal candidate for life-course analysis” (Sanders & Newman, 2013, p. 126).

Finally, it could be that occupational characteristics truly do not predict TL and this study is the first to explore such potential associations. Through a systematic review of 30 studies, Qiao and Jiang (2020) found that many inconsistencies exist on the impact of health promotion interventions (e.g., lifestyle change, family-based intervention, meditation, exercise) on TL. The most consistent result they found was that weight-loss, diet, and exercise could delay TL shortening. These interventions are physical in nature, targeting human biology; perhaps occupations that are less physical and more psychosocial accrue less benefit to TL. Given that there have been previous studies that demonstrated a link between stress, trauma, and TL shortening (Epel et al., 2004), there may be a specific “dose-response” of occupations required to reduce stress and maintain TL. TL results may differ in other study designs, such as an intervention study with different types or doses of occupation.

TL is typically associated with better health in the literature (Blasco, 2005; Deelen et al., 2014; Njajou et al., 2009), and there is a relationship between health and occupations (Polatajko et al., 2007). Therefore, it was expected that there would be a positive correlation between TL and the more desirable occupational characteristics (e.g., *Enjoyment*, *Importance*). However, we found the opposite in our results. A possible explanation is that since age and TL are associated (both in our sample and in the literature), older participants may have more time to engage in more positive occupations (e.g., occupations that are rated as more *Creative* and *Enjoyment*, both characteristics found statistically significantly associated with TLs). This speculation is further reinforced by our finding that age was associated with both *Enjoyment* and *Time adequacy*. The correlations among TL and occupational characteristics were small; however, the consistency among them warrants future replication studies.

Strengths and limitations

This study was the first to explore the relationship between occupational characteristics and telomere length, a biological health marker. Several studies have examined the relationship between physical activities and TL (e.g., Puterman et al., 2018), as well as mindful or meditative activities with TL (Conklin et al., 2018). We demonstrated the feasibility of collecting dried blood spots for TL analyses for future studies on occupation.

All measures have inherent limitations. With the PPA, participants may have listed personal projects that were imminent but not representative of their daily lives. Also, using an average score across 10 projects may be too crude an indicator to capture the details of people's occupational repertoire. There are also limitations to the chosen SF-36 Health Survey and SWLS. Advances in patient-reported outcome measures suggest that other tools may be more appropriate (PCORI, 2019; Weldring & Smith, 2013). Interestingly, the correlation between PCS and TL was low and non-significant in our study. If they are both valid measures of health status, why were they not correlated? Perhaps using a different patient-reported outcome measure (e.g., PROMIS measures; Cella et al., 2010) may have led to different results. Finally, self-report measures may carry inherent biases (i.e., participants may under- or over-report health status) (Spitzer & Weber, 2019).

Finally, we had a relatively small sample size for the number of variables in the regression analyses and may not have had sufficient power to be confident in the results, especially in the sub-analyses of the two groups. Therefore, any conclusions are preliminary and made cautiously.

Future directions

While we did not find any significant relationships between occupational characteristics and TL, our study provokes further questions about the relationship and complex pathways between occupation and TL, leading to suggestions for future studies. Such studies could use different methods of measuring occupational characteristics, such as the Experience Sampling Method (Kimhy et al., 2006) which can probe participants to provide information about their occupations in the moment over multiple timepoints throughout the day. Using other methods of measuring occupations and occupational characteristics may reveal different findings. Finally, using a larger sample may reveal a difference in TL between IA and HC groups, as well as providing more power to build on current results.

Longitudinal studies can provide more temporal information needed to assess the directionality of associations between occupations and health outcomes. The original plan for this dissertation was for a one-year follow-up using the same procedures as this chapter for baseline measures (Chapters 2-4). However, due to the COVID-19 pandemic and subsequent restrictions, the follow-up study was not possible.

Conclusion

Different occupational characteristics were associated with physical health for the IA and HC groups. The occupational characteristic, *Stress,* was a predictor of mental health in our overall sample, suggesting that perception of occupations is important to maintaining mental health. *Social* and *Creative* occupations did not contribute to health measures over and beyond the other occupational characteristics and demographics. In this sample, using PPA, occupational characteristics did not predict TL. Future studies should therefore consider repeating this study with a larger sample and applying different research designs and instruments to more thoroughly investigate the link between occupational engagement and health.

Chapter 4: Exploring the relationship between occupational balance and health of adults with and without inflammatory arthritis

Introduction

Occupational balance is the subjective perception of having "the right amount of occupations and the right variation between occupations" (Wagman et al., 2012, p. 324). People with chronic illnesses like inflammatory arthritis (IA) experience symptoms that limit their everyday occupation (Katz et al., 2006) and it is unclear how these disruptions impact occupational balance, and if their occupational balance differs from the general population. The purpose of this chapter was to explore the relationship between occupational balance and health of adults with and without IA using validated measures.

Several observational studies have demonstrated a positive relationship between occupational balance and health and well-being. For example, occupational balance was related to self-reported measures of stress (Håkansson & Ahlborg, 2018; Yu et al., 2018), life satisfaction, and self-rated health (Wagman & Håkansson, 2014b) among healthy adults. Occupational balance was associated with life satisfaction in a survey study of 686 adults with rheumatoid arthritis (RA; Wagman et al., 2020); indicators of occupational balance were also associated with general health status in another cross-sectional survey of 169 adults with RA (Forhan & Backman, 2010). Through semi-structured interviews with nine women with RA and/or juvenile idiopathic arthritis (JIA), Ottenvall Hammar and Håkansson (2013) found that it was crucial for participants to achieve some sense of occupational balance in order to perceive good health. Stamm et al. (2009) conducted a qualitative study exploring the concept of occupational balance in 10 participants (eight women, two men) with RA and found that it was beneficial for participants to have a mix of both challenging and relaxing occupations. However, to better assess the benefits, the authors proposed that future studies compare experiences of people with and without RA (and other diseases) and generate potential treatment options.

Previous studies using the Occupational Balance Questionnaire have included participants with a health condition such as RA (Wagman et al., 2020) or a sample of healthy participants (Wagman & Håkansson, 2014b) but not both together. While promoting occupational balance shows promise for helping people self manage IA in the presence of occupational disruptions (McDonald et al., 2012), there is little evidence on whether occupational balance differs between people with or without arthritis. This knowledge gap prevents a full understanding of the role of occupational balance in perceiving health and well-being; such understanding is a first step in identifying possible interventions based on the concept of occupational balance as an approach to living well with arthritis.

Dür and colleagues (2016) reported correlations between occupational balance questionnaire (OB Quest) items, cytokines, CRP levels (biological markers of inflammation), and SF-36 Health Survey subscales among people with and without RA. In the RA group, engaging in little or no variety of different activities was weakly associated with higher CRP and IL-6 levels. Dür et al's (2016) study is unique in seeking evidence on the relationship between occupational balance and biological correlates of health. The use of health biomarkers can supplement self-reported measures of health, providing rich and comprehensive health data. As introduced in Chapter 3, telomere length (TL) is a novel biomarker that can be used in studies similar to Dür and colleagues', to explore the relationship between occupational balance and health. TL indicates cellular aging and is a marker of immunity and inflammation (Jose et al., 2017; Wong et al., 2014), potentially useful in IA studies. While prior studies suggest occupational balance is health promoting (Wagman et al., 2020; Yu et al., 2018), as suggested by Stamm and colleagues (2009), a comparative study including people with and without arthritis is required, and studies using both biomarkers and self-reported measures of health may advance understanding of ways that occupational balance interventions could contribute to arthritis self-management.

This study explored the relationship between occupational balance and health, in adults with and without IA. Our **research questions** were:

1) Is there a difference in occupational balance between participants with and without arthritis (IA and healthy comparison [HC] groups)?
2) If there is a difference in occupational balance between groups, do differences remain after controlling for covariates?
3) Does occupational balance predict self-reported physical and mental health and TL, in the full sample and the IA and HC groups?

Method

Details on participant recruitment, procedures, and measures were described in Chapter 2. Below is a brief summary.

Participant eligibility and recruitment

Inclusion criteria were adults (19 years or older), and ability to read and write English. Participants in the IA group required a rheumatologist-confirmed diagnosis of an inflammatory type of arthritis such as (but not limited to): rheumatoid arthritis, psoriatic arthritis, spondyloarthritis, systemic lupus erythematosus, and juvenile idiopathic arthritis; on a stable drug regimen for at least three months. Exclusion criteria were a history of cancer in the last five years and current smoking status (as defined by smoking at least 100 cigarettes in one's lifetime and has smoked at least one cigarette during the past 30 days), as these have been found to affect telomere biology (Ma et al., 2011; Bendix et al., 2014). Long-term neurological conditions (e.g., multiple sclerosis, stroke) and respiratory conditions (e.g., chronic obstructive pulmonary disease) were excluded. Participants reporting common medical conditions (e.g., diabetes, depression, and hypertension) were not excluded if they confirmed the condition was controlled by medication and/or self-management strategies and did not restrict engagement in daily occupations. Diagnosis and medication were recorded when applicable.

Participants were recruited via convenience sampling method (e.g., clinic and community advertising), and word of mouth as participants shared recruitment notices with friends and family.

Procedures

Study sessions were scheduled with eligible participants. Two days prior to data collection, participants were reminded via email to reschedule if they had a current illness (e.g., cold, urinary tract infection, etc.) as we wanted them to feel well when collecting health measures. Data collection took place from October 2018-December 2019, and group sessions occurred for up to 15 participants, taking 60-120 minutes for participants to complete the study procedures.

Variables and measures

1. The **Occupational Balance Questionnaire** (OBQ; Wagman & Håkansson, 2014a; Håkansson et al., 2019) is an 11-item scale with a score range of 0-33. It assesses respondents' perceptions of the amount and variety of their everyday activities. Higher scores indicate greater balance. The OBQ has demonstrated adequate test-rest reliability in healthy adults (Håkansson et al., 2019). It has also been used in the IA population and demonstrates good internal consistency (Wagman et al., 2020). We used the English version (Yu et al., 2018). We administered the original 13-item OBQ, but during the course of our study, the OBQ developers reduced it to 11 items based on ongoing research on scale properties. Therefore, all our study participants completed the 13-item scale, but our

analyses omitted two items so that the scale score is the latest 11-item OBQ. In our study, the 11-item scale resulted in a Cronbach's alpha of .93.

2. **Physical Component Score** (PCS) is a summary score derived from physical health items in the SF-36 Health Survey (Ware, 1993). Normalized scores range from 0-100, with higher scores indicating better health. The SF-36 Health Survey has demonstrated reliability and validity in both the arthritis (Kvien et al., 1998; Linde et al., 2008) and general population (Jenkinson, 1994).
3. **Mental Component Score** (MCS) is also a summary score derived from emotional and mental health items in the SF-36 Health Survey, and higher scores indicate better mental health. The PCS and MCS are composite scales for which internal consistency is not reasonably applied (Ritvo et al., 1997) because they use weighting and aggregation of the eight subscales in the SF-36. Cronbach's alpha in the present sample for the eight subscales ranged from .78 to .92.
4. **Telomere length** (TL) was measured from dried blood spots collected from participants. TL analyses followed the protocol used by Hsieh et al. (2016), with intra-run and inter-run coefficients of variation for the internal controls at 5-10%.

The following demographic data were collected:

5. **Demographic** data collected from participants included age, sex, income, BMI, employment status, diagnosis, and disease activity (RADAI) for the IA group (greater scores on the RADAI indicates higher disease activity). We measured height and weight during the study session to calculate BMI.

Data analyses

Two participants each missed one item on the OBQ and this was dealt with by mean substitution (Kang, 2013). For the SF-36, two participants did not fill out the entire 36 items (each missing an item, for a total of two missing items) which did not affect the scale scores because they are an arithmetic mean.

We used IBM SPSS Statistics for Windows, version 27, for all analyses, beginning with descriptive statistics and correlational analyses. Chi-square and independent t-tests (as applicable) were used to assess between-group differences on demographic variables and occupational balance. ANCOVAs were used to determine between-group differences in occupational balance while controlling for five covariates. PCS, age, sex, and employment status were chosen to be covariates for ANCOVAs because all four variables were associated with occupational balance in prior studies (Dür et al., 2016; González-Bernal et al., 2020; Wagman et al., 2020; Yu et al., 2018). Income was also shown to be associated with health measures in Chapter 3, and therefore included as a covariate in this question. Three separate multiple linear regression analyses were conducted for each of PCS, MCS, and TL, using occupational balance and diagnosis (IA/HC) as predictor variables. When diagnosis was a significant variable in the regressions, an interaction term of occupational balance and diagnosis was added. The sample size was calculated for the overall dissertation using the primary research questions in Chapter 3, which needed a minimum of 115 for those regression analyses; in the present chapter with fewer variables, the sample size exceeded the recommended minimum. Significance level was set at $p < .05$ for all analyses.

Results

Please see Chapter 2 (Table 2.1) for details on participant demographics. A total of 143 adults (32 males, 111 females) participated in this study, with a mean age of 50 years old (SD =

16.31). There were no statistically significant differences in age and sex between IA and HC groups.

Bivariate correlations for continuous variables are in Table 4.1. Occupational balance was modestly, significantly, and positively correlated with age, mental health, and physical health. Even after controlling for age and BMI, which were associated with TL, there was no relationship between occupational balance and TL. Occupational balance was inversely correlated with disease activity in the IA group (r = -.38, p = .002), but not disease duration (r = .08, p = .54).

Table 4.1
Bivariate Correlation Coefficients (Pearson's r) between Occupational Balance, Demographics, and Health and Well-being Measures, n = 143

	Age	***BMI***	***PCS***	***MCS***	***OBQ***
BMI	.19*				
PCS	-.26**	-.21*			
MCS	.42**	-.02	-.08		
OBQ	**.20***	-.08	**.25****	**.51****	
TL	-.58**	-.23**	.15	-.17*	-.07

***Correlation is significant at ≤ 0.01 level (2-tailed).*
**Correlation is significant at ≤ 0.05 level (2-tailed).*
BMI: body mass index, **PCS**: Physical Component Score (from SF-36), **MCS**: Mental Component Score (from SF-36), **OBQ**: Occupational Balance Questionnaire, **TL**: telomere length.

Is there a difference in occupational balance between the IA and HC groups?

Occupational balance scores were statistically significantly lower in the IA group (mean = 15.89, SD = 7.50) compared to HC group (mean = 19.37, SD = 7.37), 95% CI 1.00, 5.94, t(df) = 2.80(141), p = .01.

Do differences in occupational balance between IA and HC groups remain after controlling for covariates?

Occupational balance remained statistically significantly different between groups when individually controlling for each of age, sex, income, and employment status (Table 4.2). However, after controlling for PCS, occupational balance did not remain statistically significantly different between groups (p = .18), nor when controlling for all five covariates together (p = .11).

Table 4.2
Between-group Differences (IA vs. HC) in Occupational Balance, ANCOVA Results

Covariate(s) in analyses	**Mean OBQ (IA group, n = 67)**	**Mean OBQ (HC group, n = 76)**	**F**	**p**
PCS	16.66	18.69	1.84	.18
Age	15.59	19.62	10.81	.001
Sex	15.71	19.52	9.41	.003
Income	15.85	19.24	7.59	.01
Employment status	16.17	19.11	5.77	.02
PCS, age, sex, income, and employment status	16.43	18.73	2.59	.11

Does occupational balance predict self-reported physical and mental health and TL, in the full sample and the IA and HC groups?

In the full sample, occupational balance and diagnosis explained 33% of the variance in PCS (p < .001); however, diagnosis contributed most of the variance (32%) and was a significant predictor for PCS (p < .001). See Tables 4.3 and 4.4. An interaction term of occupational balance and diagnosis was statistically significant (p < .001) in predicting PCS. We therefore conducted regression analyses for the two groups separately.

In the <u>HC group</u>, occupational balance explained approximately 5% of the variance in PCS (R^2 = .05, p = .05), while in the <u>IA group</u>, occupational balance explained approximately 17% of the variance in PCS (R^2 = .17, p = .001). See Figure 4.1, Tables 4.3 and 4.4.

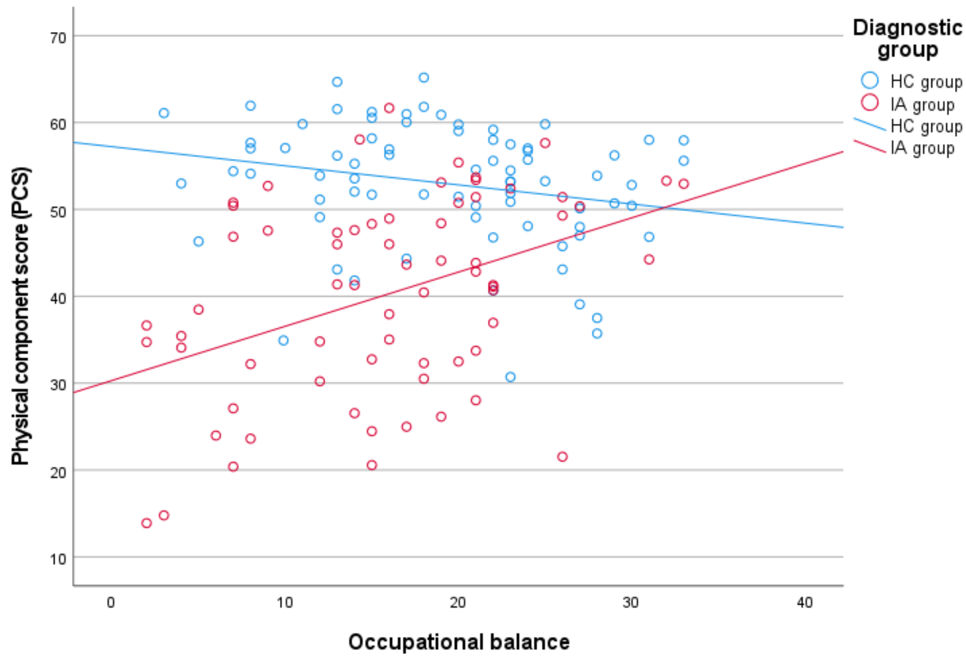


Figure 4.1
Occupational Balance and PCS Separately for IA and HC Groups

Table 4.3
Regression Model Summaries for PCS as outcome variable

Model	R^2	Source	Sum of Squares	df	MnSq	F	p
Overall sample (n = 143)	.33	Regression	6038.82	2	3019.41	34.66	< .001
		Residual	12195.63	140	87.11		
		Total	18234.45	142			
IA group (n = 67)	.17	Regression	1446.66	1	1446.66	13.08	.001
		Residual	7187.33	65	110.57		
		Total	8633.99	66			
HC group (n = 76)	.05	Regression	197.01	1	197.01	4.02	.05
		Residual	3624.16	74	48.98		
		Total	3821.17	75			

*the overall sample model included both occupational balance and diagnosis (IA/HC) as predictor variables; the HC and IA group models included only occupational balance as a predictor variable.

Table 4.4
Regression Models for PCS as outcome variable

Coefficients	R^2	Unstandardized coefficients		Standardized coefficients	T	p	95% CI for B	
		B	Std. Error				Lower	Upper
Total Sample, n = 143								
(Constant)	--	49.43	2.31	--	21.39	< .001	44.86	54.00
Diagnosis	.32	- 12.10	1.61	- .54	- 7.53	< .001	- 15.28	- 8.93
Diagnosis and OBQ	.33	.18	.11	.12	1.73	.09	- .03	.39
HC Group, n = 76								
(Constant)	--	57.23	2.27	--	25.21	< .01	52.70	61.75
OBQ	.05	- .22	0.11	- .23	- 2.01	.05	- .44	- .00
IA Group, n = 67								
(Constant)	--	30.31	3.03	--	10.01	< .001	24.27	36.36
OBQ	.17	.62	.02	.41	3.62	.001	.28	.97

In the full sample, occupational balance and diagnosis explained 27% of the variance in MCS ($p < .001$), with occupational balance contributing 26% of the variance. Occupational balance did not predict variance in TL, nor did diagnosis. See Tables 4.5-4.8.

Table 4.5
Regression Model Summary (n = 143) for MCS as outcome variable

R^2	Source	Sum of Squares	df	MnSq	F	p
.27	Regression	3551.36	2	1775.68	25.71	< .001
	Residual	9667.74	140	69.06		
	Total	13219.10	142			

Table 4.6
Regression Model Coefficients for MCS as outcome variable (n = 143)

Coefficients	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	35.75	2.06	--	17.37	< .001	31.68	39.82
OBQ	.26	.67	.09	.53	7.13	< .001	.49	.86
OBQ and diagnosis	.27	1.28	1.43	.07	.89	.37	-1.56	4.11

Table 4.7
Regression Model Summary (n = 143) for TL as outcome variable

R^2	Source	Sum of Squares	df	MnSq	F	p
.02	Regression	6.18	2	3.09	1.46	.24
	Residual	296.43	140	2.12		
	Total	302.60	142			

Table 4.8
Regression Model Coefficients for TL as outcome variable (n = 143)

Coefficients	R^2	Unstandardized coefficients		Standardized coefficients	t	p	95% CI for B	
		B	Std. Error				Lower	Upper
(Constant)	--	8.56	.36	--	23.78	< .001	7.85	9.27
OBQ	.01	-.02	.02	-.10	-1.12	.27	-.05	.01
OBQ and diagnosis	.02	-.38	.25	-.13	-1.51	.13	-.87	.12

Discussion

In this chapter, we explored the relationships between occupational balance and health measures in adults with and without IA, and discovered some important differences. Occupational balance was higher in the HC group compared to the IA group; of the three health measures studied, mental health was most strongly associated with occupational balance; occupational balance predicted poorer physical health for the IA group but not the HC group; and occupational balance was not associated with telomere length.

The between-group difference in occupational balance is consistent with other studies. For example, Yu et al. (2018) found that people who had chronic health problems had lower occupational balance compared to those who did not report any health conditions. Both IA and HC groups had greater occupational balance scores compared to a prior study of Swedish women aged 30-55 (Magnusson et al., 2020). Given that our sample was older, and age was correlated with occupational balance in our study and in other studies (Wagman et al., 2020), it is possible that our sample has greater occupational balance than the general population, which needs to be considered when interpreting this study's findings.

In the present sample, after observing that diagnosis explained a large proportion of variance in PCS, an interaction term was added, then regression analyses repeated with the two groups to separately explore the relationship between occupational balance and physical health. Occupational balance was a predictor of physical health in the IA group, but not in the HC group. The inverse correlation between RADAI disease activity scores and occupational balance, along with the presence and variability of pain, fatigue, decreased strength, and mobility in the IA group may explain why occupational balance and PCS are associated in the IA group but not the HC group. This suggestion is reinforced by our finding that after controlling for physical health, there was no between-group difference in occupational balance. The IA group's lower PCS scores (compared to the HC group, as seen in Chapter 3) may contribute to their lower occupational balance scores, and other factors contributing to occupational balance (e.g., MCS or other measures not included in this study) may be similar for people with and without IA.

Previous studies demonstrate how arthritis symptoms may contribute to the differences in occupational balance between groups. Semi-structured interviews with nine women living with RA found that activity limitations due to their disease negatively affected their sense of occupational balance (Stamm et al., 2004). In a more recent study, using group interviews with 33 adults with RA (Ahlstrand et al., 2012), participants discussed how arthritis symptoms like pain decreased participation in everyday activities and subsequently, created an imbalance among their everyday activities. Lower disease activity scores (representing arthritis symptoms) were also found to be associated with higher occupational balance in a survey of 682 adults with RA (Wagman et al., 2020). Dür et al. (2016) found associations between inflammatory markers (also related to arthritis symptoms) and occupational balance in a sample of people with and without RA. Aligning with the above studies, we found that disease activity was inversely correlated with occupational balance in the IA group in our study; however, disease duration was not associated with occupational balance. Given that arthritis symptoms (disease activity) impact physical health and functioning, and we found in our IA group that physical health and occupational balance are related, it is not surprising that occupational balance is also correlated with disease activity. Further research using more rigorous designs is needed to investigate the mechanisms through which IA symptoms impact occupational balance.

Among the variables explored in the present study, occupational balance was most strongly associated with MCS scores for the total sample. In fact, OBQ scores explained 26% of variance in MCS with diagnosis adding only 1%, in contrast to the findings for PCS (diagnosis explaining 32% of the variance to PCS and OBQ contributing only 1%). One possible explanation for this finding is the congruence between aspects of occupational balance and MCS elements in the SF-36, such as items in the subscales *energy/fatigue* and *role limitations due to emotional problems*. Previous studies also demonstrate a relationship between occupational balance and mental health as measured by the SF-36 MCS (Yu et al., 2018), and a one-question self-rated health item ("How do you rate your health in general?") (Wagman & Håkansson, 2014b). Among a sample of 682 people with RA, Wagman et al. (2020) found that those who were not continuously stressed had significantly higher occupational balance. Our findings from a mixed sample of adults with and without IA corroborate these prior studies with regard to mental health; in fact, we found that occupational balance was a stronger predictor of mental health than diagnosis. A potential clinical implication is that taking an occupational perspective in arthritis rehabilitation and self-management may support mental health outcomes for people with arthritis. For example, assessing occupational balance and offering strategies toward achieving a more satisfactory amount and variation of occupations that make up people's day-to-day lives may complement current self-management approaches.

Since occupational balance and stress are related (Matsuka et al., 2013; Yu et al., 2018), it was expected that occupational balance would be associated with TL, via the stress pathway. However, occupational balance was not significantly associated with telomere length in this sample; nor did TL differ between the two groups, which was also unexpected given prior research showing shorter telomeres in people with arthritis (Barkovskaya et al., 2017; Lee et al., 2018; Steer et al., 2007). Much of the research in TL focuses on how stress is the pathway through which lifestyle influences TL biology. Engaging in mindfulness or meditative activities or physical activities can reduce stress, which in turn, preserve TL (Puterman & Epel, 2012; Schutte & Malouff, 2014). However, the different factors and mechanisms that influence TL are still largely unknown (Mather et al., 2011), and this may also be the case for the concept of occupational balance. The absence of association may also be sample specific, given that this sample did not replicate the between-group difference in TL found in other studies (Barkovskaya et al., 2017; Lee et al., 2018; Steer et al., 2007). Overall, the mechanism through which occupational balance and

TL may be associated is likely complex requires further investigation before concluding there is no relationship.

Our findings have clinical implications for practitioners working with arthritis patients. The OBQ is easy to administer, reliable, and valid. Rehabilitation professionals should measure occupational balance as part of their practice and, when applicable, consider interventions to help their clientele choose or adjust occupations toward a more satisfying balance regarding the amount and kinds of occupations in which they engage. Interventions to balance different kinds of occupations may bolster physical and mental health, add to patients' repertoire of coping strategies, and potentially promote overall health in the IA population.

This study adds to the conceptual understanding of occupational balance. Our study used the OBQ to compare occupational balance in participants with and without IA, which had not been tested previously and offers a better understanding of the impact of arthritis on occupational balance. When controlled for physical health (as measured by the SF-36 PCS), there was no difference in occupational balance between groups, illustrating physical health as a primary impact of arthritis on perceptions of occupational balance. These findings call for further exploration on the inter-relationships among physical health, arthritis symptoms, and occupational balance. Previous studies have reported that occupational balance is associated with general health in people with RA (Forhan & Backman, 2010). Our study extends these findings by showing that occupational balance contributes more strongly to mental health than physical health, and is inversely associated with arthritis disease activity, providing a more nuanced understanding of how occupational balance contributes to various facets of health.

Strengths and limitations

Comparing occupational balance between adults with and without IA contributes to the literature on this concept and is a strength of this current study. In addition, this study explored the relationship between occupational balance and biomarkers. To our knowledge, only Dür et al.'s study (2016) investigated associations between occupational balance and biological markers, i.e., cytokines and CRP levels, and our study adds to the currently small body of literature on occupational balance and biomarkers. Measuring several variables (physical health, mental health, occupational balance, and TL) in our study allowed for a comprehensive exploration into the complex relationship between occupational balance and health constructs. Finally, our study showed the feasibility of collecting dried blood spots for telomere length analysis in future studies.

Our findings are limited to the perspectives of adults with similar characteristics (e.g., white, university educated, urban dwelling), in which the privilege of these groups may afford the choice of and ability to select certain occupations, impacting occupational balance. People of lower SES (Borchard, 2010; van der Meer, 2008) or those who identify as part of a racialized group (Beagan & Etowa, 2009), may have greater barriers to engage in desired occupations, potentially decreasing occupational balance. Furthermore, only English-speaking people were able to participate in this study. Occupations and occupational balance may be manifested differently in non-Western cultures (Kantartzis & Molineux, 2011); therefore, findings should not be generalized to other cultures or non-English speaking populations without further research. Future research using non-English or non-Western samples can use occupational balance assessments of other languages (e.g., Günal et al., 2020; Ho et al., 2020). However, a strength of the OBQ is that it does not focus on specific occupations but solely on the respondent's perception of the amount, variety, and impact of occupations; therefore, the actual occupations that comprise a person's ratings is their own interpretation in their own context. As an exploratory study, we are unable to attribute directionality among variables. For example, while we found associations between occupational balance, IA symptoms (disease activity), and physical health, future longitudinal and intervention studies are needed to elucidate the causal directions between these variables.

Future directions

Ideally, future studies would use a more representative (random) sample and longitudinal design given the fluctuations in perceived balance, health, and well-being. As discussed above, our sample is relatively privileged. It would be interesting to explore how occupational balance presents in more diverse groups, and specifically, how occupational balance differs between IA and HC groups from a more representative sample.

Similarly, studies may explore how occupational balance differs between healthy comparison groups and groups with other health conditions (e.g., multiple sclerosis). We found that the HC group had greater occupational balance compared to the IA group (prior to controlling for PCS); this finding may or may not carry to other disease groups, and future studies can provide knowledge on the factors specific to each disease group that affect occupational balance. Identifying those factors can help develop specific interventions targeting occupational balance, leading to improved well-being especially for those living with chronic diseases.

Conclusion

While the IA group reported lower occupational balance compared to the HC group, this difference did not remain statistically significant after controlling for physical health. Occupational balance was a predictor of physical health only in the IA group. In our overall sample, occupational balance had a strong relationship with mental health, accounting for more than a quarter of its variance. Finally, occupational balance was not associated with TL; however, the mechanism through which occupational balance and TL are associated is likely complex and multi-faceted and requires further investigation.

Chapter 5: Exploring occupations and well-being before and during the COVID-19 pandemic in adults with and without inflammatory arthritis

Introduction

The World Health Organization (WHO) declared a global pandemic on March 11, 2020 (WHO, 2020). The COVID-19 pandemic called for large-scale physical distancing, resulting in decreased social interactions and disruption to various everyday occupations. British Columbia (BC) public health officials advised strict physical distancing and staying at home as much as possible starting on March 16, 2020 with some restrictions easing on May 19, 2020 (Phase 1; CBC, 2020 April 3). During BC's Phase 1 restrictions, older adults stayed away from family members, children were home from schools and playgrounds, workers were juggling both work and childcare responsibilities at home, and social gatherings were prohibited. Consequently, people's occupational patterns and ways of doing occupations changed; knowing more about *how* occupations changed during this phase of the pandemic may inform future public health advisories.

Occupational balance is the subjective perception of having "the right amount of occupations and the right variation between occupations" (Wagman et al., 2012, p. 324). Disruptions to daily routines and occupations affect people's sense of occupational balance (Nissmark & Malmgren Fänge, 2018; Roy et al., 2013), and the pandemic is a major source of disruption. In an editorial, Gostin & Wiley (2020) observed during the early stage of the pandemic that some people experienced restrictions to their usual occupations. Therefore, people's occupations may have changed, and/or required different ways of doing. Examining occupations from an occupational balance perspective allows a broad overview of what people do, complementing the exploration of people's specific occupations (as detailed in Chapters 3 and 4). Occupational balance is positively correlated with self-reported measures of health and well-being

(Forhan & Backman, 2010; Wagman et al., 2020; Yu et al., 2018), and further examining these associations in a time of profound occupational disruption may yield new insights. Prior public health emergencies have shown that trauma occurs and persists in populations after the event (Agyapong et al., 2019; North & Pfefferbaum, 2013; Tang et al., 2014). For example, 18 months after the Fort McMurray wildfire, survey data from 3070 teenagers reported more mental health symptoms compared to a similar aged control group (Brown et al., 2019). Early reports on the COVID-19 pandemic suggest that the scale of occupational disruption and social isolation is widespread, and a prolonged period of recovery is anticipated (Galea et al., 2020; Kaufman et al., 2020). It is therefore important to understand how occupational balance and well-being are affected during COVID-19.

The pandemic, as a population-wide event, would impact everyone's occupations to some degree, but may be exacerbated in vulnerable populations such as those with immune-compromised conditions like inflammatory arthritis (IA). IA presents unique challenges with regard to infectious diseases like COVID-19. For example, due to their immunocompromised status, people with IA may experience increased worry related to contracting COVID-19 and consider physical distancing and stay-at-home directives more seriously than the general population. Indeed, a recent study that explored the stress level of those with IA (lupus and RA) and osteoarthritis found that participants had significantly higher level of COVID-19-specific stress ratings than general stress ratings (Katz et al., 2020). Minimizing social contacts and supports reduces the risk of disease spread, but these supports may have been important coping strategies to manage their disease (Zyrianova et al., 2006). Therefore, physical distancing measures may negatively impact the IA population more so than the general population. However, it is also possible that people with IA are accustomed to self-isolating due to past experiences of taking medications that suppress their immune system.

An Irish study found that women with IA reported worse general health, mood, and disease activity compared to men during COVID-19 (Maguire & O'Shea, 2020); yet, it is not known how the well-being of people with IA compares to those without IA. Among the general population, studies on previous epidemics reveal that multiple factors combine to disrupt emotional well-being (Jeong et al., 2016) and everyday activities (Marafa & Tung, 2004; Wang, 2014). Because widespread physical distancing restrictions are rare, there is little knowledge on how such measures influence occupation and occupational balance; it is also unknown how well-being changed once the pandemic occurred for people with IA and if this differed from the general population.

COVID-19 suspended our longitudinal study on daily activities and health in adults with IA and a healthy comparison (HC) group because in-person research and blood draws for non-pandemic research were prohibited by the ethics board at the time. However, because baseline data had been collected prior to the pandemic, there arose the opportunity to assess the impact of BC's phase one restrictions on everyday occupations, occupational balance, health, and well-being by converting the measurement of these variables to an online survey. Consequently, we aimed to compare occupations, occupational balance, self-reported measures of perceived stress, life satisfaction, and physical and mental health from preCOVID-19 to COVID-19 periods among participants from the disrupted study. It is important to note that COVID-19 spanned many months, and this study focused on the early months of the pandemic (Phase 1) in BC. **Research questions** were as follows:

1) Are there differences in occupations, occupational characteristics, occupational balance, perceived stress, life satisfaction, mental and physical health between preCOVID-19 and COVID-19 time periods, in the total sample or within the IA and HC groups?
2) During COVID-19, are there differences in occupations, occupational characteristics, occupational balance, perceived stress, life satisfaction, mental and physical health between the IA and HC groups?

Method

This COVID-19 modification to the thesis plan was approved by the clinical research ethics board at the University of British Columbia. The current study is an observational, before-and-after design, with baseline data obtained from studies reported in Chapters 2-4 and follow-up data collected during COVID-19 (Phase 1 restrictions).

Participant eligibility and recruitment

Recruitment procedures and eligibility criteria were described in Chapter 2. Accrual of participants for the present analysis is illustrated in Figures 5.1. A total of 143 participants volunteered for the original study between October 16, 2018 and December 14, 2019, of whom 48 had completed their "one-year" (11-15 months) follow-up between October 5, 2019 and March 12, 2020. Data collected on and prior to March 12, 2020 was completed during in-person study sessions. The preCOVID-19 baseline (T1) data for the present analysis is extracted from the questionnaire participants completed up until March 12, 2020. For those who completed the one-year follow-up, these questionnaires were used because they were the most recent.

We invited 94 of the original 143 participants by email in April 2020 to participate in the COVID-19 (T2) online survey. The remaining participants (n = 49) were not invited because they were due for their follow-up for the original study and at the time, it was expected that in-person research would resume in the weeks ahead, raising a concern for participant burden. Those not invited had a higher mean life satisfaction score (25.08) compared to invited participants (22.52), p = .04. Of the 94 eligible for the pandemic phase, 71 agreed to participate. We compared demographics and health measures between responders and non-responders (see results).

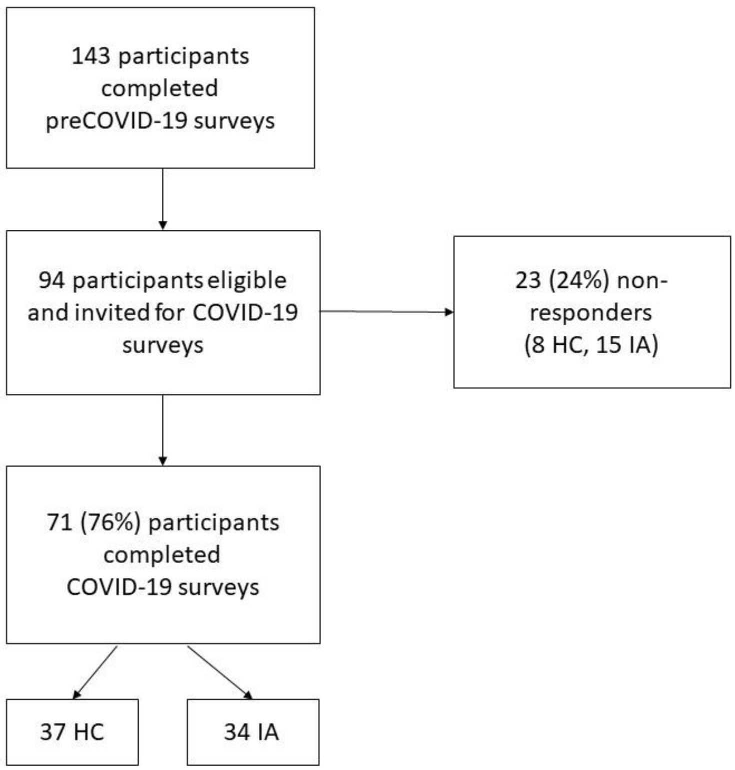


Figure 5.1

Participant Flow Chart

Procedures

A link to the online survey was provided to participants, with an email reminder sent at two weeks. Surveys were completed between April 25 to May 16, 2020. The elapsed time between baseline (T1 preCOVID-19 surveys) and follow-up (T2 COVID-19 surveys) ranged from 2 to 18 months (mean = 5 months), with 94% of participants having an elapsed time of ≤ 8 months.

Variables and measures

Please see Appendix A for a content list of the T1 study package and Appendix B for a content list of the T2 COVID-19 online questionnaire. Questionnaires contained the following measures:

1) **Personal Projects Analysis (PPA**). Participants generated a list of salient projects that described the types of occupations in which they were engaging, and then rated 10 projects on 0-10 scales for 19 dimensions to describe occupational characteristics. The mean score was calculated for each dimension, with 10 indicating that dimension was highly characteristic of the occupation and 0 for not at all. See Chapter 2 for details on the PPA.
2) **Occupational Balance Questionnaire (OBQ)** is an 11-item scale with a score range of 0-33. It assesses respondents' perceptions of the amount and variety of their everyday activities (occupations). Higher scores indicate greater balance. See Chapter 4 for details on the OBQ.
3) **Perceived Stress Scale** (PSS; Cohen et al., 1983) consists of 10 items, with a score range of 0-40. The PSS explores participants' global (event-independent) appraisals and higher scores reflect greater stress. The PSS has good psychometric properties (e.g., internal consistency, reliability, hypothesis validity) (Lee, 2012), with a Cronbach's alpha of .88 in this study.
4) **Satisfaction with Life Scale (SWLS)** contains 5 items with a possible score range of 5-35; higher scores reflect greater life satisfaction. See Chapter 3 for details on the SWLS.

5) **SF-36 Health Survey,** for which Physical Component Scores (PCS) and Mental Component Scores (MCS) were calculated and could range from 0 to 100 with higher scores indicating better health. See Chapter 2 for details on the SF-36.
6) **Demographic** data included age, sex, marital status, ethnicity, employment status, income, and diagnosis.
7) **RADAI** for IA activity status, with greater scores indicating higher activity status. See Chapter 2 for details.
8) **COVID-19 items** include any new diagnoses or health conditions (e.g., SARS-COv-2) since baseline, along with open-ended questions asking about the impact of the pandemic on their everyday activities.

Data analyses

Data were entered into SPSS (IBM SPSS Statistics for Windows, version 27) and double-checked for accuracy. Descriptive statistics were calculated for all variables. Significance level was set at $p < .05$ for all analyses.

Comparing between preCOVID-19 and COVID-19 timepoints. Information about participants' types of occupations and occupational characteristics were captured with PPA. Project categories were entered and analyzed in QSR International NVivo 12 qualitative data analysis software. Because we were interested in similarities and differences from pre-pandemic (T1) to pandemic (T2) times, we applied the T1 occupational categories identified in Chapter 2 to the T2 occupations, adding new categories when occupations did not fit the prior scheme. Occupations in each category and sub-category were tallied for the total sample and for each of the IA and HC groups.

Paired t-tests were used to identify differences in mean scores of occupational characteristics (PPA dimensions), OBQ, PSS, SWLS, MCS, and PCS between preCOVID-19 (T1) and COVID-19 (T2) timepoints.

Comparing between IA and HC groups during COVID-19. This research question refers only to T2 data. Chi-square tests were used to identify between-group (IA vs. HC) differences in frequency counts across occupational categories. Independent groups t-tests and ANCOVAs were used to assess for between-group differences in occupational characteristics, OBQ, PSS, SWLS, MCS, and PCS scores during COVID-19.

Missing data

There were missing data for some demographic and PPA items. RADAI scores were missing for two participants at T1 and one participant for T2; one participant did not provide income information at T1, and nine participants did not provide employment status at T2. Missing data were left as missing in demographic summaries.

Three participants did not complete any portion of the PPA, resulting in 68 participants for PPA analyses because projects cannot be imputed. Ten participants had short project lists (five participants listed nine projects and another five participants listed eight projects), and these were included in analysis resulting in a total of 665 projects. Six of the 68 PPAs were missing ratings for project dimensions, resulting in 62 participants for the analysis of occupational characteristics. Five participants omitted rating between one and 16 project dimensions.

Results

Participant demographics

The 71 participants who completed both preCOVID-19 and COVID-19 questionnaires did not significantly differ from non-responders (n = 23) on age, sex, diagnostic group (IA vs. HC), or baseline mean scores for occupational balance, perceived stress, life satisfaction, mental and physical health. See Table 5.1 for participant demographics.

The IA group reported a mean disease duration of 14 years (SD = 15) and mean RADAI score of 3.8 (SD = 2.4). Seventeen (50%) of the IA group had RA, 6 (18%) with psoriatic arthritis, 5 (15%) with lupus, 3 (9%) with JIA, 2 (6%) spondyloarthritis, 1 (3%) with polymyalgia rheumatica, and 1 (3%) unsure; one person had both RA and lupus (consequently, the summed count of IA conditions exceed n = 34). While participants resided in the greater Vancouver area at baseline, three participants lived elsewhere during COVID-19 (two in Ontario and one in Mexico). No participants reported contracting the coronavirus. Twelve participants reported a change in employment status, five were reductions due to COVID-19.

Table 5.1
Participant Demographics, Count (%) Unless Otherwise Noted

	Overall sample (n = 71)	IA group (n = 34)	HC group (n = 37)
Sex*			
Male	16 (23%)	4 (12%)	12 (32%)
Female	55 (77%)	30 (88%)	25 (68%)
Age, mean (SD)	53.42 (17.58)	56.41 (17.61)	50.68 (17.34)
Education level			
Some high school	1 (1%)	0 (0%)	1 (3%)
High school graduate	7 (10%)	3 (9%)	4 (11%)
Trade, vocational school, or community college graduate	19 (27%)	10 (29%)	9 (24%)
Bachelor's degree	24 (34%)	11 (32%)	13 (35%)
Master's or doctoral degree	20 (28%)	10 (30%)	10 (27%)
Married/partnered	43 (61%)	22 (67%)	21 (57%)
Employment status			
Part-time	9 (13%)	7 (19%)	2 (6%)
Full-time	23 (32%)	12 (33%)	11 (32%)
Retired	22 (31%)	9 (24%)	13 (38%)
Other	17 (24%)	9 (24%)	8 (24%)
Income			
Under $40,000	19 (27%)	8 (23%)	11 (30%)
$40,000-59,999	8 (11%)	3 (9%)	5 (14%)
$60,000-79,999	7 (10%)	6 (18%)	1 (3%)
$80,000-99,999	10 (14%)	6 (18%)	4 (11%)
$100,000-119,999	13 (18%)	6 (18%)	7 (19%)
$120,000 and over	13 (18%)	5 (14%)	8 (22%)
Ethnicity			
White	48 (67%)	29 (85%)	19 (51%)
Chinese	9 (13%)	1 (3%)	8 (22%)
Mixed race	6 (9%)	1 (3%)	5 (14%)
Filipino	1 (1%)	1 (3%)	0 (0%)
Japanese	1 (1%)	0 (0%)	1 (3%)
Latin American	2 (3%)	1 (3%)	1 (3%)
South Asian	2 (3%)	0 (0%)	2 (5%)
South East Asian	2 (3%)	1 (3%)	1 (3%)
Co-morbidities			
0	29 (40%)	7 (20%) (none other than IA)	22 (60%)
1	22 (31%)	13 (38%)	9 (24%)
2	12 (17%)	8 (24%)	4 (10%)
3	4 (6%)	3 (9%)	1 (3%)
4 or more	4 (6%)	3 (9%)	3 (3%)
BMI mean (SD)	25.05 (5.87)	25.49 (5.50)	24.64 (6.24)

**Non-binary (LGBTQ+) was an option on the survey. No participants selected it*

Comparing preCOVID-19 and COVID-19 timepoints

To address the first research question comparing measures between T1 and T2, the results are presented in Tables 5.2 to 5.8.

Occupational categories. To address the first research question comparing T1 and T2 occupations, the COVID-19 (T2) occupations elicited by PPA are categorized in Table 5.2 and compared to preCOVID-19 (T1) occupational categories and sub-categories (from Chapter 2). Based on frequency counts, the rank order of *Holistic health* occupations (first) and *Life planning* occupations (last) remained the same as preCOVID-19. For the COVID-19 timepoint, there were no projects in the sub-categories of *Clubs, Shopping,* and *Starting/ending romantic relationships*.

Two new clusters of occupations were added. First, *Community news,* a sub-category under *Around the community* captured occupations that focused on staying informed (e.g., "keep up with the news everyday"). Second, many occupations centered around COVID-19 (e.g., "sew face masks", "survive lockdown") while aligning with one of the six major categories from the original content analysis. Because these occupations shared the unique theme of being driven by the pandemic, a new post-hoc category, *Pandemic* was tallied to elucidate pandemic-specific occupations.

Table 5.2

Categorical Analysis of COVID-19 Occupations, placed into preCOVID-19 Categories and Tallied

Category (Total # of projects; # in HC and IA groups, respectively)	**Sub-category** (Total # of projects; # in HC and IA groups, respectively)	**Verbatim examples**
1) Holistic health *(177; 84, 93)*	Physical activity (88; 36, 32)	Walking everyday, get better at my golf game, exercise regularly, learn to run, practice yoga daily, increase physical exercise, yoga on TV
	Self-management (50; 27, 23)	Lose weight, take a shower, be more happy, go outside everyday, sleep more than 5 hours a day, consider counseling
	Consume healthier (21; 13, 8)	Eat healthier, not to overeat, drink more water, cutting sugar
	Reflection and spirituality (14; 7, 7)	Daily meditation, write in my journal, work on mindfulness
	Managing health-related appointments (4; 1, 3)	Move forward with knee replacement, get my spine injection
2) Around the home *(149; 69, 81)*	Home improvement and gardening (61; 28, 33)	Learn how to garden, tend to my indoor plants, shampoo carpet, condo renovation
	Decluttering and organizing the home (36; 19, 17)	Sort stuff out, organize my bike locker, clear up my belongings, clean the library, organize file cabinet, sort clothes out for donation
	House chores (32; 12, 20)	Wash floors at home, clean room, vacuum downstairs, dust more frequently
	Making meals (20, 9, 11)	Getting groceries, cooking, help food prep
3) Leisure and enjoyment *(138; 65, 73)*	Creative hobbies (65; 26, 39)	New quilt projects, finish knitting sweater, get better on ukulele, make a fancy origami project, stamp collecting, learn how to play piano, create a scrapbook, edit my poetry, sew reusable face masks, start writing my book, fill in ancestry books I have started
	Travel (4; 4, 0)	Travel, visit my grandchildren when safe to do so during COVID-19, organize a family vacation once COVID is over
	Reading (29; 13, 16)	Finish a novel, read more books, read for pleasure, read daily
	Cooking for fun (18; 9, 9)	Learning to bake, trying new recipes, make cream puffs, learn how to make sourdough bread; brew kombucha every so often
	Entertainment (11; 6, 5)	Watch Netflix, puzzles, scrabble, listen to more podcasts, playing games

	New languages (11; 7, 4)	Daily Spanish lessons, learn fluent conversational Cantonese, practice French on duolingo, speak Estonian more often
	Clubs (0)	N/A
	Shopping for fun (0)	N/A
4) Relating to others *(79; 51, 28)*	Socializing and spending time with friends and family (50; 32, 18)	Socialize with friends, stay in touch with family, call my family more; spend time with friends via Zoom; talking on the phone, keep in touch more; connection with friends on Face Time
	Tend and befriend (nurturing and helping friends and family) (17; 13, 4)	Make meals for neighbour, teach son to read novels, shopping for seniors, donate to foodbank, look after my grandson, homeschooling routine for son, helping neighbours
	Romantic partners – aspirations and activities (6, 3, 3)	Spend time with my husband, work on my relationship with my significant other, go for walks with my wife regularly
	Pets (6; 3, 3)	Play with my cats, get a puppy for therapy
5) Around the community *(79; 46, 33)*	Work-related tasks (50, 27, 23)	Build my business, cut down on my work everyday, work, get a promotion, learn Python, complete my mobile work bench
	Volunteering (15; 9, 6)	Look for volunteer opportunities, do more for the association, volunteer at the cat shelter
	Schooling and courses (6; 4, 2)	Further my education, work on my graduate school research, go back to college
	Accessing and getting around the community (2; 1, 1)	Take course to fix my bike, get my car back
	Community news (6; 5, 1)*	Keep up with the news everyday, spend less time in social media, stay informed of the most current affairs and latest developments e.g., COVID-19 updates
6) Life planning *(43; 22, 21)*	Finances (30, 19, 11)	File taxes, save money for tuition, financial planning, cut down on spending
	Moving (3; 1, 0)	Moving, packing, buy an apartment
	Retirement planning (6; 2, 4)	Prepare a retirement plan, estate plan and will, finish end of life documents
	Family planning (4; 1, 3)	Get pregnant, rescheduled my wedding, figure out whether to adopt a child
	Starting/ending romantic relationships (0)	N/A
Post-hoc categories		
Learning *(28; 23, 5)*		Learning to bake, learn to garden, learn to cook, learn Mandarin

Pandemic *(35; 25, 10)**		Find more ways to connect with kids/grandkids during COVID self-isolation; Understand how to finance during this pandemic, survive lockdown, shopping for seniors, sew face masks, home schooling routine for son, plan Mother's Day gifts/social distance event

**The two new categories that arose at T2.*

Occupational characteristics. Average project dimension ratings for the total sample are reported in Table 5.3. Sixteen of the 19 dimensions were scored higher during pre-COVID19 than during COVID-19. Fourteen of 19 dimensions had statistically significant differences between timepoints, and all of these dimensions except for one were rated higher pre-pandemic; *Time adequacy* was rated higher during COVID-19 than preCOVID-19.

Within-group analyses showed that the HC group had statistically significantly higher preCOVID-19 scores in nine dimensions, compared to COVID-19 (Table 5.4). The IA group had statistically significantly higher preCOVID-19 scores in 10 dimensions (Table 5.5). It is important to note that for some of these dimensions, a greater score does not always indicate that it is 'better'. For example, higher ratings of *Stress* or *Difficulty* may not be desirable, while higher ratings of *Enjoyment* would be. Please see Appendix C for a more detailed explanation for each PPA project dimension.

Table 5.3

Changes in Project Dimensions between Timepoints, in the Overall Sample (n = 62)

Project dimensions	**PreCOVID-19**		**COVID-19**		**Mean difference**	**95% CI mean difference**		**t**	**p**
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
Social	4.77	1.71	3.61	1.74	1.16	.71	1.61	5.11	< .001
Negative impact	2.13	1.61	1.23	1.28	.90	.48	1.32	4.31	< .001
Creative	5.82	1.81	4.98	1.89	.84	.41	1.27	3.89	< .001
Stress	4.33	1.62	3.54	1.85	.79	.35	1.23	3.57	.001
Importance	8.05	1.10	7.53	1.26	.52	.23	.81	3.55	.001
Identity	7.07	1.44	6.35	1.98	.71	.29	.14	3.37	.001
Others' view	6.05	1.87	5.42	1.95	.63	.16	1.11	2.66	.01
Value congruency	8.04	1.30	7.65	1.32	.39	.08	.70	2.49	.02
Difficulty	5.25	1.59	4.61	2.18	.64	.13	1.15	2.49	.02
Enjoyment	7.04	1.60	6.55	1.63	.49	.09	.88	2.47	.02
Visibility	6.58	1.65	6.00	1.86	.59	.11	1.06	2.47	.02
Challenge	5.86	1.54	5.34	1.89	.52	.05	.99	2.21	.03
Time adequacy	6.13	1.60	6.68	1.75	-.55	-1.04	-.05	-2.20	.03
Absorption	7.16	1.63	6.65	1.81	.51	.01	1.03	1.97	.05
Control	7.80	1.53	7.44	1.67	.36	.06	.77	1.72	.09
Outcome	7.93	1.54	7.58	1.84	.35	.09	.80	1.58	.12
Initiation	6.74	2.09	6.96	2.05	-.21	-.78	.35	-.76	.45
Positive impact	7.16	2.06	7.37	2.42	-.21	-.78	.37	-.71	.48
Progress	5.64	1.75	5.51	1.84	.14	-.33	.61	.58	.56

** shaded rows are dimensions that significantly differed between timepoints*

Table 5.4

Project Dimensions between Timepoints, in the HC Group (n = 33)

Project dimensions	PreCOVID-19		COVID-19		Mean difference	95% CI mean difference		t	p
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
Social	4.68	1.69	3.51	1.77	1.17	.52	1.82	3.69	.001
Stress	4.06	1.42	3.33	1.43	.74	.25	1.23	3.07	.01
Creative	5.49	1.96	4.65	2.04	.84	.18	1.51	2.60	.01
Negative impact	1.90	1.67	1.14	1.24	.76	.15	1.36	2.56	.02
Identity	6.90	1.38	6.17	2.11	.72	.08	1.37	2.28	.03
Challenge	5.59	1.57	4.88	1.69	.71	.04	1.37	2.17	.04
Others' view	5.58	1.72	4.78	1.98	.81	.04	1.57	2.15	.04
Importance	7.90	1.09	7.52	1.25	.38	.01	.75	2.10	.04
Difficulty	4.89	1.45	4.29	1.87	.60	.00	1.20	2.03	.05
Value congruency	7.75	1.37	7.40	1.34	.35	.14	.84	1.48	.15
Absorption	6.96	1.78	6.38	2.16	.58	.26	1.42	1.41	.17
Control	7.89	1.56	7.47	1.72	.42	.22	1.06	1.33	.19
Enjoyment	6.84	1.47	6.45	1.56	.39	.27	1.06	1.22	.23
Progress	5.72	1.75	5.36	1.67	.35	.25	.95	1.19	.24
Visibility	6.22	1.29	5.83	1.94	.39	.31	1.08	1.14	.26
Outcome	7.75	1.59	7.34	2.02	.41	.35	1.17	1.09	.28
Time adequacy	5.98	1.67	6.34	1.82	-.36	-1.06	.34	-1.05	.30
Positive impact	6.87	2.04	6.82	2.62	.06	-.79	.90	.13	.89
Initiation	6.65	2.26	6.65	2.26	.00	-.93	.94	.01	.99

** shaded rows are dimensions that significantly differed between timepoints*

Table 5.5
Project Dimensions between Timepoints, in the IA Group (n = 29)

Project dimensions	PreCOVID-19		COVID-19		Mean difference	95% CI mean difference		t	p
	Mean	*SD*	*Mean*	*SD*		*Lower*	*Upper*		
Negative impact	2.39	1.53	1.32	1.34	1.07	.46	1.69	3.58	.001
Social	4.87	1.76	3.72	1.73	1.15	.47	1.83	3.47	.002
Creative	6.19	1.58	5.35	1.65	.84	.26	1.41	2.96	.01
Importance	8.22	1.10	7.55	1.29	.68	.19	1.16	2.88	.01
Enjoyment	7.26	1.73	6.66	1.73	.59	.15	1.03	2.74	.01
Identity	7.25	1.51	6.55	1.85	.70	.13	1.28	2.50	.02
Visibility	6.97	1.91	6.17	1.79	.80	.12	1.47	2.42	.02
Stress	4.62	1.80	3.77	2.22	.85	.05	1.64	2.19	.04
Value congruency	8.36	1.15	7.93	1.26	.43	.02	.84	2.14	.04
Time adequacy	6.30	1.52	7.04	1.61	-.74	-1.49	.00	-2.05	.05
Difficulty	5.65	1.66	4.97	2.46	.68	.21	1.57	1.56	.13
Others' view	6.54	1.92	6.10	1.69	.44	.14	1.03	1.56	.13
Absorption	7.40	1.43	6.97	1.27	.43	.20	1.06	1.40	.17
Initiation	6.84	1.92	7.29	1.77	-.45	-1.11	.22	-1.38	.18
Positive impact	7.50	2.07	8.00	2.05	-.50	-1.33	.32	-1.26	.22
Outcome	8.13	1.49	7.83	1.62	.30	.20	.80	1.22	.23
Control	7.69	1.51	7.40	1.64	.29	-.26	.83	1.07	.29
Challenge	6.17	1.48	5.86	2.00	.30	-.40	1.01	.89	.38
Progress	5.57	1.78	5.66	2.02	-.09	-.85	.67	-.25	.80

* *shaded rows are dimensions that significantly differed between timepoints*

Health and well-being. In the total sample, there were no statistically significant differences between timepoints in SWLS and PCS. OBQ and PSS scores were higher, and MCS were lower during the COVID-19 period compared to the preCOVID-19 period (Table 5.6).

Within-group analyses showed that the same pattern of between-timepoints differences in self-reported measures held for the HC group (Table 5.7). In the IA group, both OBQ and PSS scores were statistically significantly higher during COVID-19 compared to baseline. The observed differences in life satisfaction, mental and physical health were not statistically significant (Table 5.8).

Within-group analyses showed that physical health improved for the IA group while it declined in the HC group, but the differences are not statistically significant. Both groups showed decreases in mental health, but this decrease was statistically significant only in the HC group.

Table 5.6

Changes in Health and Well-being Measures between Timepoints, Overall Sample (n = 71)

Measures	PreCOVID-19			COVID-19			Mean difference	95% CI Mean Difference		t	p
	Median	*Mean*	*SD*	*Median*	*Mean*	*SD*		*Lower*	Upper		
OBQ	16.00	16.30	7.12	20.00	19.61	5.47	3.31	2.09	4.53	5.41	< .001
PSS	15.00	15.32	6.98	17.00	20.70	12.71	5.38	2.94	7.82	4.40	< .001
SWLS	23.00	22.35	7.25	25.00	22.44	7.61	.09	-1.08	1.25	.14	.89
MCS	48.97	47.25	8.34	46.30	44.65	9.92	-2.60	-4.54	-.67	-2.69	.01
PCS	50.74	47.21	11.98	50.35	47.06	1.78	-.15	-1.94	1.65	-.17	.87

** shaded rows denote statistically significant differences between timepoints*

OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Table 5.7

Changes in Health and Well-being Measures between Timepoints, HC Group (n = 37)

Measures	PreCOVID-19			COVID-19			Mean difference	95% CI Mean Difference		t	p
	Median	*Mean*	*SD*	*Median*	*Mean*	*SD*		*Lower*	Upper		
OBQ	16.00	16.32	6.89	21.00	20.05	5.17	3.73	1.96	5.50	4.28	< .001
PSS	15.00	15.27	6.51	17.00	21.41	12.71	6.14	2.64	9.63	3.56	.001
SWLS	23.00	22.51	6.89	25.00	23.00	6.92	.49	-.96	2.15	.78	.44
MCS	48.97	46.61	7.29	43.84	43.28	9.14	-3.33	-6.27	-.39	-2.29	.03
PCS	50.74	54.01	6.86	54.33	52.89	7.00	-1.12	-3.41	-1.08	-1.05	.30

** shaded rows denote statistically significant differences between timepoints*

OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Table 5.8
Changes in Health and Well-being Measures between Timepoints, IA Group (n = 34)

Measures	**PreCOVID-19**			**COVID-19**			**Mean difference**	**95% CI Mean Difference**		**t**	**p**
	Median	***Mean***	***SD***	***Median***	***Mean***	***SD***		***Lower***	**Upper**		
OBQ	16.50	16.26	7.46	19.00	19.12	5.80	2.86	1.10	4.61	3.31	.002
PSS	15.50	15.38	7.55	17.00	19.94	12.85	4.56	1.00	8.12	2.61	.01
SWLS	23.00	22.29	7.72	21.50	21.82	8.36	-.47	-2.29	1.35	-.53	.60
MCS	49.50	47.96	9.41	48.02	46.13	10.63	-1.83	-4.43	.78	-1.43	.16
PCS	42.92	39.75	11.96	43.69	40.71	12.76	0.96	-1.97	3.88	-.67	.51

** shaded rows denote statistically significant differences between timepoints*

OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

During COVID-19

To address the second research question, the results of the between-group comparisons (IA vs. HC) during COVID-19 (T2) are presented in Tables 5.9-5.12.

Occupational categories. There were no differences in the occupational types in which participants engaged, except for the category *Relating to others*, in which the HC group reported more occupations than did the IA group (Table 5.9).

Table 5.9
Project (Occupational) Categories between Groups, During COVID-19

Project categories	Total number of projects	# and % of projects by IA group	# and % of projects by HC group	Chi-square test (2-sided)
Holistic health	177	93 (53%)	84 (47%)	.34
Around the home	149	81 (54%)	69 (46%)	.21
Leisure and enjoyment	138	73 (53%)	65 (47%)	.37
Relating to others	79	28 (35%)	51 (65%)	.01
Around the community	79	33 (42%)	46 (58%)	.15
Life planning	43	21 (49%)	22 (51%)	.93

**shaded row denotes significant between-group difference*

Occupational characteristics. The IA group had higher rankings in the *Others' view* and *Challenge* dimensions, compared to the HC group (Table 5.10). We then ran ANCOVA analyses to control for age, sex, and baseline PCS to explore between-group differences. Analyses were controlled for these three variables because theoretically, it makes sense that age and sex influence occupational choice, and physical health (PCS) was statistically significantly different between groups (in T1 and T2). After controlling for PCS, sex, age, *Other's View* remained significantly different between groups, and *Challenge* remained significantly different after adjusting for age. We completed ANCOVA analyses on the other dimensions that did not show significant between-group differences, and they remained non-significant after adjusting for PCS, age, and sex.

Table 5.10
Project Dimensions by IA and HC groups, During COVID-19

Project dimensions	IA		HC		Mean difference	95% CI Mean Difference		t	p
	Mean	*SD*	*Mean*	*SD*		*Lower*	*Upper*		
Others' view	6.10	1.69	4.78	1.98	-1.32	-2.28	-.37	-2.78	.01
Challenge	5.86	2.00	4.88	1.69	-.98	-1.95	-.01	-2.03	.05
Positive impact	8.00	2.05	6.82	2.62	-1.18	-2.43	.07	-1.89	.06
Time adequacy	7.04	1.61	6.34	1.82	-.71	-1.60	.19	-1.59	.12
Value congruency	7.93	1.26	7.40	1.34	-.53	-1.20	.14	-1.58	.12
Creative	5.35	1.65	4.65	2.04	-.70	-1.65	.25	-1.47	.15
Absorption	6.97	1.27	6.38	2.16	-.59	-1.52	.34	-1.26	.21
Initiation	7.29	1.77	6.65	2.26	-.64	-1.69	.42	-1.21	.23
Difficulty	4.97	2.46	4.29	1.87	-.68	-1.81	.45	-1.20	.24
Outcome	7.83	1.62	7.34	2.02	-.48	-1.43	.47	-1.02	.31
Stress	3.77	2.22	3.33	1.43	-.44	-1.41	.52	-.92	.36
Identity	6.55	1.85	6.17	2.11	-.38	-1.40	.65	-.74	.46
Visibility	6.17	1.79	5.83	1.94	-.34	-1.31	.62	-.71	.48
Progress	5.66	2.02	5.36	1.67	-.29	-1.25	.66	-.62	.54
Enjoyment	6.66	1.73	6.45	1.56	-.22	-1.06	.62	-.52	.61
Negative impact	1.32	1.34	1.14	1.24	-.17	-.86	.51	-.52	.61
Social	3.72	1.73	3.51	1.77	-.21	-1.10	.68	-.47	.64
Control	7.40	1.64	7.47	1.72	.07	-.79	.94	.17	.86
Importance	7.55	1.29	7.52	1.25	-.03	-.68	.62	-.09	.93

* *shaded rows denote statistically significantly between-group differences in dimensions*

Health and well-being. During COVID-19, there were no significant between-group differences in the health and well-being measures, except for PCS which was higher in the HC group (Table 5.11). For each measure, we then controlled for age, sex, baseline PCS, as well as the respective baseline measure. We found no significant between-group differences in the health and well-being measures, including PCS (which was controlled for age, sex, and baseline PCS).

Table 5.11

Unadjusted Between-group (IA vs. HC) Differences in Health and Well-being Measures, During COVID-19

Measures	IA (n = 34)		HC (n = 37)		Mean difference	95% CI Mean Diff		t	p
	Mean	*SD*	*Mean*	*SD*		*Lower*	*Upper*		
OBQ	19.12	5.80	20.05	5.17	.94	-1.66	3.54	.72	.48
PSS	19.94	12.85	21.41	12.71	1.46	-4.59	7.52	.48	.63
SWLS	21.82	8.36	23.00	6.92	1.18	-2.45	4.80	.65	.52
MCS	46.13	10.63	43.28	9.14	-2.85	-7.54	1.83	-1.22	.23
PCS	40.71	12.76	52.89	7.00	12.18	7.36	17.00	5.04	< .001

**shaded row denotes significant between-group difference*

OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Table 5.12

Adjusted Means in Health and Well-being Measures by Groups, During COVID-19

Measures	IA group (n = 34)				HC group (n = 37)				F	p
	Adjusted mean*	Std. Error	95% Confidence Interval		Adjusted mean*	Std. Error	95% Confidence Interval			
			Lower	Upper			Lower	Upper		
OBQ	19.81	.80	18.22	21.40	19.42	.75	17.91	20.92	.10	.75
PSS	17.74	2.09	13.58	21.91	23.43	1.98	19.48	23.37	3.09	.08
SWLS	22.44	.98	20.49	24.39	22.43	.93	20.59	24.28	.00	.99
MCS	45.57	1.61	42.35	48.78	49.80	1.53	40.75	46.85	.50	.48
PCS	46.63	1.46	43.71	49.55	47.46	1.39	44.69	50.23	.13	.72

**Adjusted for age, sex, baseline PCS, and the baseline for each measure; PCS was adjusted only for age, sex, and baseline PCS*

OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Post-hoc analyses

It is possible that the above results are not specific to the COVID-19 pandemic. In other words, our between-group and between-timepoint differences in occupational balance, perceived stress, life satisfaction, mental health, and physical health may be due to natural changes in general. To determine this, we would need to conduct the same analyses but using non-pandemic timepoints.

To determine if the above results in self-reported measures are specific to the pandemic, we repeated the analyses for self-reported health measures between baseline and follow-up assessments of T1, two timepoints prior to the pandemic. These two timepoints will be referred to as T1a (baseline) and T1b (follow-up). The time lapse between T1a and T1b assessments (mean = 12 months, range 11-13 months) was within the range of preCOVID-19 and COVID-19 assessments (mean = 5 months, range 2-18 months). There were T1a and T1b data for 48 participants: 25 in the HC group, 23 in the IA group; 13 males and 35 females.

Only OBQ was significantly higher during T1a compared to T1b, in the overall sample (Table 5.13) and for the HC group (Table 5.14). In the IA group, only PCS was significantly higher during T1b (Table 5.15). Chapters 3 and 4 showed that both PCS and OBQ scores were higher in the HC group compared to the IA group during T1a (between-group differences within a given timepoint). Similarly, analyses of T1a (baseline of 143 participants) showed no statistically significant differences in PSS between the IA and HC groups ($p = .08$).

Table 5.13

Well-being Measures between T1a and T1b, Overall Sample (n = 48)

Measures	**T1a**		**T1b**		**Mean difference**	**95% CI mean difference**		**t**	**p**
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
OBQ	18.51	7.79	16.63	7.32	1.88	.21	3.55	2.27	.03
PSS	13.77	6.16	13.82	6.21	-.04	-1.60	1.51	-.06	.96
SWLS	22.96	7.82	22.69	7.74	-.27	-1.65	1.11	-.40	.69
MCS	49.28	10.45	48.54	7.24	-.74	-2.98	1.49	-.67	.51
PCS	46.80	12.48	48.04	11.08	1.25	-.62	3.11	-1.35	.18

shaded row denote statistically significant difference between timepoints*; **OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Table 5.14

Well-being Measures between T1a and T1b, HC Group (n = 25)

Measures	**T1a**		**T1b**		**Mean difference**	**95% CI mean difference**		**t**	**p**
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
OBQ	20.88	7.71	17.60	7.01	-3.28	-5.71	.85	-2.78	.01
PSS	13.48	6.11	13.68	5.86	-.20	-2.56	2.16	-.18	.86
SWLS	23.84	7.47	22.92	8.07	-.92	-2.70	.86	-1.06	.30
MCS	50.27	10.48	48.89	6.63	-1.38	-4.80	2.04	-.83	.41
PCS	54.16	7.23	53.14	8.21	-1.02	-3.02	.97	-1.06	.30

shaded row denote statistically significant difference between timepoints*; **OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Table 5.15

Well-being Measures between T1a and T1b, IA Group (n = 23)

Measures	**T1a**		**T1b**		**Mean difference**	**95% CI mean difference**		**t**	**p**
	Mean	***SD***	***Mean***	***SD***		***Lower***	***Upper***		
OBQ	15.93	7.16	15.57	7.60	-.36	2.64	1.92	-.33	.75
PSS	14.09	6.33	13.96	6.70	-.13	-2.05	2.30	.12	.91
SWLS	22.00	8.25	22.43	7.54	.43	-1.80	2.67	.40	.69
MCS	48.20	10.54	48.15	7.97	-.05	-3.14	3.04	-.03	.97
PCS	38.79	12.12	42.51	11.29	3.72	-6.79	-.64	-2.51	.02

shaded row denote statistically significant difference between timepoints*; **OBQ: Occupational Balance Questionnaire, **PSS**: Perceived Stress Scale, **SWLS**: Satisfaction with Life Scale, **MCS**: Mental Component Score (from SF-36), **PCS**: Physical Component Score (from SF-36)

Discussion

In this study, we explored how people's occupations, occupational balance, and self-reported health measures differed during COVID-19 compared to a preCOVID-19 baseline, and between IA vs. HC groups during the pandemic. Between timepoints: We found two new clusters of occupations in which participants engaged during the pandemic (*Community news* and *Pandemic*-related occupations). We also found that the HC group had statistically significantly differences in nine occupational characteristics between timepoints, and the IA group had statistically significant differences in 10 occupational characteristics. The HC group reported greater stress and occupational balance scores as well as decreased mental health during the pandemic, while the IA group reported only reported greater stress and occupational balance. Between groups, during COVID-19: We found no differences in occupational categories between groups, except for *Relating to others*, where the HC group reported more occupations in this category than did the IA group. Only two occupational characteristics differed between groups (*Others' view* and *Challenge)*, which may be due to chance given the large number (19) of characteristics we were analyzing. We found that only PCS differed between groups during COVID-19, but this did not remain statistically significantly different after controlling for covariates. Below, I discuss each of the main findings.

Occupational types and characteristics

At the time questionnaires were distributed during COVID-19, participants had experienced more than a month of the strictest "stay-at-home" health advisories in BC (Phase 1) – enough time to experience some effects and prior to any easing of restrictions. During COVID-19, participants continued to engage in *Health*-related occupations most and *Life planning* occupations least; the pandemic did not change the rank order of these two categories compared to baseline. Perhaps participants wanted to stay as healthy as possible regardless of COVID-19 restrictions. However, examining the specific occupations categorized under *Health*, there is less variety compared to preCOVID-19. For example, people engaged in many different types of exercise preCOVID-19 (e.g., dance, boxing, curling; see Chapter 2) whereas exercise done during COVID-

19 consist primarily of running, walking, and biking. This finding is consistent with the closure of gyms and clubs during Phase 1 of the pandemic response, and reflects how public health measures impacted the range of occupations people engage in.

Not surprisingly, the category *Around the home* moved up in rank and people engaged in these occupations more so than *Leisure and enjoyment* occupations. Spending more time at home provided more opportunity to focus on home improvements and household chores. A new occupational category was apparent during COVID-19, *Community news,* because participants reported activities to keep updated on COVID-19 news. Additionally, we found more altruistic types of occupations under *Tend and befriend (nurturing and helping friends and family).* PreCOVID-19 occupations listed in this sub-category were mainly about helping family and friends, while during COVID-19, many of the listed occupations were about helping the wider community (e.g., foodbank donations, helping neighbours and seniors).

People stopped engaging in several occupations during COVID-19. There were no occupations under *Shopping, Clubs,* and *Starting/ending romantic relationships*. The temporary loss of these occupations demonstrates wide-reaching implications of the public health advisory of "staying at home as much as possible" during Phase 1. *Travel*-related occupations decreased and those listed during COVID-19 centred around trip planning post-pandemic.

The decreases in occupations summarized above suggest how pandemic restrictions may contribute to **occupational deprivation**. Most research on occupational deprivation draws upon the experiences of refugees and immigrants (e.g., Darawsheh, 2019; Morville & Erlandsson, 2013; Mpofu & Hocking, 2013). Events out of people's control (e.g., needing to flee a war-torn country and seeking asylum; experiencing a pandemic) can lead to major changes, or discontinuation, in one's occupational repertoire. Asylum seekers in a Danish asylum centre spoke about the difficulty in filling time with meaningful occupations and the distress that comes with feeling uncertain of the future (Morville & Erlandsson, 2013). People describing occupational restrictions during COVID-19 may experience occupational deprivation to a certain extent; a loss of roles and habits is associated with decreased health and well-being (Burchett & Matheson, 2010; Mpofu & Hocking, 2013). Our health measures will be discussed in a later section.

Social occupations

Both IA and HC groups listed occupations that were rated as less *Social* (PPA project dimension; occupational characteristic) during COVID-19 compared to preCOVID-19. In fact, most differences in occupational characteristics were less than 1 point, except for *Social* which was greater than 1 point when comparing between timepoints for both groups. This finding makes sense given the physical distancing and stay-at-home restrictions. However, the decrease in social occupations may be more pronounced for the IA group. Indeed, between-group analyses of occupational categories revealed that people with IA reported fewer projects categorized as *Relating to others* compared to the HC group. Due to their immunocompromised status, people with IA may be more fearful in contracting the virus and stay away from others. Worries related to contracting the coronavirus exist in the general population (Lin, 2020) and these fears may be heightened among people with IA and reduce occupations done with others. Yet, many of the occupations listed in this category (*Relating to others*) were virtual, such as "staying connected with friends online". People with IA may focus more on coping and maintaining their health (physical, mental, and/or emotional health) during COVID-19 and have less time and energy to engage with other people, virtually or otherwise. There may be other reasons why people with IA reported fewer social occupations and future studies are needed to identify these reasons.

Social types of occupations are health promoting (Huxhold et al., 2014), and it is possible that such occupations may be even more important for people with arthritis. Engaging in social activities with friends were found to increase positive affect and life satisfaction as well as decreasing negative affect in older adults (Huxhold et al., 2014). Social interactions with close others were associated with lower levels of inflammatory markers in a sample of healthy adults (Bajaj et al., 2016). Conversely, feelings of loneliness and social isolation were positively correlated with poorer health (Coyle & Dugan, 2012; Gerst-Emerson & Jayawardhana, 2015; Jessen et al., 2018). Recent recognition of the benefits of social occupations led to increased exploration of "social prescriptions" from physicians in Canada (Mercer, 2018). However, social prescription is not an entirely new concept to occupational therapists (Backman, 2019) who can use their client-centred, occupational analysis to recommend appropriate social occupations for clients. A cross-sectional study with 1210 IA patients in England found frequent reports of feeling lonely and socially isolated (Dures et al., 2017). Add on the stress and anxiety of potentially contracting COVID-19, along with a decrease in social occupations, loneliness and decreased well-being may then be further exacerbated in this population. In light of our study findings, health professionals (occupational therapists, in particular) need to find creative and effective ways during COVID-19 to support people with IA to engage in social occupations as a way of maintaining health.

Occupational balance and well-being

During the COVID-19 pandemic, it was widely expected that staying at home could affect health and well-being; in fact, the Provincial Health Officer frequently advised people to go outside daily, while physical distancing, as a step to maintain health (CBC, 2020 April 29). Unexpectedly, in light of activity disruptions, our participants' occupational balance increased during COVID-19 compared to preCOVID-19, by almost half a standard deviation. Possibly, staying at home allowed for engagement in occupations for which participants may previously not had time for, even if some valued activities ceased or decreased. We found that the occupational characteristic, *Time adequacy*, was higher during COVID-19 compared to pre-pandemic for both groups, indicating that participants were not pressed for time for the group of 10 occupations they rated during the pandemic. Fewer social obligations and other expectations (e.g., work commute) may have offered more discretionary time to engage in occupations that people valued yet had little time for during 'normal' circumstances. Taking a 'pause' from a faster-paced life, doing things slower, or going on less social outings may have contributed to improved perceived balance of occupations (occupational balance). Yet, this finding contrasts with reports of increased burdens at home during the pandemic, such as parents working from home while caring for young children (Craig & Churchill, 2020). Findings could simply be an artifact specific to this sample's experience. While our sample included, but was not exclusive to, parents with children, the mean age of our participants (53 years) suggests fewer childcare duties. Fewer concurrent childcare and work demands would impact occupational balance, but this remains to be tested in future studies.

In contrast to occupational balance, subjective mental health decreased for our overall sample, as measured by the SF-36 MCS summary score. This decrease of 2.6 is lower than the minimal clinically important difference (Coteur et al., 2009). Given the numerous stressors of this pandemic (e.g., social isolation, unemployment, home-schooling children, and uncertainties about the future; Saxena & Gautam, 2020), it is not surprising that participants' stress scores also increased during COVID-19, compared to pre-pandemic. The pandemic and its stressors have led to mental health challenges for people living in Italy and China (Mazza et al., 2020; Qiu et al., 2020), and similar findings may be expected to be reported in other countries. Overall, it is possible that our sample was more worried and stressed during the current pandemic, yet had more discretionary time to engage in a better balance of occupations.

It was interesting to observe different trends in the two groups (IA vs. HC), because these trends can generate hypotheses for future research. For example, sub-group analyses showed that the significant decline in mental health scores occurred only for the HC group (within-group difference). We also observed a trend where the mental health scores of the IA group were higher compared to the HC group (between-group difference), although this difference was not statistically significant. These findings are interesting in part because the IA group reported fewer social occupations, as seen in the between-group analyses in occupational categories (*Relating to others*). Previous literature demonstrates a link between social activities and increased well-being (Huxhold et al., 2014); therefore, decreased social occupations would be expected to be concomitant with lower mental health scores but this was not the case with the present IA sample. However, our IA sample may not be representative of the wider IA population since they may possess some of the socioeconomic factors (e.g., education level, race) that can protect and buffer them from mental health decline.

Resiliency

The IA group may be exhibiting greater resilience or robust coping during COVID-19 disruptions than the HC group. Prior experience with social isolation due to disease status or taking medications that suppress their immune system may develop unique coping skills for people with IA. Fluctuating symptoms such as fatigue, joint stiffness, and pain require people with IA to be flexible with their daily activities (Shaw et al., 2020). In a recent study similar to ours, 316 participants with lupus (a type of IA) experienced increased mental and emotional well-being during COVID-19, leading the authors to hypothesize that lupus patients were accustomed to the limitations imposed by the pandemic (e.g., isolation, anxiety, decreased activity) (Lim et al., 2020). People with arthritis are familiar with adapting to disrupted activities (Leino et al., 2015) and decreased social interactions, and thus have a repertoire of coping strategies from which to choose (Grønning et al., 2011; Ottenvall Hammar & Håkansson, 2013). Consequently, the IA group may have learned to adapt in the face of challenges and restrictions similar to those imposed by COVID-19.

Resiliency may also be why stress increased but mental health did not change in the IA group. Perhaps stress was an acute perception that was experienced in the face of the first phase of the pandemic, but the IA group drew from their coping strategies so that stress did not affect their overall mental health. These findings may also be applicable to other chronic disease groups that require ongoing self-care management strategies which may prove useful during challenging times like pandemic lockdowns. Future research using a longer follow-up time would be useful to explore how stress and mental health scores differ or converge over the long term during the pandemic. Considering the impact on mental health stemming from the pandemic (Mazza et al., 2020; Qiu et al., 2020), it is crucial to understand the protective and risk factors of mental health deterioration over time.

Examining the data between T1a and T1b reinforces the message that the IA group may be more resilient during COVID-19. Overall, the trends found in our COVID-19 results were not replicated during the preCOVID-19 period (T1a vs. T1b), which confirms that our findings are at least partially COVID-19-specific. During preCOVID-19, occupational balance decreased after a year in the HC group – perhaps people became busier over time. This trend reversed during COVID-19 (i.e., occupational balance increased). In addition, mental health did not differ between T1a and T1b in both the HC and IA groups, whereas it significantly decreased during COVID-19 only in the HC group. Finally, during preCOVID-19, the IA group had lower occupational balance compared to the HC group, but this gap closed such that there was no between-group difference in occupational balance during COVID-19.

Strengths and limitations

This study is unique because it examines occupations, occupational balance, and well-being during a global pandemic when people were required to physically distant or self-isolate from others to prevent the spread of a highly contagious disease. Specifically, we explored occupations, occupational balance, and well-being in the IA and HC groups during this time. In addition, we were able to collect baseline data prior to the pandemic.

The timing of our COVID-19 survey is noteworthy. Participants completed COVID-19 surveys all during Phase 1, so findings are specific during the strictest 'stay-at-home' health advisories in BC. Being able to compare these items between timepoints allowed for a better understanding on how the COVID-19 period affected occupations and well-being. We were also able to capture these measures 'in real time' for both timepoints, meaning that there was no recall bias. The measures used in this analysis were selected for a different study purpose, yet the opportunity to draw upon preCOVID-19 assessments is a strength for studying the pandemic impact.

To date, this is the first study to explore occupational balance among people with IA during COVID-19. While another study (González-Bernal et al., 2020) also measured occupational balance using the same tool (Occupational Balance Questionnaire) during COVID-19, they used a general population group whereas we included both an IA and HC group, which offers additional information on the impact of IA on occupational balance during the pandemic.

Our findings are limited to the experiences of adults with similar characteristics (e.g., white, university educated, urban dwelling in BC). COVID-19 disproportionately affects ethnic minorities (Kirby, 2020); although the reported effects are proximal (e.g., contracting the virus, deaths), it is possible that these effects are manifested distally as well (e.g., more mental health challenges). Results may differ with larger, more diverse and representative samples; from other geographical areas; or with different demographic traits.

Our well-being results reflect how our sample may not be representative of the general and IA populations. For both timepoints, the IA and HC groups reported higher mean occupational balance scores than a prior study of Swedish women aged 30-55 (Magnusson et al., 2020). It is possible that because Magnusson et al.'s (2020) participants were younger and likely had different responsibilities (e.g., childcare, work, family chores) that life stage explains in the higher occupational balance scores in our study. As discussed in Chapter 3, both our HC and IA groups reported higher PCS scores; therefore, our sample is healthier (at least physically) and not representative of the general and IA population.

Future directions

Our study examined people's overall perception of their occupations and well-being prior to and during the first phase of COVID-19. It would be useful to explore people's occupations, occupational balance, and well-being throughout and after the pandemic, and how quickly they may or may not return to preCOVID-19 levels to plan for recovery interventions. Even though pandemic measures (e.g., physical distancing restrictions and home confinement) meant disruptions to people's typical occupations, little research has yet to be shared on occupations during the COVID-19 pandemic (Kamalakannan & Chakroborty, 2020). The large-scale disruption to daily activities apparent during a pandemic may influence mental health and have a long recovery period (Mihashi et al., 2009), and occupation-based research is needed to develop interventions to support mental health during and after COVID-19, as well as preparing for similar health challenges in future public health emergencies.

Future studies should examine the sociodemographic factors that contribute to occupational balance. Even though our study's IA group demonstrated greater occupational balance than the HC group, it may be that the IA group is not representative of most 'vulnerable' populations. While they did not measure occupational balance, emerging studies show that other vulnerable populations with medical comorbidities are being negatively affected by COVID-19 (Mehta et al., 2020; Richardson et al., 2020). There may be factors inherent in our IA group that makes them unique and predispose them to better occupational balance. A survey of 3261 adults in Spain identified four variables to be associated with greater occupational balance during the COVID-19 pandemic: older age, not telecommuting for work, not being infected with the coronavirus, and the perception of receiving enough information about coronavirus infection (González-Bernal et al., 2020). Examining sociodemographic factors would help elucidate the variables that contribute to occupational balance, which can then inform interventions targeting occupational balance. Finally, we had a small convenient sample. Future studies should use larger samples and interaction effects to explore the magnitude of difference in occupational balance between groups. Doing so would further knowledge on the effects of occupational balance to promote health in the IA population.

Future studies may explore how people with other chronic health conditions compare to the general population during the pandemic, in terms of occupations and well-being. As mentioned above, other vulnerable populations are negatively impacted by the pandemic (Mehta et al., 2020; Richardson et al., 2020); yet our results with an IA group do not reflect this finding. In fact, our results point to the resiliency of our sample in coping with the pandemic. Future studies could therefore include people who have conditions that also present fluctuating symptoms (e.g., multiple sclerosis) and/or immune-compromised status (e.g., patients with cancer). Perhaps there are certain groups who demonstrate greater resiliency despite their health status. This would require the addition of a measure of resiliency. In a cross-sectional study of 298 participants with RA, resiliency (as measured by the Ego-Resiliency Scale) was found to be a partial mediator between disease activity and mental health (Liu et al., 2017). Including a resiliency measure may identify people most vulnerable to poorer health outcomes.

Conclusion

The mental health challenges stemming from COVID-19 isolation and occupational changes have been informally coined as the secondary and "silent epidemic" (Cowie & Myers, 2021, p. 66). Our overall sample engaged in fewer social occupations during COVID-19, and between-group analyses showed that the IA group engaged in fewer social occupations compared to the HC group. Occupational balance increased for our participants, yet stress also increased. Mental health scores decreased only in the HC group. While literature shows that social occupations are positively correlated with well-being, the IA group did not report decreased mental health even though they decreased engagement in social occupations. It may be that the IA group regularly engage in coping strategies that allow them to retain mental health. However, this speculation requires further study and confirmation. Overall, COVID-19 restrictions can negatively impact mental health, yet there may be lessons drawn from people with chronic illness on adapting and coping in the face of uncertainty in daily life.

Chapter 6: Discussion, synthesis, and future directions

Overview

Inflammatory arthritis (IA) symptoms can negatively impact one's ability to engage in various occupations. Given that the onset of IA is usually in young adult years (Eriksson et al., 2013; McLaughlin & Ostör, 2014; Sullivan et al., 1975), this group of people are juggling different roles (e.g., worker, parent, partner) with many obligatory occupations accompanying these roles. There is a demand within this population for self-management strategies (Gong et al., 2013) that provide guidance on how lifestyle or everyday activities can promote health. Because most 'healthy lifestyle' or activity recommendations focus on physical activities (Gewurtz et al., 2016), there is a paucity of research on how other forms of occupations can promote health.

The overall aim of my dissertation was to explore the relationship between everyday occupations and health in adults with and without IA (healthy comparison [HC] group). To achieve this aim, I explored the occupations and occupational characteristics of the two groups (Chapter 2); the relationship between occupation and health (Chapter 3); the relationship between occupational balance and health (Chapter 4); and finally, how occupations and well-being changed during the COVID-19 pandemic and how they differed between groups (Chapter 5). The research contained in Chapters 2-5 reflect my effort to contribute to current knowledge concerning the relationship between occupation and health.

In this final chapter, I synthesize overall findings along with potential implications of the research, which includes the significance, contribution, and applications. Finally, future research directions will be noted, as well as personal reflections.

Overall analysis

Occupations and occupational characteristics

In Chapter 2, we grouped participants' occupations into six major categories: *Holistic health*, *Leisure and enjoyment*, *Around the home*, *Relating to others*, *Around the community*, and *Life planning*. Given that people with IA experience joint pain, stiffness, and fatigue, it was expected that these symptoms could alter this group's occupations and be different from the occupations of the healthy comparison (HC) group. Yet, we found no between-group differences (IA vs. HC groups) in frequency counts for these occupational categories: participants across the two groups engaged in similar distribution of occupational type. Both groups also rated their set of occupations as important, congruent with their values, and likely to result in a positive outcome. It may be that certain occupational characteristics and the six occupational categories that we identified are somewhat universal in nature, regardless of diagnosis. Occupation is a basic human need (Polatajko et al., 2007) and perhaps occupations are similar across the continuum of abilities and disabilities. Since the categorical analysis only addressed how occupations are labeled and not how they are performed, any such differences due to IA and associated symptoms were not captured in this stage of the Personal Projects Analysis (PPA).

Implications: These findings contribute to the field of occupational science and arthritis. To our knowledge, there have been only two other studies (Brooke et al., 2007; Poulsen et al., 2011) that explored the personal projects (occupational categories) of people with specific health conditions — multiple sclerosis and boys with developmental coordination disorder, respectively. By conducting an in-depth exploration on occupations of people with inflammatory arthritis, we provided new, preliminary insights on the nature of occupations among people with IA. However, replication studies are needed to further substantiate findings and interpretation.

Despite similarities in occupations between the groups, the IA group ranked their set of occupations higher in *Creative* and *Absorbing* compared to the HC group (Chapter 2). It is possible that IA participants intentionally select *Creative* and *Absorbing* occupations to distract themselves from pain (Ahlstrand et al., 2012) or other symptoms common to IA. Previous research has shown that enjoyable leisure activities lessen arthritis symptoms and improve well-being (Greysen et al., 2017; Pradhan et al., 2007; Zangi et al, 2012). However, in Chapter 3, *Creative* occupations did not contribute any additional variance in health measures beyond the strongest predictor variables in either group. Because participants provided dimension rankings (e.g., *Creative* dimension) on a set of 10 projects that they had previously listed, if a participant did not list other creative occupations in the first elicitation phase, then we would not be able to capture data on these other potentially creative occupations. Also, some information specific to creative occupations was lost in the average ratings. Different tools or research designs that examine only creative occupations may lead to different findings. Future research could also explore why the IA group rated their occupations higher in *Creative* and *Absorbing*; qualitative study approaches may be appropriate for such research questions.

One of the occupational characteristics, *Others' view*, was different between groups during preCOVID-19 (Chapter 2) and COVID-19 (Chapter 5) periods. Specifically, the IA group rated their occupations as being seen as important by those within their social circle more so than the HC group. The stability of this finding across timepoints reinforces the possibility that the IA group engages in occupations they believe to be important to others as a way to prioritize occupations or feel 'normal' through their occupations (Grønning et al., 2011), as discussed in Chapter 2. Health professionals should discuss this possibility with IA patients. For example, when coaching on self-management strategies such as preserving energy (planning, pacing occupations), health professionals can enquire about reasons underlying routines and occupations, e.g., do patients engage in obligatory occupations from the perspective of their social sphere at the cost of occupations that are personally meaningful and important? While it may be important for some people to engage in occupations that are valued by others, these occupations should not be at odds with the patients' personal priorities or occupational identity.

Given that IA leads to physical limitations, a key difference between the IA and HC groups was physical health (PCS) scores. In the analyses, it is interesting to consider similarities and differences among the variables most strongly associated with physical health. There were several predictors of PCS for the HC group, of which age explained the greatest amount of variance in physical health (17%), with 3 to 6% explained by each of *Importance*, *Progress*, *Enjoyment*, *Others' view*, and *Identity* (total variance explained was 37%). In the IA group, only 14% of the variance in physical health was explained by the variables in the study, 7% each by *Others' view* and *Positive impact*. Why would the same set of candidate variables explain over one-third of the variance in physical health for the HC group, yet only 14% of the variance in physical health for participants with arthritis? Examining the concept of occupational balance may contribute to better understanding the relationship between occupation and physical health. Occupational balance explained 17% of the variance in physical health for IA group but was not associated with physical health in the HC group (interaction effect). Occupational balance was lower in the IA group than HC group, but the difference was non-significant after controlling for physical health. The present study design did not allow for assessing the direction of association between occupational balance and physical health, but our findings suggest that a deeper inquiry into this association may be worthwhile for discovering ways that occupation could be applied in practice to improve health outcomes for people with arthritis. Overall, there appears a relationship between IA diagnosis, occupational balance, and physical health that needs to be explored in further studies.

The occupational characteristic *Stress* (chapter 3) and occupational balance (chapter 4) were both associated with mental health, with the former being an inverse relationship. The stress attributed to occupations, and one's sense of a satisfying amount and mix of occupations, are overlapping concepts. Specifically, both concepts are based on one's perceptions and experiences. These findings substantiate the claim that subjective experiences of occupations are important to overall well-being, which is a key concept in the Do-Live-Well framework (Moll et al., 2015).

Implications: The Do-Live-Well (DLW) model illustrates how occupational experiences and patterns influence health and well-being (Moll et al., 2015). This dissertation contributes empirical evidence to propositions in the DLW model by demonstrating how different occupational characteristics (roughly equivalent to *dimensions of experience* in DLW) are associated with physical health, and that this relationship is influenced by health conditions, symptoms, and other personal factors. Our findings reinforce the need to take into account personal factors such as diagnosis and associated functional limitations in the relationship between occupation and health. However, there may be certain aspects of this relationship that are common across conditions. For example, we found that occupational balance (a parallel to *activity patterns* in Do-Live-Well) contributed to mental health more than diagnosis (Chapter 4). Further research is needed to build upon our results and test the assumptions of Do-Live-Well.

Implications: To increase public awareness on how occupation can promote health and well-being, there have been previous efforts among the Canadian Association of Occupational Therapists and Canadian researchers to work towards a National Activity Guide (Moll et al., 2012), with the goal of highlighting the “health benefits of participation in the occupations of daily life” (p. 1). While the Do-Live-Well framework (Moll et al., 2015) formalized that early initiative, the goal of creating a national guide has not yet been fully realized. The profession of occupational therapy should continue guiding efforts to substantiate the link between occupation and health (Pizzi & Richards, 2017).

Creating a national activity guide from an occupational perspective remains a worthy pursuit, using the DLW as a foundational framework. Findings from this dissertation along with future research that builds upon work to date can also contribute to creating this guide. It is important to incorporate the perspectives of individuals with a chronic illness in a national activity guide (Moll et al., 2012), because 44% of the Canadian population is living with at least one chronic condition (Public Health Agency of Canada, 2019). Indeed, findings from this dissertation demonstrate that diagnosis is an important factor in the relationship between occupation and health; as such, our findings support the notion that general public health recommendations need to consider the various health issues that people experience. In other words, tailored activity guidelines are needed that take into account people’s specific health conditions to effectively promote health.

Occupations and telomere length

We did not find any TL differences between groups; nor did we find any associations between telomere length (TL) and occupational characteristics or occupational balance. The lack of between-group difference was surprising given previous research to date (Barkovskaya et al., 2017; Lee et al., 2018; Steer et al., 2007); yet, age and sex explained 37% of the variance in TL (Chapter 3) which is consistent with previous research (Rode et al., 2015). There may be other pathways through which occupations impact health and well-being. Research using TL as a biomarker is still relatively new, and variables that influence TL are not conclusive. While this dissertation accounted for many covariates, it may not have captured all confounders that influence telomere length.

Telomere results may have differed with a larger sample, selected using systematic or random sampling. Similarly, while our method of TL analysis has good reliability (Hsieh et al., 2016), perhaps using a more accurate method like the flow-FISH (Aubert et al., 2012; Canela et al., 2007) would provide different results. While the null findings were disappointing, there is still a rationale for future study involving telomeres as a marker of the biological impact of occupations in daily life.

Hernandez et al.'s framework (2020) describes how an imbalance of stressful and restful occupations (components of lifestyle balance) can lead to physiological activation and allostatic load, resulting in poor health. Physiological activation in their framework includes: hypothalamic-pituitary-adrenal axis activation, hormonal (e.g., cortisol, epinephrine) release, and enhanced sympathetic tone. While Hernandez et al. (2020) did not specifically mention telomere length shortening as part of physiological activation, cortisol responses to stressors are associated with shorter telomeres (Tomiyama et al., 2012). Therefore, there is a potential relationship between an imbalance of stressful and restful occupations with TL, despite the current finding of no relationship between occupational balance and TL. Longitudinal studies may be more appropriate in assessing stressful and restful occupations for examining how occupational balance may be associated with TL.

Implications: There are pathways that are not fully understood in the relationship between occupation and TL. Future studies should include a larger sample size, use a smaller age range as well as a longitudinal design. In addition, it may be worth repeating studies from Chapters 3 and

4 using other TL analysis methods. While our study did not show a relationship between occupational balance and TL, occupational balance may be associated with other biomarkers due to physiological activation and allostatic load (Hernandez et al., 2020). For example, researchers conducting future studies may study blood pressure and cortisol levels in relation to occupational balance.

Occupations, occupational balance, and well-being before and during COVID-19

The COVID-19 pandemic has led to many changes in life including home confinement and physical distancing (CBC, 2020 April 3), which required people to alter, postpone, or abandon existing plans and life courses. Even though occupational balance and stress increased for both IA and HC groups, mental health decreased only for the HC group during the pandemic, compared to preCOVID-19. A recent qualitative study explored the experiences of people with RA about their mental health, through analyzing online Reddit threads (Park et al., 2020). Park et al.'s study (2020) provides further insights on the mental health and emotional struggles that their RA sample experienced, such as feelings of loss around the activities that they used to be able to do and that their peers are able to do. While people with IA experience emotional struggles, they may also develop a more positive attitude towards life to counter these negative thoughts and feelings (Grønning et al., 2011; Ottenvall Hammar & Håkansson, 2013). Once COVID-19 occurred, it is possible that the IA group drew from their adaptation skills to cope with the stressors of the pandemic. Occupational therapists can learn from people with IA to understand different coping strategies and share them with other clients.

Occupational balance was higher in the HC group than the IA group during pre-pandemic times prior to controlling for PCS (Chapter 4), but there was no difference in occupational balance between groups during COVID-19 (Chapter 5). In her opinion piece, Hammell (2020) wrote:

> Many people accustomed to the privilege of having predictable access to a wide array of occupational choices [prior to COVID-19] were suddenly compelled to endure—albeit temporarily—the sort of deprivation of occupational opportunities habitually experienced by many millions of the world's people—people who experience a lifetime of structural barriers that constrain their opportunities and possible occupational choices. (p. 401)

People living with chronic diseases, like IA, would be included among those facing persistent structural barriers, mentioned in Hammell's reflection above. Their experience adapting to, working around, and coping with barriers may represent a unique skill set. While the within-group analyses in Chapter 5 showed that each group reported higher occupational balance during COVID-19 compared to preCOVID-19, the pandemic may have created a sort of 'leveling' field where both groups experienced similar levels of occupational restrictions due to public health physical distancing measures, for which the IA group was better prepared in their coping abilities. However, these conjectures are topics for future follow-up and research.

Age is an important factor to consider when exploring occupational balance. Previous studies show that age is associated with occupational balance (Wagman et al., 2020), although other studies did not find such an association (Wagman & Håkansson, 2014b; Yu et al., 2018). In Chapter 4, we found that there was a weak but significant relationship between age and occupational balance such that being older was associated with greater occupational balance. In addition, we found in Chapter 3 that age was related to the *Enjoyment* and *Time adequacy* occupational characteristics. Perhaps being older allows one to have more time to engage in valued and enjoyable occupations, influencing occupational balance. It is important to note that while Wagman et al.'s study (2020) found an association between age and occupational balance, they only included participants who were over 65 years of age. This association may be related to employment status (i.e., being retired) and not having to care for children; a lack of childcare and work responsibilities duties may mean more discretionary time leading to higher occupational balance. While the above studies were conducted during pre-pandemic times, they may help explain the increased occupational balance found in our sample during COVID-19 which will be discussed next.

Everyone is affected by the current pandemic; however, people juggling work along with childcare duties face unique, challenging struggles (Craig & Churchill, 2020; Hjalmsdottir & Bjarnadottir, 2020) that can negatively affect occupational balance. Literature shows that there is a complex relationship between occupational balance and caring for children. In a survey study of 1048 adults (Matuska et al., 2013), participants who had two children had greater life balance (compared to those with one, three, or no children); however, this finding only applies if those two children did not live at home. Other studies also found that having no children living at home was positively correlated with greater occupational balance (Wagman & Håkansson, 2014b; Wagman et al., 2020). A recent study that explored the factors contributing to occupational balance during COVID-19 in 3261 adults living in Spain found that occupational balance was positively correlated with the number of young children living at home (González-Bernal et al., 2020). González-Bernal et al.'s (2020) study does not align with another study that reported a greater mental and emotional load of parents struggling to maintain work duties along with caregiving responsibilities (Hjalmsdottir & Bjarnadottir, 2020). In addition, our research (Chapter 5) indicates that occupational balance increased during COVID-19. Possibly, our sample may not be juggling childcare and work duties. Because occupational balance was originally not the main focus of this dissertation, number of children was not a question asked of participants. However, as demonstrated in Chapter 5, it became clear that occupational balance is a worthy concept to study during the pandemic and that there is complicated relationship between occupational balance and children at home. There may be interesting findings stemming from future occupational balance research that stratify by different demographics (i.e., age, employment status, and childcare responsibilities).

Implications: While Chapter 5 deviated from the original dissertation plan due to COVID-19 public health restrictions affecting in-person research activities, our findings provided new knowledge on how challenging times like a pandemic can impact people's occupations and well-being. The evidence on how the pandemic is affecting people's well-being is rapidly growing; our findings contribute to this body of literature, using an occupational perspective. Building upon our study, future studies should explore the how resiliency (of people with chronic diseases) help sustain well-being during the pandemic.

Occupational choice

The assumption within occupational therapy that individuals have equal opportunities to choose occupations and hence influence their health raises critique (Hammell, 2020). There is abundant evidence that choice in occupations is largely unequal and is mainly afforded to those within privileged circles. In her paper, Hammell (2020) discusses how racism, ableism, poverty, sexism, heterosexism, homophobia, transphobia, classism, and colonialism – all shape societal structures and influence the availability of occupational choice. For example, childhood poverty is associated with restricted free play time and disruptions to schooling and socialization (Leadley & Hocking, 2017). 'Everyday racism' was also found to pervade all aspects of occupations in a study of 50 African Canadian women living in Nova Scotia (Beagan & Etowa, 2009). The overall aim of this dissertation (to explore the relationship between occupation and health) no doubt perpetuates this underlying assumption – that people are able to choose specific occupations which may or may not then be associated with better or poorer health. It is important to acknowledge and reflect upon the many power structures and systems of oppression that impact our participants' choice of occupations, and that occupational 'choice' may not, in reality, be a choice for many. Therefore, the findings from this dissertation are recognized to be limited to people with similar demographic characteristics and contexts. The sample studied was relatively healthy, on average, based on their SF-36 scores. People with lower health status as a result of structural inequities or social determinants may report not only different occupations, but also different associations between occupation and health.

Overall future directions

This dissertation advances understanding of the relationship between occupation and health in adults with and without IA. It helps explicate the impact of IA on occupation, health, occupational balance, and well-being. However, findings have generated several new questions for future research on occupation.

Future research can probe into the motivations and reasons for why the IA group do what they do. A scoping review of 18 papers covering a multitude of different health conditions found preliminary results on the relationship between volition or motivation and occupational participation (Harel-Katz & Carmeli, 2019). The researchers concluded that volition can lead to greater engagement in everyday occupations. The scoping review also identified studies that demonstrate a negative effect of a chronic disease on volition and participation. Therefore, volition is multifaceted and research specific to IA is needed to understand the reasons for what people do, and provide insights to arthritis management and interventions with the goal of health promotion.

Similarly, while there is growing literature base on occupational balance, there remains little understanding on the specific factors contributing to occupational balance. Age, stress, pain levels, IA disease activity, and caring for children are some of the variables that have recently been found to be associated with occupational balance (Wagman et al., 2020). There may be other factors that contribute to occupational balance, and future research is needed to uncover them. Developing a deeper understanding on the variables associated with occupational balance would help target interventions aimed at improving occupational balance, and ultimately promoting people's health and well-being.

The inclusion of the HC group when exploring the occupations and health of the IA group allowed for comparison between groups and identified the specific variables applicable to the IA group that were different from the HC group. Similar research is needed and can explore other disease groups and including a HC group. Would another chronic disease group (e.g., multiple sclerosis) have similar occupations as the general population? And do their experiences and perceptions of occupations, or occupational characteristics, differ from those of the general population? Would the same findings regarding the relationship between occupation and health apply to other groups? Such research would help identify whether findings from our research extend beyond the IA group.

Finally, longitudinal studies should explore how people's health and occupations changed before, during, and after the COVID-19 pandemic. To our knowledge, there is no other study that explored people's engagement in occupations during COVID-19. In addition, besides our study (Chapter 5), there is only one other study that examined the well-being of people with IA during COVID-19 (Maguire & O'Shea, 2020). Therefore, further studies are needed to better understand the occupations and well-being of people with IA compared to the general population. Such studies may substantiate our hypothesis regarding greater resilience in the IA group during COVID-19. Tracking people's mental health and occupational balance throughout the pandemic can provide knowledge on how people with IA cope during these challenging times. Studies (Montano & Acebes, 2020) and opinion pieces (Choudhari, 2020; Egede et al., 2020) suggest that other vulnerable populations have a high likelihood of being negatively affected by COVID-I9, specifically in regard to developing mental health conditions, so future research exploring other groups are also needed. Even though the IA participants in our study showed mental health resiliency in the face of COVID-19, this resiliency may not hold true for other population groups, and it is crucial to identify which groups are most at risk and to take steps to prevent mental health deterioration.

Personal reflections

This dissertation offers a deeper understanding of occupation, occupational characteristics, and occupational balance by comparing perceptions of people with and without arthritis. There are four main findings derived from this dissertation that are particularly interesting: 1) having IA does not seem to stop participants from engaging in the same types of occupations as those without IA; 2) people with IA report occupations that are rated as more creative, absorbing, and seen as important by others, and the exact reasons for this remains to be explored; 3) an overall perception of one's occupations (occupational balance) is important for well-being; and 4) there are lessons to be learned from the IA group regarding resiliency and coping. I hope that these findings are useful in furthering research in the fields of arthritis, occupational science, and occupational therapy.

I am certain that all PhD graduates have learned some important lessons throughout their training journey. Collecting blood and analyzing for telomere length was new to me, and I have learned about the extensive logistics required to include telomere length in a study. From purchasing appropriate blood collection equipment to ensuring that blood samples were properly collected, dried, stored, transported, and analyzed – the whole process required much perseverance. Even though the telomere length results are somewhat disappointing, I do feel a sense of personal achievement for stepping up to the challenge of learning ‘the ropes’ and successfully implementing the study with telomere length.

Planning for multiple in-person data collection sessions (sometimes having sessions of only one or two participants) was time consuming. Once I converted the study measures online for the COVID-19 timepoint (Chapter 5), I realized that data collection would have required much less time if we had used electronic surveys right from the beginning. During the course of my PhD, I also learned of other studies asking participants to collect their own blood spots and mailing them in for analysis. With these lessons in mind, I may have collected data electronically and asked participants to mail in their blood spots. However, through in-person sessions, I was able to ensure that participants correctly understood the instructions for completing questionnaires (especially the PPA, which required more explanation). In addition, I enjoyed hearing participants’ reflections after completing the PPA, as they gained more insights into their occupations.

In retrospect, my PhD journey was a rewarding one. It was rewarding because it came with challenges and I had learned so much from them. I am extremely grateful for Dr. Catherine Backman, who made the challenges meaningful and supported me from start to finish with her encouragement and patient feedback.

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Appendices

Appendix A: Study package (list of content)

1. Personal Projects Analysis, from Little (1983), with two project dimensions added:
    - *Creative*. "How creative do you find this project to be? Use 10 if you find it very creative, and 0 if it is not at all creative."
    - *Social*. "How social do you find this project to be? Use 10 if you find it very social/sociable with others, and 0 if it is not at all sociable."
2. SF-36 Health Survey v. 2, from Quality Metric
3. Stanford Leisure-Time Activity Categorial Item (L-CAT; Kiernan et al., 2013)
4. Questions about alcohol use, smoking, and diet
5. Pittsburgh Sleep Quality Index (1 item) (Buysse et al., 1989)
6. Satisfaction with Life Scale (Diener et al., 2013)
7. Occupational Balance Questionnaire (Wagman & Håkansson, 2014a)
8. Perceived Stress Scale (Cohen et al., 1983)
9. Rheumatoid Arthritis Disease Activity Index, for IA group only (Fransen et al., 2000)
10. Single fatigue item
11. Comorbidities and questions about health
12. Demographic descriptors (e.g., age, marital status, ethnic background, etc.)

Appendix B: COVID-19 online survey (list of content)

1. SF-36 Health Survey v. 2, from Quality Metric
2. Pittsburgh Sleep Quality Index (1 item) (Buysse et al., 1989)
3. Stanford Leisure-Time Activity Categorial Item (L-CAT; Kiernan et al., 2013)
4. Satisfaction with Life Scale (Diener et al., 2013)
5. Occupational Balance Questionnaire (Wagman & Håkansson, 2014a)
6. Perceived Stress Scale (Cohen et al., 1983)
7. Single fatigue item
8. Rheumatoid Arthritis Disease Activity Index, for IA group only (Fransen et al., 2000)
9. Personal Projects Analysis, from Little (1983), with two project dimensions added (*Social* and *Creative*)
10. Selected demographic items: employment status, job changes, height, weight, new health conditions/diagnoses since baseline, moved from BC (y/n)
11. COVID-19 related questions: (e.g., does COVID-19 impact your daily activities? (y/n; explain); physical distancing/isolating/quarantine status; living alone/with others; open-ended items)

Appendix C: Definitions of PPA project dimensions

Dimensions	Definitions
Creative	How creative do you find this project to be? *Use 10 if you consider it very creative, and 0 if it is not at all not creative.*
Social	How social do you find this project to be? *Use 10 if you consider it very social/sociable with others, and 0 if it is not at all sociable.*
Importance	How important is this project to you? *Use 10 if you consider it to be very important, and 0 if it is not at all important.*
Enjoyment	How enjoyable is this project to you? *Use 10 if you consider it to be very enjoyable, and 0 if it is not at all enjoyable.*
Value Congruency	To what extent is this project consistent with the values that guide your life? *Use 10 if this project is totally consistent with your values, and 0 if this project is totally at odds with them.*
Identity	All of us have things we do that we feel are typical or truly expressive of us. These things can be thought of as our "trademarks". For example, some people engage in sports every chance they get, others prefer to read, others prefer to socialize. Think of what your own personal "trademarks" are, and then rate this project on the extent to which it is typical of you. *Use 10 if this project is very typical of you, and 0 if it is not typical at all.*
Absorption	How engrossed or deeply involved are you when you engage in this project? *Use 10 if this project if you are very engrossed in it, and 0 if you are not at engrossed.*
Control	How much control do you have in this project? *Use 10 if you have a lot of control in this project, and 0 if you do not have any control.*
Initiation	How much do you feel you have initiated this project? *Use 10 if you have initiated this project a lot, and 0 if you do not feel you have initiated it at all.*
Time adequacy	Do you feel that the amount of time you spend working on this project is enough? *Use 10 if you feel that you have enough time for this project, and 0 if you do not have enough time for this project.*
Progress	How successful have you been in this project so far? *Use 10 to indicate that you have been very successful and 0 to indicate that you have had no success at all.*

Outcome	What do you anticipate the outcome of this project to be? *Use 10 to indicate that you think there will be a positive outcome, and 0 if you think the outcome will be poor.*
Visibility	How visible is this project to the relevant people who are close to you? *Use 10 if this project is very visible to people who are close to you, and 0 if the project is not at all visible.*
Other's view	How important is each project seen to be by relevant people who are close to you? *Use 10 if this project is thought to be very important by people who are close to you, and 0 if those people do not think is important at all.*
Stress	How stressful is it for you to carry out this project? *Use 10 if it is very stressful for you to carry out this project, and 0 if it is not at all stressful.*
Difficulty	How difficult do you find it to carry out each project? *Use 10 for a project which is extremely difficult to carry out, and 0 for one that is not difficult at all.*
Challenge	To what extent is this project viewed as challenging to you? *Use 10 to indicate that you view this project as very challenging, and 0 if you view this project as mundane or not at all challenging.*
Negative impact	How much do you feel that this project hinders or negatively impacts your other projects? *Use 10 to indicate that this project significantly hinders other projects, and 0 if this project does not hinder your other projects at all.*
Positive impact	How much do you feel that this project helps or positively impacts your other projects? *Use 10 to indicate that this project significantly helps other projects, and 0 if this project does not help your other projects at all.*