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**ACTIVITY PATTERNS AND WELL-BEING IN COMMUTERS:
AN OCCUPATIONAL PERSPECTIVE**

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**Presented to the faculty of Towson University
in partial fulfillment of the
requirements for the degree of the
Doctor of Science
in Occupational Science**

**Department of Occupational Therapy and Occupational Science
Towson University
December 2017**

TOWSON UNIVERSITY
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DISSERTATION APPROVAL PAGE

This is to certify that the dissertation prepared by Ann Greenbaum entitled "Activity Patterns and Well-being of Commuters: An Occupational Perspective" has been approved by the thesis committee as satisfactorily completing the dissertation requirements for the degree Doctor of Science in Occupational Science.

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Acknowledgments

I would like to express my gratitude to Towson University and the Department of Occupational Therapy and Occupational Science for allowing me the opportunity to complete these studies. The support I received from faculty, staff, and students was substantial and allowed me both academic and personal growth. This community has been my “home” for past few years, and continues to provide meaning and value to me through the wonderful people I have met, and the surrounding place.

My work on this project dovetailed with my interest in growing alternative transportation at the University and in the community. As a cyclist myself, I wished to see more opportunity for safe cycling and greater participation in non-motorized forms of transportation. To that end, I have worked with the American College and University President’s Climate Commitment (ACUPCC) committee at Towson University to bring cycling and walking into the vision for the Towson University community, and I would like to acknowledge the committee for providing a platform for promoting alternative transportation. Additionally, I would like to thank the Towson University Department of Student Affairs and Dr. Deb. Moriarty for partial funding of my project, and the efforts of a student assistant, Jennifer Rollman.

During my teaching career at Towson University, I was encouraged by supervisors and advisors to pursue further education, in particular Dr. Maggie Reitz, then chair of the Department of Kinesiology, and Dr. Janet Delany, and I am grateful for their personal support.

Each member of my committee provided unique and valuable insights and encouragement. Dr. Frederick Parente guided the statistics with an expert hand, affirming the value in my chosen topic, and providing alternative ways of examining the research. Dr. Jenna Yeager kept me focused on being deliberate in the research process, as well as providing encouragement and enthusiasm for sharing the final

product. Dr. Barbara Demchick provided expert guidance on both big picture and important details concerning the research and writing process. Finally, many, many thanks to Dr. Beth Merryman who graciously and tirelessly guided me through the entire dissertation process. Her expertise combined with a “can-do” approach facilitated an enjoyable and rewarding experience.

Friends and family provided moral support, tea and other beverages, laughter, stress-relieving bike rides and tennis matches, and symbolic gifts along the way. Thanks to Jeane and Cindy for their friendship and encouragement throughout, and to Jack for his perpetually positive perspective. Thanks to my children, Katie and Emma, who share my DNA, and my desire grow, learn, and improve people’s quality of life. Finally, thanks to my parents who, through their loving support, gave me opportunities and started the wheels rolling.

Activity Patterns and Well-being of Commuters: An Occupational Perspective

Ann Greenbaum

Abstract

This study explored the predictors of commuter well-being in college students using an occupational framework. While past studies focused more on the physical impact of commuting on health, there was a gap in the scholarly literature regarding the occupational aspects (the *doing*) of commuting on well-being, especially using different modes of transportation, such as by car, bike, walking, or campus shuttle. Using a mixed methods sequential design, this research examined occupational science concepts such as enjoyment, routine, control, choice, and meaningfulness experienced during commuting by various modes. The study includes surveys of over 500 students as well as focus groups of commuters.

Findings indicate that several occupational aspects accounted for 59% of the variance in a model of satisfaction with commuting, suggesting occupational aspects are significant predictors of commuter satisfaction. Further, the *doing* of commuting (activity patterns and dimensions of experience in a Do-Live-Well framework) resulted in greater satisfaction when active modes (walking or cycling) of commuting were used, compared to passive modes (car and campus shuttle). Future studies can address how attention to occupational aspects can enhance commuting experiences and promote participation in healthier and more sustainable modes.

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Chapter One

Introduction

Every day travel to and from work or school, commonly termed “commuting,” is an activity of daily living, and can influence a person’s well-being and quality of life (de Vos, Schwanen, Van Acker & Witlox, 2013; Novaco & Gonzalez, 2009; Stutzer & Frey, 2008). A daily commute that is enjoyable and relaxing can positively influence a person’s overall health and happiness, while a stressful commute can cause negative health effects (Koslowsky, 1997; Novaco & Gonzalez, 2009). Occupational scientists investigate how activities of daily living influence a person’s health and well-being. This study addresses commuting from an occupational lens, examining day-to day experiences of commuters and their perceptions of health and well-being.

Research in the fields of transportation and health indicate that commuting experiences can influence psychological as well as physical health, affecting a person’s overall well-being (Hilbrecht, Smale & Mock, 2014; Office for National Statistics (ONS), 2014; Stokols, 1981). The commuter’s experience can vary depending on the person’s socio-demographics and lifestyle (Kwasniewski et al., 2010; ONS, 2014), the social, physical and cultural environment, and how the person engages in their commute. While traveling may influence well-being through many avenues, the *doing* of the commute may significantly influence well-being.

The concept of *doing*, a term used in occupational science to describe how an individual meets personal needs through participation in occupation, is the basis of the “Do-Live-Well” framework (Moll, Gewurtz, Krupa, Law, Larivière, Levasseur, 2015). The *doing* describes how the occupation or activity is performed, and may include spiritual, social, emotional and physical aspects surrounding performance. The “Do-Live-Well” (DLW) framework therefore defines how

elements of occupation, dimensions of experience, and activity patterns influence well-being. The components of the framework describe the nature of what people do as well as how they engage in day-to-day activities. These activity patterns and dimensions of experience have been theoretically and empirically linked to health and well-being (Moll et al., 2015).

The DLW framework is used in this study to describe how characteristics of activity patterns and dimensions of experience in commuting may influence well-being. The framework was chosen because it provides a link between occupation and well-being through the *doing*, with specific focus on how the activity is experienced. For example, characteristics of activity patterns, such as routines, can be influenced by how a person travels. Driving by car can facilitate a routine of dropping off a child at daycare, driving to work, leaving work to go to the grocery store, and picking up a child. The ease or difficulty of completing the tasks efficiently and effectively exists on a continuum of less routine to more routine, which can influence a person's well-being through disruption or stability of daily patterns (Moll et al., 2015).

Another characteristic of activity patterns that can influence well-being is engagement, which is the extent to which a person is participating in, or involved in, their commute. Other examples of activity patterns and dimensions of experience explored include the meanings of the commute such as levels of enjoyment and influences on identity, and the choice or control a person has over his or her commute. The level of engagement, the meaningfulness, and the level of choice and control in a commuting experience can be indicative of a person's well-being (Moll et al., 2015). Well-being is defined here as a "state of overall contentment" or how people perceive their physical and mental health (Hammell, 2009). The DLW framework uses "flourishing" as a measure of well-being, indicating optimal health and functioning (Moll et al.,

2015). The quality of the commute, based on the “doing,” may influence, positively or negatively, a person’s health and well-being, resulting in various levels of flourishing.

A person’s well-being may also be influenced by the mode of transportation used (Besser & Dannenberg, 2005; Künn-Nelen, 2015; Litman, 2013; ONS, 2014; Paez & Whalen, 2010).

Modes of transport may vary, and can include forms such as the train, car, skateboard, bicycle, and bus, among others. Some modes are considered passive (car, bus, train, airplane), or active (walk, bike, skateboard), or may even be multi-modal (bus or train mixed with walking).

Participation in active modes can impact health directly based on the amount of physical activity during the travel, which improves cardiovascular health and fitness (Gatersleben & Uzzell, 2007; Hansson, Mattisson, Bjork, Ostergren & Jakobsson, 2011; Kunn-Nelen, 2015; Lindstrom, 2008).

Active modes have also been shown to improve psychological well-being (Humphreys, Goodman & Ogilvie, 2013; Löfgren, 2015; Martin, Goryakin & Suhrcke, 2014). Passive modes of transportation have shown both positive and negative health and well-being outcomes (LeGrain, Eluru, & El_Geneidy, 2015; Löfgren, 2015; Wener & Evans, 2011). Some modes of transportation have been evaluated based on the amount of stress they cause for the traveler, such as from traffic or time constraints (Bissell, 2014; Koslowsky, 1997; LeGrain et al., 2015).

Research indicates that traveling by various modes impacts a personal health and well-being.

Travel and commuting are daily activities that have been examined by occupational scientists (Primeau, 1996). For example, daily commuting has become a time-consuming occupation, resulting in adjustments to other domains of life. Commuting influences and is influenced by the way we organize our day through personal choices, as well as by external societal factors. Commuting therefore influences health through determining the rhythms of people’s lives, balance, and through meaning. Increasing awareness of the unhealthy aspects of

commuting has importance in public health, and it is therefore important to investigate these occupational determinants of health. What people choose to do on a daily basis, and how they do it, is the core of the field of occupational science. Further, commuting is rarely studied for the act itself, as a valued occupation, and not just as a means to an end (Primeau, 1996). Human travel behavior, especially the way we travel, has importance in both occupational science and public health. Currently there is no research which comprehensively addresses how activity patterns and dimensions of experience influence, and are influenced by, the occupation of commuting. A few studies have evaluated the health impacts of participation in various transportation modes based on various patterns of occupation of the commuter, but none have examined them within an occupational framework. This study investigated ways in which commute mode influenced well-being, by investigating the experiences of commuting across various travel modes, through an occupational science lens. It was hypothesized that well-being outcomes would be mediated by activity patterns and dimensions of experience specific to the travel mode experience.

Background

In the United States, commuting by personal automobile is the predominant form of transportation for work (U.S. Department of Transportation, 2009). A recent American Community Survey shows that the majority (86%) of workers drive alone or carpool to work while approximately 5% ride the bus or train, 3% walk, and less than 1% bicycle (U.S. Census Bureau, 2013). Rates of car transportation are similar in other industrialized countries, except where public transport is well developed (e.g., England and Wales), or where active transport (bicycling and walking) is promoted through infrastructure and policy (e.g. Scandinavian countries) (Hilbrecht et al., 2014; ONS, 2014). Rates of participation in various commuting modes in Scandinavian countries such as Denmark vary significantly from the United States. For

example, in the city of Copenhagen, rates of commuting by bicycle are 35%, while bus and train commuting are 32%, and car travel is 26% (European Commission, 2012).

It is evident that the use and distribution of transportation modes varies by country, but how this impacts population well-being is unknown. Countries that have the highest well-being survey scores include Denmark, which also has one of the lowest car commuting rates (Biswas-Diener, Vitterso & Diener, 2010; Gallup World Poll, 2014; Inglehart & Klingemann, 2000). In international surveys, Denmark consistently outranks the US on well-being measures such as life satisfaction, positive and negative affect, and work-life balance (Biswas-Diener et al., 2010; OECD, 2016). It is unclear how the commute experience affects population well-being. Investigating this question at the individual level, especially how transport mode influences a commuter's activity patterns, and how those activity patterns impact well-being, has significance for individual and population health and well-being.

Researchers have investigated how commuting influences personal well-being (Dickerson, Hole & Munford, 2014; Humphreys et al., 2013; Novaco & Gonzalez, 2009), and how it may vary by mode (Martin et al., 2014; ONS, 2014). The Office for National Statistics in the United Kingdom measured whether life satisfaction, anxiety, happiness and the value of daily activities varied by travel mode (ONS, 2014). They found that car commuters had a higher satisfaction with life and with daily activities than did bus commuters. They also found that those people who walk to work had lower life satisfaction and activity satisfaction than did car commuters. There are limited studies that have explained how the experiences and patterns of commuting contribute to satisfaction and well-being.

Travel and commuting as occupation

Human travel behavior has been studied by occupational scientists and others mainly using activity approaches, in which the activity at the destination is the purpose for travel (de Vos et al., 2013; Primeau, 1996). Travel destinations can include work and education trips (considered commuting since the trip is made regularly, timely, and daily) as well as leisure, personal business, or self-care, meeting physiological, recreational, financial, and social needs (Primeau, 1996).

The study of commuting as a form of daily travel occupation involves understanding the meanings and purposes of the commute not only as a means to an end (to get to work or to education) but also for its value as an occupation itself (deVos et al., 2013; Primeau, 1996). For people who have a choice, how and why they choose to travel a certain way may reflect belief systems, but is constrained by life responsibilities (Primeau, 1996). The *doing* of commuting is often embedded within various occupational roles. Roles such as an employee, a student, or a parent are, in turn, associated with personal responsibilities, such as work, education, or raising children. The daily commute to work or school connects home and work life, acting as a bridge between the two (Primeau, 1996; Wheatley, 2014). Therefore, commuting becomes a “fluid experience equally blended into home life and workplace and points in between” (Basmajian, 2010, p. 77). This complexity makes travel behavior a critical area for investigation of quality of life issues (Primeau, 1996). As summarized by Primeau, an individual’s “daily orchestration of work, play and self-care activities, in accordance with social and cultural expectation, results in a unique set of travel choices and constraints” (1996, p. 120). This suggests that commuting should be studied in a contextual manner, examining personal experiences in a person’s environment, in order to glean insight into how it facilitates or restricts well-being outcomes.

Problem Statement

Commuting to school or work is a significant activity of a person's daily life. Commuting can be an emotionally or physically taxing experience, or it can result in pleasant and rewarding experiences, all of which influence a person's sense of well-being. There is a need to understand how people's daily experiences of commuting influence their well-being from an individual standpoint as well as from a broader societal view. Individuals satisfied with their travel arrangements and routines have higher well-being, and are more likely to sustain their travel practices, which is of importance in sustainable modes. Further, societal policies focus on quality of life issues and well-being; transportation is often a component of these policies. Exactly how the commuting experience influences well-being has been studied through various avenues, but rarely from an occupational perspective.

Several models have been constructed to demonstrate the effects of commuting and transportation on well-being (Lee & Sener, 2016; Nie & Sousa-Poza, 2016; Smith, 2015). Some use frameworks that describes how various components of travel, such as the built environment, access to transportation, and traffic, influence the social, physical or mental dimensions of well-being (Lee & Sener, 2016). Nie and Sousa-Poza's (2016) model indicates how commute time influences other activities, such as work, sleep, social activities and caring for family, impacting well-being indirectly through time use. Smith's (2015) model comes closest to connecting the commute journey experience to well-being, connecting affect measures such as boredom, enthusiasm, enjoyment and arrival time confidence to well-being.

These models are adequate for investigating well-being and commuting interactions, but inadequate for exploring fully the occupational aspects of commuting and the *doing* of the occupation. Occupational models typically evaluate the person-environment-occupational

interactions (see Law, Cooper, Strong, Stewart, Rigby & Letts, 1996). The Person-Environment-Occupation (PEO) model, for example, has been used to evaluate the usability of buses for seniors, examining the mismatch between the personal factors (capacities and innate ability) of the user, the demands of the task, and the cultural, physical, social and institutional factors (Broome et al., 2009). However, neither occupational nor transportation models fully investigate the occupational experience of the user. The use of the occupational Do-Live-Well (DLW) model in this study allows one to investigate commuting in a comprehensive way (Moll et al., 2015). The model allows the researcher to investigate and compare how activities (in this case modes of commuting) differ from each other in terms of their daily patterns and various dimensions of the experience. For example, the framework can be used to measure the importance of choice, control and enjoyment in commuting, and results can be compared by mode. Examining the experience through an occupational framework allows for identification of the personally valued occupational aspects of the commute.

Activity patterns and dimensions of experience are characteristics of everyday occupations that “shape optimal health and well-being” (Moll et al., 2015, p. 15). Activity patterns include foundational theoretical and practical elements of occupational therapy and occupational science, such as daily routines and meaningful activity, balance, control, and engagement (Moll et al., 2015). Activity patterns relate to the nature of the experience and the way people engage in an activity. Dimensions of experience are broader categories of experiences, including connecting with others, taking care of oneself, and enjoyment (Moll et al., 2015, p. 11). Both activity patterns and dimensions of experience are empirically linked to health and well-being (Polatajko et al., 2007; Reitz, 1992). A novel method of understanding commuter well-being is through examining how the characteristics of activity patterns and dimensions of

experience are a part of the commute. Importantly, the experience of the commute and well-being may vary according to the method or mode of travel chosen. This study examined the influence of activity characteristics and experiences associated with the travel mode on satisfaction with travel and well-being.

Purpose of the Study

The purpose of the research study was three-fold. First, this investigation described and explained the dimensions of experience, activity patterns, and well-being characteristics experienced by commuters of various travel modes (walking, bicycling, campus shuttle, car, etc.) Second, this study assessed the occupational experiences of college student commuters with respect to activity patterns and dimensions of experience. The third purpose was to explain the occupational aspects of commuting through the framework of the DLW.

Significance to Occupational Science

Current categorizations of occupations vary depending on the culture. For example, categorization of occupation in the U.S. is based on the purpose of the activity, and include activities of daily living (ADLs), instrumental ADLs (I-ADLs), work, play, leisure, etc. (American Occupational Therapy Association [AOTA], 2008). Categorization of occupation in Canada and Europe includes similar purpose-defined groupings described as self-care, leisure, and productivity (Jonsson, 2008). Other occupation-based categorization schemes, from the field of occupational science, are based on time-use, such as free time, committed time, necessary time, etc. (Harvey & Pentland, 2003). Still other practitioners and researchers have categorized occupations based on how they are experienced, such as the level of engagement, social involvement, relaxation benefit, or regularity of the experience (Jonsson, 2008). These latter experience-based categories are described in terms of how these occupational patterns are

significant for human development and well-being (Jonsson, 2008). Hence, experience is an important facet of occupation that is central to everyday living (Persson, Eklund, & Isaacson, 1999).

Current research in the field of occupational science concerns how occupation and daily activity (such as travel) relates to personal well-being and health (Jonsson, 2008). This study adds to the literature by investigating the links between activities and how they are performed, and well-being. Moll and colleagues (2015) developed an occupation-based framework which is substantiated through the following key occupational therapy and health sources: the Canadian Model of Occupational Performance and Engagement (CMOP-E; Polatajko, Townsend, & Craik, 2007), the Person-Environment-Occupation model (PEO; Law et al., 2005), the International Classification of Functioning, Disability, and Health (ICF; World Health Organization, 2007). The Do-Live-Well (DLW) framework organizes concepts linking occupation and well-being (Moll et al., 2015). This broad-based health promotion framework, described further in chapter two, addresses the occupational determinants of health. Elements of the framework include eight dimensions of experience and five activity patterns linked to well-being (Moll et al., 2015, p. 10). Dimensions of experience include categories of experience such as activating the senses, while concepts reflective of characteristics of activity patterns include meaning and routine. These characteristics describe how an occupation is experienced, and are reflective of the occupational therapy and occupational science tenets of “doing, being and becoming” as articulated by Wilcock in her seminal work (1999, p. 1). How these dimensions of experience and characteristics of activity patterns influence or are influenced by the commute is unknown. Further, viewing transportation from an occupational lens allows one to understand the complexities of occupational patterns and experiences, and their influence on well-being.

Occupational science is a field which calls for a connection between daily activities and well-being, and this unique relationship needs exploration (Wilcock, 2007). This study extends the occupational realm into transportation, paired with health. Through evaluation of travel using an occupational lens, transportation studies and designs may enhance healthful occupational participation. Further, by explaining the activity patterns and dimensions of experience of commuters, a model for developing transport guidelines locally can be described. This research will therefore present an interdisciplinary perspective aimed at describing the occupational patterns of commuter students at a university and examine associations between how they travel and their well-being. This adds to the literature and research behind the importance of daily activities on well-being, especially student commuters.

Well-being is a complex term, and has been described from many disciplinary traditions (Nordbakke & Schwanen, 2014). This study utilizes the DLW framework to define well-being and describes personally experienced ways of *doing* in terms of living a purposeful and meaningful life, being engaged, opportunity and interest in activities, and societal contributions (De Vos et al., 2013; Hammell, 2009; Veenhoven, 2002). Well-being is an important indicator of health in a population, and well-being measures such as subjective well-being have recently been included in some nationwide measures, as input to policy (Diener, Oishi, & Lucas, 2015). Commuting can influence both the physical and mental health components of well-being (Novaco, Kliever & Broquet, 1991; Novaco & Gonzalez, 2009; Roberts, Hodgson & Dolan, 2011). Commuters also desire a certain level of satisfaction with their travel experience, and this may be reflected in a well-being outcome (Smith, 2017). This study contributes to occupational science through an exploration of how different characteristics and patterns of commuting influence satisfaction and well-being.

Rationale for Study

Travel affects subjective well-being in a multitude of ways (De Vos et al., 2013). For example, travel facilitates access to and participation in activities, fulfilling multiple needs for work, self-care, and leisure (Abou-Zeid & Ben-Akiva, 2012; Ettema, Gärling, Olsson & Friman, 2010a). In addition, activities can be performed during travel, such as social engagement (conversation during travel) or entertainment (listening to news or music) (Ettema, Friman, Gärling, Olsson & Fuji, 2012; Jain & Lyons, 2008; Ohmori & Harata, 2008). Travel as an occupation itself becomes a source of utility, enhancing well-being through leisure or enjoyment inherent in the travel experience, such as trips designed to ‘get out of the house’ (De Vos et al., 2013; Mohktarian & Salomon, 2001). Travel may influence well-being through the potential to travel (a capabilities approach) or through perceptions of one’s ability to travel (De Vos et al., 2013; Flamm & Kaufmann, 2006). Finally, travel can influence well-being directly through the experiences and satisfaction during the commute (De Vos et al., 2013). Satisfaction and enjoyment may vary by transport mode, reflecting the quality of the travel experience (Abou-Zeid, 2009; Ettema, Gärling, Eriksson, Friman, Olsson & Fuji, 2011, Ettema et al., 2012; Olsson, Gärling, Ettema, Friman & Fuji, 2013). Travel influences subjective well-being in many documented ways. This study examined only the experience of travel in the context of the commute to work, and its influence on subjective well-being.

The commute represents one of the least appreciated activities performed during the day (Kahneman, Krueger, Schkade, Schwarz & Stone, 2004; Wheatley, 2014), and its effects on well-being are varied. Often, the perception of commuting to work generates dissatisfaction and drudgery. Some studies show that the length of the commute influences satisfaction, with longer commutes reducing life satisfaction (Stutzer & Frey, 2008). Other recent research has identified

that commutes may be positive (see Ettema et al., 2012, p. 219-20). Satisfaction may be influenced by the extent to which the commute is perceived as productive (Basmajian, 2010; Lyons & Urry, 2005), although conflicting evidence is found in this regard (see Ettema et al., 2012). Satisfaction with commuting is associated with factors such as mode of transport, levels of stress, boredom and other feelings, as well as exogenous factors (e.g. road maintenance). The ability to access adequate transportation and the way in which inadequate transportation influences social participation has detrimental impacts on well-being (Delbosc & Currie, 2011a & 2011b; Wheatley, 2014).

The connection between travel and well-being is important to study because travel, especially commuting, is an activity that is part of our everyday experience. For some, it comprises a larger portion of the daily routine; for others, this component is minor. Individual well-being can be influenced by how individuals can fulfill daily responsibilities for employment, family, and self-care, regardless of or because of travel choices. Well-being can be influenced by how daily life, and the way we wish to live it, is promoted or constrained. Therefore, the decision to travel a certain way influences how well a person lives, or flourishes, and this is of interest to occupational scientists. Examining commuting from an occupational lens that investigates how travel influences or is influenced by daily patterns holds implications for well-being. How the experience of commuting, as an occupation in and of itself, can provide for our human needs and promote our ability to flourish (through meeting physical/mental health, self-esteem, sense of belonging, personal and economic security, opportunities for self-determination, meaningful occupation, maintenance of valued roles, ability to contribute to others) is the focus of this study.

Research Questions

This study addressed the following research questions:

1. What are the characteristics of college student commuters with respect to travel mode, activity patterns, dimensions of experience, and well-being?
2. What are the occupational experiences of college student commuters with respect to dimensions of experience and activity patterns?
3. What are the occupational aspects of commuting relative to well-being?

Theoretical Framework

Figure 1 below represents the theoretical framework used to create the quantitative survey questions and qualitative interview questions related to the research. The theoretical model is based on the “Do-Live-Well” (DLW) conceptual framework of Moll et al. (2015). This framework proposes a dynamic, bi-directional relationship between commute mode and a person’s well-being, through an examination of five characteristics of activity patterns and eight dimensions of experience. The model proposes that characteristics of activity patterns and dimensions of experience may vary by commute mode, and that the patterns and experiences can influence each other, which results in a certain level of satisfaction and well-being.

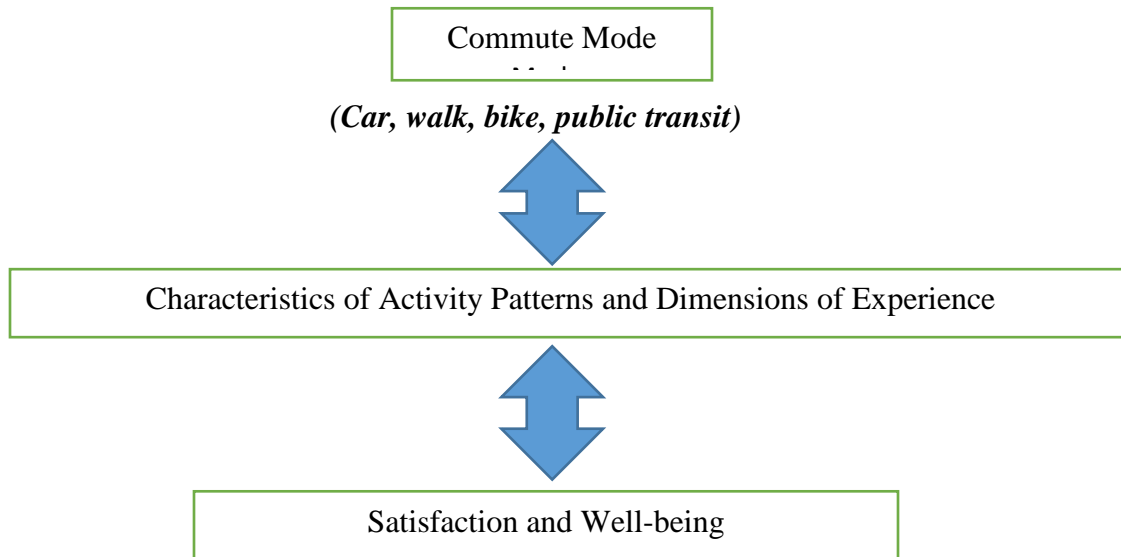


Figure 1. Conceptual model for evaluating well-being related to characteristics of activity patterns and commute mode. Adapted from ““Do-Live-Well”: A Canadian framework for promoting occupation, health, and well-being,” by S.E. Moll, R.E. Gewurtz, T.M. Krupa, M.C. Law, N. Larivière, & M. Levasseur, 2015, *Canadian Journal of Occupational Therapy*, 82(1), p. 15. Copyright 2014 by CAOT.

The chosen study design was based on a two-step pilot study performed to investigate and characterize activity patterns of commuters. The first step of the pilot study was a quantitative study investigating student’s and employee’s activity patterns, occupational concepts that describe characteristics which shape well-being (Moll et al., 2015) at a university. These characteristics of activity patterns are described further in “Definition of Terms” and in chapter two. Results from the first pilot study indicated that several characteristics of activity patterns varied by commute mode (Greenbaum, 2016a). Two characteristics of activity patterns (control and routine) were found to vary significantly by mode, but results were limited due to small sample size (n=10, n=43). The second step used a different method of data collection (paper versus online survey) and refined the survey instrument (Greenbaum, 2016b). Listed below are working definitions of several terms used in this proposal.

Definition of Terms

Active travel

Used in the transportation literature to define modes of travel in which physical activity is the primary component of locomotion (Pucher, Buehler, Basset & Dannenberg, 2010). These include cycling, walking, skateboarding, among others.

Activity patterns

An occupational therapy and occupational science concept, and an element of the Do-Live-Well framework created by Moll and colleagues (2015). “Activity patterns” refer to characteristics of occupation that contribute to well-being, and concern the “nature of what people do [and] how they engage in day-to-day activities over time and space” (p. 15). This term originates in Krupa et al., (2010), who describe an occupational therapy intervention model promoting engagement in activities and activity patterns that contribute to health and well-being. Activity patterns in the current study are consistent with the terminology in Moll et al., (2015) and include engagement, meaning, balance, control/choice, and routine.

Commute mode

A method of travel which is used regularly by a commuter for transportation to and from a work or school destination. Examples are automobile (car), bus, train, walk (pedestrian), bicycle, skateboard, plane, etc.

Dimensions of experience

These include eight broad categories of experience: activating body, mind, and senses, connecting with others, contributing to community and society, taking care of oneself, building security/prosperity, developing/expressing identity, developing capabilities and potential, experiencing pleasure/joy. The concept connecting with others was not included in this study.

Do-Live-Well (DLW)

Created by Moll and colleagues (2015) and described more completely in Chapter Two, it defines occupational parameters which influence health and well-being. It is described herein as the “DLW” framework.

Eudaimonic well-being

Eudaimonic well-being or eudaimonia is defined as living according to one’s potential, with a sense of purpose and engagement in life. The definition comes from following one’s *daimon* or ‘true self’ (Heller et al., 2013; Ryff & Singer, 2013).

Hedonic well-being

Hedonic well-being is feeling good, happy, positive, or satisfied with life, and has also been termed subjective well-being (Ryan & Deci, 2001; Ryff & Singer, 2013).

Occupations

Occupations are activities and phenomenological, personally constructed experiences (Pierce, 2001) that organize people in their daily lives (Hasselkus, 2006; McColl, Law, & Stewart, 1993), are transactional (Dickie, Cutchin & Humphry, 2006), are based in the context of the doer (Dickie et al., 2006; Hammell, 2009), and impact a person’s well-being through being, doing and becoming (Erlandsson, 2013; Wilcock, 1988b). This study examines commute travel as the occupation of interest.

Passive travel

The term passive travel in the transportation literature defines modes of travel in which the main component of locomotion does not require physical activity. These include automobile, bus, and train, among others.

Psychological well-being

An approach to well-being which includes both eudaimonic and hedonic well-being (Ryff & Singer, 2013).

Subjective well-being

An individual interpretation of one's well-being, which is dependent on behaviors and circumstances such as health and social/physical environment (Veenhoven, 2002).

Well-being

Well-being refers to a “state of overall contentment—or perceived state of harmony—with one's physical/mental health, self-esteem, sense of belonging, personal and economic security, and with one's opportunities for self-determination, meaningful occupation, maintenance of valued roles, and ability to contribute to others” (Hammell, 2009, p. 108). The DLW framework utilizes “flourishing” to describe well-being outcomes, as defined by Keyes (2002).

Chapter Two

Review of the Literature

This reflection-based literature review includes influences from the social sciences on travel patterns and behavior. Within this review, the overarching concept of traveling as a routine occupation (e.g., the commute) and how it influences health and well-being, is described. Using the DLW occupation-focused framework (Moll et al., 2015), influences of key activity patterns in travel as determinants of health and wellbeing are investigated. This framework will facilitate understanding of and operationalize the concepts that connect lifestyle activity patterns to well-being.

The literature review is organized by first describing transportation within the context of occupational science to ground the study. Second, the conceptual framework and its use in the proposed study are described. The conceptual framework includes four different sections, and each section is described independently in various travel modes, and then how this influences well-being. Since activity patterns and dimensions of experience are the focus of the study, each are operationalized using concepts from the literature review. Then, studies on various forces that influence commuting are evaluated, followed by reviews of well-being studies in transportation.

Defining transportation in the context of occupational science

Defining the terminology used in transportation aids in maintaining consistency across disciplines. Within the transportation literature, terms such as transport mode, active and passive transport, mobility and access are used. Transport modes are specific ways of moving from one place to another, such as by car, public transport, foot, bicycle, train, etc. Active transportation refers to modes of transportation that require physical activity, such as walking for transport and cycling. Recently bus or transit travel has been included in or is considered complementary to

active transport, since travel on foot or bike to and from the connection is often required (Rissel, Curac, Greenaway & Bauman, 2012). Mobility in transport literature refers to being mobile and being able to choose which activities to participate in outside the home (Nordbakke & Schwanen, 2014). Mobility has been described as transportation that allows one to arrive at a specific location with the end destination as the reason for travel (Ryan, Wretstrand, Schmidt, 2015). In the field of occupational therapy, community mobility refers to “moving around in the community and using public or private transportation, such as driving, walking, bicycling, or access and riding in buses, taxi cabs, or other transportation systems” (American Occupational Therapy Association, 2014, p. 43). Access refers to the ability to reach activities and destinations, such as availability of a personal vehicle or bus service (Gray, Shaw, & Farrington, 2006), and may be considered a component of choice. Choice is one characteristic of activity patterns addressed in this study. However, the majority of transportation studies in the occupation-based literature are concerned with mobility and access related to aging or those with disabling conditions (Nordbaake & Schwanen, 2014), and these populations will not be specifically included in this study.

Transportation as an occupation has traditionally been categorized as an instrumental activity of daily living (I-ADL) in occupational therapy (AOTA, 2008), or a behavior performed to achieve another goal (Fricke & Unsworth, 2001). Research has shown that many I-ADLs have value, either by providing opportunity for engagement in other occupations (e.g., activities at the destination), intrinsically, or overlapping meanings with other I-ADLs (Stav & Leiberman, 2008; Weinblatt, Ziv & Avrech-Bar, 2000). This reflects the dynamic and the situated nature of the meaning of occupations (Kielhofner, 1985), suggesting that context influences meanings of occupations, and these are ever changing. Others have categorized transportation in the domain

of productivity or leisure, depending on how it is experienced. However, it is not always possible to categorize occupations into pre-determined categories (Jonsson, 2008; Weinblatt et al., 2000). What is important in categorization, according to Jonsson, is how the occupation is experienced and the general patterns that surround its experience, in its context (2008), and is especially important when linking the occupation to physical, mental, and social well-being (Moll et al., 2015). Therefore, categorization in the current study is based on the “doing” of the commute – how activity patterns and dimensions of experience are a part of the commute. In an effort to re-conceptualize how occupations contribute to well-being, Moll et al. (2015) created a unique framework which provides a broader perspective on the “forces that contribute to health and well-being” (p. 9). Their occupational framework is grounded in empirical evidence which links *what* people experience and *how* they experience their occupations with well-being, and is used to frame this research. The conceptual framework is described below from the lens of travel well-being.

Conceptual Framework

This study uses a conceptual framework described and defined by Moll et al. (2015) as the “Do-Live-Well” (DLW) framework. This framework illustrates and delineates the relationship between the daily experiences of people and their health and well-being. The fundamental message of the DLW framework is that *what one does every day and how it is done* impacts one’s health and well-being. The DLW framework for promoting occupation, health, and well-being is depicted in schematic in Figure 2.

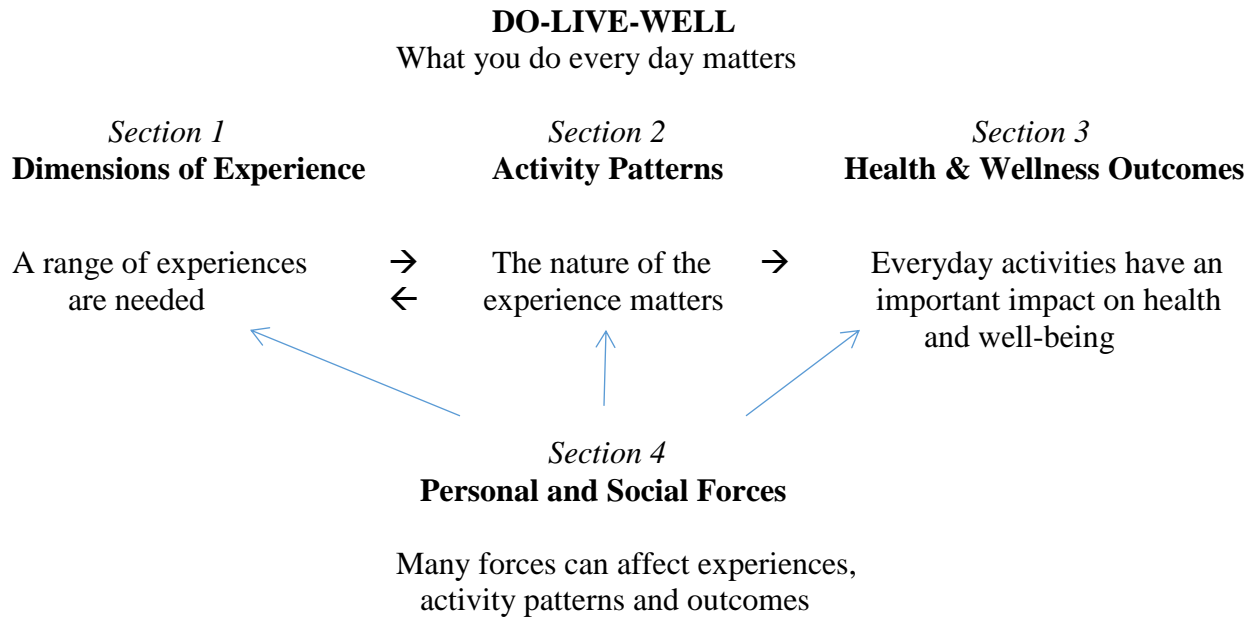


Figure 2. “Do-Live-Well”: A Canadian framework for promoting occupation, health, and well-being (Adapted from ““Do-Live-Well”: A Canadian framework for promoting occupation, health, and well-being,” by S.E. Moll, R.E. Gewurtz, T.M. Krupa, M.C. Law, N. Larivière, & M. Levasseur, 2015, *Canadian Journal of Occupational Therapy*, 82(1), p. 12. Copyright 2014 by CAOT.

The framework incorporates the importance of daily lifestyle in health and well-being through classification of occupations based on people’s experiences (dimensions of experience), understanding how and why people engage in activities (their activity patterns), and addressing internal and external influences on participation (personal and social forces). This occupation-based DLW health-promotion framework is employed to explicate participation in travel modes related to well-being. This study is important in explaining how the occupational patterns involved in commuting to work and school influence participation and engagement in purposeful travel on a day-to-day basis. Four sections of the model describe the experience of participation in commuter travel mode, and explore the potential effects on well-being. Section one will describe the activity patterns of the DLW framework. Section two will describe the dimensions

of experience. Section three will describe the personal and social forces, and section four will describe the well-being outcomes.

The following figure (3) is adapted from the DLW framework to depict how patterns of activity and dimensions of experience are related to the travel mode, which then influences satisfaction well-being. Additionally, there is a dynamic relationship between commute mode and activity patterns/dimensions of experience, among activity patterns and dimensions of experience, as well as between activity patterns/dimensions of experience and well-being.

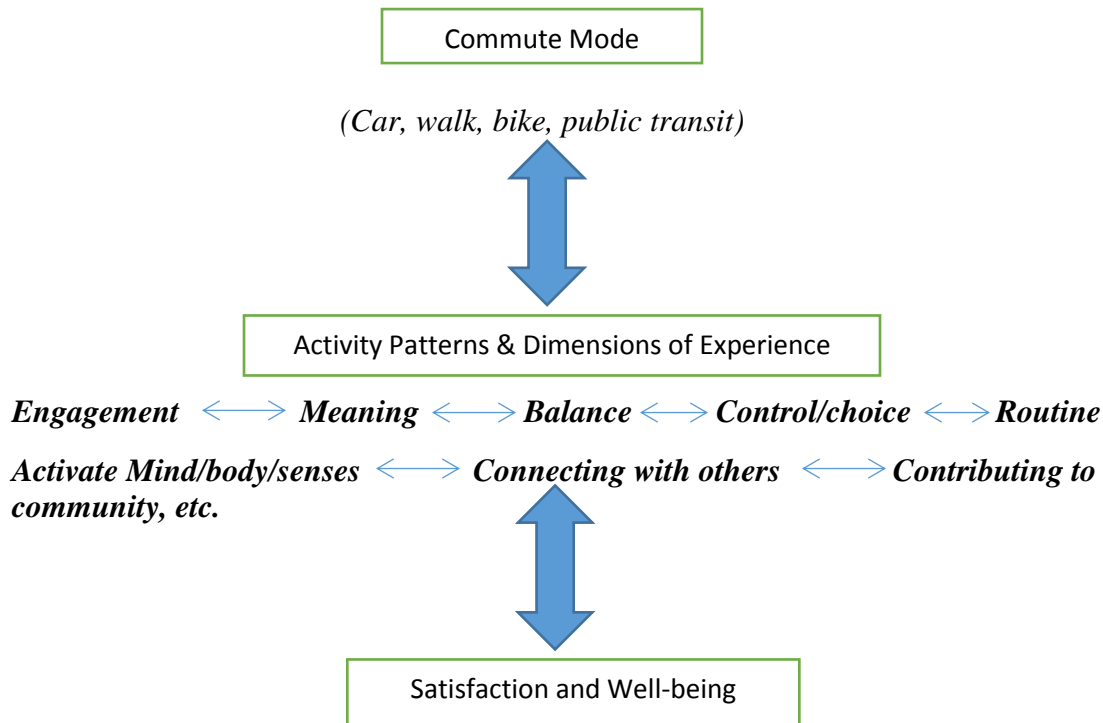


Figure 3. Conceptual model (detailed) for evaluating well-being related to characteristics of activity patterns/dimensions of experience, and commute mode. Adapted from the ““Do-Live-Well”: A Canadian framework for promoting occupation, health, and well-being,” by S.E. Moll, R.E. Gewurtz, T.M. Krupa, M.C. Law, N. Larivière, & M. Levasseur, 2015, *Canadian Journal of Occupational Therapy*, 82(1), p. 15. Copyright 2014 by CAOT.

This study addresses the one-way influences of commute mode on activity patterns and dimensions of experience, and on well-being, acknowledging that the interaction may be bi-

directional. For example, meaningfulness in commuting by bicycling may provide identity and a way of contributing to the community by decreasing carbon emissions, and a person's well-being can increase their desire to engage in this mode of travel. The interest was in understanding the connections between how particular activity patterns and dimensions of experience modify well-being. The activity pattern concepts and dimensions of experience are operationally defined in terms of how they influence well-being by travel mode (see Tables 1 and 2), and described in the context of occupational science and the framework and how they are linked to well-being. The following sections describe each characteristic of activity patterns and dimension of experience, including links to well-being, and subsequently in the context of commuting and travel mode.

Section One: Activity Patterns of the “Do-Live -Well” Framework

This section in the framework addresses activity patterns involved in occupation. Moll et al. (2015) utilize the terminology “characteristics of activity patterns” to designate the essence of what people engage in every day, and specifically *how* they participate in activities (Moll et al., 2015). These concepts are identified from theoretical and empirical evidence as key patterns in activities that contribute to health and well-being (see Moll et al., Table 2, p. 15). Six variables, described as activity patterns, provide the primary focus for this study, and include the patterns of engagement, meaning, balance, control, choice, and routine. Although choice and control are grouped together in the model, they are split into two distinct variables for operational simplicity. The six characteristics of activity patterns are operationally defined below (see Table 1) in terms of how they influence or are influenced by the commuting experience. These operational definitions of patterns of activity are derived from guidelines provided in the DLW, but adapted to evaluate the commuting experience.

Table 1. Operational Definitions of Characteristics of Activity Patterns

Variables	Operational Definitions*
Engagement	The degree to which travel mode promotes a sense of active engagement and inhibits “autopilot” during commuting
Meaning	The degree to which travel mode promotes or inhibits a personally meaningful experience
Balance	The degree to which travel mode impact’s one’s ability to participate in tasks and perform roles that are personally valued, or promotes lifestyle balance
Control	The degree to which one has autonomy to travel the way one desires to travel based on chosen mode
Control	The degree to which one has choices in one’s commute
Routine	The degree to which a predictable routine is promoted or inhibited by travel mode

* Activity patterns operationally defined for this study are based on the DLW framework (Moll et al., 2015), constructed to reflect the travel mode experience.

Characteristics of Activity Patterns

The five activity patterns are described below in the context of occupational science and the framework, and how they are linked to well-being. Subsequently, each activity pattern is described in terms of travel and commuting, and any links to well-being.

Engagement

According to Moll and colleagues, engagement refers to “the process of initiating and sustaining participation in particular activity patterns” (2015, p. 15). Kuo (2011) defines

engagement as the amount of attention one gives to performing an activity. Moll and colleagues, as well as other researchers, argue that mindfulness and flow experiences signify engagement in occupation (Elliot, 2011; Moll et al., 2015). Flow experiences during travel are nearly non-existent, except for one description in the literature concerning cycling and flow, which explores how cycling can nurture mindfulness in a spiritually stressful era (Irvine, 2008). Irvine, in his book *Einstein and the Art of Mindful Cycling*, describes how flow and mindfulness are induced by the spinning of the bicycle wheels, and the rhythm of the pedaling (2012).

Mindfulness is rarely addressed in travel, and is a psychological construct which involves maintaining a sense of openness, attunement, and alertness to the experience (Brown & Ryan, 2003), in other words being “present” during the activity (Elliot, 2011, p. 372). Mindfulness implies an intentional awareness to all sensations and thoughts while participating in the activity, and to the immediate physical environment or social environment (Davidson & Kaszniak, 2015; Reid, 2011). Reid describes how mindfulness is associated with occupational engagement through “presence in doing” (2011, p. 50), a description of the level of awareness or attunement in participation in activities. Reid (2011) describes it as being present to the “requirements of the task, the outcomes, the body, and the immediate and social environment through conscious awareness” (p. 52). Mindfulness can occur in mundane daily activities, and is characterized as time passing slowly, peacefulness or emotional release (Wright, Sadlo, & Stew, 2006; Moll et al., 2015). Many factors can promote mindfulness, such as having sufficient time to engage in meaningful activities (Kasser & Sheldon, 2009), context or place of occupation, and choice in occupation (Reid, 2008).

Engagement in occupations has been identified as a significant contributor to well-being (Christiansen & Baum, 2005; Jonsson, 2008; Kielhofner, 2009), and well-being is considered an

issue of engagement in living (Ryff & Singer, 1998). Engagement through mindfulness has been linked to positive mental health and positive social engagement (Brown, Ryan, & Creswell, 2007), positive affect (Giluk, 2009), happiness (Killingsworth & Gilbert, 2010), and personal well-being (Elliot, 2011). Mindfulness-based interventions have been shown to facilitate a higher state of presence (Reid, 2009), improve mental and physical health (Walloch, 2006) and enhance psychological functioning (Baer, 2003). Ryan, Huta and Deci (2008) suggested that promoting mindfulness can fulfill basic psychological needs. Chang, Huang, and Lin (2015) studied how meeting basic psychological needs links mindfulness to well-being. Utilizing self-determination theory, in which three basic psychological needs are critical for enhancing well-being (Deci & Ryan, 2000; Ryan & Deci, 2000), Chang and colleagues found that enhancing a person's mindfulness enables increased satisfaction of autonomy, relatedness, and competence, and therefore well-being (2015). Mindfulness and awareness are important in promoting autonomous action and value-driven activities, which are components of eudaimonic well-being (Ryan et al., 2008). Mindfulness contributes to eudaimonia, by "facilitating awareness of what is worth doing, and doing it well" (Ryan et al., 2008, p. 159), by "adding clarity and vividness to experience" as well as de-emphasizing "unhealthy thoughts, habits, and unhealthy behavior patterns" (Brown & Ryan, 2003, p. 823). Mindfulness is therefore a link to a state of being which enhances positive mental health and well-being (Gu, Strauss, Bond, & Cavanagh, 2015; Langer & Moldoveanu, 2000; Reid et al., 2011). The construct of mindfulness is chosen in this study to depict engagement, since it is described as such in the DLW framework, and is the most well defined and relevant description in occupational science of engagement.

Studies of occupational engagement in travel, as depicted by mindful experiences, are uncommon. Examples of engagement through mindfulness during travel might be observing the

surroundings on the bus ride to school. One study by LaJeunesse and Rodriguez (2012) examined mindfulness in travel, and focused on the attention given to the commute experience. The researchers evaluated how much commuters are likely to ‘attune to’ their commuting experience (LaJeunesse & Rodriguez, 2012). They described ‘commute attunement’ as a relaxed, peaceful, and restorative mindful commute experience (p. 197), based on the amount of attention to the commute experience. They found that mindful travelers are more able to manage the stressful experiences of commuting than non-mindful travelers, and that mindfulness directly enhanced attunement to the commuting experience. Additionally, using structural equation modeling, they found that competence, a basic psychological need, mediated this relationship. As described earlier, according to Chang et al. (2015), meeting basic needs such as competence can positively influence well-being.

Evaluating engagement during travel may be difficult to determine. For example, engagement includes active attention to driving, for example, such as the maneuvering of the vehicle and navigation for car commuters, but not passive engagement in secondary activities during driving, such as listening to a radio show. Moreover, participation in public transport is by nature a passive experience in that the traveler is not the driver. Therefore, bus or train travel may involve participation in different tasks or activities that can occur during the commute (Ettema et al., 2012), but this may not signify a mindful experience. Epley and Schroeder (2015) studied social interaction during bus commutes, and found that social engagement by riders varied, and enjoyment was related to social interaction. This is consistent with the DLW dimension of experience termed “enjoyment,” but not necessarily engagement, although the participants were characterized as being more engaged in the experience of bus travel when interacting with others. Social interaction is linked to being fully present in the moment

(Bejerholm & Eklund, 2006), so riding on a bus may promote mindfulness in terms of social engagement.

Passengers using passive modes of travel often participate in secondary activities. Ettema et al. (2010b, 2012) described how train passengers exhibited higher levels of engagement while working, reading, and communicating remotely than those of other modes, although engagement was not defined *per se*. These (often) planned secondary activities *en route* to work can include social activities and work/leisure (Lyons, Jain & Holley, 2007). Travelers reported more productivity and enjoyment during their commutes by train when involved in an activity. Other researchers suggest that future studies will show an increase in focused secondary activity, as Smartphone use allows more social networking and browsing on public transport (Lyons & Urry, 2005), potentially enhancing engagement during passive modes of travel. Whether secondary activities during travel are linked to well-being is unknown.

Understanding the mechanisms of mindfulness can help distinguish its influence on well-being. Mindfulness may “have greater probability of expression when psychological needs such as competence, or feelings associated with performing activities with skill and aptitude, are satisfied” (LaJeunesse & Rodriguez, 2012, p. 197). This suggests that skill and performance measures may influence mindfulness. Different transport modes may require more or less attention, and more or less skill to perform them and therefore certain transport modes may be more amenable to mindfulness. Differences in mindfulness and attention by travel mode (e.g. whether drivers of cars are more or less mindful than bus travelers or pedestrians or cyclists) have not been researched sufficiently. One qualitative research study described a cyclist’s commute experience, who found that his connection to the green environment and awareness of his surroundings increased over time (Guell & Ogilvie, 2015). This suggests a level of

mindfulness and engagement not common to more accelerated commute modes, which was enhanced by repeated commutes.

Another study examined journey-based affect by travel mode (LaJeunesse & Rodriguez, 2012). This construct (journey-based affect) was comprised of affective measures of commuter travel experiences, including attunement (or travel mindfulness), and stress. They found that walkers and bicyclists reported higher journey-based positive affect than bus and car travelers. This indicates that engagement levels can be influenced by transport mode since stressful car travel experiences limit mindful experiences. Gatersleben and Uzzell (2007) examined the affective experience of different commuters and found that bicyclists and walkers had higher levels of attunement and competence than car and bus commuters. Walkers and bicyclists found their commute to be relatively relaxing and exciting, while bus commuters were mostly bored. These studies suggest that some modes of transport may be more amenable to mindful experiences. This study will address whether engagement through mindful experiences occurs during participation in commuting by different travel modes.

According to Comerford (2011), commuting is an event in which there are “many stimuli, thoughts and feelings competing for attention” (p. 692). He suggests that some of these competing stimuli “will attract [a person’s] attention regardless of what mode of transport is used” (p. 692). The question of whether engagement occurs across various travel modes may not be only whether mindfulness occurs, but how much distraction occurs. Some studies have evaluated potential inhibitors of mindfulness and flow that can occur during the commute, such as distractedness, impulsiveness, and stress. Studies with car commuters suggest that distractions can occur from many sources, such as mobile communication (Ferdinand & Menachemi, 2014), traffic congestion (Hennessy & Weisenthal, 1999), music or news programs (Bellinger, Budde,

Machida, Richardson & Berg, 2009), and noise (Finkelman, Zeitlin, Filippi, & Friend, 1977). Drivers' thoughts are distracted frequently behind the wheel (Berthie et al., 2015). Berthie and colleagues studied "mind wandering," a state of inattention caused by a shift in attention from the task to inner thoughts (2015). This characteristic was shown to affect 85 percent of the drivers in the study, for an average of 35 percent of the trip, independent of duration. The contexts which favored inattention were familiar routes, monotony from lack of stimulation, and driving alone. Mind wandering has also been linked to easier on-going tasks (Smallwood & Schooler, 2006), suggesting that the relationship between the level of skill required (the task's attentional demands) and the abilities of the participant, may impact mind-wandering, and therefore mindfulness. This has implications for flow experiences, which occur when skill and abilities are compatible (Csikszentmihalyi, 1990), as well as for engagement.

Engagement and mindfulness may well have to do with the speed of travel, in which slower movement may promote more engagement and more well-being, and less obsession with speed and saving time (Music, 2014; Tranter, 2014). Tranter (2014) cites Hoelting (2010, p. 30) who suggests that the speed of commuting can interrupt the "natural connections between our senses and the world we travel through." This can result in life in the fast lane, and a "forgetting-of-being...or doing without being" (Clark, 1997, p.86), essentially preventing engagement.

The absence of engagement in mindful experiences while using fast and motorized modes of transport is significant for wellbeing outcomes. However, there is little research in this area concerning transportation as a regular activity (commuting), and well-being. This study focused on identifying the experience of mindfulness during commuting.

Meaning

The second important concept related to characteristics of activity patterns is meaning. As described by Moll and colleagues (2015), meaning is a subjective, actively-constructed process in which individuals or groups make sense of their situation (Hasselkus, 2011; Nelson, 1996). The way in which an activity is personally valued and goal-driven makes it particularly meaningful (Eakman, Carlson, & Clark, 2010; Hasselkus, 2011; Pierce, 2001). Meaning of activities is defined as the significance of an event to the individual (Christiansen & Baum, 1997). For a particular occupation, there may be many meanings, and these may depend on personal needs and characteristics, as well as social, cultural, and environmental context (Kantartzis & Molineux, 2011; Weinblatt et al., 2000). Hasselkus (2011) suggests that participation in the activity is necessary to create meaning, and activity patterns may be then shaped by the meaning people derive from that participation.

Participation in occupation that is personally meaningful leads to improved well-being (Hasselkus, 2011; Wilcock, 1998a; Yerxa, 1990), and is one of the core foundations of well-being and good health (Antonovsky, 1996), as well as the cornerstone of occupational science. Meaningful occupation, especially the subjective meanings that individuals attribute to daily activities, contributes to both fulfillment in life and sense of purpose (Csikszentmihalyi, 1990; Eakman & Eklund, 2012; Hammell, 2004). Psychological studies have also linked participation in purposeful experiences with positive mental health (Leufstadius, Erlandsson, Björkman, & Eklund, 2008; Ryff & Singer, 1998), and eudaimonic well-being (Ryff & Singer, 2013). Heller and colleagues (2013) found that positive eudaimonic well-being is protective against mental health issues, predicts physical health, and lowers levels of the stress hormone cortisol. Roepke, Jayawickreme & Riffle (2014) recently reviewed studies that linked meaningful experiences to

better physical health, and found that the subjective presence of meaning is indicative of well-being.

Seniors and adults who have lost participation in meaningful occupations through life disruptions such as loss of work or social status have decreased well-being (Wong, 1989). Studies have linked meaningful occupation with well-being through various mechanisms (Watters, Pearce, Backman & Suto, 2013) and using models (Eakman et al., 2010; Eakman, 2013; Persson, Erlandsson, Eklund & Iwarsson, 2001), supporting a relationship in which increased meaning correlates with increased well-being. In summary, participation in meaningful occupations is linked to positive well-being outcomes, particularly when those occupations facilitate satisfaction of basic psychological needs.

Travel is an everyday occupation that can have a unique purpose and meaning for the individual. For example, transportation can provide access to activities or activities enabled by travel to the destination, such as work, school, or shopping, and these activities hold meaning for the individual (De Vos et al., 2013). Transport can also have meaning through the activities performed during travel, such as for entertainment and leisure, or social purposes. Other ways in which travel can have purpose and meaning are through the “potential to travel in a particular way, which has value in and of itself” (De Vos et al., 2013, p. 435). The commute has dichotomous meanings for some, being both productive and a waste of time, but is considered to be “a product of past experience, present routines, and gender norms” (Basmajian, 2010, p. 76). However, limited research has been done to understand how the experience of travel itself, and particularly the mode of travel, brings purpose and meaning to life.

Meanings in travel may vary according to the mode a person uses, providing value such as identity, habitus, autonomy, efficiency, freedom and independence, control, and/or

maximizing health (Steinbach, Green, Datta & Edwards, 2011). These meanings can influence well-being directly through satisfaction of basic needs or indirectly through achieving purpose in life. Steinbach and colleagues (2011) suggest that the meaning of particular transportation modes may be understood in terms of personal goals such as enhancing health, maintaining safety, or providing efficiency. Context is also important in creating meaning in transportation, as local mobility cultures may have tacit codes or norms for certain modes, which may impact the meaning of a transportation experience (Jenson, 2009; Steinbach et al., 2011). Meaning can therefore be shaped by culture, as well as social and institutional norms, and policies. Further, meanings can be valued differently, in that those which impact health and safety may be valued more or less highly than prestige, for example, impact well-being more or less strongly (Steg & Gifford, 2005). These meanings and their relative importance can also differ between demographic groups, such as males and females, or married versus unmarried individuals, and may vary over time (Steg & Gifford, 2005).

Much of the literature has focused on the extrinsic or functional values in how people travel, such as the availability and flexibility of the commute mode. Many modes provide this utilitarian function, but each to a different extent. These may be intrinsic and are considered more important in terms of value to the participant and continued use than practical reasons (Stokes & Hallett, 1992). This study addresses meanings of transport which provide for other needs beyond the instrumental value. The intrinsic value of the commute is investigated related to various meanings.

Balance

The third important characteristic of activity patterns is occupational balance (Moll et al., 2015). Moll and colleagues define occupational balance as “a person’s perception of having the

right amount and the right variations in occupations” (2015, p. 16). Occupational balance, according to Moll and colleagues, includes the concepts of lifestyle balance, occupational integrity, and role balance. Each is described here, as well as the links of occupational balance to well-being.

Lifestyle balance is defined as a “consistent pattern of occupations” (Christiansen & Matuska, 2006, p. 50), and has its roots in Adolph Meyer’s public health view of balance in occupational participation (Christiansen & Matuska, 2006; Meyer, 1922). Meyer promotes a balance of rhythms of daily lifestyle activities, which include the work, play, rest, and sleep components, in order to maintain health and well-being (Meyer, 1922). Christiansen and Matuska’s (2006) occupational Model of Lifestyle Balance includes patterns that allow people to successfully manage their everyday life, especially meeting biological and psychological needs through occupations that provide for health and safety, relationships, engagement, identity and time for personal goals and renewal, all of which contributes to well-being (Wagman et al., 2012). Occupational integrity is a component of lifestyle balance and involves designing a lifestyle that is meaningful and reflects individual values and strengths. (Pentland & McColl, 2008).

Role balance is another component of occupational balance. Role balance has been described as a type of self-organization in which the roles a person assumes are performed in accordance with a person’s values and needs (Marks & MacDermid, 1996). Roles can include employee or worker, parent, spouse, etc. Participation in valued roles and occupational balance are linked to lower perceived stress and improved quality of life (Lariviere, Levasseur, & Boisvert, 2013), higher subjective well-being (Matuska, 2012), and better perceived health (Forhan & Backman, 2010).

Occupational balance, whether it be lifestyle or role balance, has been investigated using perceptions of adequate participation in activities (e.g., subjective occupational balance), as well as objectively, through appropriate time use in activities (Moll et al., 2015; Wagman et al., 2012; Hakansson, Lissner, Bjorkelund & Sonn, 2009). Subjective investigations of lifestyle balance query participants on the meanings of balance, and identify characteristics, such as having rewarding relationships, feeling interested, engaged, challenged in activities, and creating positive identity (Wagman, Hakansson, Mataska, Rjorklund & Fakjberm, 2012). Others have investigated experiences of “respecting their own values, needs, and resources; having strategies to manage and control everyday life; having a harmonious occupational repertoire; and engaging in personally meaningful occupation” (Hakansson et al., 2006, p. 74). Occupational balance has been measured subjectively in questionnaires using the statement, “I have balance between different occupations in my occupational pattern” (Håkansson, Lissner, Björkelund & Sonn, 2009, p. 112). In a study of 488 Swedish women, occupational balance was associated with self-perceived satisfaction with life and no perceived stress, but not with good perceived health (Håkansson et al., 2009). Higher control, another pattern of daily occupation, was associated with good perceived health, and researchers interpreted these findings by suggesting that manageability is the most important dimension affecting perceived health, but noted that occupational balance and meaning were also important. Significant relationships were found between all dimensions of engagement in patterns of daily occupations, suggesting that good health depended on a combination of occupational experiences (Håkansson et al., 2009).

The work/school commute can influence a person’s ability to balance his or her lifestyle. Commuting to work can be interpreted as a part of the work domain with respect to lifestyle activities. Balancing work with one’s personal life, especially when personal life is complex, can

be challenging. Managing the commute with one's personal life can require integration of multiple roles, such as dropping off children at school, picking up groceries, and arriving at work on-time, ready to perform. Commute time can exacerbate time and energy drains when one is already strained by childcare and household responsibilities, and this impacts work-life balance (Haley-Lock, Berman & Timberlake, 2013). These lifestyle balance issues may impact women disproportionately (Haley-Lock et al., 2013; Roberts, Hogsdon & Dolan, 2011). These and other demographic characteristics can influence how people participate in daily activities, and are potential conflicting forces incorporated in the DLW framework (see Forces).

When balance of roles and time constraints are the challenge, travel time may be used for work responsibilities, particularly for public transit commuters (Hardill, 2002). Several researchers have demonstrated positive utility from activities that can be conducted while commuting by different modes, resulting in multi-tasking opportunities to think, talk, listen to music, read, relax, watch scenery, or even sleep while traveling (Handy, Weston & Mokhtarian, 2005; Mokhtarian & Salomon, 2001; Salomon & Mokhtarian, 1997). This suggests a positive benefit for well-being from commuting by some using public transport. Others have suggested that commuting provides a transition time that allows a mental break or shift between activity domains or roles (Hilbrecht et al., 2014; Jain & Lyons, 2008; Lyons & Urry, 2005). This 'time out' may also allow for an improved work/life balance since it allows the commuting experience to be used for pleasurable or preferable activities. It may also enable engagement or have meaning in its utility for mental transition from work role to home role (M. Merryman, personal communication, March 4, 2016).

However, long distance commuting is associated with a higher incidence of separation from a spouse in some countries (Sandow, 2014), and commuting time has been shown to be

positively associated with work/family conflicts (Voydanoff, 2005). Longer car or public transit commutes have been shown to reduce time for leisure physical activity and to increase hours of work, resulting in an imbalance in time for other activities, and decreased well-being (Hilbrecht et al., 2014; Hoener, Barlow, Allen & Schootman, 2012). Kobus, Van Ommeren & Rietveld (2015) found an inverse relationship between indicators of academic achievement (as measured by self-reported average grades) and increased commute time for 2,857 Dutch university students, in which approximately two-thirds commuted by public transit and one third by bicycle.

People who walk or cycle for transportation consider time spent traveling to work as useful in several ways, such as offering opportunity for physical activity and time valued outdoors (Hamer & Chida, 2008). For those engaged in active transport, this may reflect a desire or opportunity for a distinct work/leisure balance of time. Some research shows that lifestyle balance may be associated with some modes of travel for work. For example, LeJeunesse and Rodriguez (2012) measured time affluence in commuters, which is the ability to “perform tasks in a leisurely manner” (p. 197). They found that walkers and bus users experienced greater time affluence (more leisure time) than car commuters, as did others (Lucas & Heady, 2002). Whether travel mode is chosen to increase personal leisure time is unknown, but greater lifestyle balance may be achieved when time affluence is higher.

Hilbrecht and colleagues (2014) utilized cross-sectional data from a 2010 Canadian Social Survey to analyze time use patterns and feelings of well-being among car commuters. They found an inverse relationship between time spent commuting and levels of well-being, as measured by life satisfaction and time pressure. They found that time allocation for activities uses a zero-sum approach, and time use trade-offs occur among activities such that more time spent commuting reduces time for other activities in proportion. They concluded that longer

commutes influence the distribution of time spent in other activities such as leisure physical activity associated with well-being, and that the commute experience mitigated or aggravated the impact on well-being. Still another study found no evidence that longer commutes were associated with lower levels of wellbeing, and suggested results may depend on methodology used, differences in cultures, and choice of well-being measures (Dickerson, Hole & Munford, 2014).

In summary, occupational balance may be impacted by commuting, which can then influence health and well-being. Occupational balance may be challenged by time constraints imposed by excessive commuting. Alternatively, balance may be managed more readily when using some modes of transportation. Commuting can therefore have a positive or negative impact on well-being through balance of personally valued roles and activities.

Control/choice

The extent to which individuals indicate they have choice and control in their activity patterns is reported to be an indicator of well-being, especially choice/control in what and how those activities are done (Moll et al., 2015; Polatajko et al., 2007). People make choices about the occupations they engage in to create a routine or daily pattern (Yerxa, 1998). Choice and control in everyday occupations has been associated with good self-rated health (Hakansson et al., 2009).

Choice indicates a person has a sense of autonomy over his or her actions (Ryan & Deci, 2000), and indicates that person is actively involved in “choosing, shaping and orchestrating their daily experience” (Hammell, 2004, p. 300). Control means “having opportunities to decide what to do” (Hakansson et al., 2009, p. 111). In self-determination theory (SDT), autonomy is considered one of three basic psychological needs (Deci & Ryan, 2000). Thus, daily activities

and supportive environments contributing to autonomy enhance daily well-being, and activities and controlling contexts that hinder autonomy may have negative effects on daily well-being (Reis, Sheldon, Gable, Roscoe & Ryan, 2000; Ryan & Deci, 2000). Most researchers agree that autonomy is “essential to the full functioning and mental health of individuals” (Ryan & Deci, 2006, p. 1559), and predicts well-being (Weinstein & Ryan, 2011).

Moll et al., (2015) suggest that the importance of individual control and autonomy may be typical for Western society, whereas other societies may emphasize shared goals and values. Therefore, choices are often socially or culturally defined (Christiansen & Townsend, 2010). Choice is also dependent on what people are capable of doing, and a person’s opportunities, and capabilities may be influenced by individual and socio-cultural factors (Sacchetto et al., 2015).

Commuting is a required activity for those who work or go to school outside of the home, but individuals may have choice in factors related to the commute. For example, commuters may decide on departure time and returns, routes, and mode of travel, among other factors. However, external constraints and barriers may limit travel choices, and individuals may have varying degrees of latitude over the configuration of their daily journey (Basmajian et al., 2010; Primeau, 1996). Kutter argues that more of the variety in travel behavior is derived from constraints than from discretion (1981), suggesting choice may be limited in commuter decisions, particularly for choice of travel mode. For example, a mother may have to drop off a child at daycare before heading to work. Constraints imposed by multiple daily activities can often lead to limited options for travel mode, resulting in car use (Ettema et al., 2011).

Choice in travel can be initiated through autonomy to choose how one travels, and specifically choice of a travel mode. Transportation literature uses the terminology *transport mode choice* or *travel mode choice*. Transport mode choice may depend on many factors. These

include: demographics, personal utility factors (travel times, distance, cost, need to carry materials, flexibility for multiple trip purposes and destinations, convenience), characteristics of the traveler (attitudes and values towards control, comfort, habits, flexibility, safety, and sustainability), characteristics of the travel mode (efficiency and flexibility), environmental factors (weather, attractiveness of the route, infrastructure conditions, density and traffic conditions), knowledge of and meanings of travel mode (familiarity with usage, identity implications), availability of travel mode (ownership of vehicle, infrastructure and policy, cultural norms and social acceptance of mode) (Cervero, 2002; Gärling, 2007; Guell & Ogilvie, 2015; Handy, 1996; Handy, Xing & Buehler, 2010; Johansson, Heldt, & Johnasson, 2006; Klockner & Friedrichsmeier, 2011; Nordfjaem, Simsekoglu, Lind, Jorgensen & Rundmo, 2014; Saelens, Sallis & Frank, 2003; Scheepers et al., 2015; Schneider, 2013; Steinbach et al., 2011; Van Acker, Van Wee & Witlox, 2010).

For commuting purposes, choice has been found to link consistently, but not exclusively, to efficiency and flexibility of the travel mode (Nordfjaern et al., 2014; Rundmo, Nordfjaern & Roche-Cerasi, 2011). Efficiency in commuting is important since the destination and targeted time of arrival is usually fixed (Nordfjaern et al., 2014). Basmajian acknowledges that the ability to make these decisions about travel provides a degree of authorship or autonomy (2010).

Nordfjaem and colleagues (2014) studied Norwegian travel, and found that those who prioritized efficiency and flexibility tended to commute by car, while those who prioritized safety and comfort used public transport (metro, train, etc.) or active transport. Active transport walking or cycling may be chosen as a transport mode to increase physical activity opportunities (Hamer & Chida, 2008). Scheepers and colleagues (2013) studied choice in active transport in the Netherlands and found that active transport modes were chosen over car use mainly for

commuting short distances. Some factors influencing choice are more relevant for specific modes, such as active transport modes (Boarnet & Crane, 2001; Cao, Mokhtarian & Handy, 2009; Ewing & Cervero, 2010; Gärling, 2007; Kitamura, Mokhtarian, & Laidet, 1997; Lee & Moudon, 2006; Mitra, 2013), public transit or personal car use (Van, Choocharukul & Fujii, 2014). Transportation planners and planning organizations, in order to model future demand for transportation and to influence use of more sustainable modes of transport, have accomplished much work in travel mode choice. However, findings are contextually based, and depend on infrastructure that supports the travel mode, so choice is often dependent on viable options for travel.

The decision to commute by a certain mode of transportation may be considered an aspect of control (Koslowsky, 1997). For example, a passenger must relinquish actual physical control to directly navigate the vehicle, while car drivers may retain control. Further, although car commuters may expect to have control during their journey to work, they may experience a lack of control on an unexpectedly crowded road (Koslowsky, 1997). Passafario and colleagues (2014) found that perceptions of control influence choice of travel mode by bicycle, but did not predict bicycle use in their model. Therefore, control desires may influence choice of mode.

Lack of control during a commute can lead to stress and lowered well-being. Bus commuters may relinquish driver control, but may choose this mode since it allows participation in enjoyable past-times such as reading or socializing (Guell & Ogilvie, 2015), thereby enhancing engagement and enjoyment, dimensions of experience in the DLW framework. Choice may reflect various individual needs, which have implications for well-being through inducing stress and influencing mood. Control issues and expectations of control can therefore modify individual commute experiences and well-being. DeVos and colleagues (2013) propose

that autonomy and choice in travel has a direct influence on well-being, and reflects the potential to travel in a particular way. They suggest that autonomy and freedom to travel how one desires has value in and of itself, reflecting option values. Legrain found that individuals who have used multiple mode options have less stress (2015).

Choice of travel mode has been linked to well-being both directly and indirectly through qualitative research (Guell & Ogilvie, 2013; Hiscock et al., 2002). For example, some London cyclists described their preference for cycling over driving in order to gain more control over their commute journey and get to work the fastest (Guell & Ogilvie, 2013). This can promote positive attitudes in travel. Lopez-Saez and colleagues (2014) examined how factors of commute mode influence well-being indirectly, such as the time needed for the commute (reliability, speed, and control), while secondary factors related directly to personal wellbeing (comfort and privacy) or to collective wellbeing (environmental impact of the chosen mode). Commuters, when making their decisions on choice of mode, generally perceived health and the environment as having secondary importance.

Scheepers et al., (2015) found a significant association between choice of transport mode and perceived general health, but not between transport choice and perceived psychological well-being. They found that cycling was significantly associated with higher perceived general health and having a healthy body weight, but not with higher perceived psychological well-being. In their study walking was found to be significantly associated with having a healthy body weight but not with general or psychological well-being.

Guell and Ogilvie (2015) found that many commuters in Cambridge, England who described a lack of choice in their commuting experienced their commute as a chore, while those who described “enjoyment in their everyday travel reported having made a conscious choice” (p.

213). Therefore, wellbeing in their study seemed to require at least the perception of choice. Commuters using all different modes expressed well-being, but only if they had made conscious decisions surrounding their commute such as for including physical activity in their daily routine. The researchers concluded that ideal commuting varies from person to person, and is reflected in the choice and the experience of the chosen commute mode. They linked choice to both physical and emotional well-being, concluding that “a sense of choice is important in experiencing if not healthy commutes, then happy commutes” (Guell et al., 2015, p. 214).

Some researchers have evaluated choice as an outcome measure in travel mode research. For example, Duarte et al. (2010) studied the impact of happiness on the decision choice between a use of a car or public transport for commuting in several southern European countries, suggesting that people often make choices that are related to their own sense of happiness. Duarte and colleagues wished to determine whether transport happiness influences overall well-being, especially whether people feeling happy with their life choose the same transport mode as unhappier people. They presented different cartoons to 870 individuals to quantify the impact of a travel mode environment in the transport mode decision process, and to find out if the expected happiness, inferred by the cartoons, changes the way an individual chooses a transport mode. They found that those who use non-motorized modes for commuting exhibit greater satisfaction and happiness than those who use motorized modes, and public transport users (metro and train) are more satisfied with their work commute than car users.

In the Netherlands, there are multiple modes of travel from which to choose, and this reflects a higher level of well-being for participants (Gärling, 2007). Stress and control are key components of these well-being findings. Legrain and colleagues (2015) found that the desire to use another mode of transport more frequently (e.g. wanting to use transit or to drive more), is

positively associated with stress. This indicates that a lack of contentment with the current commute mode leads to more stress, so that drivers who wished to walk more demonstrated higher levels of stress. Legrain argues that “perhaps a component of the stress certain drivers feel is related to feelings of control; they feel more stressed because they wish to walk to work or school, but cannot” (p. 148-149). In their study, control and choice in travel mode was linked to loss of well-being through stress. This has implications for dimensions of experience in the DLW, since stress can limit experiences of pleasure and joy, as well as self-care.

Other studies have linked measures of control in travel to stress. Novaco, Stokols, Campbell, and Stokols (1979) found that measurements of control help explain the forces that cause stress in travel. Travel impedance describes how specific stressors such as traffic congestion impede one’s commute. The stress of impedance is mediated by many factors, including control, so that having personal control over one’s trip (distance or route or time) lessens the stress (Novaco et al., 1990; Schaeffer, Street, Singer & Baum, 1988). One study demonstrated that perceived control in commuter train access (getting on the train and getting a desired seat) is inversely related to psychophysiological stress (Singer, Lundberg, & Frankehauser, 1978). Much research links stress and anxiety to car commuting, particularly in relation to a lack of control from traffic congestion (Gee & Takeuchi, 2004; Novaco & Gonzalez, 2009; Novaco et al., 1979; Rasmussen, Knapp, & Garner, 2000; Reardon & Abdallah, 2013).

Legrain et al. (2015) consider mode to be a significant component of commuting stress, in which variables that are inherent to different modes contribute to the stress of that commute. These studies investigate stress as a factor of control, and evaluate stressful outcomes by commute mode at a Canadian university. Driving generally has been shown to be the most stressful mode of transportation when compared to others (Legrain et al., 2015), such as train

commuting (Wener & Evans, 2011), however results are often conflicting, and depend on distance traveled and location, as well as how stress is measured (Legrain et al., 2015). Active mode commutes were the least stressful (Abou-Zeid, 2009; Gatersleben & Uzzell, 2007). Legrain and colleagues found that “both walking and taking transit have a strong negative effect on stress when compared to driving” (p. 148). Gatersleben and Uzzell (2007) surveyed drivers, cyclists, walkers, and public transport users, and found that car drivers have the most stressful commutes, while others found transit to be the most stressful commute mode (Haider, Kerr & Badami, 2013; Ory et al., 2004).

The context in which the study occurs may influence the stress of the experience, such as urban versus rural, length of the commute, or other variables. Kunn-Nelen (2015) found commute time is more negative for perceived health of car drivers than for public transport commuters. McLennan and Bennetts (2003) found that perceived stress varied based on the length of the commute and the travel mode. Longer journeys by car resulted in more stress compared to other modes, while public transit users were most stressed on shorter journeys. Further, having multiple options for travel resulted in less stress. In summary, context influences travel mode stress, and measures of stress may vary from study to study, resulting in inconsistent outcomes. Since stress is an important factor in both physical and psychological well-being, examining what causes stress is necessary.

Determining the cause of stress is difficult, and travel predictability is often used to measure personal control in commuting (Evans, Wener & Phillips, 2002). Control and predictability may vary by mode. For example, transfers on buses promote less control and less predictability, while shorter travel times mitigate these stressors. Predictability can be a similar concept to control, or at least the perception of control (Koslowky, Kluger & Riech, 1995;

Novaco & Gonzalez, 2009). According to Kluger (1998), “when a commute has low variability across days, the aversiveness of the commute is predictable and uncertainty is low, hence the commuter can maintain a sense of control” (as cited in Novaco, 2009, p. 16). For public transport, predictability, or knowing exact departure and arrival times “removes uncertainty, and increases feelings of control” (Dziekan & Kottenhoff, 2007, p. 492). If the service is perceived as more reliable, people feel more in control and this can reduce stress. Car commuters experience more stress and more negative moods than active transporters (Wener & Evans, 2011), which can be attributed to more perceived mental effort involved in driving and less predictability due to traffic and commute time. Wener & Evans (2011) studied how commute modes influenced effort and predictability, resulting in stress and mood alteration. They found that car commuters in New York city found their trip was significantly less predictable than did train commuters. They also found that predictability was a significant mediator of the effects of commuting mode (Wener & Evans, 2011). Gottholmseder, Nowotny, Pruckner, and Theurl (2009) found that as the unpredictability of commute time increased, perceptions of stress increased.

Additionally, access issues are a factor in terms of having control. In public transport, due to limited routes and uncertain departures/arrivals, control is limited, while greater control and choice are linked to active transport modes such as cycling (Steinbach et al., 2011) and walking. Active modes allow more freedom and flexibility, but may require equipment or shorter distances for travel than car travel (Koslowsky et al., 1995; Nix et al., 1999). Choice of walking is often related to the built environment, particularly the safety and comfort of the surroundings (Ferrer, Ruiz, & Mars, 2015). Transport modes vary in their ability to provide safety. Car travel may cause physical safety issues, as well as perception of safety, and a psychosocial benefit of protection (Reardon & Abdallah, 2013). Risk perception is a factor in several modes of transport,

particularly bicycling and walking, and often requires adapting routes or times in order to maintain safe traveling (Dessing, de Vries, Hegeman, Verhagen, Mechelen & Pierik, 2016; Evenson et al., 2016; Krenin, Oja & Titze, 2014; Rossen et al., 2011). Bicycle commuters may make the choice to commute despite the dangers of traffic (Guell & Ogilvie, 2015), and car commuters may underestimate the risks when traveling.

Another consideration in travel mode choice suggests that residential location can influence travel mode choice, which in turn influences well-being. One paradox of commuting is observed in which residential location, such as suburban living, positively influences quality of life through access to green space or nicer house or less congestion, but which can result in a longer commute, which lessens well-being (Vega & Reynolds-Feighan, 2009; Ye & Titheridge, 2015). Well-being may therefore be influenced by choices of location as well as other factors, such as travel costs associated with location.

Sener and Reeder (2014) suggest that choices of travel mode are based on people's roles in life and society. Therefore, employment role and work requirements, such as hours worked, location, commute distance, etc., can influence choice of travel mode. Discrete choice models in transportation examine mode choice patterns to predict travel patterns. Danaf, Abou-Zeid and Kaysi (2014) found that travel time, cost, income, car ownership, gender and residence location were the main factors influencing choice of travel mode in college students at a university.

In summary, the amount of control in commuter transport is linked to well-being through travel mode choice and participation. Mediators of control include the amount of stress from the commute, as well as environmental and personal characteristics. Commute modes such as active transport may provide more control, but choice may be limited by access, distance, and safety factors.

Routine

Routines are considered “regular, repetitive, predictable patterns of behavior or time use, including habits, rituals, and the rhythms of life” (Moll et al., 2015, p. 16). Regular rhythms and habits of activity are linked to stability and establishing or grounding humans in their culture (Hasselkus, 2011). Ehn and Lofgren (2007) suggest routines can also be beneficial by offering security and predictability. Routines introduce organization and structure, freeing an individual’s mind (Clark, 2000; Kahneman et al., 2004; Ludwig, 1998) and “conserving energy and attention to enable quick responses to unexpected contingencies or pursuits that have a higher priority or importance” (Christiansen & Townsend, 2010, p. 10). Routines may therefore allow one to “combine many tasks with other activities – from daydreaming to other kinds of multi-tasking” (Ehn & Lofgren, 2007, p. 101).

Routines may be health promoting by providing a buffer from the stressors of everyday life, especially when they address or adapt to meet certain basic individual needs (Christiansen & Townsend, 2010; Ludwig, 1997; Polatajko et al., 2007; Yerxa & Locker, 1990). For example, commuting to work is an example in which the time frame is generally defined, and family routines are often set around this activity, but changing this routine may be useful for childcare or family responsibilities.

Routines may also be health-promoting by providing a mechanism for “achieving given outcomes and an orderly life” (Clark, 2000, p. 128S). Studies have shown that having an orderly life results in higher levels of active coping and therefore greater mental health (Reich & Zautra, 1991). Weisner (2009) describes how individuals have a desire to sustain a daily routine to influence their well-being. Routines can enhance well-being through providing opportunities for habits. Habits are the things that one does repeatedly, while routines are the structure in which

occupations are organized (Clark, 2000). One way in which routines and habits can be health-giving is through providing discipline for a healthy behavior (Ludwig, 1998; Zemke, 1994). Additionally, repeated patterns of daily living involving activities that reflect values and interests promote expression of character and identity, allow creativity, and enrich life (Clark, 2000; Dewey, 1922; Giddens, 1991). Routines within a socially constructed environment can also influence healthy behaviors. For example, participation in regular family routines by adolescents has been correlated with decreased mental illness and increased self-esteem (Koome, Hocking, & Sutton, 2012). Therefore, routine “connotes control, constancy, and everydayness” (Aldrich & Dickie, 2013, p. 12).

Routines can also have a negative effect on health, especially when they are demanding and inflexible (Clark, Sanders, Carlson, Blanche, & Jackson, 2007; Corbin, 1999) or excessive, in which case they can be destructive (Christiansen & Townsend, 2010), or when they promote mindlessness or stress. Routines may exist along a continuum in which they may enhance or inhibit well-being (Christiansen & Townsend, 2010; Ludwig, 1998; Moll et al., 2015).

Commuting is moving from one location to another to fulfill obligations for work or for education. Commuting is a necessary part of a daily routine, performed usually during the weekdays, and therefore has a regular pattern in most people’s lives. The commute pattern predominates in the morning and evening routine of most adults, when a person goes to school or work and returns home in the evening, and so is associated with the work routine. Most employees and students have fixed schedules and need to arrive at a specific time. Students may have more irregular schedules, similar to part time workers. Work and school “require compliance with specific temporal expectations that set a daily schedule and routine” (Primeau, 1996, p. 120). The association between type of activity and time of day has been studied in

occupational science in terms of activity rhythms, and regular routines have been hypothesized to be important in maintaining mental health in certain populations through “synchronizing biologic[al] rhythms” (Christiansen, 1996, p. 440).

Commuting is also a daily routine which is subject to other contextual conditions such as environmental constraints. For example, the environment can place the commuter in situations that are difficult to maneuver, such as traffic jams for cars, crowds and lengthy waits for buses, and inclement weather for pedestrians and cyclists (Feng & Boyle, 2014). Commuters have an obligation to arrive at a specific destination, at a specific time, in order to perform a specific activity (employee, student, etc.). They must do this in the context of personal, family, and community responsibilities.

One avenue in which routines and habits of commuting can influence well-being is through the ways in which a mode of travel facilitates or prevents routine. For example, certain travel modes may be more amenable to routine, allowing for accurate prediction of arrival time, as discussed previously. Other routines include having particular habits during the commute which provide familiarity, such as reading the newspaper on the subway. Therefore, the ability of a commute mode to facilitate a predictable and consistent routine will be investigated. The assumption is that the commute experience exists along a continuum of predictability/unpredictability, and this influences well-being.

Time use patterns are often investigated in commuting, and time use patterns can indicate whether routines are regular or irregular. The commute by car has been frequently implicated with irregular time use patterns due to traffic congestion. Public transport users also deal with irregular schedules, which contribute to the stress levels of commuters. Some studies, however, show how car commuting facilitates routine, while also allowing individuals to meet challenges

when their routine is interrupted (Goodman, 2012). However, in their study walkers and cyclists described their journey duration as far more predictable than car commuters and far less vulnerable to external circumstances such as traffic congestion.

Descriptions of commuting experiences involve perceptions of routine and predictability, as well as mindfulness and engagement. Clark (2000) describes a person's morning commute on the freeway as an example of an habitual occupation. O'Dell (2013) describes his multimodal morning commute by bike and train, from the perspective of routine and habits involved, as being unpredictable in nature. He describes the rhythm of the commute as "broken" when transitioning from bike to train, causing a "moment of unpredictability [which] is injected into the routine as commuters stand anticipating the train. As the train approaches, the cultural energy on the platform thickens. Newspapers are folded, bags are picked up and idle daydreams dissipate" (p. 6). O'Dell describes how the jostling for seats on the train continues the unpredictable daily experience. O'Dell's account of train commuting connotes a feeling of anxiety and stress, influencing commute well-being through lack of routine.

Middleton (2011) examined walking as a routine practice, and interviewed commuter walkers to determine their habits. She found that breaking the commuting routine through holidays resulted in a loss of a sense of timing and awareness – almost a loss of mindfulness, from which it took time to recover. The repetition influenced the individual's competency as a pedestrian. Middleton argued that "habitual movements are a coping mechanism for pedestrians as they negotiate the city on foot" (p. 2873). She suggests that habitual behaviors, especially in walking for transport, have transformative potential to make other activities possible. This suggests that routine and habit are positive components of commuter walking, and may allow for positive well-being.

Other transport modes, such as cycling and walking, may allow for greater predictability and therefore greater adherence to routines (Gardner, 2009; Evans et al., 2002). DeBruijn, Kremers, Singh, van den Putte, and van Mechelen (2009) studied habits and intention in Dutch cycling commuters, and found that habit strength predicted bicycle use, such that the more a person cycled, the more habitual it became for the cyclist. This may be due to the habituated physical activity, which Heesch (2014) found to be one of the strongest correlates of commuter cycling (utility cycling). Others found that active commuting provides a routine for incorporating regular physical activity in daily life (Djurhuus, Hansen, Aadahl, & Glumer, 2014). Sener & Reeder (2014) found that flexible work schedules facilitate participation in physical activity through ability to include active travel in daily routines. Therefore, work and employment conditions can influence active travel behavior routines.

Others have found that car travel provides opportunity for routine, such as listening to a particular radio program only on the way to work (Guell et al., 2015). The regularity of the commute time may coincide with a program, which may be an opportunity provided only by a certain mode of travel. Public transport also provides opportunity for similar routines, such as reading the newspaper.

In summary, routines are entrenched and important in daily lifestyles, especially in travel. O'Dell (2007) calls the routine of commuting “infraordinary,” since it is, like infrared light, almost invisible in our lives, and the ritual is “embedded in our biological being and sense of self” (p. 87). He argues that the commute is culturally produced and organized so completely by our culture that this “works to disguise the dramas and tensions ever implicit in the commute.” (p. 87). The idea of culturally imposed travel requirements is consistent with forces that affect activity engagement, creating feelings of limited control, thereby influencing health and well-

being. For example, routines of travel can also be stressful if they are not fulfilling the needs of the traveler or providing for easy transitions. Therefore, commuting is a routine which is constructed externally and internalized, but which influences our well-being in ways which we may not be aware, both positively and negatively.

Section Two: The Dimensions of Experience of the “Do-Live-Well” Framework

The dimensions of experience in the DLW framework describe the range of everyday experiences that are necessary in living a healthy life (Moll et al., 2015). The concept of dimensions is based on Jonsson’s (2008) idea of classification according to how people experience occupation. The dimensions are broad categories of experiences and include activating the body, mind and senses, contributing to community, self-care, expressing identity, developing capabilities and potential, connecting to others, and enjoyment. These concepts are operationally defined in Table 2, and explained further in the context of transportation.

Table 2. Operational Definitions of Dimensions of Experience

Variables	Operational Definitions*
Activating your body, mind, and senses	The degree to which the commute mode enables activating the body, mind, and senses
Connecting with others	The degree to which the commute mode allows one to connect with others
Contributing to community and society	The degree to which the commute mode allows one to contribute to the community and society
Taking care of oneself	The degree to which the commute mode allows one to take care of oneself
Building security and prosperity	The degree to which the commute mode allows one to build security and prosperity
Developing and expressing identity	The degree to which the commute mode allows one to develop and express identity
Developing capabilities and potential	The degree to which the commute mode allows one to develop capabilities and potential
Experiencing pleasure and joy	The degree to which the commute mode allows one to experience pleasure and joy

* Dimensions of experience are operationally defined for this study are based on the DLW framework (Moll et al., 2015), constructed to reflect travel mode experience.

Dimensions of Experience

The following section of the literature review will explore the dimensions of experience in the DLW, and how they relate to well-being. The DLW framework describes the dimensions of experience as “broad categories of everyday experience that are diverse yet distinct, understandable, meaningful, and evidence based” (Moll et al., 2015, p. 11). These eight dimensions of experience include activating the body, mind, and senses, connecting with others,

contributing to community and society, taking care of yourself, building security and prosperity, developing and expressing identity, developing capabilities and potential, experiencing pleasure and joy. The dimensions of experience provide a framework with which to systematically categorize experiences in this literature review.

Activating your body, mind, and senses

Activating the body and senses may occur during active modes of transportation, such as cycling or walking. Sensory experiences during bicycling are described by Spinney (2006) in an ethnography which details the sounds, smells, sights and kinesthetic experience of cycling in the mountains. Stefansdotir describes the aesthetic experience of commuting by bicycle in an urban space as a “multisensory phenomenon influenced by various motivational factors” (2014, p. 496). Perception of sensory information may be different for a commuter versus a recreational cyclist (Spinney, 2007; Stefansdotir, 2014), as well as for drivers (Appleyard, Lynch & Myer, 1966) and pedestrians (Gehl, Johanse Kaefer & Reigstad, 2006). Variations in visual experience may be due to speed with faster modes providing less detail of the environment and travel by foot more amenable to receipt of full sensory input since focus may be on traffic or intersections, requiring immediate and narrowed concentration. Perceptions while traveling can influence the meaning that the experience has for the commuter, since elements of the environment that may catch the commuter’s attention may have symbolic or instrumental meaning due to the aesthetic experience (Stefansdotir, 2014). Other research has explored speed of travel by various modes and visual experiences. For example, Forsyth and Krizek (2011) describe how speed of cycling influences the sensory experience of the cyclist.

Sensory experiences may be motivating factors for participation, as well as a need for fitness or skill challenge. The meanings for the person may therefore relate to participating or

identifying oneself as an active person for active modes. Reardon and Abdallah (2013) suggest that reduced anxiety and stress as a result of cycling and walking for transport may be due to physical activity. Meanings and motivations overlap when motivations fulfill needs such as personal interests or values (Nix, Ryan, Manly & Deci, 1999), suggesting that sensory experiences which motivate participation provide various personal meanings.

Accounts of sensory experiences by car commute are rare, but do occur. Kent (2014) argued that the complex physical sensations associated with being carried by a car, and controlling the car, enhance enjoyment. Others have described the pleasure of driving experienced by beautiful scenery, speed and a sense of mastery in operating the car (Jakobsson Bergstad et al., 2011b; Ory & Mokhtarian, 2005). In an ethnography of commuters, one car commuter described the sounds during a traffic jam, stating, “everybody has their car windows open and everybody’s playing different music” (Guell & Ogilvie, 2015, p. 211). In this study, the sensory experience was reported as a positive emotion, and interpreted as a “tactic” to make the experience more meaningful (Guell & Ogilvie, 2015). Activating the body and mind may help make stressful or boring commuting experiences more enjoyable and rewarding by providing meaning.

Connecting with others

Mode of transport may affect overall well-being through connecting with others. Public transport has links to positive social interactions. For example, public transport may provide the “opportunity for brief contact with others in one’s community,” facilitating ‘thin’ bonds (Abdallah & Johnson, 2008, as cited in Reardon & Abdallah, 2013, p. 641). Lack of transport opportunities can also influence well-being through social exclusion. Car ownership or access to transport has been shown to be inversely related to loneliness (Victor, Scambler, Bowling &

Bond, 2005). Social exclusion has been linked to owning fewer cars and less use of public transport (Stanley, Hensher, Stanley & Vella-Broderick, 2011). Mobility options (differences in access, competence, and appropriateness) and their influence on well-being reflect forms of social inequality, and studies are limited (Reardon & Abdallah, 2013; Stanley et al., 2011).

Contributing to community and society

Steinbach and colleagues (2011) found that participation in cycling was related to certain ethical or aesthetic attitudes such as sustainability, suggesting that participation in active commuting by bicycle generates meaning through contributing to societal goals of resource conservation and limitations to pollution. Mattison, Hakansson, & Jakobsson (2015) found a significant association between commuting by car and low social capital and participation in community events. This association was not true with active commuting, and further, the longer the commute time, the greater the association. The relationship between decreased social capital measures and commuting time also held for public transport users, but only when the commute was of long duration (Mattison et al., 2015). Time use in commuting can influence community involvement, as demonstrated by research showing that the commute lowers participation in community affairs by 10% for each additional 10 minutes (Putman, 2000, as cited in Reardon & Abdallah, 2013, p. 642).

Taking care of yourself

The DLW model describes taking care of oneself as “attending to personal physical, psychosocial, and spiritual needs” (Moll et al., 2015, p. 14). Physical activity can influence health, and choice of transport mode can affect physical activity levels (Reardon & Abdallah, 2013). Studies demonstrate a significant association between commute transport mode use, physical activity and obesity levels (Craig, Brownson, Cragg & Dunn, 2002; Lindström, 2008;

Wen, Orr, Millet & Rissel, 2006). Craig et al. (2002) found that obesity was higher in communities where car is the main mode of transport, and Wen et al. (2006) found that car commuters had higher levels of obesity and lower levels of physical activity compared to non-car commuters. Lindstrom (2008) found that Swedish workers who walked or bicycled to work were less likely to be overweight or obese, while only Swedish men were likely to be obese when using public transport.

Daily physical activities (not necessarily gained during commuting) such as cycling or walking may also have a protective effect on mental and psychological functioning, stress, and anxiety (Ellefsen, 1997; Hamer, Stamatakis & Steptoe, 2009), and some studies have shown that commuting by cycling or walking is associated with improved psychological health (Martin et al., 2014). Ory and Mokhtarian (2005) found positive well-being meanings from travel to include a form of escape and physical exercise and independence. Steinbach et al. (2011) identified some motivations for cycling, including maximizing future health gain and minimizing wasted time. Sun, Liu, and Tao (2015) evaluated nearly 20,000 Chinese children in grades 4-12, utilizing body mass index, body fat, and waist circumference as well as depression symptoms and their associations with active or passive travel to and from school. They found that active travel was associated with significantly better mental and physical well-being than passive travelers. In summary, these studies indicate that active transportation may provide greater opportunities than passive transport for taking care of oneself both physically and emotionally.

Developing and expressing identity

Participation in certain travel modes may promote meanings of identity. Symbolic value of travel mode is often associated with cars. For example, Cairns, Harmer, Hopkin and Skippon describe the unique values and meanings associated with driving a car, which include signaling

masculinity and allowing independence (2014). Travel by car has been shown to provide symbolic meanings such as status and prestige compared to public transport (Ellaway, Macintyre, Hiscock, & Kearns, 2003; Hiscock, Macintyre, Kearns & Ellaway, 2002; Steg & Gifford, 2005). Other benefits from car use, as opposed to public transport, include autonomy (Ellaway et al., 2003; Gardner & Abraham, 2007; Gatersleben & Uzzell, 2007; Hiscock et al., 2002; Mann & Abraham, 2006). Steg and Gifford (2005) argue that the car provides “more status and pleasure than other modes [because] it is a means of self-expression and enables one to control a powerful machine” (p. 61).

However, meanings may vary by culture. For example, in the U.S., car travel is linked to higher status and affluence, while in some European countries bicycle travel has higher status (Aldred, 2010; Edensor, 2004). Steinbach et al., (2011) studied how cycling in London typically appealed to a certain gender (males), ethnicity (caucasian) and class (affluent), and was linked to a bourgeois existence and independence, depending on local norms. Certain ethnic groups or female gender found meanings in cycling despite the lack of participation by others in their group, suggesting that the lack of popularity didn't inhibit meaningful participation for some (Steinbach et al., 2011). Meanings for other genders and ethnicities included pride in accomplishment of traveling by a unique mode, ethical and aesthetic values, and informal membership in a 'cycling club.' In summary, many travel modes can be valued “as a means of self-expression,” and can enhance psychological well-being through expressing identity (Abou-Zeid, 2009, p. 22).

Developing capabilities and potential

Travel by car has been shown to provide greater psychosocial benefits such as mastery, self-esteem, protection, and autonomy, than public transport (Ellaway et al., 2003; Hiscock et al.,

2002). De Vos and colleagues investigated how having “knowledge and skill regarding [transportation] can generate feelings of freedom, competence and belonging” as well as provide the confidence to realize certain goals (2013, p. 422). Self-reward value includes flow experience, in which the skills match the challenge of the occupation, and can be more meaningful than instrumental value (Novaco & Gonzalez, 2009). There are no known studies on developing capabilities and potential in cycling for transport.

Experiencing pleasure and joy

Some have described commuting as an enjoyable activity, while others indicate it is an obligatory activity to be endured (Gardner & Abraham, 2006; Mann & Abraham, 2006). Research shows that enjoyment may vary by mode. Gatersleben and Uzzell (2007) surveyed 389 commuters in the U.K. at a university setting to determine any relationship between travel mode choice and affective appraisals of the daily commute. They found that commuters who walk or cycle were more likely to find their journey relaxing, while car users were more likely to find their journey stressful. Secondly, they found that users of public transport were more likely to find their commute depressing or boring, while other modes (walkers, drivers, cyclists) are more likely to find their journey exciting. Using content analysis, they identified both unpleasant experiences (negative arousal or stress) and pleasant experiences (flexibility of the travel experience, scenery, co-existing activities and enjoyment) in all modes. Unpleasant experiences by cyclists and pedestrians resulted from environmental danger and inconvenience, while delays were most unpleasant for drivers and transport users. Overgrown sidewalks, lighting issues and road crossing dangers were most unpleasant for walkers, while car traffic and noise were most unpleasant for cyclists. Public transport users found delays stressful, as well as promoting boredom. Car drivers had much higher levels of stress than other commute modes. Walkers and

cyclists considered their experience enjoyable due to relaxation and excitement, while public transport users enjoyed music and reading. Overall, the most pleasant experiences of participants did not vary as much by mode used, while the most unpleasant experiences were very mode-dependent (public transport and car).

In another study, Paez and Whalen (2010) compared enjoyment of commute by transportation mode among university students. They found that active travelers (walkers and cyclists) had more satisfaction with their commute compared to transit users or car commuters, concluding that active commuting is more conducive to enjoyment than motorized modes of transportation. The surrounding environment or activities during travel influenced enjoyment for both car and bicycle commuters. Others have used ethnographies to document enjoyment (Guell & Ogilvie, 2015). One cyclist described how the aesthetics of his commuting route influenced enjoyment, stating, “it’s all green, there are huge houses with nice gardens and I’ve started to choose the route now for its pleasantness at the start of the morning” (Guell & Ogilvie, 2015, p. 209).

Motivation to use various modes for transport has been linked to the enjoyment or lack of enjoyment. For example, car use has been strongly linked to positive affect (freedom, fun, love of driving), and less strongly to instrumental motives such as transportation characteristics (cost, comfort, privacy, safety) (Steg, 2005; Steg, Vlek, & Slotegraaf, 2001). Vehicle type can influence judgments and enjoyment of travel (Collantes & Mokhtarian, 2007; Novaco & Gonzalez 2009). Other accounts indicate that car commuting has annoyances not found on the bus, and bus commuting allows pleasure through winding down after work, reading a book or chatting with people (Guell & Ogilvie, 2015), influencing choice of commute mode.

Olsson and colleagues found satisfaction with work commute linked to overall happiness (2013). They measured satisfaction using a nine-point scale that addressed quality of travel. They found that walking and bicycling to work resulted in more satisfaction than car and public transit. Using a Satisfaction with Travel Scale, they demonstrated that positive or neutral feelings dominate during the work commute. Finally, they conclude that, “for many people, being able to make the routines of everyday life work, such that positive feelings dominate over negative feelings resulting from daily hassles, may be equally important for their overall happiness” (Olsson et al., 2013, p. 262). In summary, commute enjoyment is linked to commute mode and

Section Three: Health and well-being outcomes of the “Do-Live-Well” Framework

Health and well-being outcomes are the third part of the DLW framework, and relate to the multidimensional state of well-being. The DLW framework utilizes an outcome of “flourishing” to describe this broad positive state of well-being, which is defined in terms of optimal human functioning, and is associated with “goodness, generativity, growth and resilience” (Frederickson & Losada, 2005, p. 678). According to Keyes (2002), adults who are mentally healthy are flourishing in life and have high levels of well-being, as opposed to those who are languishing.

Indicators of well-being include both the hedonic and eudaimonic interpretations affected by travel. Hedonic well-being refers to feelings of happiness, while eudaimonic well-being refers to having a purpose in life. Jakobsson Bergstad (2011a) suggests that “daily travel is itself likely to affect individuals’ mood and lead to a cumulative satisfaction” (p. 3). Therefore, measuring well-being in several ways can be useful to determine how well-being is affected in the domain of travel.

Novaco and Gonzalez state that commuting in and of itself is not intrinsically harmful, and it is not a “uniformly unwanted activity pattern” (2009, p. 29). Some qualitative studies suggest that commuting is something people look forward to, rather than revile (Jain & Lyons, 2008; Mann & Abraham, 2006). This may depend on the utility of the commute, e.g. the instrumental value such as doing work tasks, social networking, relaxation, or the symbolic or affective value such as freedom, self-esteem, protection, and autonomy (Novaco, 2009). These values or utilities may vary by transport mode. For example, Steg and colleagues (Steg, 2005; Steg, Vlek & Slotegraaf, 2001) found that car use is more strongly related to symbolic and affective motivations than instrumental motives.

Perceived health status was found to co-vary with transport modes. For example, in a study of 3,663 adult cyclists surveyed in the Netherlands, cycling was found to be associated with better perceived general health, but not with better perceived psychological wellbeing, while walking was not associated with either (Scheepers et al., 2015). Scheepers and colleagues utilized the Mental Health Inventory (MHI-5) containing five questions and Likert scale responses, to measure perceived psychological well-being (Scheepers et al., 2015). Recreational cycling has been shown to influence emotional well-being (Garrard et al., 2012), but commuter cycling well-being has not been well researched. Several studies in the United Kingdom on transport and well-being have yielded differing results, depending on the type of survey used. Humphreys et al. (2013) used a survey (SF-8) and found no significant difference between transport choice and psychological well-being for commuters in Cambridge. However, Martin et al. (2014) used a 12 item general health questionnaire (GHQ-12) and found a positive association between transport choice and psychological well-being for commuters in Great Britain.

DeVos and colleagues (2013) describe five ways in which individuals experience well-being from travel. The first way is through experiences during destination-oriented travel. For example, stress can occur from traffic and joy can occur in country driving, resulting in positive and negative affect or feelings (Abou-Zeid, 2009; Ettema, Gärling, Olsson & Friman, 2010). Additionally, travel affects well-being through travel-facilitated activities that a person can participate in, as well as through limited participation from limited travel opportunities (Currie et al., 2010; Delbosc & Currie, 2011). Activities can help people achieve growth and progress in their goals (Ettema et al., 2012). The third way well-being is affected by travel is through activities during destination-oriented travel (Ettema et al., 2012), such as through secondary activities (reading, listening to music, socializing) during the travel. The fourth way well-being is affected is when travel is the activity, where travel is done for its inherent value such as for scenery, or the sensation (joyriding) (Mokhtarian & Salomon, 2001). The last way well-being is affected, according to De Vos and colleagues (2013) is through potential travel, which refers to a person's freedom to be motile and one's access to resources (Nordbakke, 2013; Nordbakke & Schwanen, 2013). In summary, De Vos and colleagues described five ways in which travel behavior influences well-being. Some of these relate to commuting (experiences during travel, travel facilitated activities) while others may not (potential travel), and for some it is unknown whether they relate to commuting as the travel purpose (when travel is the activity).

These investigations have utilized various methods for well-being measurement, depending on their conception of well-being (DeVos et al., 2013). DeVos and colleagues (2013) reviewed two intellectual traditions of well-being (the hedonic and eudaimonic approaches), and suggested that a combination of the two measures gives the best results. They suggested scales that include eudaimonic aspects, such as the Flourish Scale (Diener et al., 2010), as well as

hedonic scales, such as SPANE (Scale of Positive and Negative Experience) (Diener et al., 2010) are robust, provide pertinent well-being results, and can be used for travel.

Other well-being studies have also been used to evaluate travel well-being, such as the Satisfaction with Travel Scale (or STS) (Jakobsson Bergstad et al., 2011a). This study was used to test and measure travel-related subjective well-being (SWB), especially how changes in SWB are dependent on context-specific factors. They wanted to understand how changes in travel context such as travel mode influenced SWB. Their measure of travel-specific well-being was intended to indicate the effect of travel on people's SWB. Their test, the STS, showed reliability, as well as the ability to compare well-being by travel mode (bus vs. car). Their survey is based on previous research which gives evidence for the impact of activity performance (daily activities performed which are instrumental to life goals) on subjective well-being. For example, Pychyl & Little (1998) proposed that the eudaimonic aspects of progressing towards life goals (unrelated to travel), and organization of activities into projects are instrumental for subjective well-being. Others have demonstrated that daily life satisfaction depends on the type of activities in which a person engages, especially when they have value for the person (Oishi et al., 1999). Others found that daily struggles can negatively impact well-being through negative moods (Gadermann & Zumbo, 2007).

How transport modes influence well-being also has importance in transportation systems and their design for efficiency and safety, as well as in community transportation planning. Some transportation researchers have studied how travel affects overall well-being by facilitating access to activities (Abou-Zeid, 2014). Guell and Ogilvie found that in the UK, commuters associated a lack of choice in their commuting with a lack of well-being (2015). Additionally, those who acknowledged well-being also had made their commuting experiences meaningful.

Well-being was described simply as ‘positive experiences’ during commuting, so some research links activity patterns in commuting to well-being.

Section Four: Forces that Affect Activity Engagement in the “Do-Live-Well” Framework

Contextual influences affect the daily activities of people. In occupational therapy, the Practice Framework describes how environment (physical and social environment) and context (cultural, personal, institutional and temporal elements) influence participation and performance (American Occupational Therapy Association, 2014). The DLW includes contextual influences on participation, as does this study which examines demographics and other influences on the commute experience.

Several studies examine how demographic influences affect participation in different travel modes. Scheepers and colleagues (2013) study in the Netherlands found that educational achievement influenced mode choice, such that persons with a college degree used active transport the most, with lower use by persons with a lower educational attainment. Gender differences by mode are also commonly evaluated. For example, Heesch, Sahlqvist and Garrard (2012) found that men are more likely to commute by bicycle than women, and both were influenced by personal factors of health and enjoyment. Roberts, Hodgson & Dolan (2011) used a British Household Panel Survey of more than 14,000 individuals, and found that commuting time has a detrimental impact on the psychological health (as measured by the GHQ-12) of women, but not men. Novaco et al. (1991) found that female drivers were the most negatively affected by stressful commutes, demonstrating that gender is an important moderator of commuting stress. This was not the case with train commuters, in which gender did not interact with commute variables in stress measures (Evans et al., 2002).

Other studies demonstrate that sociodemographic factors influence mode choice. Yong et al. (2015) found that psychological motives of car use (symbolic and affective motives) were valued more strongly in men than in women. Western gender findings are from Ellaway et al. (2003), Lois and Lopez-Saez (2009) and Steg (2005). Others have shown that residential location and distance may enable a person to travel using their preferred travel mode, thereby enhancing well-being (Jakobsson Bergstad et al., 2011a; Ettema et al., 2011; Olsson et al., 2013). Increases in commute time are associated with lower levels of subjective well-being (Roberts et al., 2011; Stutzer & Frey, 2008).

In summary, the DLW framework examines the interaction among activity patterns, dimensions of experience, demographic factors and well-being. This framework facilitates an understanding of how the commuting experience interacts with travel mode to influence well-being.

Chapter 3:

Methodology

Research Design & Rationale

This study examined commuter experiences within an occupational therapy/occupational science framework (DLW). The study used a mixed methods research design to gain a comprehensive understanding of this complex phenomenon of commuting (Moll et al., 2015). Mixed methods research provided a depth and breadth of understanding, as well as the affording an opportunity for corroboration of findings through triangulation/cross-checking (Creswell & Plano Clark, 2011). The primary interest of the study was to describe activity patterns and dimensions of experience in commuting. Therefore, an explanatory sequential design was used to explain the experiences of commuters, and to examine occupational patterns and experiences involved in commuting by various modes, and their influence on well-being. Mixed methods in two phases provided an in-depth understanding of commuters' experiences. A quantitative data collection and analysis phase led to a qualitative data collection and analysis phase, with the quantitative analysis informing the follow-up qualitative analysis. An explanatory design (and not simple exploration) was warranted because the DLW framework had not been tested in this type of research (Moll et al., 2015).

Using mixed methods, quantitative design and analysis was used to understand whether activity patterns vary by travel mode, and correlations to well-being. Subsequent qualitative data allowed for a deeper understanding of the phenomenon of commuting from an occupational perspective, and explanation of the quantitative results "in terms of detailed voices and participant perspectives" (Creswell & Plano Clark, 2011, p. 151). The survey included a three-step query of commuters' occupational patterns and experiences (Greenbaum, 2016), two well-

being measures, and demographics. The phase I survey generated numerical data (using Likert-style responses) which corresponded to levels of agreement with statements from the DLW framework. Phase II focus group discussions followed based on the commute experiences. The quantitative results directed the analysis of focus group results; significant findings from phase I identified concepts for phase II analysis. Results from phase I and phase II were compared in order to examine consistency across phases and corroborate findings, enhancing the reliability of the study.

Setting and Participants

The study was conducted at Towson University, a setting of interest because it includes a diverse body of people (over 20,000 students) who commute regularly to the same destination from a variety of locations, and who have various modes available for transport. The population sampled included students (undergraduates and graduate students) who live off campus and commute regularly to Towson University, and who use various modes of transport (e.g., car, bike, walking, campus shuttle, etc.). According to data from 2014, the commuting population consisted of approximately 17,000 students, faculty and staff, averaging approximately 11-12 miles per trip, with approximately 86% driving alone (Towson University Sightlines, 2014). However, in recent years, the use of shuttle bus for commuting has increased, as well as other modes such as car sharing, so the commuting population is dynamic and not well characterized. This study investigated student commuting experiences to on-campus classes and activities.

IRB approval was obtained prior to the commencement of the study, and confirmation is shown in Appendix A. Both convenience sampling (ease of access) and purposeful sampling (seeking commuters in under-represented modes) was used to create a diverse sample from a population of adult student commuters ages 18 and over, representing various modes of

transportation (Creswell & Plano-Clark, 2011). The study included 706 responses in the quantitative phase, with a qualitative follow-up of 25 participants (at least six from each mode). The recruitment and consent of participants is described further in the procedures section.

Phase I – Questionnaire

A quantitative survey (Commuter Experience Survey, Appendix B) was designed in order to collect information concerning occupational patterns and well-being. Quantitative survey information was gathered to assess travel parameters, demographics, occupational travel patterns from the DLW, and well-being. The instrument included five modules to address questions about: (1) commute mode, distance, time and frequency; (2) experiences of activity patterns and dimensions of experience associated with commute mode; (3) satisfaction with travel associated with commute mode; (4) eudaimonic well-being; (5) socio-demographic variables. A more detailed description of the survey follows below.

The first section of the Commuter Experience survey provided information for the participants about the general aim of the survey (e.g., to investigate people's experiences of commuting to the university and how it influences their health), fully informing them of the purpose of the survey. This section included the informed consent and a research protocol. The first module included questions about commute mode (primary mode of travel, weekly frequency of commuting, daily commute distance in miles and time in minutes). The second module asked questions about their experience of commuting. This module was developed from the characteristics of activity patterns and dimensions of experience identified in the DLW framework proposed by Moll et al., (2015) with reference to their influence on well-being. These concepts were conceptualized and adapted for commuting. The five activity patterns (engagement, meaning, choice/control, balance, and routine) from the DLW were

operationalized into six questions (choice and control were operationalized separately) in terms of how these patterns were enabled by the travel mode, or how the travel mode permitted the activity pattern. The eight dimensions of experience (activating body, mind and senses, connecting with others, contributing to community and society, taking care of yourself, building security/prosperity, developing and expressing identity, developing capabilities and potential, experiencing pleasure and joy) from the DLW were operationalized into eight questions. Operationalizing of operational concepts was accomplished through literature review of transport and well-being research within the DLW framework. A “comments” section was included to provide an opportunity for further discussion concerning the activity patterns and dimensions of experience.

The third and fourth modules of the survey include standardized instruments. These instruments measured travel well-being and general well-being. The third module used the Satisfaction with Daily Travel Scale (STS)(Jakobsson Bergstad et al., 2011). This scale measured subjective hedonic well-being related to travel, and is based on the Satisfaction with Life Scale that measures general well-being (DeVos et al., 2013). Subjective well-being has been shown to depend on context-specific factors, such as events or episodes (Kahneman et al., 2004). Therefore, commuting is an event which can influence momentary affect and therefore subjective well-being. The STS assessed how travel influences well-being; its use was based on recommendations by Ettema and colleagues who suggest that “measuring travel-specific subjective well-being may yield an indication of the effect of travel on people’s subjective well-being” (2011, p. 169). In the Commuter Experience Survey, the STS instrument was adapted slightly to specifically address the commute experience (see Appendix B, Module 3). The instrument includes four cognitive items, for example, “my commute facilitates my daily life”

and one affective item “my daily commute makes me feel good” (Jakobsson Bergstad et al., 2011a). The STS was found to have strong psychometric properties, including good reliability (Jakobsson Bergstad et al., 2011a).

The fourth module of the survey included a measure of psychological or eudaimonic well-being using the Flourishing Scale (FS)(Diener et al., 2010). The FS is an eight-item scale and is based on five dimensions (social relationships, having a purposeful and meaningful life, self-respect and optimism, feelings of competence and engagement, and interest in daily activities) (Diener et al., 2010). The FS was found to have good psychometric properties, including reliability and validity in several different sample populations (Cronbach alpha coefficient reported of .89), and is suitable for use with a wide range of age groups and applications (Diener et al., 2010; Hone, Jarden & Schofield, 2013; Silva & Caetano, 2013). For example, psychometric analyses were performed in several colleges and universities in the United States and Singapore (Diener et al., 2010) as well as nearly 10,000 adults in New Zealand. Results indicated generalizability to the adult population (Hone et al., 2014) and good convergent validity in a sample of adult students and employees in a Portuguese university (Silva et al., 2013). Each question in the second, third and fourth module was evaluated by choice from seven items on a Likert scale ranging from 1 ‘strongly agree’ to 7 ‘strongly disagree.’ The seven-item Likert scale was chosen for the second module for uniformity with the standardized and validated surveys used in modules three and four. Scores were obtained by individual ratings for each item, as well as a composite measure averaging the ratings across all items within the scale, consistent with the research (Jakobsson Bergstad et al., 2011a).

The fifth module of the survey included sociodemographic data in order to ascertain any influences on activity patterns and well-being. The following variables were included in this

category: age, sex, race, marital status, hours of paid work, household income, level of education, student status, and number of household children.

Phase II - Focus Group

Following the quantitative phase of this study, a qualitative focus group phase occurred to improve depth of understanding regarding characteristics of activity patterns, travel mode use, and well-being. Focus groups provide opportunity for systematic group discussion and, facilitated by a leader, are considered ideal for efficiently gathering a range of insights, and exploring differing perspectives, opinions, and experiences (Barbour & Kitzinger, 1999; Freeman, 2006; Krueger & Casey, 2000; Rice & Ezzy, 1999). Travel experiences are varied and complex, and focus groups helped to clarify and explain these, especially in terms of experiences and how they influence well-being. Further, focus groups can support the validity of the quantitative aspects of the study by improving instrument validity. Interpretive validity is another strength of focus groups, in which the meaning of a behavior can be attached to the participant's perspective (Johnson & Turner, 2003).

For qualitative data collection, focus groups were held for various travel modes. Because of grouping constraints and practical purposes, groups ranged from one to six participants. Although smaller and larger groups have been used successfully in other studies, and best practices suggested between 6-12 participants, a smaller group was chosen because the breadth and complexity of topics allowed participants sufficient time to share (Freeman, 2006; Kitzinger & Barbour, 1999), as well as for practical purposes. These participants were organized into sub-groups by travel mode (car, bicycle, campus shuttle or bus, walk) for the qualitative portion whenever possible. Because the purpose of this study was to compare the experiences of sub-groups (travel modes), best practices advised segmentation of participants into homogenous sub-

groups to facilitate an analysis of differences between sub-groups, as well as to increase external validity of comparisons made between subgroups (Freeman, 2006). Each travel mode focus group participated in queries about their travel experience, and how commuting influenced their general well-being. Focus group discussions were audio taped and transcribed verbatim. Transcripts were reviewed with the audiotapes for accuracy. Details on focus group recruitment and length of sessions are described below.

The researcher acted as facilitator, ensuring that all participants engaged by using a selected list of questions and sequentially calling on participants, focusing discussion on the topic of interest, and ensuring all participants were able to contribute fully to the discussion (Freeman, 2006). A co-facilitator, trained in focus group proceedings, was included to keep sessions organized, and summarized the focus group discussions for the participants to dispute or agree. The researcher encouraged interaction among participants for different viewpoints and discussion of topics (Barbour & Kitzinger, 1999). Comparisons among experiences and opinions are considered valuable sources of insights into complex behaviors (Morgan, 1997). The focus group questions in this study were used to gather the participants' perspectives of how the transportation mode influenced their commutes, and to explain how the commute influenced their well-being. Discussion began with the easier topics (describe the experience) and ended with more complex patterns (how does your commute influence your well-being?) (Krueger & Casey, 2000). All participants answered initial questions followed by a detailed description ("tell us your first name, how long is your commute time, and then describe your commute experience"), going one by one around the table. The next question addressed well-being ("how does your commute influence your well-being?"). Focus group discussions continued until a

point of theoretical saturation (no new insights) (Krueger & Casey, 2000). Questions in Appendix C were used to guide focus group discussions.

Procedures

Procedures are described below for quantitative survey and qualitative focus group concerning recruitment of participants, consent for participation, and data collection. Participants in all procedures were self-selected based on the following inclusion criteria: (a) students who commute to the university, and (b) at least 18 years of age.

Quantitative survey:

- 1) Upper level undergraduate and graduate student commuters were recruited by three different methods. Some students were recruited through large classes at the University, with prior consent by professors. Some participants were recruited via email through the University advertising a commuter study. Other students were identified directly through their primary use of a specific mode. These students were recruited at various locations throughout the University, such as through bulletin boards, or public transportation areas (shuttle flyers) (see Appendix D – Recruitment Flier). Bicyclists and shuttle commuters demonstrated lower participation in the pilot study, and were purposefully recruited by word of mouth or flyers in order to optimize participation.
- 2) All recruitment materials such as flyers or emails received IRB approval prior to posting or distribution, and IRB approval through Towson University was maintained throughout the study. Participation in the quantitative portion of the study was voluntary and anonymous. Consent was obtained through informed consent (Appendix E), either read by the participants at the beginning of the online survey, or read aloud to the participants prior to paper survey.

- 3) Surveys were administered initially online using Survey Monkey to participants responding to a travel research study promoted by the campus commuter organization, fliers and through emails. In person recruitment occurred by the researcher to students in a classroom setting, by introduction of the researcher and her purpose.

Qualitative focus group:

- 1) Participants were recruited based on two different methods. Participants in the survey who indicated interest in further participation were invited to participate in the qualitative follow-up focus group (see Appendix F – Follow up E-mail). Additional emails were also sent via a campus commuter association to invite individuals to engage in a sixty to ninety minutes focus group. Focus groups contained from one to seven individuals who commuted regularly by one of the four travel modes. Sampling strategies for the qualitative phase were used in order to maximize participation by individuals utilizing certain modes, (Creswell & Plano Clark, 2011). Participants commuting by certain limited modes (bicycle or campus shuttle) were recruited using a purposive sampling strategy, identified through various locations on campus such as on shuttle buses (Creswell & Plano Clark, 2011). For example, advertising the study to bicycle commuters was accomplished through posters at specific settings (bike racks) and word of mouth.
- 2) Although those participating in the focus group forfeited anonymity, all of the information collected from them was kept confidential. Nothing was reported that could be traceable individually (all data reported in the aggregate or stated in a way that prevents identification). The participants completed the informed consent process prior to participation, and were provided complete information about the researcher's study purpose. They were asked to write their first name on a name tag, so that they can be

identified by the researcher and other focus group participants. This information was de-identified in transcription of the recording, using a numerical assignment. Also, they were asked to write their names on a small ticket for the gift card incentive drawing at the end of each focus group. The researcher disclosed that audio recordings would be made of the focus group, but that participants would be de-identified. Only informed consent forms were associated with participant names. These forms were kept separate from data collected and instructions in Principal Investigator's office, locked and secured for a minimum of 3 years post data collection.

- 3) Data was collected during the 45-90-minute focus group, which varied depending on the focus group size and saturation. To build rapport with participants and allow in-depth discussions, the setting for the focus groups was at Towson University in a routine classroom setting or a designated room in which considerations were made for reducing any distractions and increasing comfort. Food and snacks were provided for participants. Focus group conversations were audiotaped for subsequent transcription. The six-step research protocol (Appendix C) was used to guide the focus group discussion related to the commute experience. This included the following components: heading, instructions for standard protocol, the questions, probing for detail or elaboration, space between questions for recording responses, and final thank you statement (Creswell, 2009). The researcher moved to the next question when saturation of concepts was apparent, or when responses became redundant (Denzin & Lincoln, 2000). In conclusion, the researcher or co-facilitator summarized the discussion, asked participants if they agreed with the conclusions, asked the participants if they had any questions, thanked them for their time, and asked if they would agree to follow up contact for member checking of findings or

other follow up. If a participant was identified for member checking for validity of findings, and a short discussion by phone followed within 2 days of participation. The summary was re-read to students to confirm findings and students were asked if they agreed with summary. After the focus group, a drawing for the gift card occurred by pulling a number from a bag containing half of a raffle ticket number, and winners were notified by email, receiving a \$40 credit to their University debit card. A total of eight gift cards were issued by the University to the students for the focus group portion.

- 4) The researcher maintained field notes, an activity log, and a reflexive journal of observations and experiences during the research process in an effort to identify personal bias and prejudice. Field notes were helpful in recording what was discussed after each focus group, comprehensively but without judgment (Lofland & Lofland, 1999). A reflexive journal was useful for keeping biases and assumptions in “check” and aiding in controlling for bias in the analysis phase (Yin, 2011), and for providing context. The reflexive journal was re-read prior to the next focus group to refresh any tendencies toward bias that may have skewed data collection. An activity log recorded the focus group date, time, location and participants.

Data storage and processing

All data were collected and stored in a manner to ensure safety and confidentiality. Survey data was identified by numerical assignment only on each survey form. Individuals in the focus groups were assigned numbers and their groups were assigned a letter during transcription in order to de-identify them. Recordings were transcribed verbatim and recordings, transcripts, and surveys are being stored under lock and key and in password-protected electronic storage. Informed consent forms were the only documents to contain participant names, and were

separated from other data. They will be maintained in a file cabinet in the Principal Investigator's locked office until 2020 and then destroyed.

Data Analysis

The first goal of the data analysis was to describe the characteristics of activity patterns and the dimensions of experience. The second goal was to describe the occupational experiences of commuters. The third goal was to assess whether occupational patterns influence well-being. The first goal was assessed by quantitative (survey) methods, while the second goal was assessed by qualitative (focus group) methods. The third goal was assessed by both quantitative and qualitative methods. Each is described separately below.

Research Question One: What are the characteristics of college student commuters with respect to travel mode, activity patterns and dimensions of experience, and well-being?

The survey was closed to new input at the end of the survey period (October 2016-January 2017), after which survey data was downloaded from SurveyMonkey to IBM SPSS Statistics, Version 23 for Windows. The survey was screened for inaccurate data (repeated responses of "1" from an individual) and incomplete data. Only valid responses were used for further analyses. The surveys were initially coded by travel mode (1=car, 2=walk, etc.). Descriptive statistics evaluated the demographic characteristics of the sample surveyed, including frequencies for each demographic category. Travel parameters were also analyzed using descriptive statistics, such as frequencies for duration of trip and distance by mode, and mode frequencies were also determined.

Individual mean composite scores were calculated utilizing Likert scale values for activity patterns (AP) and dimension of experience (DoE), as well as for the satisfaction (STS) and well-being (FS) scales, creating two composite independent variables (AP and DoE) and two

composite outcome measures (STS and FS). Assumptions of normality were examined using histogram visualization of the data, and reliability was examined using Cronbach's alpha (Tavakol & Dennick, 2011). Descriptive statistics identified means, standard deviations, and ranges of outcome measures across travel modes. Analysis of variance (ANOVA) explored differences among mean values (AP, DoE, STS and FS) by travel mode (Portney & Watkins, 2009). Tukey's HSD post-hoc tests of statistically significant means identified which groups were different.

To examine whether occupational constructs were correlated with well-being outcome measures, Pearson product moment correlations were computed among composite scores. All variables were tested for correlation with AP, DoE, STS, and FS. Multiple linear regression analyses determined whether occupational constructs (AP and DoE) predicted STS, controlling for various possible confounding factors on well-being measures. The following socio-demographic categorical variables were entered as independent variables: sex (man 1 vs woman 2), age (18-22, 1; 23-39, 2; 40-59, 3; 60-79, 4), race (Hispanic 1, Caucasian 2, African-American 3, American Indian 4, Other 5), marital status (single, separated, divorced or widowed 1, married or cohabiting 2), hours of paid work/week (less than 20 hours 1, 20-35 hours 2, more than 35 hours, 3), household income (less than \$20K 1, \$20-50K 2, greater than 50K 3), highest level of formal education (completed high school 1, attended some college 2, completed college 3, completed graduate school 4), student status (not a student 1, part-time student 2, full-time student 3), children under 18 living in household (0 1, 1-2 2, more than 2 3), commute distance one-way (less than 3 miles 1, 3-10 miles 2, between 10 and 30 miles 3, more than 30 miles 4), commute time (less than 15 minutes 1, 15-30 minutes 2, more than 30 minutes 3). These variables were dichotomized into binary variables for linear regression analyses, creating two

categories in which the largest category was the dominant category, and other categories were then combined into one. Hierarchical linear modeling was performed to determine which predictor variables were significantly correlated with outcome variables using ordinary least squares (OLS) multiple linear regression.

Research Question 2: What are the occupational experiences of college student commuters with respect to dimensions of experience and activity patterns?

To address the second research question, qualitative data analysis of survey data followed the methods described by Creswell (2007). The P.I. performed the following preliminary tasks: transcribed focus group conversations verbatim with rechecking of recordings; entered all transcribed data into ATLAS.ti 7 software. Qualitative data from Commuter Activity Survey in the form of “comments” were also entered in ATLAS.ti at this point. Subsequently, the researcher read through the written transcripts twice to accomplish an overall understanding of the focus group discussion, as well as notebooks with observations, notes and journal entries of focus groups. Coding was the next step, in which phrases, sentences or paragraphs which related to the six characteristics of activity patterns or seven dimensions of experience were identified (based on operational definitions). Coding is the process of “grouping evidence and labeling ideas so that they reflect increasingly broader perspectives” (Creswell et al., 2011, p. 208). The codes were broadly reflective of the DLW framework. Thematic description was not necessary as topics related to the 13 areas of occupation in the DLW framework. Codes were then shared with a co-researcher, who identified any discrepancies or inaccuracies, aiding in trustworthiness of data coding. Subsequently, significant phrases, sentences or paragraphs that were unique or that pertained to the experience related to well-being, activity patterns or dimensions of experience were identified for use as examples of participant’s stories. The researcher then

reviewed and analyzed transcripts for researcher bias. For example, both positive and negative examples of codes were explicitly identified for each mode. A reflective journal was used to keep the researcher as moderator “on track” with identifying the focus group format and questioning process, as well as review any unintentional bias noticed focus groups. The journal was not used in the research analysis process. This process allowed for a complete review of the transcripts. ATLAS.ti 7 software organized the data obtained from the interviews, facilitated the coding and annotating of data, and enabled organization by grouping the modes together according to each occupational concept (patterns and experiences).

Initially, the entire focus group transcription was analyzed using open coding. This allowed for identification of topic areas and general understanding of the content. Then, after coding was completed, code categories were sorted by mode. Using the quantitative analysis, only significant APs and DoEs were examined. This allowed for comparisons of AP and DoE across modes. Inductive analysis was used to compare and contrast travel modes, searching for patterns that were similar or different by mode (Creswell, 2007). Comparisons across travel modes were done to search variations or similarities in themes across activity patterns and dimensions of experience.

Research Question 3: What are the occupational aspects of commuting relative to well-being?

The third research question was addressed by examining both quantitative and qualitative results. Qualitative results from survey data were triangulated with quantitative results from focus groups and the literature review within the theoretical framework (Creswell, 2007; Groenewald, 2004; Kennedy, 2009), addressing how the DLW framework explains the occupational aspects of commuting. This corroboration technique, using multiple types of data to support or contradict the interpretation, was used to explore similarities and differences across

codes (Creswell, 2007), and to describe the experience of commuting by travel mode. Other frameworks of commuting and well-being were examined to determine how the results from this study compared with other frameworks (Lee & Sener, 2016; Nie & Sousa-Poza, 2016; Smith, 2016)

Role of the researcher

The researcher in this study played the role as facilitator to reveal individual and group patterns of commuter activity and well-being. The researcher disclosed her roles as teacher and community member, and her interests in promoting and studying healthy occupations in the community to participants, but personal bias concerning transportation was not disclosed to prevent swayed responses from participants. The research process included journaling before, during and after data collection and analysis to identify biases and influences concerning assumptions (Creswell, 2013). This allowed for reflexivity of the researcher's personal experiences and world views, to lessen their impact on the different phases of the research.

Ethical considerations

Prior to data collection, Institutional Review Board (IRB) approval was received from the University through an addendum to the original approved submission (see Appendix A – Initial IRB approval). The researcher completed all requirements for human participants training through the Collaborative Institutional Training Initiative online (CITI, 2016), required for human participant research at Towson University. The researcher abided by these requirements.

Confidentiality and anonymity were maintained during data collection, analysis, and dissemination of results through disclosure of researcher's commitment for privacy of data (conversations and survey information), and de-identification of data. Other rights of participants

include autonomy and beneficence, and participants were allowed to terminate their participation at any time, and ask questions concerning their feedback and use of their data. Additionally, considerations of justice for individuals were addressed by allowing responses from individuals without criticism or prejudice (Orb, Eisenhauer & Winaden, 2000).

Limitations and delimitations

This study was intentionally limited in its scope in order to minimize variability in travel parameters. For example, this study evaluated experiences of members of the University who commuted regularly for work or school by a specific commute mode, and did not evaluate commuters at other Universities or destinations. Also, the time frame was limited, considering only participants' experiences during the current year of the study, and was therefore dependent on conditions at the time. Variations in results could therefore be due to environmental changes, such as considerations in travel due to construction changes, weather, shuttle schedules, etc.

Delimitations of the study therefore indicated that the experiences of these participants are not generalizable to a larger population outside of the University. Data collection did not include information on residence locations, or access and availability of different transportation modes directly. Further, a convenience sample used in the focus groups limited the generalizability.

Summary

This mixed methods study investigated the experience of travel mode, as measured by characteristics of activity patterns and dimensions of experience, and correlations with well-being. This study utilized a mixed methods explanatory sequential design to describe the experience of participants commuting to a suburban university. The quantitative survey informed

the qualitative focus group analysis which evaluated only significant variables, and triangulation corroborated some results.

Chapter 4

Phase 1. Quantitative Results

The purpose of this study was to investigate whether commuting influenced the self-perceived well-being of students. University undergraduate and graduate students were queried by survey between October 2016 and January 2017. All participants completed a multi-section questionnaire, distributed either using an online survey system (SurveyMonkey©) or an in-person paper survey. The online survey was distributed to commuters identified through an off-campus student services email list. Email invitations to participate in the survey on SurveyMonkey© were sent to approximately 8,830 student commuters (who report commuting), of which 647 responses were obtained (a 7.3% response rate). Additionally, in class paper surveys were completed by a total of 75 students in occupational therapy programs as well as undergraduate psychology classes. Further purposive sampling to increase the number of cyclists in the survey was accomplished by emails to Towson University faculty and staff who then notified individual cycling commuters. SurveyMonkey© data were downloaded to an IBM SPSS version 23 database, and paper survey data was entered by hand into the database. A total of 720 responses were collected with nine modes of transportation represented. Descriptive statistics performed identified nine modes of transport, including private car (driver), private car (passenger), walking, bicycling, skateboarding, campus shuttle, MTA bus or train, multimodal (several modes in one trip) and other, shown in Table 3. Data were extracted from four modes (car, bike, walk, public transit) commonly compared in the transport literature with respect to satisfaction and well-being (Smith et al., 2017).

Data indicated approximately 63% of responses came from car commuters who drove, while 15% were shuttle participants and 12% were pedestrian commuters (walkers). Cyclists numbered 14, approximately 2% of the survey participants.

Table 3. Number of survey responses and response rate by mode

<u>Mode</u>	<u>Responses</u>	<u>Rate (approx. %)</u>
Car driver	450	63
Campus shuttle	108	15
Walker	83	12
Car passenger	22	3
Multi-modal	17	2
MTA bus or train	16	2
Cyclist	14	2
Other	9	1
Skateboard	1	<1
Total	720	100%

Filtering of respondents resulted in various valid responses, depending on statistical queries utilized. After filtering out invalid responses (incomplete or unqualified), 709 valid responses were obtained (see Table 4).

Table 4. Summary of responses

<u>Metric</u>	<u>Number</u>
Survey Monkey (response rate)	647 (7%)
Paper Survey	75
Total responses	720
Invalid responses	11
Total valid responses	709

Demographics of Respondents. The demographic profile of the sample, which included 720 participants (from the subgroup of student commuters), corresponds roughly to the Towson University general population (TU fall fact sheet, 2016, Office of Institutional Research). The

majority of participants were aged 18-22, female, white, worked less than 20 hours per week, were single, separated, divorced or widowed, had income less than \$20,000, were undergraduates, had no children living in their household, and were full time university students. Table 5 lists the predominant demographic variables and their relative percentages in the sample and the reference population.

Table 5. Select demographic variables of sample and population reference

Variable (predominant)	Sample* Valid Percent (%)	Population* Percent (%)
Age (18-22 years)	75	67
Gender (female)	75	62
Ethnicity (white)	62	60
Hours -paid work (less than 20)	62	n/a
Marital status (single/separated/divorced/widowed)	93	n/a
Annual income (less than \$20,000)	55	n/a
Education (undergraduate)	70	86
Children (no children in household)	80	n/a
Student status (full time)	81	79

n/a data not available

*sample obtained from subpopulation of 8,830 commuters (student population of 22,343) - Fall 2017

Travel Variables. Additional self-reported travel variables were collected from the survey which have been shown to influence well-being. These include the number of commute days, commute distance and commute time. With respect to distance and time, one way was measured. The largest percentage of commuters traveled five days a week to the university (45%), with

almost 88% commuting at least three days a week (see Table 6). There was a wide range of distance and time commuting. About 60% of commuters traveled 10 miles or less one-way, and about 40% of commuters traveled over 10 miles.

Table 6. Select travel variables

<u>Number of commute days</u>	<u>N</u>	<u>Valid Percent (%)</u>
1 day	12	1.7
2 days	77	10.8
3 days	129	18.1
4 days	155	21.7
5 days	321	45.0
6 or more	19	2.7
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	714	

<u>One-way commute distance (miles)</u>	<u>N</u>	<u>Valid Percent (%)</u>
Less than 3	235	32.9
Between 3-10	192	26.9
Greater than 10 and less than 30	162	22.7
More than 30	121	16.9
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The distribution of commute time showed one third commuting less than 15 minutes, one third between 15 and 30 minutes, and one third more than 30 minutes. A pie graph shows the distribution of survey participants' commute time pictorially (Figure 4).

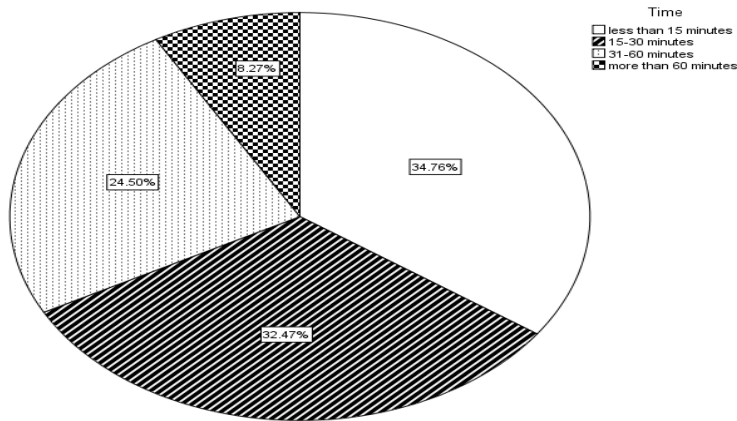


Figure 4. Commute time (minutes)

In order to understand differences in travel patterns, travel times from physically active modes of travel such as cycling and walking commute trips were compared with physically passive modes (car and shuttle). As shown in Figure 5, active commuters traveled less overall time (one-way commute time was less than 30 minutes - split equally between “less than 15 minutes” and “15-30 minute” categories). Passive commuters varied equally between the three categories of “less than 15 minutes,” “15-30 minutes” and “31-60 minutes”, with a small group (about 8% of all commuters) traveling more than 60 minutes.

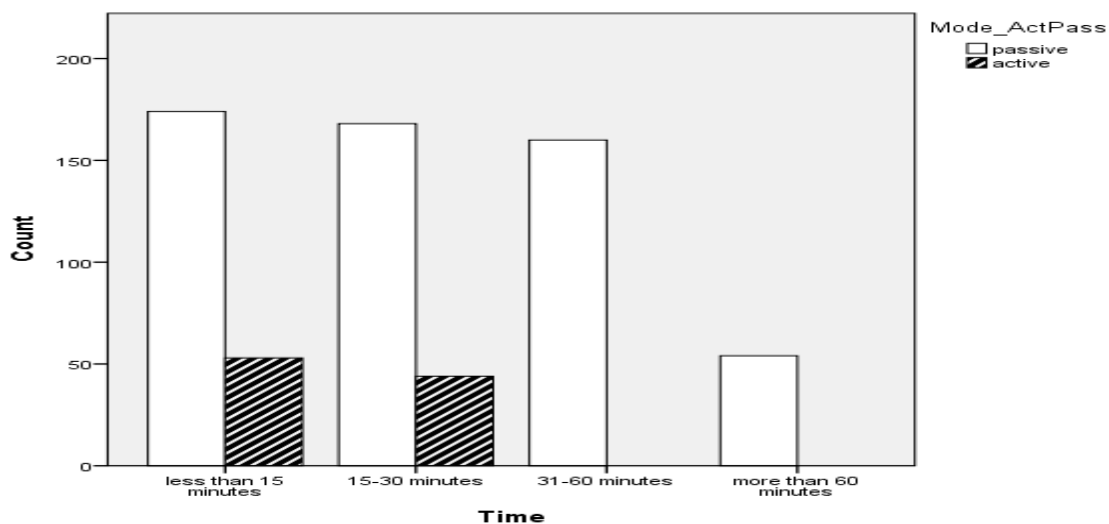


Figure 5. Commute time of active and passive commuters

A final sample used for data analysis contained 655 participants, and represented commuters using the following four modes: car driver (69%), campus shuttle (16%), walking (13%), and cycling (2%).

Commuter Survey

Overview of study. Components of occupations indicative of well-being, as identified in the “Do-Live-Well” (DLW) framework (Moll et al., 2015), were examined in commuter surveys to understand whether participation in various commute modes can influence satisfaction with travel and well-being. The framework included occupational constructs such as characteristics of activity patterns and dimensions of experience, as well as demographics and well-being measures. Well-being measures used in this study included Satisfaction with Travel Scale (STS) (Jakobsson Bergstad et al., 2011a) and overall well-being as measured by the Flourishing Scale (FS) (Diener et al., 2009). This study explained differences in occupational components by mode related to satisfaction with travel and overall well-being.

Survey overview. The commuter survey respondents reported levels of agreement with four different outcome measures: characteristics of activity patterns, dimensions of experience, satisfaction with travel, and subjective well-being. Likert scale responses were recorded for each item within each of the scales, from strongly disagree (1) to strongly agree (7). Mean values, used to report central tendencies of Likert scale responses, were obtained for each scale. Mean values higher than 3.5 (median) indicate agreement with the item or statement, with lowest agreement (smallest possible scores) indicated by “1”, and highest indicated by “7.”

Survey results – reliability

The commuter survey (six items including characteristics of activity patterns) shows acceptable internal consistency and reliability based on a Cronbach's alpha of 0.82 (Tavakol & Dennick, 2011). Observed power for all significant variables was above 0.91.

Characteristics of activity patterns (AP).

Scores from six characteristics of activity patterns (AP) (engagement, meaning, choice, control, balance and routine) were averaged to obtain a mean AP score for each respondent. Mean activity patterns for the four modes combined indicate normal distributions (see Figure 6). The sample of 641 valid scores indicated a wide distribution, ranging from “1” (low AP) to “7” (high AP). Mean AP was 4.74 for the four modes (S.D. = 1.305), indicating slight agreement with statements. The distribution of mean AP was approximately symmetric (skewness = -0.308, S.E. = 0.097; kurtosis -0.423, S.E. = 0.193).

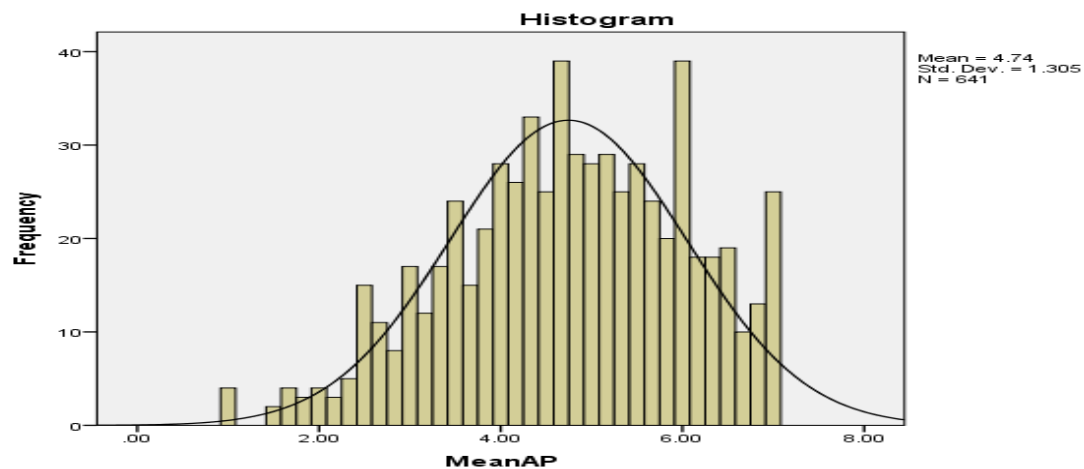


Figure 6. Histogram showing distribution of mean Likert scale values for characteristics of activity patterns.

The commuter survey respondents were asked to report their level of agreement with six characteristics of activity patterns (engagement, meaning, choice, control, routine, and balance) related to their commute. Graphic depiction of data from the Likert scale survey indicates how

different mode users evaluate their daily commute to school based on the various activity patterns. A sample profile of the Likert scale analysis for balance is shown below in Figure 7.

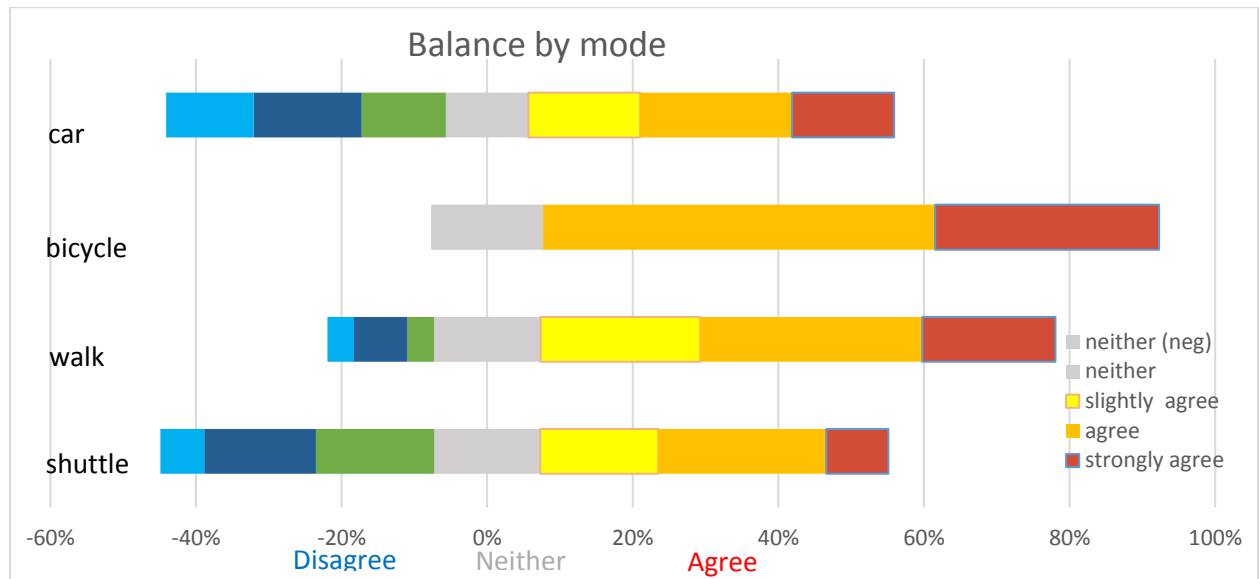


Figure 7. Balance by mode. The percentage of respondents who agree with the statement are shown to the right of the zero line. The percentage who disagree are to the left. The percentage for respondents who are neutral (neither agree nor disagree) are split down the middle and are shown in a neutral color.

Balance was highest among cyclists, followed by walkers, and lowest in shuttle and car commuters. All cyclists either agreed with the statement, “my commute mode allows me to have balance in my life (allows me time to engage in personally important activities)” or were indifferent. Shuttle and car drivers had similar patterns to each other, with approximately 35% of participants disagreeing with the statement, 15% neutral, and about 50% agreeing. The large number of neutral responses may indicate lack of consistency of experience or lack of understanding of the question. Balance therefore seemed to be a pattern of activity more common among active commuters. Similar profile patterns for other characteristics such as meaningfulness and engagement were observed in which cycling was rated higher than walking, and walking was rated higher than car and shuttle commuters.

Mean values and standard deviations for characteristics of activity patterns by mode are shown in Table 7. There is a statistically significant difference ($p < 0.05$) in characteristics of activity patterns between the different modes as indicated by a one-way ANOVA. On average, students who cycled or walked agreed that their commute was more engaging, meaningful, provided balance of daily activities, allowed control and choice, as well as routine, than did car drivers or shuttle commuters. Post hoc tests indicate significant differences between active commuters (walk and bike) and passive commuters (car and shuttle) (Table 7).

Table 7. ANOVA comparisons of characteristics of activity patterns by mode.

	Mode	Mean	N	S.D.	Post hoc
	Bicycle (B)	6.07	14	1.07	B>(C,S)*
	Walk (W)	5.24	79	1.17	W>(C,S)*
	Car (C)	4.70	442	1.39	C<(W,B)*
	Shuttle (S)	4.39	106	1.27	S<(W,B)*
ANOVA	Sum of squares	df	MS	F	P value
Between groups	58.4	3	19.5	12.0	.000
Within groups	1031.1	637	1.6		.000
Total	15515.0	641			

Note: The letters in parentheses under mode refer to the letters used in illustrating statistically significant differences ($p < 0.05$) under post hoc tests, as indicated by *. For example, mean values for bicycling (B) are significantly higher than both car (C) and shuttle (S).

Summary Characteristics of activity patterns: the results show that the bike/walk is dominant in all cases. In comparison to the car and especially journeys by shuttle, journeys by bike or on foot score higher on activity patterns such as engagement, control, choice, and routine.

Dimensions of experience. The commuter survey respondents were asked to report their level of agreement with seven dimensions of experience (activate mind, body and senses, contribute to community, care of self, build prosperity, build identity, develop potential, pleasure and joy) related to their commute. Scores from seven items were averaged to obtain a mean DoE score for each respondent. The commuter survey (DoE) shows acceptable internal consistency and reliability based on a Cronbach's alpha of 0.91 (Tavakol & Dennick, 2011). Observed power for all significant variables was above 0.91. Mean DoE for the four modes combined indicate normal distributions (see Figure 8). The sample of 641 valid scores indicated a wide distribution, ranging from 1 (low DoE) to 7 (high DoE). Mean DoE was 4.30 for the four modes (S.D. = 1.305), indicating slight agreement with statements. The distribution of mean DoE was approximately symmetric (skewness = -0.137, S.E. = 0.097; kurtosis -0.445, S.E. = 0.194).

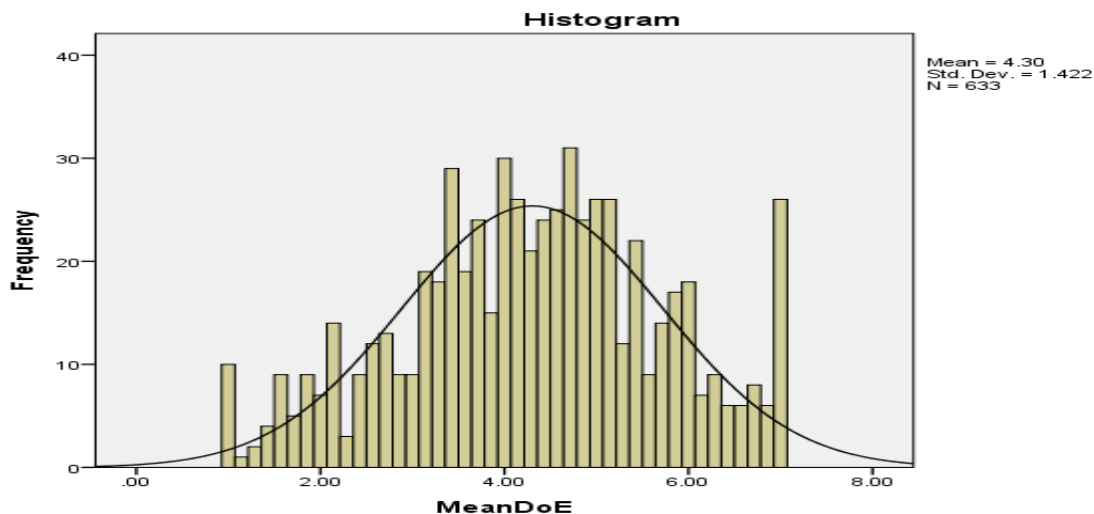


Figure 8. Histogram showing distribution of mean Likert scale values for dimensions of experience.

Graphic depiction of data from the Likert scale survey indicates how different mode users evaluate their daily commute to work based on the various dimensions of experience. Figure 9 represents a sample profile of the Likert scale analysis for pleasure and joy.

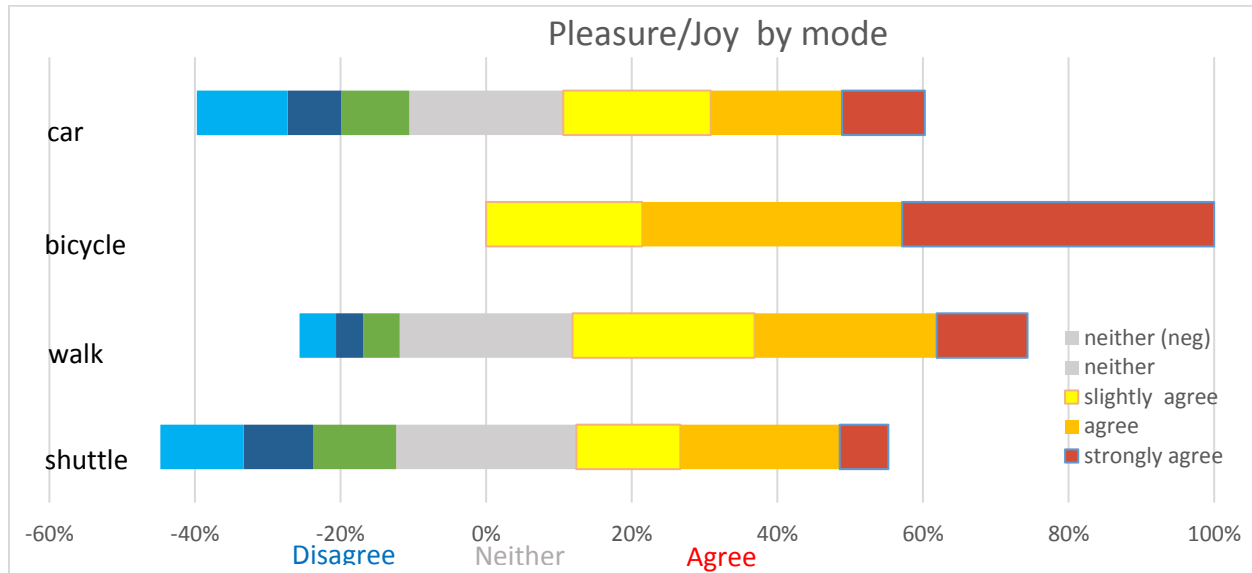


Figure 9. Pleasure and joy by mode. The percentage of respondents who agree with the statement are to the right of the zero line. The percentage who disagree are to the left. The percentage for respondents who are neutral (neither agree nor disagree) are split down the middle on either side of 0% and are shown in a neutral color.

Figure 9 demonstrates that pleasure and joy was highest among cyclists, followed by walkers, and lowest in shuttle and car commuters. All cyclists agreed with the statement, “my travel mode allows me to experience pleasure and joy.” Shuttle and car drivers had similar patterns to each other, with about 30 % of participants disagreeing with the engagement statement, 20% neutral, and about 50% agreeing. The large number of neutral responses may indicate lack of consistency of experience or, alternatively, a lack of understanding of the question. Pleasure and joy therefore seems to be a dimension of experience which is more common among active commuters. Indeed, similar profile patterns for other dimensions such as activating the mind,

body and senses were observed in which cycling was rated higher than walking, and walking was rated higher than car and shuttle commuters.

Mean values and standard deviations for dimensions of experience by mode are shown in Table 8. There is a statistically significant difference ($p < 0.05$) in dimensions of experience between the different modes as indicated by a one-way ANOVA. On average, students who cycled or walked agreed more that their commute activated their mind, body and senses, allowed them to contribute to their community, take care of themselves, build security and prosperity, build identity, develop their capabilities and potential, and experience pleasure and joy, than did car drivers or shuttle commuters. Post hoc tests indicate significant differences between active commuters (walk and bike) and passive commuters (car and shuttle) (Table 8). Further, biking was rated significantly higher than all the other modes for dimensions of experience.

Table 8: ANOVA comparisons of dimensions of experience by mode.

	Mode	Mean	N	S.D.	Post hoc
	Bicycle(B)	6.07	14	0.83	B>(W,C,S)*
	Walk(W)	4.76	80	1.29	W>(C,S)*
	Car(C)	4.20	439	1.40	C<(W,B)*
	Shuttle(S)	4.16	100	1.48	S<(W,B)*
ANOVA	Sum of squares	df	MS	F	P value
Between groups	67.2	3	22.4	11.7	.000
Within groups	1210.3	629	1.9		.000
Total	12993.7	633			

Note: The letters in parentheses in mode refer to the letters used in illustrating statistically significant differences (* $p < 0.05$). For example, mean values for bicycling (B) are significantly higher than walking (W), car (C) and shuttle (S).

In comparison to the other modes, commutes by shuttle and car score especially poorly on dimensions of experience, especially pleasure/joy, and activating the mind, body and senses. Journeys by bicycle score highest on enjoyment, whereas journeys on foot score highest on taking care of oneself.

Combined data grouped active modes (bike/walk) together and passive modes (car/shuttle) together. Combined data were used to compare individual characteristics of activity patterns and dimensions of experience. Generally, means of individual activity patterns and dimensions of experience were significantly higher for active modes than passive modes (see Table 9).

Table 9. Differences between occupational concepts by active and passive mode

Occupational concept	Mode	Mean	S.D.	<i>t</i>	df	<i>p</i>
Engagement	Passive	4.66	1.72	-3.61	137**	0.000*
	Active	5.29	1.58			
Meaningful	Passive	4.05	1.75	-5.93	648	0.000*
	Active	5.19	1.58			
Balance	Passive	4.26	1.95	-5.12	150**	0.000*
	Active	5.19	1.58			
Control	Passive	4.94	1.82	-2.95	148**	0.004*
	Active	5.44	1.44			
Routine	Passive	5.46	1.55	-2.25	648	0.025*
	Active	5.83	1.35			
Choice	Passive	4.41	2.11	-2.24	135**	0.016*
	Active	4.95	1.98			
Active MBS	Passive	4.08	1.70	-10.47	144**	0.000*
	Active	5.81	1.46			
Contribute	Passive	3.48	1.79	-4.33	649	0.000*
	Active	4.34	1.81			
Care of Self	Passive	4.73	1.78	-7.20	171**	0.000*
	Active	5.79	1.24			
Security/Prosperity	Passive	4.47	1.69	-.37	648	0.710
	Active	4.54	1.75			
Identity	Passive	4.08	1.76	-2.59	649	0.010*
	Active	4.59	1.77			
Capability/Potential	Passive	4.21	1.72	-1.98	648	0.048*
	Active	4.59	1.65			
Pleasure/Joy	Passive	4.26	1.83	-4.54	143	0.000*
	Active	5.05	1.52			

*significant at $p < 0.05$

**values indicate equal variances not assumed

Satisfaction with Travel Scale. To evaluate whether satisfaction with travel varied by mode, scores from the five-item satisfaction with travel survey (Jakobsson Bergstad, 2011; see Appendix B) were averaged to obtain a composite mean STS score for each respondent. The sample indicated a wide distribution of scores. The satisfaction with travel survey shows acceptable internal consistency and reliability based on a Cronbach's alpha of 0.89 (Tavakol & Dennick, 2011). Observed power for all significant variables was above 0.91. Mean STS was 4.34 for the four modes (S.D. = 1.52) indicating slight agreement with satisfaction with travel. The distribution of STS is approximately normal (skewness = -0.136, S.E. = .096; kurtosis = -0.814, S.E. = 0.192). Figure 5 displays the distribution of STS among respondents (n=648).

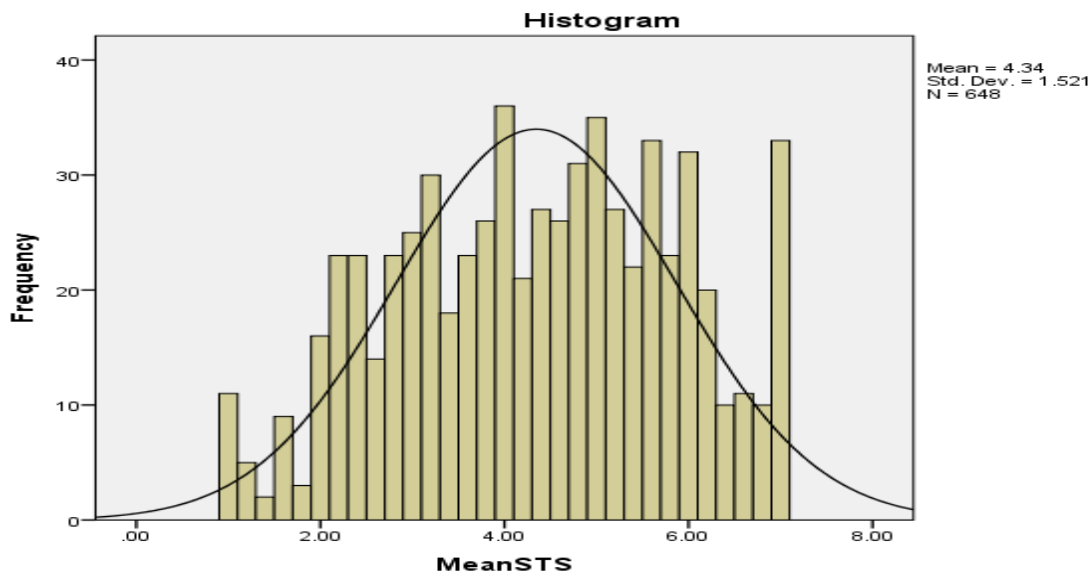


Figure 10. Histogram of mean Satisfaction with Travel Scale (STS)

Figure 11 displays percentages of participants agreeing and disagreeing with the statement “I am satisfied with my commute,” one of the items on the STS. More active travelers (bike and walk) agreed with the statement than passive travelers (shuttle and car). Specifically, nearly 80% of

active travelers agreed, while only 45-50% of passive travelers felt satisfaction with their commute.

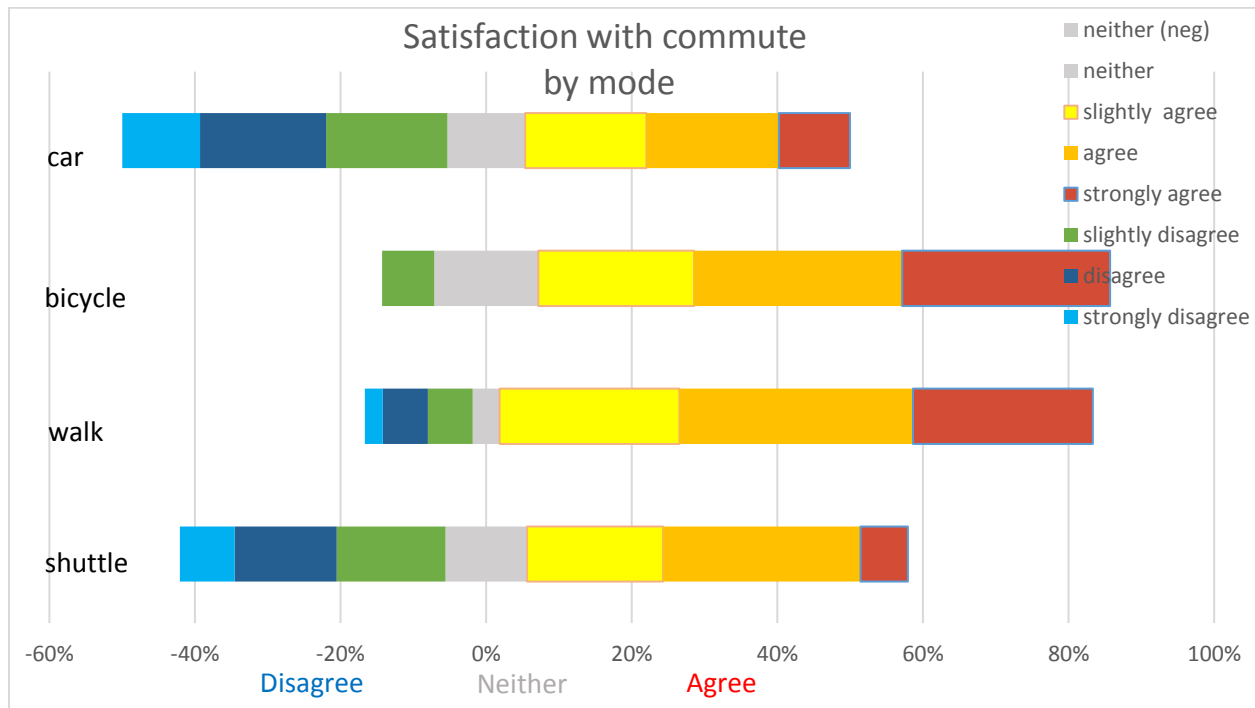


Figure 11. Satisfaction with commute. The percentage of respondents who agree with the statements are shown to the right of the zero line. The percentage for respondents who are neutral (neither agree nor disagree) are split down the middle on either side of 0% and are shown in a neutral color.

Mean STS values of sample participants are shown in Table 10. There is a statistically significant difference ($p < 0.05$) among the different modes, as shown by a one-way ANOVA. Active travelers (cyclists and walkers) have the highest satisfaction with travel, while passive travelers (shuttle and car drivers) have the lowest satisfaction, as indicated by post hoc tests.

Table 10. Satisfaction with Travel by mode.

	Mode	Mean	N	S.D.	post hoc
	Car(C)	4.14	450	1.50	C<(W,B)*
	Shuttle(S)	4.37	105	1.47	S<(W,B)*
	Walk(W)	5.22	79	1.33	W>(C,S)*
	Bike(B)	5.77	14	0.98	B>(C,S)*
	Total	4.34	648	1.52	
ANOVA	Sum of squares	df	MS	F	p-value
Between groups	105.87	3	35.29	16.34	.000
Within groups	1391.07	644	2.16		
Total	13729.16	648			
Corrected total	1496.94	647			

Note: The letters in parentheses for mode refer to the letters used in illustrating statistically significant differences (* $p < 0.05$). For example, car (C) commuters have statistically lower satisfaction than both walkers (W) and bicyclists (B)

Occupational characteristics and commuter well-being. To evaluate whether activity patterns, dimensions of experience, or satisfaction with commute group means were associated with well-being, Pearson product moment correlations were performed. Results revealed a moderately weak but significant correlation between occupational categories and well-being (see Table 11).

Table 11. Correlations among occupational concepts and well-being

		Mean AP	Mean DoE	Mean STS	Mean SWB
Mean AP	Pearson Correlation		.800*	.734*	.290*
	N		621	635	630
Mean DoE	Pearson Correlation			.715*	.308*
	N			631	624
Mean STS	Pearson Correlation				.275*
	N				640

*Correlation is significant at the 0.01 level (2-tailed).

However, there was a statistically significant correlation between characteristics of activity patterns and satisfaction with travel, as well as dimensions of experience and satisfaction with travel. This relationship was explored further.

Occupational characteristics and Satisfaction with Travel. A Pearson product moment correlation coefficient was computed to assess the relationship between mean AP and mean satisfaction with travel (see Table 11). There was a strong positive correlation between the two variables [$r = .734$, $n = 635$, $p = 0.000$]. There was also a positive correlation between mean DoE and mean satisfaction with travel [$r = .715$, $n = 631$, $p = 0.000$]. When controlling for travel time, a partial correlation was still significant and positive [AP: $r = .697$, $n = 614$, $p = 0.000$] [DoE: $r = .680$, $n = 614$, $p = 0.000$]. This suggests that travel time had very little influence in controlling for the relationship between occupational concepts and satisfaction with travel. Overall, there was a strong, positive correlation between characteristics of activity patterns and satisfaction with travel, such that increases in activity patterns were correlated with increases in satisfaction. The same relationship exists between DoE and satisfaction.

Multiple linear regression of Satisfaction with Travel. To test whether satisfaction with travel is composed of factors based on the DLW framework, a hierarchical multiple linear regression analysis was performed. Independent variables that might explain satisfaction with travel were entered into a hierarchical linear regression model in three steps or blocks, in order to understand their influence on satisfaction with travel. Demographics and travel variables were anticipated to influence satisfaction less than occupational variables, and were entered in steps one and two. Occupational concepts were entered in the third step. Variables were entered into the following regression model in three sequential steps based on their expected predictive value (least priority to greatest priority, according to the framework):

$$S = \beta + \beta'A + \beta'D + \beta'M + \beta'S + \beta'T + u$$

S = satisfaction with travel

A = characteristics of activity patterns (step 3)

D = dimensions of experience (step 3)

M = mode (step 2)

S = sociodemographic variables (step 1)

T = travel variables (step 2)

u = regression error term

Potential predictors included activity patterns and dimensions of experience, travel variables (distance and time traveled, days commuting, mode), and demographics. Mode, socio-demographics, and travel attributes are categorical variables. For regression purposes, these variables were re-coded as dichotomous variables (the predominant group was coded as “-1,” and the other groups as “1”). Characteristics of activity patterns, dimensions of experience, and satisfaction with travel were considered rank order (Likert scale) variables. Relevant assumptions of regression were tested prior to regression analysis (normality, linearity, homoscedasticity, collinearity, outliers), and all assumptions were satisfied.

Table 12 provides standardized regression coefficients for the independent variables in the three steps or models, as well as statistical improvements in successive models. All models are significant ($p < 0.001$). Model one includes only demographics, and indicates that having no children is a significant predictor of satisfaction with travel. Model two, which includes travel attributes, explains satisfaction with travel better than model one (demographics) by 19%. Commute time and mode are significant predictors in this model. Model three, which includes occupational concepts (as well as demographics and other travel attributes), explains satisfaction with travel better than model two, by 39%. The full model was able to account for 65 percent of

the variance in satisfaction with travel, $F(15, 548) = 69.07$, $p < 0.001$, $R^2 = .65$. All predictor variables and the dependent variable *satisfaction* were tested for multi-collinearity, and the concepts do not overlap considerably, so they are considered separate and distinct concepts.

Table 12. Hierarchical regression analysis of predictors of satisfaction with travel^a

Predictor variables	Regression 1	Regression 2	Regression 3
Age (-1, 18-22; 1, 23 and older)	.05		
Ethnicity (-1 white, 1 other)	.01		
Work (-1, <20 hrs; 1, ≥20 hrs)	.03		
Gender (-1, female; 1, male)	-.00		
Marital (-1, single; 1 married)	-.04		
Income (-1, <20K; 1, >20K)	.02		
Education (-1, undergrad; 1, grad)	.03		
Student (-1, full time; 1, part-time)	.02		
Children (-1, none; 1, one or more)	-.06*		
Days commuting		-.01	
Distance (miles)		-.05	
One-way commute time (min)		-.16**	
Mode (-1, active; 1, passive)		.07*	
Mean activity patterns			.40**
Mean dimensions of experience			.32**
R^2	.07	.26	.65
R^2 change	.07	.19	.39
F change	4.87**	35.37**	309.81**

^aAll standardized regression coefficients are from the final step in the analysis, $n=564$.

* $p < 0.05$

** $p < 0.001$

To identify which specific occupational constructs were unique predictors of satisfaction with travel, six individual characteristics of activity patterns and seven dimensions of experience

were entered in the third step in the regression model in place of the mean scale values. An OLS multiple linear regression predicted satisfaction with travel based on 8 independent variables – *pleasure/joy, balance of activities, time traveled, activation of mind/ body/senses, routine, choice, meaning and control* (see Table 13). The eight predictors account for approximately 70% of the variance in perceived satisfaction with travel, with a significant regression equation, $F(26, 537) = 46.97$, $p < 0.000$, $R^2 = 0.695$. Of these eight variables, *pleasure and joy* (how much people enjoy and gain pleasure during their commute) makes the largest contribution and is the strongest indicator of satisfaction with travel ($\beta = 0.31$). *Balance*, or time to engage in personally valued activities, also makes a significant contribution ($\beta = 0.13$). *Time traveled* was inversely related to satisfaction with travel ($\beta = -0.12$), such that the longer the commute, the lower the satisfaction with travel. *Activating the mind, body or senses* during the commute made a positive and significant contribution to satisfaction with travel ($\beta = 0.10$). Having a predictable daily *routine* in commuting, and having *choice* and *control* in one's commute, were also significant predictors, each accounting for approximately 9 percent of the variance. In summary, the best fitting model for predicting satisfaction with travel was found to be a linear combination of five characteristics of activity patterns (*balance, routine, choice, meaningful, and control*), a travel parameter (one-way *time traveled*), and two dimensions of experience (*pleasure/joy, and activating mind/body/senses*).

Table 13. Significant multiple linear regression variables on satisfaction with travel (all modes)[†]

Variables	β	t				
Pleasure Joy	.31	8.19***				
Balance	.13	3.29**				
Time	-.12	-2.88**				
Activate mind, body	.10	2.63**				
Routine	.09	2.94**				
Choice	.09	2.93**				
Meaningful	.09	2.21*				
Control	.08	2.07*				

Model		Sum of squares	df	MS	F	p-value
3	Regression	901.74	26	34.68	46.97	.000
	Residual	396.49	537	.74		
	Total	1,298.23	562			

[†] data from full model in Table 12

*significant at $p < 0.05$

**significant at $p < 0.01$

***significant at $p < 0.001$.

In order to understand which variables explain satisfaction with travel by mode, OLS regression was performed on the eight significant predictors from the full model above, one selecting for passive modes and another selecting for active modes. This “skinny” model was predictive for all modes, but showed higher predictive power for passive modes of travel (car and shuttle) compared to active modes (bike and walk). For passive modes, the regression was significant at $F(6, 535) = 165.88, p < 0.001, R^2 = 0.65$. For active modes, the regression was also

significant at $F(6, 85) = 19.60$, $p < 0.001$, adjusted $R^2 = 0.55$. The skinny model explains 65% of the variance in STS for active modes, versus 55% for passive modes. This “skinny” model also resulted in different significant predictors by mode (see Table 14). For passive modes of transportation (car and shuttle), the model includes six of the original eight significant predictors of satisfaction with commuting (*pleasure/joy*, *balance*, *time*, *activate mind*, *body and senses*, *routine and choice*). However, for active modes (walk and bike), only two variables are significant predictors: *pleasure/joy* and *balance*. There is variability in significance of predictors by mode and strength of predictors. The differences may be due to the strength of *pleasure and joy* as a predictor in passive modes versus active (.44 versus .31) which may overshadow other predictors due to the smaller sample size for passive mode, or to actual differences between active and passive modes. Removal of less significant predictors (from the full model) can increase the significance or the strength of the remaining predictors.

Table 14. “Skinny” model with multiple linear regression variables compared by modes

Variable	<u>Passive modes (n=538)</u>		<u>Active modes (n=85)</u>	
	β	t	β	t
Pleasure Joy	.31	7.68**	.44	4.32**
Balance	.17	6.00**	.22	2.14*
Time	-.17	-5.97**	-.08	-1.13
Activate mind, body	.15	4.67**	.09	1.02
Routine	.15	5.03**	.07	0.74
Choice	.13	4.29**	.10	1.17

Note: * denotes a significant predictor at $p < 0.05$ ** significant predictor at $p < 0.001$

Summary: The model results support the theory that characteristics of activity patterns and dimensions of experience influence satisfaction with travel, and this varies by mode. Interestingly, time is not a significant predictor for active modes, indicating that the duration of the commute does not predict satisfaction with commuting by bicycle or by walking, but longer times commuting by car or shuttle are less satisfying. Correlations between predictor variables and satisfaction with travel still hold strongly when controlling for time, shown in Table 15. When comparing Pearson correlations for each variable with partial correlations (in which time is extracted), routine is relatively unaffected, while mode, balance and choice are more affected.

Table 15. Pearson correlation of significant variables with STS and partial correlations controlling for time

Variable	Pearson correlation	Partial correlation	Difference
Balance	.67*	.60*	.07
Routine	.50*	.49*	.01
Choice	.53*	.46	.07
Mind/body/senses	.57*	.54*	.03
Pleasure/joy	.69*	.66*	.03
Meaning	.58*	.56*	.02
Mode (A/P)	.28*	.19*	.09
Time	-.44*		

* = Significant (two-tailed) at $p=0.000$

Phase II. Qualitative Results

The purpose of the qualitative portion was to explain the occupational experiences of college student commuters with respect to dimensions of experience and activity patterns. Additionally, qualitative analysis was used to support or refute the quantitative results with respect to how factors might influence satisfaction and participants' well-being. The primary form of data collection consisted of ten focus groups, held between March and May, 2017. Additionally, qualitative comments retrieved from the quantitative survey (phase I, see Appendix B, Commuter Activity Patterns Survey) conducted in the fall semester were included in the qualitative analysis. Face-to-face semi-structured focus groups were conducted in phase II to enable flexible and in-depth exploration of travel experiences. Focus group participants were purposively recruited with primary consideration to mode. The participants ranged from freshmen to graduate students, all living off-campus of varying distances (see Table 16). To be eligible, students resided in off-campus housing and commuted predominantly by one of four modes of transportation: car, shuttle, bicycle or walking. Some participants used more than one mode of transportation, but agreed to discuss only one mode or their predominant mode at the focus group. Participants provided data about their commute time and distance, sociodemographic information, and completed IRB consent forms. The researcher used a predefined interview guideline (see Methods section – Phase II) commencing with the purpose of the research project. After introductions, icebreakers and food promoted comfort and participation in the discussion in the focus group (Krueger & Casey, 2000).

Initially, the focus group participants described their commute experiences to the university in detail and explained how their commute experience influenced their health and well-being, particularly related to their mode of travel. The question format (see Appendix C.

Focus Group Interview Protocol) varied according to the need to create discussion and gather additional viewpoints. Subsequently, prompts were made with notecards that listed the occupational concepts from the DLW framework (Moll et al., 2015). The question was then posed, “do any of these words reflect how your commute influences your well-being, and if so, can you explain how?” An explanation of the concepts was provided, if requested. Finally, a concluding summary, that captured the student’s comments in overview, was articulated by a trained assistant or the researcher. This was used as a form of member-checking to ensure that the findings were consistent with the participants’ intended meanings. Feedback was encouraged at this point and was incorporated into the transcripts if given. The feedback was generally in agreement with the summary. Participants were then thanked and informed that two participants would be randomly chosen from each mode for a \$40 gift card at the university. After the interview, participants were emailed information on how they would receive the gift card.

Focus groups ranged in duration from 38 minutes to 1 hour and 20 minutes, depending on the number of participants, time constraints or data/response saturation in which further comments were repetitious. The total number of participants included 19 undergraduate and 6 graduate students, including 19 females and 6 males, 11 white, 7 African Americans, and 5 Asians (Middle Eastern descent or Indian) (see Table 16). Participants included car commuters (n=6), shuttle commuters (n=7), cyclists (n=6) and walkers (n=6), who indicated that they commuted primarily by one mode most days of the week. Most focus groups consisted of participants who used solely one mode (e.g., all cyclists), but several focus groups had multiple modes due to sampling and time constraints. Mode was therefore attached to data collected from each individual (see Table 16 – participant), and incorporated into the analysis by mode. All focus groups were audio-recorded and subsequently transcribed. No identifiable information was

attached to the transcripts and data were stored in a locked room and treated with strict confidentiality. Participants were numbered during transcription for anonymity.

Table 16. Demographic and travel profile of focus group participants

Group	Mode	Participant*	Gender	Ethnicity	Year**	Distance (miles)	Time (min.)
1	Shuttle	1S	M	Afric.A.	Jr	1	15
1	Shuttle	2S	M	Afric A	Sr	1-2	20-30
1	Shuttle	3S	M	White	Jr	1.5	10
2	Shuttle	4S	F	White	So		10-30
2	Shuttle	5S	F	White	So	2	20
2	Shuttle	6S	F	White	Jr	2	10-15
3	Car	1C	F	White	GS	8	30
3	Car	2C	F	White	GS	1-2	10
3	Car	3C	F	Asian	Sr	18	45
3	Car	4C	F	Afric A	Jr		30
3	Car	5C	F	Asian	So	30	15-30
3	Car	6C	M	Asian Ind.	Fr	23	30-45
4	Bike	1B	F	White	GS	3	30
4	Bike	2B	F	White	GS	1	10
4	Bike	3B	F	White	GS	4-5	30
5	Walk	1W	F	White	GS	0.5	10
5	Shuttle	7S	F	Afric A	Sr	2	35
5	Walk	2W	F	Afric A	Jr	0.3	10
6	Walk	3W	F	White	Sr		15
7	Walk	4W	F	Afric A	Jr	1	20
7	Walk/bus	5W	F	Afric A	Jr		10
8	Walk	6W	F	White	Jr		10-15
8	Bike	4B	M	Asian	Fr	1	10-15
9	Bike	5B	F	White	Jr	1	10-15
10	Bike	6B	M	Asian	Fr	6	20-30

Note: *Participants coded consecutively according to their mode of travel

**Year: Fr=Freshman So=Sophomore Jr=Junior Sr=Senior GS=Graduate Student

Transcripts were entered into AtlasTI (version 7) for analysis. Initial coding of all transcripts began with a list of operationally defined variables from the Do-Live-Well theoretical framework according to the thirteen possible occupational categories (six APs or seven DoEs). Coding of categories was performed on a continuum from negative to positive. For example, comments such as ‘unenjoyable’ were coded under *pleasure/joy* as a negative comment, while ‘favorite part of the day’ was coded as a positive comment.

Results from the quantitative phase further drove the qualitative analysis. Six concepts reflecting APs or DoEs were significant predictors of satisfaction with travel from the phase I quantitative analysis. These included pleasure/joy, balance, activating mind, body and senses, routine, choice and meaning. Each concept is described in terms of the extent to which there is a perception of, for example, pleasure/joy or balance in their commute. Analysis incorporated a potential for interpretation of category on a continuum of perceptions (from meaningful to unmeaningful, and balanced versus unbalanced), according to the DLW framework. Therefore, coding included both positive and negative interpretations. Qualitative categories and positive and negative valence examples are shown in Tables 17 and 18. Time, a significant predictor variable in the quantitative phase, was discussed within several occupational categories. The following analysis describes each category in context according to the mode of travel.

Table 17. Qualitative themes and positive valence examples

Theme	Example 1	Example 2	Example 3
Pleasure/joy	“I also enjoy walking around campus because the campus is beautiful” (W)	“Overall for the duration of my commute, I feel at peace” (B)	“Other days I genuinely enjoy my walk” (W)
Balance	“If I do bike, I don’t have to go out for a run and do other exercises” (B)	I have time that’s sort of wasted that I can reach out to somebody and get caught up a little bit while I’m driving so sometimes I’ll do that even though I shouldn’t (C)	“Use that time sometimes to like listen to the news or listen to podcast so I feel like that’s kind of informative” (C)
Mind/body/senses	“There’s something refreshing and awakening to it for me” (B)	“That’s the time where I find I think about those things the most, and like really have a more clear head and like process emotional things” (W)	“I get the fresh air that helps me relax and the cardiovascular and muscular benefits of working out” (B)
Routine	“It’s easier to just rely on how long I know it will take me to get to school by biking or walking” (B)	“I like knowing exactly what time I need to leave and I get there exactly on time” (W)	“It’s always consistent” (W)
Choice	“It was much easier, much faster to ride my bike” (B)	“I can leave <i>later</i> if I ride my bike” (B)	“Walking allows me to switch my routine up, so I can just go with the flow” (W)
Meaningful	“I am taking the steps to minimize my carbon footprint” (B)	“When I bike it’s like me doing the work so it has more meaning” (B)	“My music is part of my commute, just cause it’s like your ‘travel song’” (S)

Notes: W= walk; B=bike; S=shuttle; C=car

Table 18. Qualitative themes and negative valence examples

Theme	Example 1	Example 2	Example 3
Pleasure/joy	“Sometimes I will walk but I don’t really enjoy it, I will be like, I’ve got to get to class!” (W)	“It’s really frustrating because your mind isn’t settled and you’re rushing to class, your professor’s angry at you and you’re angry at the driver and it’s just a hot mess!” (S)	“Other times it kind of makes you stressed out if you’re late or something” (S)
Balance	“You have the commuting time...you don’t really have time to pray...I choose that time...Why is there so much traffic I could be doing anything else!” (C)	“I have to consider my commuting and I don’t want to go to the gym because I want to go to the gym but I cannot go because of traffic” (C)	“I’m not outside appreciating the outdoors as much as I would like” (C)
Mind/body/senses	“I am conscious that my commute is just more sitting and not being active” (C)	“Other times I just kind of turn my brain off” (S)	“I need to like pay more attention”(C)
Routine	“Shuttle arrival times are very unpredictable” (S)	“I wake up, grab food and my books, head out the door, then hope that the shuttle will be there at a reasonable time. It usually isn’t” (S)	“Traffic can make my commute less predictable” (C)
Choice	“I tried taking the bus and I tried biking like once maybe, but with my schedule and needing to go to [school] and home, I wasn’t able to use public transportation or biking” (C)	“I feel like I need to take my car because the other alternatives limit my ability to do the different things that I want to do, so I would rather be not using a car but I feel stuck using one.” (C)	“I would prefer not to drive myself, but I live too far to walk” (C)
Meaningful	“In terms of physical activity it’s not adding anything to my health”(C)	“I feel guilty every time I would be driving that car and like it leaked oil and it burned oil” (C)	“[It’s] a blur when you drive it every day” (C)

Notes: W= walk; B=bike; S=shuttle; C=car

Pleasure/joy of commute

“Pleasure and joy” includes expressions of positive and negative emotion or affect experienced during the commute. That is, coding for pleasure as well as displeasure was included in the analysis. Pleasure and joy comments in the focus group discussion were related to happiness and amusement and contentment on the positive end, and stress and frustration on the negative end. Compared to other modes, shuttle participants discussed their commute in the most negative or neutral manner, especially concerning their comfort during the commute (“supercrowded” or “superhot” and “noisy”). The commute was often physically unpleasant. Other comments related to factors of inconvenience, such as weather conditions, a slow app for gathering information concerning shuttle arrival and departure times, and being late due to missed shuttle or schedule changes. This resulted in feelings of frustration and stress – lacking in pleasure or joy. Other comments were indifferent about the commute, considering it “mundane,” a utilitarian experience, and an experience to be “tolerated.” Some positive comments relating to pleasure/joy were occasional interactions with a friendly driver who took the time and effort to relay travel information or interact pleasantly, or occasional conversations with people waiting for the shuttle (sometimes resulting in bonding over the challenges of shuttle schedules!). On a continuum of enjoyment, pleasure and joy was not experienced frequently by shuttle commuters, but instead a process to be endured.

Car commuters had stronger expressions of displeasure concerning the experience, especially related to traffic, parking, and annoyances like potholes and tractor trailers. This influenced their mental and physical well-being, as one person commented on her physical stress resulting from increased blood pressure. A few participants did comment on the comfort of being in a car, particularly a newer model car, and the ability to listen to music or podcasts which

was enjoyable, or the occasional backroad scenery. On the whole, the comments made by car commuters were the antithesis of pleasure and joy, mostly due to a stressful commute experience.

Pedestrian commuters enjoyed the campus surroundings and the bridge, and enjoyed their walk. One walker described the experience as “easy, because you’re on your own time.” Time considerations may have increased the enjoyment of the commute, since alternative modes often required waiting. Another walker found the commute to be a utilitarian experience some days (“some days I feel like I’m on autopilot and other days I genuinely enjoy my walk”), while other days it was predicated on her mood. One participant commented on having to cross the road and the traffic, saying waiting for cars “was not something I look forward to.” Overall, pedestrian commuters were indifferent to fairly positive about their experience.

Cyclists commented that the pleasure/joy factor was “one of the primary reasons why I chose to bike.” This feeling was echoed by others, who stated that it was their favorite part of the day. One cyclist enthusiastically compared her cycling commute to driving:

I also like the mental health benefits [of cycling]...like [drivers are] stressed and in a hurry and pressure[d] to get to the next light and stop there, and I mean I never feel unhappy when I’m on a bike. When I’m in a car, I feel stressed, but when I’m on my bike I feel fine, and I can go way past those guys.

This commuter gave evidence of positive affect from the experience of cycling. Another remarked about the “peacefulness” of the experience, again comparing it to driving which “brings just the opposite [of peace].” Most cyclists enjoyed the exercise, with one even wearing her sweat from cycling as a “badge of honor.” Another commented on the “simplification that

comes with riding your bike.” Unenjoyable aspects of cycling were having to deal with uncooperative or distracted car drivers. One student experienced a bicycle accident when he was hit by a car door opening in a bike lane. Other unenjoyable experiences were described relative to inconvenience from pathways blocked by snow and construction. In general, pleasure/joy was described as a significant part of the bike commute experience and a reason for cycling to school, but unpleasant experiences occurred occasionally.

To summarize, shuttle and car drivers found their commute least enjoyable, with shuttle commuters describing the boredom of the trips as well as the anxiety from time worries. The stress of traffic was a factor experienced by several drivers, indicating a lack of pleasure and joy. Walkers either enjoyed being on their own schedule, or were indifferent about the experience. Cyclists experienced the most pleasure and joy in their commute, which stemmed from the simplicity and peace of riding, but weather and traffic were lingering hindrances. The enjoyment factor overall seemed to be related to both time considerations and the efficiency of the mode of travel - active commuting was more efficient and had fewer impediments, while passive commuting was generally time-restrictive and less enjoyable due to the worry.

Balance of activities

Balance of activities was interpreted in the qualitative coding as having time and opportunity for personally valued activities and roles, and when time spent in activities “matches ... desired patterns” (Moll et al., 2015). Most shuttle participants considered their commute a time for secondary activities, or “things that people report doing at the same time as their main (technically called primary) activity” (Miller & Bowd, 2012, p. 176). Participants discussed performing activities concurrently while commuting which they valued or enjoyed, such as listening to music, talking on the phone or study time with electronic flashcards. One participant

shared that the time was useful for short reviews of school material, but background thoughts hinted at anxiety about time wasted on the shuttle or being late:

I have a little mental note that [commuting] is extra study time, like I have flashcards on my phone, so it's easy to get while I'm on the bus, and so that is like an extra 10 minutes that I can quick review all my flashcards before heading off to a test. So that is nice like being able to have that small period of time where you're not like worrying about getting to school on time or because like you can't control whether the bus is going to get there on time or not, but you're going to get there when you get there whatever time you're going to get there, and you sit and do what you can."

Drawbacks to commuting in terms of time and activities were having to leave campus earlier than they desired due to shuttle schedules, thereby missing longer study times at the library or social activities on campus.

Car commuters also participated in secondary activities during their commute unrelated to the driving task, such as prayer and worship time, listening to music or podcasts, and talking on the phone. Others found the time in the car useful for quiet time or alone time, time to think. One participant wanted to make use of the time in the car but remarked that many activities that they wanted to do were not conducive to driving, such as talking on a phone. The strong desire to utilize their "wasted" time in the car for more meaningful activities was apparent. One exclaimed "why is there so much traffic...I could be doing anything else!" The secondary activities seemed to be an attempt to be efficient with their time and were more than just an avoidance strategy from the tediousness of driving which prompted multi-tasking.

Additionally, driving was notably sedentary, like their daily class participation (“I am conscious that my commute is just more sitting and not being active”). Therefore, there was much discussion in the car focus groups concerning the “trade-off” of activities, such as how to plan gym sessions around traffic considerations. One participant mused that “if my class is at 2:30 there is traffic around 3:30, so if I go to the gym after my class I have to consider my commuting and I want to go to the gym, but I cannot go because of the traffic.” Traffic considerations also influenced participation in other club or social activities on campus, forcing them to choose between staying for a club and fighting the traffic or missing the social activity. The commute time affected other areas of physical wellness besides the exercise component. One commuter desired healthy eating, and her commute schedule required a rushed morning that did not allow for cooking breakfast for herself, so she didn’t eat well. On the positive side of balance, one commuter mentioned she was able to accomplish other chores in between classes, such as grocery shopping due to possession of a car.

Walkers were generally positive about the balance of activities, appreciating the opportunity to get exercise, save money and have lower stress levels. All walkers were upperclassmen (juniors or seniors) or graduate students, and likely had more responsibilities than younger undergraduates. Therefore, they mentioned that the time constraints of being a student limited their opportunities for planned exercise, which was instead incorporated into their commute experience, enhancing their efficient use of time. Additionally, one participant valued the alone time which “forces you...you have nothing else to do on your way, and exercise at the same time kind of helps clear your head, so for me, that’s a good opportunity to kind of process things, think through things, help me make decisions for the day, for the week.” The exercise during the commute stimulated mental processing, preparing the student for her studies.

Cyclists also commented on the multi-tasking concept “killing two birds with one stone” experienced by the pedestrian commuters, in that they accomplished exercise as part of their transportation process, stating “if I do bike, I don’t have to go out for a run and do other exercises” and “it’s not like another thing [you have to do], it’s part of the process.” These cyclists were appreciative that their commute included their daily dose of exercise. Several also valued the environmental component of cycling, such that they were “taking steps to minimize [their] carbon footprint.” This environmentalist viewpoint was not, however, unique to cyclists; at least one car commuter described her choice of an electric car for this reason. For several cyclists commuting was a time saver in itself, because it was the quickest mode of travel for their commute, which allowed more time for them to perform other activities.

In summary, secondary activities were common for shuttle and car commuters, as a way of multi-tasking to make their commute more productive or cut down on wasted time. This time-saver idea was described slightly differently by the walkers or cyclists, such that their primary activity (e.g., cycling) *included* a secondary activity (e.g., exercise). In other words, it wasn’t something that they decided to do during their commute, but it was a required component of the commute, giving the commute a bonus. The active commute was viewed in a positive way compared to a neutral or negative way by passive commuters. Another important finding concerned the desire by shuttle and car commuters to plan for activities in which they wanted to participate, but which were challenging for them because of external, uncontrollable factors. For example, car commuters had considerations of traffic, while shuttle commuters had challenges of fixed shuttle schedules. They therefore had to consider trade-offs between required activities and leisure or desired activities, implying that choice was a consideration in the category of balance. Neither cyclists nor walkers explored the tradeoff concept in focus group discussions.

Activating the mind, body, senses

“Activating the mind, body and senses” during the commute involves physical as well as cognitive or sensory engagement (Moll et al., 2015). Activating the physical body occurred through walking or cycling, but also was a component of getting to and from the shuttle stop and to and from the parking spot. Qualitative analysis revealed that cyclists reflected more than other modes on the commute’s impact on bodily comforts and discomforts. For example, some described getting really sweaty riding up hills when it was hot, or wrapping up in gloves and hat to keep warm. However, the discomforts of being outside were seen as having benefits, which reduced stress and increased enjoyment:

“ah I honestly, even when it’s really cold... this year I invested in some super sweet biking gloves that were wind and water resistant because, my ears I’ve always wrapped them up but your ears and your eyes and your nose...I would wear sunglasses even when it was basically dark outside because you know that wind! There’s just something refreshing and awakening to it for me!”

Cycling was seen as a stress reducer due to the fact that it was an outdoors activity, “I think it’s more about being outside and the nature part of it [that] reduces my stress.” Cyclists also discussed how much they had to pay attention, stating “that’s the one thing that’s nice about that is that you always have to focus on the moment, because it’s not like a ride in the country, where you can just zone out and focus on the tree, it’s like (pounds on the table) FOCUS...NOW!”

Walking discussion was full of references to sensory experiences, which were linked to mental well-being. Viewing the early morning sunrise, and smells in the atmosphere, as well as the exercise aspect, even if the walk was a daily necessity for getting to class, were considered a

way to clear one's head, "that's the time where I find I think about those things the most, and like really have a clearer head and like process emotional things." Two participants agreed separately that mental sanity was a positive outcome of walking, as well as physical fitness.

The car commuters were mixed in their response relating to activating their mind or senses, with some enjoying the time to activate their mind through listening to public radio or music, as well as enjoying some quiet time for thought. These secondary activities were often described as a way of coping with the banality of the commute, with one participant describing music in terms of relief or alleviation ("maybe it will help"), while another coped by zoning out ("other times I just kind of turn my brain off and listen to music or listen to nothing"). One car commuter described the dangers of being so tired that she almost dozed off, stating that driving required that she "needed to pay more attention." Alternatively, one described the drive time in the morning as an opportunity to wake up. Finally, one participant chose to change her route occasionally from highway to backroad travel to have a more scenic ride and not be on autopilot, increasing her interest in and awareness of her surroundings.

Shuttle commuters complained of loud music and noise from other riders and considered that it may not be safe for their ears. They were occasionally delighted when they could open the windows for fresh air and relax, and not think about driving. They also enjoyed the exercise to and from the shuttle stop.

In summary, active commuters (walkers and cyclists) described their experiences with specific references to weather related bodily and sensory experiences or the effects of exercise. Additionally, their discussion exhibited intensity and vigor, exhibited by terms such as "refreshing" and "awakening." While active commuters were sometimes physically uncomfortable, still they described their commute experiences as invigorating or relaxing. The

act of commuting itself by bike or walking provided the sensory input. This may have created more meaning or purpose to their travel experience. Passive mode commuters (car drivers and shuttle passengers) were more likely to search for secondary activities to activate or de-activate their mind, but they did not elaborate on activating their physical body.

Routine

Whether the commute mode allowed for a predictable and reliable routine was also a category of inquiry. Descriptions of flexibility or rigidity in schedules were searched for in the transcripts, as well as how the commute routine matched the needs of the individual (Moll et al., 2015). Creating or adhering to a routine was easier with cycling for some, who stated that they knew how long it would take to get to school by biking. Cycling as a transportation mode was “easier to rely on,” especially knowing it was an activity related to their own abilities (“with biking it’s easier to control because it’s me and my pedaling, pedaling, pedaling ability”). This cyclist, who had experienced an accident with a car door, commented that he would leave a one-hour gap for his commute even though it only took 40 minutes to get to campus by bike.

Walkers had similar comments to cyclists, stating that their commute was always consistent, and in fact “routine, down to the minute.” This predictability helped them to relieve stress:

I like knowing exactly what time I need to leave and I get there exactly on time so I’m the type that likes that type of routine and walking just helps keep that routine like consistent every day. Because it really would frustrate me if like my whole routine was thrown off if I had to wait on something you know like a car and traffic, so you know walking helps me keep my routine consistent.

This student may have chosen walking as her commute mode due to the knowledge that it allowed a predictable routine, and this suited her personality and unique need for control and consistency.

In contrast, car commuters complained of traffic and unexpected construction, which made their commute “highly variable” and “annoying.” This also influenced their sense of control over their commute experience. One car commuter spoke of taking an alternate route due to construction, stating “I’m not used to driving that road and like I’m using navigation trying to find the best way, so it became a routine like looking up the traffic before I leave so I know which route to take.” Routine for this commuter referred to a repeated pattern of activity that she used daily, caused by repeatedly delayed travel experiences.

Shuttle commuters had the most to comment on issues related to having a predictable routine. While a few stated that the shuttle schedule was mostly consistent, several indicated frustrations from an unpredictable schedule. The students utilized an app system or a website, which provided shuttle arrival times. However, there were difficulties with accessing the app, and they described how they had the habit of constantly checking the app, since the shuttle arrival times were constantly changing. One student, who stayed late in the evening in the library, found that the shuttles had stopped running even though the app had indicated it was still coming, and she was “stranded on campus.” Still others said that having the shuttle positively influenced their well-being, “even though sometimes I will be late I will eventually get to school, but sometimes it’s an obstacle course to get to school.” The variability of the shuttle schedules plus the fact that they were unpredictable decreased the level of routine, which resulted in feelings from annoyance to frustration, to worry and anxiety, to fear of missing the shuttle and being late. The frustration was increased because having the app implied that they would have

more control and predictability. The constantly changing schedules and inaccuracies with the app required “readjust[ing] my whole schedule – now I get to school like 45 minutes before my class, when before I would just get to school like 10 minutes before my class...” Finally, one student described the shuttle system humorously, joking that the university “offers shuttles at designated pickup points but them being on time is as reliable as Mexican drinking water, Hillary Clinton emails or a van that says, ‘Free Candy’.”

In summary, cycling and walking allowed a more predictable commute in terms of anticipating the time necessary for travel, as well as a reliable routine. Car commuting required more flexibility to prepare for unexpected traffic. The shuttle was the least predictable relative to routine and therefore increased the anxiety and frustration of the students, ultimately causing more stress for the students.

Choice

Choice was operationalized in the survey as “having autonomy surrounding one’s commute”. Choice was interpreted in transcripts as having options among the various modes of travel, having the ability to select among activities during the commute, or choice in route decisions. Choice decisions included discussion of the tradeoffs, weighed in terms of which was fastest, or cheapest, or how easy the commute would be. This second interpretation has overlap with the concept of control.

Cyclists frequently stated that they purposefully chose their commute mode because it was easier or faster. For example, one stated “I like to bike in comparison to driving a car or walking, because walking takes longer, so I can leave *later* if I ride my bike.” Another cyclist made an intentional choice for environmental reasons, stating, “it’s certainly a choice that I

make, it's more; I still would default to my car, unless I thought about it" (the environmental impact). Others chose cycling for the enjoyment, and wished their friends could experience the same pleasure of cycling; "I feel like if they borrowed my bike for the day and they kind of like experienced what I experience..." Another chose not to ride on rainy days. Choice for cyclists was deliberate and based on efficiency, enjoyment, values and weather.

Some walkers enjoyed having the option to walk, while others walked because it was the only way to get to class on time. Some chose their residence based on being able to walk to classes. Car commuters spoke of the need to drive due to "crammed" schedules and other activities, such as jobs that required promptness. Choice to drive was sometimes based on investigating or trying out other options such as public transportation or biking, and sometimes due to the lack of planning and preparation ("yes, I could bike, however, I haven't taken the time to prepare my bike or route"). One graduate student did not feel like she had a choice. This student needed a car because "the other alternatives limit my ability to do the different things that I want to do, so I would rather not be using a car, but I feel stuck using one and I don't know how to get out of that based on our current infrastructure." Students described lack of choice in terms of having no other options when traveling from a longer distance, or having no bus routes available ("I would very much prefer not to drive myself, but I live too far away to not drive"). Others contemplated choice in terms of multi-tasking options during the commute, to make their commute meaningful ("I can make the time meaningful by making a choice to pray or listen to music or listen to hymns"). The fact that car commuters were not able to choose to be physically active during the commute was "disappointing," indicating that trade-offs were recognized to be a part of the decision to commute by car.

Most shuttle participants were appreciative that they had the opportunity to commute by public transportation if they wished to, especially when they did not own a car. Some were limited in choice due to financial considerations, or chose to limit their expenditures for parking and gas. Others had a choice to walk but most of the time chose to take the shuttle. Some indicated the lack of choice since other options were out of reach (too expensive). For example, one stated, “you can have the option in [shuttle departure] times, but they’re still set in stone times and if you miss the shuttle and you have to drive, it costs so much to park on campus in the visitor’s spot...so it’s a false sense of choice- you don’t really have a choice.” On the positive side, some considered their commute mode an advantage and a calculated choice, remarking, “when I commuted from a half hour away and I got a flat tire, I was done. If there’s an accident and the roads are blocked off, I can’t get to class. Whereas the shuttles, they find a way to go around that.” The student had experienced commuting by car, and the associated downfalls. He was able to find a mode that better suited his needs. Choice provided a sense of self-empowerment and control, and transportation decisions became more positive after experimenting with options.

Meaningfulness of the commute

The descriptions of commuting included various references to meaningfulness of their experience, and these varied by mode. For example, cyclists found their commute meaningful in terms of assisting them in becoming or staying healthy due to the physical exercise and the ability to maintain an active lifestyle. Cycling was also meaningful to some due to the environmental aspect, through minimizing their carbon footprint. For others, cycling was meaningful because it allowed them to free their mind of worries and distractions. Specifically, one found that pedaling allowed them to have a blank space in their mind since “when you bike

you don't have to worry about other responsibilities." Also, one found meaning in actually moving by pedaling, stating "when I bike it's like me doing the work, so it has more meaning [than being a passive participant]. Whether the meaning was predetermined or only realized after cycling for a certain time was often unclear. However, one cyclist described how she searched for meaningfulness gained from a previous cycling experience in which she had experienced a sense of flow and mindfulness. The commute experience at the university was different, and she found it difficult to re-experience what she described as a flow state or experience (see Chapter 2 - Engagement) during the commute because of "people or curbs you have to be aware of, or [traffic] lights." She found that during her commute "there's a lot of just disturbances that disrupt [the flow experience], but you do get specks of like the air hitting you when it's a nice day, or the sun hitting you, and it's kind of nice." The student described searching for a re-creation of a past meaningful experience, and was able to re-create bits and pieces of meaning during her commute. She also described the value of her commute as a student, remarking that, "you're inside most of the time studying, and there's that 10 minutes that you can be outside and get the fresh air, you know oxygen and vitamins..." Another cyclist commented on how commuting by bicycle furthered her approach toward life, and so she actually preferred to have a longer commute, stating:

Sometimes I wish that I was further away to really get the experience *more*, especially the uphill. I'm a person that likes to push, like the way I work out is like, so if I've got to get up that hill every day on campus, I translate the way I work out to how I perform in everything else, so if I give it all in one thing...

Walkers also found the meaningfulness of their commute in exercise attained ("I feel the physical difference"), and cost savings ("financially I don't have to pay for gas"). They also

found walking a way to clear their head of things so that they were able to “process emotional things.” One occupational therapy student found meaning in the fact that she was capable of walking, while some of her clients were not so abled. This made her appreciative of her own physical abilities and spurred her to walk. Exploring her capabilities was meaningful to her, which is a DoE linked to health and wellbeing in the DLW framework.

Car commuters described meaningfulness in terms of how they utilized their time. Some found the commute time sometimes wasteful or without purpose and therefore not meaningful. Others said they had to make a conscious decision to make it more meaningful through “prayer or listen to music or listen to hymns” and phone conversations. Others found commuting to be simply a means to an end, remarking that it was a “blur when you drive it every day,” indicating no meaningfulness in the experience of commuting itself.

Shuttle commuters found meaning in secondary activities such as music, flashcards for review of materials learned in school, video games or sleep. One student considered his music as a part of the commute, exclaiming, “it’s like your ‘travel song’ and I always feel weird when I forget my headphones at home. I like to listen to anything fast paced on the shuttle ride...because one it kind of wakes me up and two when I get off the shuttle - it makes me hustle to class.” The secondary activity of listening to music prepared them for their daily classes. Mostly for shuttle riders it was a functional experience, described this way “because it helps me to get on campus in an easy, safe way that’s free.”

In summary, meaningfulness was tied to the actual commute experience for cyclists and walkers, while meaning was often tied to secondary activities performed during the commute for shuttle and car commuters (and time was used more efficiently by enfolded occupations such as talking on their cell phones or listening to the radio).

Summary of qualitative results

The purpose was to describe and explain commuter experiences from the perspective of the DLW framework. Phase II analysis included concepts extracted from focus groups as well as written comments included in the survey data. Only statistically significant occupational concepts from qualitative analysis were identified and used in Phase II qualitative analysis. Six concepts are discussed, which include: pleasure/joy experienced during the commute, balance of personally important activities, activating the mind/body/senses, routine experienced during the commute, choice, and meaningfulness of the commute. Each of these concepts is described in terms of valence (e.g. both positive and negative descriptions were coded). They are also described by mode; both active (bicycle and walking) and passive (car and shuttle) modes are analyzed. Collectively, these concepts represented themes from the DLW, and included both characteristics of activity patterns and dimensions of experience.

The effects of travel on well-being can be both positive and negative, and that this depends on the mode. Participants using active modes indicated more positive and less negative expressions of AP (routine, balance, choice, control, meaningfulness, etc.) and DoE (pleasure/joy, activating the mind/body/senses) compared to passive modes. The negative aspects of commuting often related to wasted time and stress. Time challenges were indicated by a lack of balance of activities and lack of routine. Stress negatively impacted the enjoyment of the commute. Positive aspects of commuting included personal time and stress relief. Personal time was used for planning the day, changing the focus of attention, and providing balance. Freedom was associated with pleasure and joy and having choice and control, relieving stress. Table 19 condenses the occupational aspects of commuting relative to well-being.

Table 19. Summary: Occupational aspects of commuting relative to well-being

Occupational Concepts	Quantitative results	Qualitative results	Mixed results
Activity patterns (AP)	Five predictors of satisfaction significantly different by mode (active higher than passive modes)	Positive indicators include balance, control/choice, meaning for active modes	Patterns indicative of well-being are described positively and predict greater satisfaction for active modes
Dimensions of experience (DoE)	Two predictors of satisfaction. DoE significantly different by active/passive mode	Mostly positive indicators of enjoyment and activating mind/body and sense indicators for active modes	Dimensions indicative of well-being are described positively and predict satisfaction with travel

Validity and Trustworthiness

In the quantitative research, internal or contextual validity was strengthened by controlling for several confounding factors such as demographics and travel attributes in the regression analysis. This strengthened the assumption that variations in the dependent variable (satisfaction with commute) were due to variations in the independent variable (Abernethy et al., 1999). Contextual validity was also strengthened by adherence to a theoretical framework and confirmation of operational definitions from the authors of the framework (Moll et al., 2015). Internal validity was also obtained by reviewing data for invalid scores (inadequate content) and order bias. In the qualitative research, contextual validity was strengthened by attempting to capture the experiences of the commuter in an authentic way (Tashakkor & Teddlie, 2010) by having them describe their experience of commuting. Researcher bias was controlled for by two methods: one a reflexivity journal was kept in which the primary research reviewed impressions and biases during focus groups prior to subsequent focus groups, and the use of an assistant who was able to

independently summarize the focus group discussion and ask for feedback. External validity was addressed by adequate sample size in both quantitative and qualitative research, reflecting the population faithfully. The measurement instruments described items in as unambiguous a fashion as possible given the abstractness of the concepts, enhancing construct validity. Qualitative responses in the form of comments were available from several participants in the survey. Some survey participant responses indicated lack of understanding of concepts and/or questions concerning application to commuting, but for the most part the responses were related to the concepts. Other threats to reliability include length of survey or length of focus group, neither of which were egregious (5-15 minutes for surveys, and 40 minutes to one and a half hours). Typographical errors in entering data were addressed by reviewing and spot checking data entries. In qualitative research, procedural reliability or consistency was maintained by having a second reader (advisor) who reviewed the transcripts for ideas and discussion, followed by initial coding by the researcher and review of coding by second reader. Specific challenges to coding according to the DLW framework included placing comments in more than one category. For example, stress was a common theme coded as a negative indicator of pleasure/joy, but may also have implications for control and choice, resulting in coding across multiple categories. Reliability was also strengthened by review of quotations representing codes by the second reader/advisor. The interview protocol was followed systematically to ensure procedural reliability. Transcripts were accurately obtained by reviewing audio several times.

Further validation was accomplished by cross verification from quantitative and qualitative sources in a triangulation of the methodology (Denzin, 1978). Chi et al. (1981) used categorization patterns in qualitative data as an aid to interpreting the quantitative data. Transportation and well-being researchers measuring the extent of affective aspects of well-

being (DeVos et al., 2015) have used valence values of concepts (ranging from negative to positive) previously.

Triangulation was accomplished for only a single concept of activity patterns (pleasure and joy), since this concept was most predictive of satisfaction of the commute for both active and passive modes. Initially, the qualitative data were coded according to pleasure and joy references on a continuum (see methods for qualitative analysis). The pleasure/joy statements for each mode were then compiled into three categories. Statements coded for pleasure/joy were given a valence of either a ‘plus 1’ for positive statements, a ‘minus 1’ for negative statements, or a “zero” for neutral statements, similar to the categorization in Tables 17 and 18. This permitted quantifying of pleasure/joy statements by giving valence (either a “+1”, a “-1” or a “0”) to the statements. The valences were then summed by mode. Mean values were then recorded for each mode. These mean values were then normalized to the quantitative Likert scale survey results to facilitate comparison of results. Results for quantitative and qualitative data for the pleasure/joy concept are shown in graphic format, in Figure 12 below.

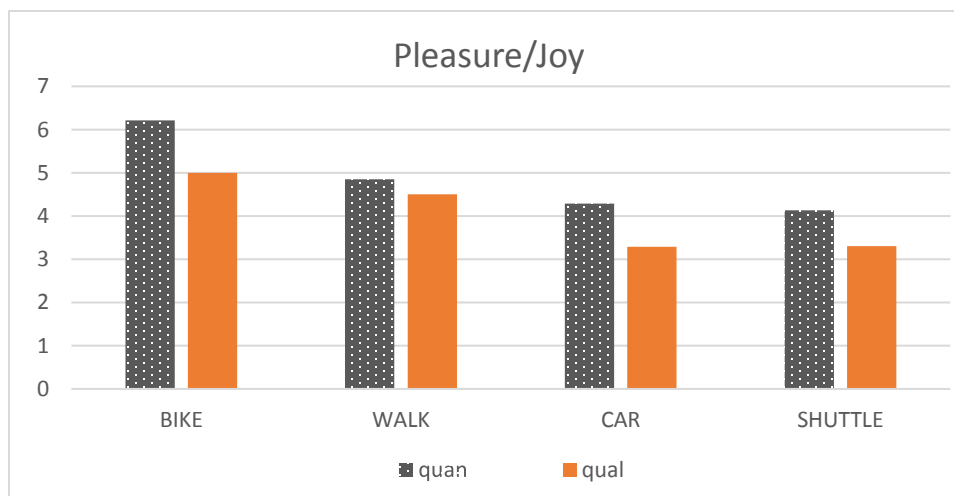


Figure 12. Comparison of quan and qual data: Pleasure/Joy construct

Figure 12 demonstrates that qualitative trends, when quantified, generally repeated the survey analysis. Specifically, pleasure and joy were higher in active modes and lower in passive modes, however T-tests of the paired samples indicate no significant differences between active versus passive modes. Table 20 shows triangulation of qualitative and quantitative data for the occupational concept of *pleasure and joy*.

Table 20. A summary of data and triangulation of pleasure/joy findings

Concept	Qualitative (n=24+)	Quantitative (n=655)
<i>Pleasure and joy</i>	Trend shows bike/walk more pleasurable than shuttle/car due to choice, control, and enabling of routines (time)	Strongly and positively correlated with STS $F(6,638)=99.70, p<0.001, \eta_p^2=.48$; Post hoc tests indicate bike/walk greater than shuttle/car

Conclusions

This chapter summarizes results from both survey and focus groups relative to occupational categories and how they influence well-being. Using an explanatory format in which the qualitative data was collected in order to explain the quantitative results (Creswell & Plano Clark, 2011), the occupational categories were investigated in terms of commuting: (1)pleasure/joy, (2)balance, (3)activating the mind body and senses, (4)routine, (5)choice and (6)meaning. These occupational categories predicted satisfaction with travel in the survey, and the qualitative analysis provides additional depth of understanding.

Chapter 5:

Discussion

This research paper used mixed methods design to explain the occupational aspects of commuting and their relationship to well-being. The research questions examined in this study were threefold. They include:

1. What are the characteristics of college student commuters with respect to mode, AP, DoE, and well-being?
2. What are the occupational experiences of commuters with respect to AP and DoE?
3. What are the occupational aspects of commuting relative to well-being?

These questions are addressed sequentially with respect to the research results and literature. First, research question one is addressed using significant findings from the quantitative phase. Using an explanatory sequential format (Creswell & Plano Clark, 2011), research question two (the qualitative strand) is addressed in terms of significant findings from research question one (the quantitative strand). Thus, the qualitative phase was used to explain the quantitative results of AP (characteristics of activity patterns) and DoE (dimensions of experience) of the DLW framework. Finally, question three is discussed in terms of both qualitative and quantitative results.

Descriptive statistics evaluated the characteristics of college student commuters with respect to their mode. Seven hundred twenty undergraduate and graduate college students completed surveys either online or in person. Concerning commute mode, surveys indicated that the majority (almost two-thirds) of students commute primarily by car; one-sixth of students commuting by campus shuttle; and one-seventh walking. Other modes identified and used less

commonly by students include: being a passenger in a car, multi-modal commuters (using more than one mode), MTA bus or train, cyclists, Uber or taxi, and skateboard. Therefore, most commuters (over 80%) used passive modes (car/shuttle/bus/train) of transportation while a minority (less than 20%) used active modes (bike/walk/skateboard). Time and distance varied most for commuters traveling by passive modes (car and shuttle). Commute time for active commuters was limited to thirty minutes or less.

Further refinement of the first research question addressed whether a difference existed among the occupational concepts of commuting by mode. The occupational concepts which were examined originated in the DLW framework (Moll et al., 2015), and consisted of six characteristics of activity patterns (AP), and seven dimensions of experience (DoE). Using inferential statistics, mean composite values of Likert scale response profiles from APs and DoEs were shown to be statistically significant ($p < 0.05$) when compared across the four modes (car, shuttle, walk, bike). Post hoc tests indicated active commuters agreed more with APs than passive modes. Thus, students using active modes of transportation generally agreed that their commute allowed them to experience more engagement, was more meaningful, allowed choice and control, as well as routine and balance (AP) compared to passive modes. Dimensions of experience (DoE) examined included activating the mind, body and senses, contributing to the community, care of self, identity, developing potential, and pleasure/joy, and were also statistically significant by mode, with active modes demonstrating higher agreement.

The occupational concepts of AP and DoE are theoretical elements grounded to health and well-being by empirical evidence (Moll et al., 2015). According to the DLW framework, how people participate in day-to-day activities, through their patterns of activity and experience can influence their quality of life resulting in optimal human functioning (Moll et al., 2015).

Flourishing is an outcome that reflects optimal human functioning. Diener and colleague's (2010) Flourishing Scale is a subjective measure of eudaimonic well-being, which emphasizes personal growth, self-respect, and optimism about the future, and was used to measure outcomes related to occupational concepts in this commuting study. This study indicated a weak but statistically significant correlation between mean AP and flourishing outcomes, and mean DoE and flourishing outcomes. This result was not explored further due to the lack of strength, but is worth noting since others have demonstrated well-being outcomes with commuters (Smith, 2016).

Another outcome measured in this study was satisfaction with commuting. This measure was used to understand how occupational concepts may influence assessments or appraisals of the commute. Satisfaction with travel is a scale which indicates an overall judgment of how well the chosen transportation mode suits a person's needs. The instrument (STS) includes four measures of cognitive appraisals and one measure of affect (Jakobsson Bergstad et al., 2011a). The present study showed evidence for occupational influences on satisfaction with travel, since greater agreement with APs and DoEs resulted in higher satisfaction with travel. In a linear regression model which included eight demographic measures, several travel variables, and two composite occupational measures (mean AP and DoE), only occupational measures and travel time were identified as significant predictors of satisfaction with travel ($R^2=.67$, $p<0.05$). This indicates that approximately 67% of the variability of satisfaction with travel is explained by occupational concepts measured by mean AP, mean DoE, and travel time. No studies have evaluated occupational concepts in a framework as predictors of satisfaction with travel. However, some have examined similar concepts individually, such as happiness and time stress

(Ettema et al., 2013; Lucas & Heady, 2002; Olsson et al., 2013). These will be discussed in a later section.

This study also provides a basis for understanding how occupational concepts influence satisfaction with respect to travel mode. In this study, time and occupational concepts were regressed on satisfaction with travel, and a significant model indicated differences in predictors for active versus passive modes. This indicates that differences in these variables can account for varying degrees of satisfaction by mode. Five occupational variables and time were identified as significant predictors for passive modes (*pleasure/joy, balance, activating mind/body/senses, routine and choice*), and two were identified for active modes (*pleasure and joy, balance*). The results confirm that travel modes are distinct in terms of several occupational categories in the DLW framework, resulting in varying levels of satisfaction.

Other studies have used regression analyses to quantify determinants of travel satisfaction (Collantes & Mokhtarian, 2007; Collins & Chambers, 2005; Ettema et al., 2012; Ory & Mokhtarian, 2005; St. Louis et al., 2014). Some demonstrated that determinants of satisfaction can vary across commute modes, but none examined occupational concepts as predictors. St. Louis and colleagues (2014) found that pedestrians and cyclists had higher levels of satisfaction, and were less negatively impacted (in terms of satisfaction) by longer travel times than drivers, metro and train users, like this study. Likewise, in the current study, travel time was inversely related to satisfaction with travel, such that longer travel was less satisfying (for shuttle and car). Thus, travel time did not predict satisfaction significantly for active modes, but did predict significantly for passive mode in the present study. Paez and Whalen (2010) found that some cyclists and pedestrians preferred longer commute times. Indeed, in the present study, one cyclist expressed her desire to have a longer commute, to recapture the “flow” experience and

incorporate more exercise into her daily routine. This student was an exercise science major in school, and personal preference may have played a role in her mode choice and satisfaction. Values may play a role in choice of modes and if mode choice matches values, higher satisfaction scores may be a result. Ory and Mokhtarian (2005) give evidence for how values and lifestyle such as pro-environmental attitudes and status seeking desires increase satisfaction when mode matches these values. They cite numerous reasons why travel might have value for an individual, such as variety, independence, control, status, exposure to scenery, synergy with other activities (Salomon & Mokhtarian, 1998), as well as escape, curiosity, exercise, and therapy (Ory & Mokhtarian, 2005). There are many reasons why people might benefit from travel or enjoy commuting, relating to the mode as well as the individual and their environment. This study indicates that factors related to how the commuting is performed, specific to the mode of travel, are important predictors of satisfaction for a commuter.

This study has implications for transportation policy, in terms of adding an occupational perspective to how and why people travel the way they do. An occupational perspective in transportation and travel would allow transportation officials to prioritize how people travel, to enhance their satisfaction and well-being. Currently, travel by car is prioritized in terms of policy and infrastructure construction, at least in Western societies. Independent travel by car is often required, especially when public transportation is inconvenient. Other modes, such as walking and cycling, are rarely prioritized for transportation, and only occasionally for recreation or to get to public transportation or close destinations. Results from this study show that there is a value in traveling by active modes (cycling and walking), which provide a more satisfying experience, and well-being benefits. These benefits include enjoyment and providing balance of daily activities.

An occupational perspective of transportation views commuting as something that is necessary to provide for income (job) or development (education), but which also can be a pathway to influence health and well-being. Beyond just the physical activity gained from active transportation, commuting by bicycle or walking allows for a satisfying experience in terms of its simplicity, relieving stress, allowing an opportunity to organize the day, as well as enjoyment. By challenging traditional forms of transportation and their ties to identity and status, and drawing attention to how this marginalizes those who participate in less traditional but occupationally beneficial forms, occupational scientists can provide a new perspective on travel. Occupational scientists can work with transportation officials to promote policies and infrastructure that enhance people's ability to engage in commuting using occupationally valued and satisfying modes. This can help people to engage in healthier forms of activities by making them more accessible and available, becoming more viable options for the public.

The findings from this study should be interpreted to allow for differences in travel experiences in which settings (infrastructure) and location, institutional and local travel policy, and cultural norms may vary, as indicated in the DLW framework (Moll et al., 2015). For example, the transportation infrastructure in and around the university campus is car-oriented which limits easy participation of other modes. Although walkways and curb cutouts are available, direct routes are frequently interrupted by construction, discouraging active commuting. Parking is limited and fee-based for students, while the shuttle system is free, encouraging public transit. Cycling paths are not available on campus but there is one bike loop north of the campus. The university is historically a commuter school, but in recent years on-campus housing has increased, along with a restrictive parking policy. This has resulted in recent changes in the commute profile. Locally and nationally, active modes of commuting are not

greatly encouraged by policy or infrastructure, but the physical health benefits and environmental impact are promoted. The findings from this study, which affirm the distinctive nature of the active modes in terms of providing higher levels of pleasure and joy and balance of activities, should be evaluated in terms of context.

In this study, demographic and travel factors (except for time) had little impact on satisfaction with travel. To examine how occupational concepts influence satisfaction with commuting, individual and focus group discussions were used to explain the quantitative results. The quantitative results from this study revealed several indicators of levels of satisfaction for participants, including *pleasure/joy, balance, choice, activating mind/body/senses, and routine*. The DLW framework allows for both positive and negative responses related to each of the five significant factors with respect to satisfaction. Concepts identified as significant predictors are discussed below in terms of qualitative explanations and literature results.

The *pleasure and joy* concept included positive emotions during the commute such as happiness and amusement, neutral emotions such as contentment, and negative emotions such as stress and frustration. Sources of the positive emotions expressed by participants included ease of walking on one's own time, mental health benefits of exercise, and freedom and peacefulness (associated with cycling). Sources of the negative emotions included time stressors and inconsistencies and unpredictability of public transport schedules. Other negative emotions such as anxiety were voiced due to traffic and parking challenges.

In a study of university employees, Gatersleben and Uzzell (2007) found that the main sources of positive and negative affect for commuters related to pleasure and arousal which varied by mode. In their study, active commuting was perceived as more relaxing and exciting compared to passive commuting, which was regarded as more stressful and boring. Results from

the qualitative phase of the current study indicate similar results, in which passive modes are more stressful and active modes more relaxing.

In this study, active modes were correlated with higher pleasure and joy compared to passive modes, both in quantitative as well as qualitative analyses. Further, the lack of pleasure/joy was predictive of lower satisfaction, and satisfaction was lower in passive modes. Gatersleben and Uzzell (2007) found that active commuters perceive their commute as more enjoyable and relaxing than car or public transit commuters, while passive commuters found their commute to be more stressful, from a standpoint of travel time as well as from attitudes toward the mode in general. Rissel, Crane, Wen, Greaves and Standen (2016) studied commuters in Australia, and found that most commuters were satisfied with their commute, but not all commuters enjoyed their commute. In their study, walkers and cyclists (active commuters) reported greater enjoyment of the commute compared to car drivers and public transport users (more passive), despite the rather “hostile” environment for cycling. Morris and Guerra (2015) and Mohktarian and Salomon (2001) also found that enjoyment was higher in active modes versus passive modes. In terms of the well-being benefits of enjoyment, Lazarus, Kanner, and Folkman (1980) argue that engaging in activities which are enjoyable may allow for resilience, counteracting the negative impact of daily stress by providing a reserve of positive resources for future stressors, such that when “situations become very taxing coping efforts are more likely to persist” (p. 209).

The current study also finds that *pleasure* and *joy* is correlated with mode independent of travel time, indicating that pleasure may be more intrinsic to mode. Focus group results identify potential reasons for this difference. Cyclists described the mental as well as physical health benefits of commuting by bicycle, explaining their enjoyment in terms of peace attained and

simplicity of travel. The feeling expressed in focus groups by cyclists of being under one's own power and control, both physically and mentally, contributed to their enjoyment. The predictable timeframe experienced by cycling commuters also made the journey more enjoyable. The enjoyment was indicative of a conscious choice to travel this way. At the other end of the spectrum of experienced pleasure and joy were shuttle and car commuters, many of whom found the commute to be unpleasant and frustrating due to unpredictable schedules and physical discomfort (for shuttle commuters). Commute stress, evidenced by anxiety and frustration, was identified in connection to several occupational concepts. Commute stress was associated with lack of control and choice (typical of car commuters), as well as lack of reliability and predictability (a concept coded in this study as lack of *routine*), and evidenced by anxiety and frustration. Stress, the antithesis of pleasure and joy, was not mentioned in the focus group discussions by cyclists and walkers, like other studies (Avila-Palencia et al., 2017; Hansen & Nielsen, 2014). One participant in the present study commented on the mental health benefits of cycling, contrasting the stressors and pressures from driving to the relaxed and peacefulness of cycling. Although commute stress was not measured specifically in the survey, it is likely that stress described by passive mode commuters in focus groups was captured as overall lower ratings of dimensions of experience and activity patterns in survey results.

Balance of personally important activities was also predictive of satisfaction with travel in this study. Qualitative analysis indicated that commuters participated in other activities during their trips, such as listening to music, prayer, or talking on the phone. These secondary activities were sometimes seen as a way of making their commute time more meaningful and/or productive. This is consistent with Ettema and colleagues, who found that in-vehicle activities can influence commuters' satisfaction (Ettema, Friman, Garling, Olsson & Fujii, 2012).

Satisfaction with travel in their study included measures of alertness and relaxation as well as tiredness and hurriedness. They found that commuters going to work who engaged in secondary activities related to entertainment (e.g., listening to music) or relaxation (e.g., sleeping or resting) had lower levels of alertness, and lower levels of satisfaction with their commute. Their results and others indicate that public transit commuters may participate in these secondary activities to distract themselves from the boredom or stress. Others have found that having the opportunity on bus or train to study or work may help by saving time for other more enjoyable activities (balance of activities), but had no effect on satisfaction with travel, either affectively or cognitively (Ettema et al., 2012).

Focus group results indicated secondary activities were common for shuttle and car commuters, but less so in cyclists and walkers. Cyclists' and walkers' balance of activities, according to qualitative analysis, came more from exercise as a component of their commute, an intrinsic quality of the actual commute mode. Quiet time for reflection was also a valued secondary activity for walkers and cyclists, as well as some drivers. Passive mode commuters frequently described their participation in secondary activities during the commute (mostly involving technology). Passive mode commuters also had lower satisfaction ratings. Whether this was due to the type of activities engaged in during the commute is unclear. *Balance* of activities was a significant predictor of satisfaction with travel for both active and passive commuters, and balance was statistically significantly higher for active modes compared to passive modes. However, as noted, there are differences in how balance was achieved for active and passive modes.

The greater balance of activities evidenced through use of active modes transportation influences satisfaction with travel, and has been shown to influence health. In the occupational

science literature, balance of activities has been correlated with self-reported health, such that imbalance resulting in stress, lethargy or boredom can indicate poorer health (Wilcock, 2006; Wilcock, Hall & Hambley, 1997). Wilcock argues that the amount of time people have for restful occupations may be out of balance with biological needs, and also that an imbalance in intellectual or spiritual reflection can result from too much time spent in routine activities, causing burnout or boredom (2006). Occupational balance has also been associated with physical or biological health, such that a lack of balance impacts immune system function (Dur et al., 2016). In the current study, optimal patterns of balance were described through self-report in active modes of transportation, primarily due to engaging in physical activity as a component of transportation, as well as through being outdoors, making commuting a multi-purpose activity. It is conceivable that such multi-purpose activities may lower stress levels due to time management advantages (preventing the need to ‘go to the gym’), and improve quality of life.

Having choice in one’s commute was also a significant predictor of satisfaction with travel in the quantitative analysis, operationally defined in this study as “autonomy to choose how I commute.” In qualitative analysis, choice was described in terms of having options of travel modes as well as choice within the travel experience itself, such as route to travel, or activities during the travel. Participants in this study indicated that having choice and control provided empowerment, and lack of choice resulted in feeling “stuck” and feelings of anxiety and stress. Feelings of frustration due to lack of choice were described by shuttle riders who did not have a car and were unhappy with the shuttle experience, as well as car commuters, who lived far away, precluding the use of other modes.

The link of personal choice in transportation to well-being is unclear. Some researchers have shown that personal choice in how one commutes influences well-being through lessening

or increasing stress. Researchers have found that having options (choice) in travel modes reduced stress (Legrain et al., 2015) and having options in driving routes reduced stress (Novaco et al., 1990). The predictability of the commute also impacts a person's control and choice, and travel predictability has been used as a proxy for personal control (Evans & Wener, 2002). The present study, however, operationalizes predictability in terms of having a daily routine. Both lack of choice and lack of a daily routine in commuting can influence stress, contributing to lower well-being. This study and others have demonstrated that some modes of travel can facilitate greater choice, lessening stress and increasing well-being (Legrain et al., 2015).

In this study, there was a statistically significant positive correlation between *control* and *balance* (Pearson's correlation = .64, $p < 0.001$ two tailed), and a lesser but significant correlation between *choice* and *balance* (correlation = .49, $p < 0.001$). Thus, higher *control* in travel and more *choice* is correlated with higher balance of activities. This suggests that *choice*, *control* and *balance* may work together, at least in transportation, to allow access to personally important activities, such that the more *control* and *choice* in transportation, the greater the *balance* of important activities, and vice versa.

Guell et al. (2013) found that *choice* and *control* over commuting is a factor which influenced decisions to travel actively, allowing participants to save time due to expediency. *Control* and *choice* were also linked to autonomy in their study, in which active travelers savored the independence from control over their own commuting times. In the current study, *choice* and *control* were shown to be statistically significantly greater in active modes of travel, and lack of choice was a source of stress for passive commuters. The amount of choice a commuter had often depended on the distance they had to travel, such that distance and choice were somehow linked. Commuters who lived closer had more options for commuting, while those from further

distances had more limited choice. *Choice* and *control* for car commuters was limited in terms of routes of travel and activities during travel, but significant constraints were placed on their travel due to traffic considerations and the need to pay attention. Shuttle commuters indicated they had limited choice and control in their traveling with frequently changing schedules or fear of missing the shuttle, resulting in frustration and stress.

Wilcock asserts that occupational choices are restricted through structures, costs and societal values placed on these options, which limits an individual's access to these opportunities (2006). This is often an issue of occupational justice, in which "equitable opportunity and resources to enable people's engagement in meaningful occupations" is affected (Wilcock & Townsend, 2000, p. 84). Thus, choice in transportation is a limiting factor which may influence well-being. Choice of transportation mode can be affected by surrounding structures (the infrastructure which supports the mode of travel), cost of transportation (parking and vehicle or transport mode ownership), cultural values (which promote commuting by car as higher in status and a positive rite of passage into adulthood for young adults), and individual needs (transporting others, work schedules). In the present study, choice and control were rated higher for walking and cycling, although less than 20% of all commuters chose this for their way of traveling. This suggests that despite cultural, social and institutional limitations to these modes, there exists an inherent quality of participation in these modes which allow for autonomy and freedom to travel as desired, influencing satisfaction. This confirms findings from others such as Legrain et al. (2015) whose research demonstrates that the stress of commuting (related to *choice* and other factors) depends on the mode used.

Summary

The DLW framework is a broad-based model that indicates that personal forces as well as environmental (social, cultural and institutional) forces affect activity engagement. While controlling for demographic influences in this study, factors such as the built environment, affordability, access to transportation, and cultural attitudes about transportation were not examined. These can have a significant impact on travel experiences and well-being.

Considering all of this evidence, it would appear that occupational concepts as described by the DLW, as well as the mode of travel emerged as a significant factor in satisfaction. The higher the agreement with occupational concepts of AP & DoE, the greater the satisfaction with travel. Satisfaction with travel was greater in active modes than passive modes. There was also some evidence that travel time influenced satisfaction, but occupational factors were found to be independent of time. What appeared to be most important was the extent to which *enjoyment* and *pleasure*, as well as *balance* were a part of their travel experience. College commuters described higher enjoyment and greater ability to balance activities when participating in active commuting, and these positive perceptions were indicative of higher satisfaction ratings, compared to passive commuters. This study contributes toward a model of satisfaction with travel explained by several occupational concepts in the DLW framework.

Implications and Applications of the Study

The DLW framework promotes 13 concepts related to the experiential aspects of day-to-day living based on empirical evidence and predictive of health and well-being (Moll et al., 2015). The occupational framework used in this study adds to the existing literature by showing that the experiences and patterns related to characteristics of the commute mode are predictive of

satisfaction. This study shows that satisfaction is derived from the actual experience of commuting, in which occupational characteristics may play a large role. As core elements of theory and practice of occupational therapy and occupational science, the concepts can be used to develop interventions and policies which promote satisfaction with commuting, and health and well-being.

The study indicates that satisfaction with travel is highly correlated with the DoE *pleasure and joy* as influenced by the commute mode, and the AP *balance* of personally valued activities. This has implications for policy, at the institutional level as well as in a larger context. The limited enjoyment and banality of the ride experienced by shuttle commuters can be improved by enhancing the social aspects and interactivity, as well as providing logistical and programming information concerning the commute.

Commuter students commented that life was lonely and most had trouble meeting people without some type of icebreaker. Academic institutions can promote social interaction on the shuttle through friendly bus drivers who connected students to the latest schedule changes, and encourage bus drivers to interact with students in a compelling way to address their concerns and needs. For example, Machado, Jose & Moreira (2012) elicited ideas from focus groups for increasing social interactions in public transportation. They found that one way to engage people is through providing informative content about public transportation, such as schedules and changes. Students in the current study needed assistance familiarizing themselves with the app and travel schedules. Guided practice with app and travel schedules, along with improved access to accurate information, could facilitate a more user-friendly experience.

Having a shared experience with other shuttle riders during the commute facilitated bonding by students in this study. Activities surrounding the shuttle commute can be used to

“break the ice” and promote bonding. Enjoyment of the shuttle experience could be improved by interesting public displays and integrated mobile apps. A commuter could access real-time information about the bus, and provide their own input concerning their travel experience. Potential shuttle participants can then have information about reliability and experiences through shared stories. Simoes Aelbrecht (2016) suggests that bus stops are public spaces in-between necessary activities where people are waiting, but which can be used to encourage social interactions. They suggest promoting activities at shuttle stops such as programmed events (book fairs or performers, food concessions) that are small scale and regular, creating crowds that then foster greater interaction. They recommend props such as public art, street furniture, thought-provoking billboards, short videos, community garden, or creative bus stops to “triangulate social interaction in public spaces” (Simoes Aelbrecht, 2016, p. 143) on a small scale to encourage gathering. For public transport, providing “infotainment” at bus stops or waiting areas can enhance mood through promoting information on local events (Friman et al., 2017). This could enhance positive emotional responses during travel and “increase satisfaction with travel but also [create] a positive mood after the commute” (Friman et al., 2017, p. 173).

The current research findings also indicate that commuters, especially passive commuters, were limited in their balance of activities, and expressed difficulty engaging in on-campus activities. Future intervention strategies should focus on strategies to improve participation in on-campus activities, by providing better access for car or shuttle commuters. Some recommendations include having a shuttle system coordinated with activities on campus. For example, clubs and organizations could share meeting times with campus transportation officials. Transportation officials could then provide an “on demand” shuttle service directly linking to activities on campus, especially for late hours. This could prevent students from being

“stuck” on campus when the shuttle system is not in service, and improve participation in valued activities that occur during off-hours.

Balance of activities was also a consideration for car commuters, who found that they wasted a lot of time commuting. Almost 50% of car commuters spent more than 30 minutes commuting one way, with 12% spending more than 60 minutes one way. Commuters stated that they would prefer to use this time studying, socializing, exercising, or engaging in other personally valued activities. Time use could be improved by increasing local and on-campus housing (notably an expensive solution), lessening commute times. Other suggestions include “car-free days” in which students stay overnight on campus in a group setting or with a friend. This could enhance students’ recognition of the impact driving has on their daily lives, as well as allow for greater participation in campus activities. Gift cards or parking fee reductions can incentivize commuters to switch to alternative modes or restrict their travel distance. Campus activities could also include and promote the enjoyable qualities of active commute modes, through cycling and walking events, specifically designed to appeal to drivers who have stressful commutes. Lowe & Gayle (2007) suggest that institutions can help students balance their work/life/study by being flexible within their organization, and provide support with time management. This study showed that balance of personally valued activities was difficult to achieve for car and shuttle commuters. Creating predictability in the shuttle system, through accurate apps that link to real time, would appear to go far in satisfying shuttle commuters.

Participants in the focus groups also indicated that they were uncomfortable with walking or cycling due to safety concerns, lack of familiarity with the route, or lack of confidence using these modes. Events that guide students through direct experiences of cycling and walking and that promote familiarity, such as scavenger hunts, “dress rehearsals” or trial runs, or signs that

improve wayfinding can be used to promote success with challenges. Increasing foot patrols to improve safety, improved lighting along routes, and a buddy system would be effective in improving safety aspects of the campus. Lee and colleagues (2017) suggest specific built environment changes to promote active transportation, such as separate bike paths. These changes can improve the chances of students using more enjoyable commute modes, and be more satisfying and health promoting.

Another instrumental factor influencing satisfaction was routine. Enhancing the predictability of the shuttle system will promote the attractiveness of this mode for commuters. Having a more flexible and reliable shuttle system will improve satisfaction. Recent changes to the shuttle system at this university have included real-time monitoring of shuttle riders through swipe cards, but no data is currently collected on wait or commute time, which could improve the service and enhance satisfaction.

Partnering with policy makers should be done to “think more broadly about the things that people do every day and how to foster health through activity and activity patterns” (Moll et al., 2015, p. 18). Considering the current research, an occupational lens applied to transportation should prompt a range of experiences during travel that activate the body and senses as well as the mind, promoting pleasure and joy. Transport policy can benefit from attention to occupational concepts that enhance public health. This study and others on satisfaction with travel influence the adoption of policy alternatives that encourage the use of active transportation over the use of the automobile (Smith, 2017; St-Louis et al., 2014). The current research confirms that active transportation influences satisfaction through occupational concepts as reflected in the DLW model. The occupational concepts (AP and DoE) explained more satisfaction than either demographics or travel characteristics in the regression model. According

to the DLW framework, occupational forces or concepts enable a broadening of the focus on how an occupation, namely commuting, can be described. The concepts of occupational activity patterns and dimensions of experience are evidence-based, core elements of the occupational therapy profession, linking what people do every day to health and well-being. This suggests that an occupation-focused framework such as the DLW may be useful in understanding travel behavior and choices, especially in terms of policies that will improve the health and well-being of individuals. If satisfaction is an outcome that is desired by transportation professionals, it may also be a desired outcome for public health officials, linking transportation and health. This study also suggests a purpose for occupational scientists in promoting policies for everyday activities in travel and commuting.

This study gives evidence for the validity of using the DLW to evaluate other everyday activities in terms of healthier choices. Technology, for example, has engineered out many of the routine but perhaps enjoyable aspects of activities, changing patterns of living. Evaluating activities that use technology, such as texting or face timing, in terms of patterns of activity and dimensions of experience, can provide insight into how they influence well-being. While texting may provide for a quicker interaction, it may also alter the meaningfulness of communication, reflected in well-being outcomes (Holtzman, DeClerck, Turcotte, Lisi & Woodworth, 2017). Examining the profiles of activities using the DLW framework can identify relevant and/or health-related occupational characteristics of activities. The DLW is therefore a useful broad-based net that can be cast to capture the health-related characteristics of occupations.

Limitations

There are several main limitations in this study. First, sampling was limited to those participants with access to email, as well as those who were available for focus groups and those

interested in remuneration. Also, there are limitations due to the sample size obtained in the survey for certain groups. The quantitative sample included a small number of active commuters, in particular the number of cyclists was small. Statistical analyses (ANOVA) were performed with unequal sample sizes, which affected the homogeneity of variance assumption. This limitation was overcome by the use of post-hoc tests which did not assume equal variance. Additionally, regression analyses that separated the data set into active and passive modes (see Table 14, p. 110) were performed with knowledge of smaller sample size for active modes (85) compared to passive modes (538), thus limiting the certainty of the predictors for this group. Beta values for non-significant predictors may be significant for a larger sample size.

Second, two focus group commuters participated in more than one mode of transport, and two participants used several modes during their commute. For example, one participant cycled during her sophomore year and walked during her junior year, which may have resulted in inaccurate recall. These participants were included due to sampling and time constraints. Attempts were made to segregate focus groups and discussions by mode to remain as consistent as possible, but this was not always possible.

A third limitation concerned operationalizing of the concepts of the DLW framework particularly in terms of how they apply to travel. The concepts are broad and somewhat vague, and concepts may also overlap each other. For example, participants may find meaning in activities that also produce pleasure and joy, or experiencing pleasure may also be a component of how engaged the person is in the experience. The purity and distinctness of the concepts is unknown, suggesting that the membranes of the DLW framework are permeable. The results are therefore based on the researcher's framing of the activity patterns and dimensions of experience

in terms of the commute, as well as the participant's interpretations and self-report in both qualitative and quantitative phases.

Attempts to address this issue were accomplished in several ways. First, concepts were discussed with the DLW framers (S. Moll, personal communication, June 2016). For qualitative analysis, coding allowed for multiple concepts to be coded for phrases or statements in the transcripts. This allowed for contextualization of overlapping concepts, which enhanced the analysis. Finally, re-reading transcripts and discussing with a second reader helped to clarify fit and reduce overlap. Additionally, in quantitative analyses, concepts were screened for multicollinearity in regression analyses to determine conceptual overlap, and results indicated limited amounts of overlap.

Another limitation included challenges of aligning focus group outcomes with quantitative outcomes. While quantitative outcomes included satisfaction with travel and well-being in terms of flourishing, qualitative inquiry was aligned more with the concept of satisfaction, despite the intent of focus group discussions centering on well-being. However, given that the qualitative results enhanced understanding of the quantitative results, and triangulation methods resulted in similar outcomes, the conclusions may be considered robust.

This study was limited by the fact that responses were self-reported and cannot be verified independently. This is particularly salient with measures such as travel time and distance. There is a discrepancy in the results with respect to distance and time, such that time is predictive of satisfaction, but distance is not. With travel time there may be recall error and some individuals may have included waiting time. Also, the study did not include longitudinal data and thus cannot identify changes over time such as how weather and travel patterns change satisfaction. The study did not include the effects of the built environment, which may vary

based on mode, or attitudes directly, which have been shown to influence satisfaction with commute (Cao & Ettema, 2014; Ye & Titheridge, 2017). Personalities and values can also influence satisfaction, since environmentally conscious commuters tend to be more satisfied with their commute (Ye & Titheridge, 2017). By design and due to the complexity of these factors, they were not controlled for in this study.

Finally, there is a lack of prior research studies on the DLW framework, and none in transportation using the DLW framework to investigate commuter well-being. However, this study helps lay a foundation for understanding patterns of activity and dimensions of experience in commuters.

Recommendations for further study

This study examined the occupational influences on student commuter satisfaction, and found that occupational categories such as pleasure/joy, balance, choice and control and meaning are rated lower when commuters use passive (car and shuttle) modes of transportation compared to active (walk and bike) modes. It would be useful for a university to understand how commute satisfaction and commute mode relates to other important outcomes, such as level of achievement (GPA), or number of years to graduation, or retention of students. Other individual level outcomes of importance in today's educational environments include emotional well-being and resiliency, happiness and levels of stress. The fact that commuting by car or public transit is an activity that, compared to most other activities, is associated with the lowest levels of positive affect and the highest levels of negative affect may have longer term implications for well-being (Stone & Schneider, 2016). Others (Engel & Bliss, 2017) have found that negative domain satisfaction correlates with lower life satisfaction. Examining how commuting experiences by

mode influence resilience and emotional well-being is important in today's societies, especially for college students who are developing daily routines in their transition to adult lifestyles.

The question of balance of activities yielded insights into how secondary activities were performed. Passive commuters performed secondary activities such as listening to music during shuttle trips or prayer during driving. Coincidentally, passive commuters had lowered satisfaction with travel. Whether participating in secondary activities was due to boredom or (as was more apparent in this study) a desire to make the time useful is unknown as well as how this impacted satisfaction and well-being. Is there a need in terms of emotional well-being for activities which are useful, or more importantly, restorative, especially during dull, repetitive or stressful commuting experiences? Further, how does this impact satisfaction and well-being?

Few studies have examined how satisfaction with travel relates to subjective well-being. Some studies show that travel satisfaction has a relatively small impact on subjective well-being (Gao, Rasouli, Timmermans and Wang, 2017). They utilized the flourishing scale (eudaimonic well-being), as well as life evaluation measures. Other researchers have found limited positive impact on satisfaction with travel and well-being (Abou-Zeid & Ben-Akiva, 2014). Since the results are inconclusive, examining other outcomes related to occupational concepts and travel besides flourishing, such as emotional well-being, would be useful to assess other links to well-being.

Other researchers have explored operationalizing key aspects that incorporate the meanings and satisfactions derived from the experiences of participation in activities, similar to the DLW. Ginis, Evans, Mortenson & Noreau (2017) systematically reviewed physical disability literature concerning subjective experiences of participation. Their goal was to begin to operationalize concepts of participation and experiences in a consistent and comprehensive

manner. They identified six key concepts of participation that align with several of the theoretical concepts that contribute to well-being in the DLW framework (Moll et al., 2015), such as control and choice, engagement, and meaning (Ginis et al., 2017). Thus, occupational therapists and occupational scientists have interests in operationalizing determinants of participation and satisfaction which link to well-being, and this study may enhance this effort.


The current research contributes to the occupational science literature concerning operationalizing factors and describing concepts that contribute to satisfaction and well-being, in the context of transportation. This research used concepts from the DLW framework to describe how transportation influences satisfaction with travel and well-being, and succeeds in explaining a part of the theoretical model by delineating which concepts are predictors of satisfaction with travel. The current model does not fully explain satisfaction with travel, with respect to the DLW framework. Approximately 30% of a person's satisfaction with travel is unexplained by the model. Other research has examined contextual/environmental factors that influence satisfaction, and combining these with occupational factors would be useful to explain satisfaction with travel more fully.

There is a need for theoretical frameworks that have practical applications and improve our understanding of the links between transport and health. This research provides a possible framework for bringing health into the transportation process. The research identified key occupational determinants of commuter satisfaction that are a component of health. There is therefore a need for an occupational perspective in transportation policy, which focuses on what is of value to people (as measured by satisfaction) in their *doing* of transportation. Promotion of passive forms of transportation through policy and infrastructure is common in western societies, while active forms of travel are generally discredited as having value and are not promoted. The

current research indicates that active forms, as opposed to passive forms of transportation, have value in terms of occupational well-being (especially enjoyment and balance of activities).

Occupational scientists, through research concerning how people *do* transportation, can provide direction in terms of occupational possibilities, promoting and influencing policies which address healthier forms of transportation.

**EXEMPTION NUMBER: 14-X140**

To: Ann Greenbaum
From: Institutional Review Board for the Protection of Human
Subjects Peggy Korczak, Member 
Date: Tuesday, May 06, 2014
RE: Application for Approval of Research Involving the Use of
Human Participants

Office of Sponsored Programs
& Research

Towson University
8000 York Road
Towson, MD 21252-0001

T. 410 704-2236
F. 410 704-4494
www.towson.edu/ospr

Thank you for submitting an application for approval of the research titled,
*The Lived Experience of Utilitarian Cycling in Two Countries
Comparison of Cycling Behavior: Baltimore vs Copenhagen*

to the Institutional Review Board for the Protection of Human Participants
(IRB) at Towson University.

Your research is exempt from general Human Participants requirements
according to 45 CFR 46.101(b)(2). No further review of this project is
required from year to year provided it does not deviate from the submitted
research design.

If you substantially change your research project or your survey
instrument, please notify the Board immediately.

We wish you every success in your research project.

CC: B. Merryman
File

Appendix B: Commuter Experience Survey

My name is Ann Greenbaum. As part of my doctoral study I am conducting research concerning your travel mode (how you commute to work or school – car, bike, walk, campus shuttle or other), and influences on your health (well-being). Thank you for participating in my survey. Your feedback is important. This survey has 17 questions, some with multiple parts. It should take no more than 15-20 minutes. There are comment sections along the way and at the end for feedback concerning the survey. The survey is anonymous but if you agree to be contacted for further follow-up, please email me separately (agreenbaum@towson.edu). Your answers would still be considered confidential if you agree to participate further.

Please circle one response

Module 1.

1. Which **mode** of transportation do you mainly use to get to school on a regular (daily) basis (your commute mode)?
 - a. Private car – I drive
 - b. Private car – I am a passenger
 - c. Walk
 - d. Bicycle
 - e. Skateboard
 - f. Campus shuttle
 - g. MTA bus or train
 - h. multi- modal (more than one at a time for example take car to shuttle stop)
Please describe here _____
 - i. Other (please describe) _____
2. On average, how many days a week do you commute using this mode of transportation?
 - a. 5 days
 - b. 4 days
 - c. 3 days
 - d. 2 days
 - e. 1 day
3. Do you use another mode of transportation?
 - a. No
 - b. Yes Which one? _____ How many days do you use this one? _____
4. If distance and availability were not constraints, what mode would you prefer to use?

5. Approximately how far is your daily commute to school, **one way**?
 - a. Less than 3 miles
 - b. 3 to 10 miles
 - c. More than 10 but less than 30 miles
 - d. More than 30 miles
6. Approximately how long does your commute take, **one-way**, on average?
 - a. Less than 15 minutes
 - b. 15-30 minutes
 - c. 31 -60 minutes
 - d. More than 60 minutes
 - e. I live on campus so I don't commute

Module 2.

7. Below are 6 statements concerning **your experience of commuting to the University**. Indicate your level of agreement with each statement by circling a response from strongly agree to strongly disagree. I am interested specifically in your **commute mode (car, bike, walk, shuttle, etc.)** and how it influences your commuter experience.

To what extent does your travel mode enable you to:

- a. Experience a sense of active **engagement**, focusing on my experience, allowing me to be aware and mindful of sights, sounds, feelings, and NOT be distracted by technology, etc., or on "autopilot."

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- b. My commute mode allows me to have a personally **meaningful** experience (an experience which provides positive meanings to me such as fun, social time, transition time, physical health benefit, challenge, accomplishment, builds my identity or allows me to express my values, self-care opportunity, skill development, quiet time, prayer, etc.)

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- c. My commute mode allows me to have **balance** in my life (allows me time and opportunity for other tasks and roles which are important to me, or allows me to balance my lifestyle by providing a valued activity).

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
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- d. My commute mode allows me to have a sense of **control** over my daily life and allows me to take charge of my daily life.

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- e. My commute mode allows me to have a predictable daily **routine** (provides daily structure and familiar habits and routines).

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- f. I have freedom and autonomy to **choose** how I commute (and I don't feel pressured to use a certain mode or commute a certain way).

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- g. Activate your body, mind and senses

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
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- h. Connect with others

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

- i. Contribute to community and society

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
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j. Take care of yourself

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

k. Build security or prosperity

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

l. Develop and express your identity

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

m. Develop your capabilities and potential

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

n. Experience pleasure and joy

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

Comments:

Module 3.

Item 7a-e adapted from: Jakobsson Bergstad, C.J., Gamble, A., Gärling, T., Hagman, O., Polk, M., Ettema, D., Friman, M., & Olsson, L.E. (2011a). Subjective well-being related to satisfaction with daily travel. *Transportation*, 38, 1-15.

8. Concerning your commute, state how much you agree or disagree with the following statements:

a. I am completely satisfied with my daily commute

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

b. My commute facilitates my daily life

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

c. When I think of my daily commute, the positives outweigh the negatives

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

d. I do not feel I want to change anything regarding my daily commute

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

e. My daily commute makes me feel good

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
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Comments:

Module 4.

Items 8a-g adapted from: Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators in Research*, 97, 143-156.

9. Below are eight general statements with which you may agree or disagree. Indicate your level of agreement with each statement.

a. I lead a purposeful and meaningful life

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

b. My social relationships are supportive and rewarding

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

c. I am engaged and interested in my daily activities

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

d. I actively contribute to the happiness and well-being of others

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

e. I am competent and capable in the activities that are important to me

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

f. I am a good person and live a good life

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

g. I am optimistic about my future

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

h. People respect me

Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
----------------	-------	----------------	----------------------------	-------------------	----------	-------------------

Module 5. Demographics

Circle one answer:

10. What is your age (in years)?

- a. 18-22
- b. 23-28
- c. 29-39
- d. 40-59

- e. 60-or older
- 11. What is your gender?
 - a. Female
 - b. Male
- 12. What is your ethnicity?
 - a. Hispanic or Latino
 - b. White
 - c. Black or African-American
 - d. American Indian or Alaska Native
 - e. Asian
 - f. Native Hawaii
- 13. What is your marital status?
 - a. Single, separated, divorced, or widowed
 - b. Married or cohabiting
- 14. How many hours of paid work do you perform weekly?
 - a. Less than 20 hours
 - b. 20-35 hours
 - c. More than 35 hours
- 15. What is your household income?
 - a. Less than \$20,000
 - b. \$20,000 – 50,000
 - c. Greater than \$50,000
- 16. What is your highest level of formal education?
 - a. Completed high school
 - b. Attended some college
 - c. Completed college
 - d. Completed graduate school
- 17. What is your student status? Check all that apply
 - a. Not a student
 - b. Part-time student
 - c. Full-time student
 - d. Undergraduate
 - e. Graduate
- 18. How many children under the age of 18 are living in your household (where you live most of the year)?
 - a. 0
 - b. 1-2
 - c. More than 2

Appendix C: Focus Group Interview Protocol

Activity Patterns and Well-being in Commuters: An Occupational Perspective

Date:

Start Time:

End Time:

Location:

Travel Mode:

Participants: (First names)

Project Description: The purpose of this study is to understand how well-being is affected by commuting at Towson University. The research questions are as follows:

1. What are the commuting experiences of college students?
2. What are the characteristics of college students' commuting with respect to travel mode, activity patterns and dimensions of experience, and well-being?
3. What are the occupational aspects of commuters relative to well-being?

Instructions for the researcher/interviewer (Creswell, 2009):

Prepare room for five to eight participants at least 15 minutes before focus group. Have two audio recorders available and in working order. Instruct co-facilitator in protocol. Welcome focus group participants. Have them complete informed consent form. Have them fill out nametag. Food is available. Describe purpose of study.

Ice breaker question: What year student are you and what is your major? Where do you live?

The focus group will be directed toward the following questions "Thinking about your daily commute to the university..."

1. Can you please describe your daily commute experience to the University?

- a. Describe a typical commute to school?
 - i. How far is it?
 - ii. How long does it take one way?
2. How does your commute influence your well-being?
 - a. Can you describe the ways in which your commute influences your well-being, both positively and negatively? For example, how does it influence:
 - i. your mood (happy or unhappy?)
 - ii. your physical health
 - iii. your daily living
 - iv. relationships
 - v. finances
3. How do any of these terms relate to your commute in any way? (meaning, choice, control, engagement, routine, balance) (activate mind/body/senses, care of self, contribute to community and society, develop or express identity, develop capabilities and potential, build security or prosperity, experience pleasure and joy).

Questions followed for explanation of ideas in more detail or for elaborate of ideas.

Final thank-you statement – “We want to thank you for your participation in these focus groups.

Your discussion is valuable to us as researchers, and we want to thank you for your time. If anyone would be willing to follow up to verify the accuracy of focus group analysis (what we call member checking), please let us know. We will now have a drawing for the gift card using your nametags.”

Questions informed by Moll et al., 2015, Krupa et al., 2010, and Lopez-Saez, 2014, and adapted for commute mode.

Appendix D: Recruitment flier

COMMUTER STUDY

*Be a part of an important commuter study at Towson
University*

Are you 18 years of age or older?

Do you commute to Towson at least 3 days a week?

If you answered YES to these questions, you may be eligible to participate in a 10 minute on-line survey of your commute experience.

The purpose of this research study is to evaluate the patterns of activity of commuters who travel by walking, campus shuttle, driving, bicycling, and other modes.

Participants will be eligible for a raffle for a \$40 gift card.

This study is conducted in partial fulfillment of dissertation research in Occupational Science, and is approved by the Institutional Research Board (IRB) at Towson University (#14-X140).

Please call Ann Greenbaum, M.S., 410-446-2391 for more information, or visit

SurveyMonkey.com/

Appendix E. Informed Consent – Qualitative Methods

I, _____ agree to participate in a study entitled “Activity Patterns in Travel: An Occupational Perspective,” which is being conducted by Ann Greenbaum, doctoral candidate in the Occupational Therapy and Occupational Science Department, Towson University. This research project explores the experiences of commuters, and the occupational or activity patterns of commuting modes.

I agree to participate in a 60-90 minute focus group that will be recorded and transcribed verbatim, but that no identifying information will be attached to these transcriptions. I also understand that all recorded and transcribed information will be stored and locked in the researcher’s office on the Towson University campus, and that electronic information will be stored on a password-protected computer. Under these conditions, I agree that any information obtained from this research may be used in any way thought best for publication or education, provided that I am in no way identified and my name is not used.

I understand that there is minimal risk of discomfort directly involved in this research, that my participation is voluntary, and that I am free to withdraw my consent and discontinue participation in this study at any time. If I have any questions or problems that arise in connection with my participation in this study, I should contact Ann Greenbaum, the Principal Investigator at 410-704-3439, Dr. Beth Merryman, the project faculty advisor at 410-704-5124, or Dr. Deborah Garland, Chairperson of the Institutional Review Board for the Protection of Human Participants at Towson University at 410-704-4110 or dgarland@towson.edu.

Date

Signature of Participant

Date

Investigator

Date

Witness

THIS PROJECT HAS BEEN REVIEWED BY THE INSTITUTIONAL REVIEW BOARD
FOR THE PROTECTION OF HUMAN PARTICIPANTS AT TOWSON UNIVERSITY

Appendix F: Follow-up email for participation in focus group

Dear [Mr./ Ms. LAST NAME],

Thank you for completing the survey “Commuter Experiences.” This is part of my dissertation work under the advisement of Dr. Beth Merryman in the Department of Occupational Therapy and Occupational Science at Towson University.

You indicated that you would consider participating in a 90 minute focus group. The purpose is to help me understand, in a more in-depth manner, your experience during your commute as well as self-reported well-being.

This focus group will take approximately 90 minutes. The discussion will be recorded for transcription, but will be anonymous (a pseudonym, but not your name, will not be attached to the transcript). There is a minimal risk of discomfort in discussing personal commuting habits and patterns of activity. In recognition of your efforts and time, you will be entered into a drawing for a gift card for your participation. If you are interested in knowing more about this study prior to participation, please contact me at agreenbaum@towson.edu. For questions or concerns regarding the study itself, you may contact me or my faculty advisor, Dr. Beth Merryman at 410-704-5124.

Sincerely,

Ann Greenbaum, M.S.
agreenbaum@towson.edu
410-704-3439

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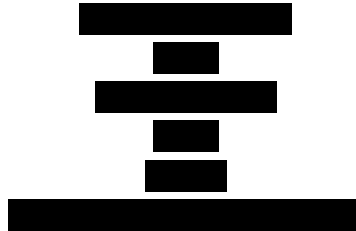
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Curriculum Vitae
Ann G. Greenbaum,
ScD Towson University
Towson, MD 21252



Education

2017	ScD	Occupational Science	Towson University, Towson, MD
		Dissertation Title: <i>Activity Patterns and Well-being of Commuters: An Occupational Perspective</i>	
1994	MS	Environmental Science (M.E.E.S.)	University of MD, Baltimore, MD
1982	BA	Biology	Randolph College, Lynchburg, VA

Certifications

2005	Certificate	Geographic Information (G.I.S.)	Penn State University
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Academic Positions Held

2008-present	Towson University
2014-present	Department of Occupational Therapy and Occupational Science, Adjunct Instructor
2012-2014	Department of Health Sciences, Adjunct Instructor
2013-2014	Department of Inter-professional Health Studies, Lecturer
2008-2013	Department of Kinesiology, Visiting Instructor
2006-2009	Stevenson University Department of Biology, Adjunct Instructo

Other Professional Positions Held

2016-present Towson University

Academic Advising Center

First Year Experience (FYE) Advisor

Freshman Transition Program (FTP) Advisor

1994-1996 Garrison Forest School

Mathematics Instructor

1984-1992 University of Maryland Medical System (UMMS), Baltimore, MD.

Department of Pathology

Research Associate

Funding

2016-2017 Office of Civic Engagement, funding for dissertation research, \$1,000

2013-2014 Graduate Student Research Award, \$1,000 cash plus tuition

Publications (former name Muhvich)

Greenbaum, A. (2014, October). The lived experience of utilitarian cyclists in two countries. *Proceedings of the Joint International Conference in Occupational Science*. From the 13th Annual SSO:USA Research conference, Minneapolis, MN.

Muhvich, A.G., Jones, R.T., Kane, A.S., Anderson, R.S., & Reimscheussel, R. (1995). Immunological and histopathological effects of chronic copper exposure in goldfish (*C. auratus*). *Fish and Shellfish Immunology*, 5, 251-264.

Muhvich, A.G., Reimscheussel, R., Lipsky, M.M. & Bennett, R.O. (1989). Fatal *Fusarium solani* isolated from newborn bonnethead sharks *Sphyrna tiburo* (L). *Journal of Fish Diseases*, 12, 57-62.

Peer-reviewed presentations

Greenbaum, A.G. (2014). A pilot study to examine the lived experience of utilitarian cyclists in two countries. Research poster presented at the 13th Annual SSO: USA Research Conference, Minneapolis, MN. *SSO:USA/CSOS/ISOS Conference Proceedings*.

TEACHING**Primary Course Responsibility:**

Undergraduate courses, Towson University

2014-present	TSEM 102	Towson Seminar- Living a Meaningful Life (eight semesters)
2012-2014	HLTH 101	Wellness in a Diverse Society (six semesters)
	GERO 101	Introduction to Gerontology (four semesters)
2013	HLTH 207	Health Care in the U.S. (one semester)
2010-2012	KNES 363	Nutrition for Sport and Exercise (six semesters)
2009-2012	KNES 235	Physical Wellness in America (formerly "Individualized fitness") (ten semesters)
2012	KNES 341	Concepts of Motor Learning (two semesters)
	KNES 331	Principles of Coaching (one semester)
	KNES 202	Net and Wall Games (one semester)
	KNES 284	Adventure Based Education (one semester)
	GERO 350	Physical Health and Aging (one semester)

Undergraduate courses, Stevenson University

2009	BIO 113	Cell Biology and Genetics (one semester)
2008-2009	BIO 107	Marine Biology (three semesters)
2008-2009	BIO 130	Human Anatomy and Physiology (three semesters)

PROFESSIONAL SERVICE

2011-2014	BMC	Baltimore Metropolitan Council (Baltimore Regional Transportation Board, Bicycle and Pedestrian Advisory Group – BRTB, BPAG), Citizen Bicycle Representative
2012-present	Treasurer	Baltimore Board of Women's Sports (BBOWS)

International Professional Association for Transport and Health

2017	Abstract review for annual research conference (IPATH)	
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Professional Memberships

2014-present	Society for the Study of Occupation: USA (SSO)
2017	International Professional Association for Transport and Health (IPATH)
2017-present	Women in Transportation (WTS) Baltimore Chapter
2015-2016	Association of Pedestrian and Bicycle Professionals (APBP)

Honors/Awards

2016	Towson University Information Literacy Award, TSEM student's award
2013-2014	Graduate Student Research Award, Towson University

Towson University Service**University-level**

2017	Writing Center, Summer Teaching of Writing Retreat
2016	Summer Orientation – Academic Advising
2012-present	American College and University President's Climate Commitment (ACUPCC) committee
2014-present	ACUPCC Transportation subcommittee
2012	Vision and Mission Committee, Department of Kinesiology

