Assessing factors associated with wealth and health of Ontario workers after permanent work injury

A thesis Submitted to the Committee of Graduate Studies

in Partial Fulfillment of the Requirements for the Degree of Master of Science

in the Faculty of Arts and Science

Trent University

Peterborough, ON, Canada

Applied Modelling and Quantitative Methods M.Sc. Graduate Program

May 2022

ABSTRACT

Assessing factors associated with wealth and health of

Ontario workers after permanent work injury

Junyi Chen

I drew on Bourdieu's theory of capital and theorized that different forms of economic, cultural and social capital which injured workers possessed and/or acquire over their disability trajectory may affect certain outcomes of permanent impairments. Using data from a cross-sectional survey of 494 Ontario workers with permanent impairments, I measured workers' different indicators of capital in temporal order. Hierarchical regression analyses were used to test the unique association of workers' individual characteristics, pre-injury capital, post-injury capital, and the outcomes of permanent impairments. The results show that factors related to individual characteristics, pre-injury and post-injury capital were associated with workers' perceived health change, whereas pre-injury and post-injury capital were most relevant factors in explaining workers' post-injury employment status and income recovery. When looking at the significance of individual predictors, post-injury variables were most relevant in understanding the outcomes of permanent impairment. The findings suggest that many workers faced economic and health disadvantages after permanent work injury.

Keywords: workers with permanent impairments, work-related disability, Bourdieu, theory of capital, hierarchical regression

Acknowledgements

I wish to express my sincere appreciation to my thesis supervisor Dr. Peri Ballantyne. This thesis would not have been possible without her guidance and continuous support. My sincere gratitude to my thesis committee, Dr. Fergal O'Hagan, for his guidance of data analysis and his insightful comments.

I appreciate Dr. Heather Scott-Marshall for being my thesis examiner and her insightful feedback. I would like to thank Dr. Wesley Burr and Dr. Bruce Cater for their help and advice. I would also like to thank the injured workers for participating in the survey.

I would like to thank my family in China for always supporting me. And many thanks to all the friends I met along the journey.

Contents

List of Tables

List of figures and diagrams

Chapter 1: Introduction

According to the statistics report of the Association of Worker's Compensation Boards of Canada (AWCBC), Worker Compensation Boards in Canada receive over 760,000 claims of workplace injury every year (AWCBC, 2019). In 2017, the AWCBC estimated that about 14% of the total claims resulted in a permanent impairment (AWCBC, 2019). In Ontario, the Workplace Safety and Insurance Board[1] (WSIB) received about 240,000 registered claims in 2017, and over 5.5% resulted in a permanent impairment (AWCBC, 2019). The WSIB defines a permanent impairment as "a physical or functional abnormality or loss (including disfigurement) which results from an injury and any psychological damage arising from the abnormality or loss" that is expected to last for a person's lifetime (WSIB, 2019). Workers who suffer from work-related impairments may be severely limited in their ability to participate in the labour market and in everyday life. Given that anyone can experience work-related impairments (Morris et al., 2018), this study intends to offer a comprehensive theoretical framework to understand and to analyze the outcomes and consequences of permanent impairments.

Studies have shown that permanent impairments negatively affect an individual's life. For instance, permanent impairments are associated with the likelihood of employment instability (Cater et al., 2013; Scott et al., 2018) and poverty (Ballantyne et al., 2016). In addition, permanent impairments are associated with negative health outcomes such as chronic health problems (Brown et al. 2006; Casey and Ballantyne, 2017) and mental health issues (O'Hagan et al., 2012). Furthermore, permanent impairments may have negative impacts on individuals' social relations

[1] In Ontario, the Workplace Safety and Insurance Board provides wage-loss benefits, medical coverage, and support to workers with work-related injuries or illnesses (WSIB, 2021).

such as stigma, marital dissolution and social isolation (Kosny et al., 2018; Kirsh et al., 2012; Scott-Marshall et al., 2013).

Theoretical orientation

Studies of work-related impairments offer insights into understanding specific aspects of injured workers lives. Very few studies, however, try to come up with an overarching theory for understanding the diverse consequences of impairments. Seeking a comprehensive theoretical framework, I draw on quantitative and qualitative studies of disability to better theorize the social contexts of impairments. Specifically, I apply Pierre Bourdieu's theory of capital to bridge the gaps in the existing literature by connecting various aspects of injured workers' experiences and outcomes together.

I argue that Bourdieu's approach is particularly useful to understand workers with permanent impairments for two main reasons. First, there is the idea of the forms of capital. Bourdieu (1986) argues that individuals possess different forms and volumes of capital, and they may utilize them as resources to manage everyday encounters. These forms of capital not only include the monetary dimension (economic) of capital, but they also include immaterial forms (i.e., cultural and social capital) which are represented in educational achievement, embodied experience, and social relationships that function to help workers to re-engage in the economic and social life after their injuries. This approach enables me to derive and test specific predictions based on the possession of different forms of capital from a survey of injured workers with permanent impairments (see below). This is especially important as the quantitative study of permanent impairments and disability have been neglected in research on the relationship between different forms of social support and disability outcomes. Second, there is also the idea of capital accumulation. Bourdieu argues that both material and immaterial forms of capital tend to persist

and accumulate over time, and they have the potential to produce profits and to reproduce themselves. That is to say, accumulated capital or the lack of it may produce accumulated advantages or disadvantages over time. This approach not only helps to account for and explain the different outcomes of permanent impairment. It also enables me to select specific statistical models based on the temporal order of capital accumulation: individual characteristics, pre-injury capital, and post-injury capital.

Overview of the data

My analysis is based on a cross-sectional survey of 494 Ontario injured workers with permanent impairments. The data comes from the Research Action Alliance on the Consequences of Work Injury (RAACWI) Health and Health Care Utilization Survey (2008-2009). Eligibility for the RAACWI survey was limited to first-time/single time and English-fluent claimants of the Ontario Workplace Safety and Insurance Board (WSIB) who were between 25 and 55 years old with workplace injuries that occurred between 2002 and 2007 and receiving a non-economic loss award (NEL) certifying permanent impairment between 2005 and 2007. There were 195 (39.5%) male and 299 (60.5%) female participants. About 60% of the respondents were 45 years old and older. Fifty-one percent had reported having high school education or less. Further details of the sample characteristics and the survey sample screening can be found in the Methods section.

Analytic approach & Research questions

In this study, I am interested in whether different forms of economic, cultural, social, and symbolic capital accumulated through injured workers' disability trajectory affect the outcomes and consequences of permanent impairments. In particular, I include three bivariate outcome variables as indictors of social, economic, and cultural consequences of permanent impairments: post-injury

employment status, income recovery and perceived health change. I use hierarchical regression to account for the temporal order and the complex effects of accumulated capital which injured workers may acquire at different points in time over their disability trajectory. Hierarchical regression is conceptually compatible with Bourdieu's theory of capital because I can use the order of entry to test the hypotheses of accumulated advantages and disadvantages. Because all three outcome variables are bivariate by design, three structurally similar models of hierarchical logistic regression were used to test the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, and the binary outcomes of permanent impairment. Specifically, three blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order. In step 1, unique associations of individual characteristics such as injured workers' age and gender to the binary outcomes were tested. Pre-injury forms of capital such as education, pre-injury personal income, pre-injury health burden were added in step 2, testing unique associations of pre-injury capital with the binary outcomes beyond the effects of individual characteristics. Post-injury capital such as informal social support, institutional support, post-injury health burden, perceived stigma, and post-injury employment status were added in step 3, testing the unique associations of post-injury capital with the binary outcomes beyond that already explained by other predictors. Chi-square tests and T-tests are used to determine the bivariate relationships between independent variables and outcome variables. McFadden's pseudo R^2 is used as an indicator of model fit. A significant increase in pseudo R^2 value between sequential steps may suggest that additional variance is added to account for the binary outcomes.

The main questions guiding this study are: 1) to what extent do pre-existing characteristics and pre-injury forms of capital contribute to the variance explained in three outcomes of permanent

impairments?; and, 2) What is the influence of social capital in explaining the outcomes of permanent impairments beyond that already explained by economic and cultural capital?

Key findings

The analyses suggest that factors related to individual characteristics, pre-injury and post-injury forms of capital were associated with injured workers' perceived health change, whereas pre-injury and post-injury capital were most relevant factors in explaining injured workers' post-injury employment status and income recovery. In addition, the analyses demonstrate how various forms of capital that distinguish impaired workers who are employed and not employed at an average of 52 months after their initial injury; workers who retrain/improve and lose their personal income from pre- to post-injury; workers who report much worse self-rated health and all others health categories. I note the importance of pre-injury personal income for a better odds of post-injury employment but having medium and high pre-injury income are also associated with a higher risk of losing personal income from pre- to post-injury. I point to the importance of post-injury employment for a better odds of retaining or improved income from pre- to post-injury period. I note the disadvantages of experiencing numerous sources of stigma for heightened risk of reporting much worse self-rated health. I also note the disadvantages of having high scores of institutional support and of having high scores of post-injury health burden for heightened risk of reporting post-injury unemployment, heightened risk of losing personal income from pre- to post-injury, and heightened risk of reporting much worse self-rated health.

It is worth noting that among the pre-injury variables, pre-injury personal income was found to be important for predicting economic outcomes such as post-injury employment and income recovery. Interestingly, pre-injury personal income was associated with an increased likelihood of reporting post-injury employment, but it was also inversely associated with the

likelihood of reporting the same or positive income recovery. These results suggest that having higher pre-injury personal income provided injured workers with post-injury advantages in re-entering the labour market, but higher pre-injury personal income creates disadvantage in re-establishing pre-injury earnings.

In addition, it is also important to note that institutional support, as a form of post-injury social capital, was inversely associated with injured workers' post-injury employment, income recovery and perception of health change. As detailed in Chapter 3, institutional support measures injured workers' sources of income, provided by public institutions (i.e., employment insurance, workers' compensation, disability benefits, and social assistance). The results seem to be counterintuitive at the first glance, but they are consistent with my expectation. While the use of institutional support is an indicator of social support, a high score of institutional support reflects a worker's disadvantages in capital accumulation (and eligibility for/need for these public sources of support). These results suggest that institutional support cannot make up for the erosion of other forms of capital that occurs following injury. Similarly, the findings consistently show that post-injury health burden, as an indicator of embodied cultural capital, was inversely associated with injured workers' post-injury economic outcomes. These findings suggest that health is a key determinant of economic recovery for workers with permanent impairments.

Contrary to my expectations, individual predictors such as education and informal social support were not significant in predicting any of the three outcomes. While previous study shows that education is an important indicator of economic outcomes (Cater et al., 2013; Polidano and Vu, 2015) and health outcomes (Jenkins and Rigg, 2004; Taylor, 2011; O'Hagan et al., 2012), my overall results found no significant association between education and post-injury employment status, income recovery and perceived health change. These findings may suggest that the effect

of education was nullified by more powerful and immediate predictors such as post-injury health burden (as our data show, many respondents had multiple conditions). In addition, previous literature shows that functional support is important to individuals' economic and health outcomes (Kosny et al., 2018; Asher, 1984; Moser et al., 2012). Yet, my results show that informal support was not significant in predicting any of the outcomes. It is possible that the capacity for informal social support to circumvent the negative effects of permanent impairment maybe far from complete.

Chapter layout

This thesis is divided into five chapters that are organized as follows. Chapter 2 provides the reader with theoretical orientation and literature review. I explore Bourdieu's theory of capital and compare to human capital theory. Then, I further explore theoretical application of Bourdieu's ideas by looking at relevant literature of work-related impairment and disability. Chapter 3 provides the reader with a detailed overview of the data, including study procedures and sample characteristics. Here, I explain my rationale behind the selection and construction of key variables, and statistical design. Chapter 4 reports statistical results of three models of hierarchical logistic regression. For each model, I begin by providing bivariate analyses of the independent variables and the dependent variable. Then, I report the statistical results of each hierarchical logistic regression. Chapter 5 discusses the key findings, the strengths and limitations of this study, and the implications of research.

Chapter 2: Literature review and theoretical orientation

The WSIB defines a permanent impairment as "a physical or functional abnormality or loss (including disfigurement) which results from an injury and any psychological damage arising from the abnormality or loss" that is expected to last for a person's lifetime (WSIB, 2019). Workers who suffer from work-related impairments may be severely limited in their ability to participate in the labour market and in everyday life.

Studies have shown that permanent impairments affect various aspects of an individual's life such as employment, income, health, mental health, family and relationships. For instance, permanent impairments are associated with a higher likelihood of unemployment. Cater et al. (2013: 2069) show that education plays a key role in enabling some workers with permanent impairments to find employment after their injury, but education alone appears to be insufficient to circumvent severe disabling effects. Scott et al. (2018) show that many older workers with work-related impairments face involuntary retirement after their injury. Over two thirds of the impaired claimants reported 75% or greater income reduction (compared to the general population) within three years post-claim (Scott et al., 2018: 320-321). Permanent impairments are also associated with the likelihood of poverty. Ballantyne et al. conducted a survey among permanently impaired workers in Ontario, and the results showed that 46% of the participants lived in or close to poverty, and 9% lived in deep poverty in the post-injury period (Ballantyne et al., 2016: 187).

In addition, permanent impairments are associated with negative health consequences. For example, Casey and Ballantyne (2017) compared the odds of suffering chronic conditions between impaired workers and general population. The authors show that work-related impairment was associated with increased likelihood of reporting chronic health conditions as compared to the general population (Casey and Ballantyne, 2017: 491). O'Hagan et al. (2012) examined mental

health outcomes for a sample of Ontario workers with permanent impairments. The results show that after their injuries over half of the survey participants scored at or above the cut-off for clinical depression, based on the CES-D: The Centre for Epidemiological Studies Depression Scale (O'Hagan et al., 2012: 305).

Furthermore, permanent impairments may have negative impacts on individuals' social relations. For example, women who suffered work-related permanent impairment were less likely than women without impairment to be married in a period of 10 years after their injury (Scott-Marshall et al., 2013: 48). Qualitative studies also suggest that injury has negative impacts on family and workplace relationships (Kosny et al., 2018; Kirsh et al., 2012). For example, interviews with 27 injured Australians and their family members show that family relationships were strained by the injury, the compensation process and the subsequent psychological impacts (Kosny et al., 2018: 939). The results of focus groups of 28 injured workers show that many workers who returned to work after their injury experienced stigma from co-workers and employers, and some were humiliated by inappropriate modified work (Kirsh et al., 2012: 150).

These studies of work-related impairments offer insights into understanding specific aspects of injured workers lives. Few studies, however, engage in theory, coming up with an overarching theory for understanding the diverse consequences of impairments. A few studies have used human capital theory to explain consequences of impairments (Cater et al., 2013; Scott et al. 2018). While 'human capital' accounts for individual's actual and potential economic capacity such as employment-related status and level of education, it rarely considers social contexts which play important roles in understanding impairment and its impacts. Seeking a comprehensive theoretical framework, I draw on quantitative and qualitative studies of disability to better theorize the social contexts of impairments.

It is important to have a general understanding of the concept of disability which changes overtime. Similar to the definition of permanent impairment provided by WSIB, the medical model of disability focuses on the functional loss of individual physiology or psychology which can be treated by largely medical interventions and technologies (Parr & Butler, 1999: 3). As Edwards and Imrie (2003: 241) point out, the medical definition is reductive because it fails to recognize that impaired individuals exist within society where social structures and attitudes are formative to the experience of impaired individuals. On the contrary, the social model of disability emphasizes social structures where individuals' impairments are contextualized. The social model understands that individuals with impairments are disabled through the attitudes and norms by which society defines them (Edwards & Imrie, 2003: 241). However, the social model is criticized because it overly emphasizes the importance of social settings, largely discounting the impaired body and the corporeal experience. To address this issue, some scholars have applied concepts developed by Pierre Bourdieu for consideration of the complex concept of disability because the disabled body is understood as corporeal and simultaneously social (Edwards & Imrie, 2003; Allen, 2004; Mithen et al., 2015; Newman et al. 2017; Townsend et al., 2018). For instance, Edwards and Imrie (2003: 244) apply Bourdieu's concepts of habitus and symbolic capital to argue that disabled bodies are produced by, but also produce and sustain the values of the non-disabled body (stigma against disabled body). Bourdieu's theory is potentially a useful framework for understanding the consequences of impairments from individual characteristics to the broader social contexts.

In this chapter, I aim to develop an overarching theoretical account of the impacts of permanent impairments on workers, drawing on and critically examining the studies of disability and work-related impairments. I will apply Pierre Bourdieu's theory of capital to bridge the gaps in the existing literature by connecting the economic, cultural and social aspects of injured workers'

experiences and outcomes together. Like many studies of work-related impairments, I am interested in the consequences of permanent impairments which are contextualized within specific social settings. Thus, my usage of the term 'impairment' goes beyond the functional loss of individuals to conceptualize it as a social phenomenon as well. I will begin by looking at the empirical literature of disability and permanent impairments.

Literature of disability and permanent impairments

Taylor (2011: 87) understands disability in old age as a dynamic process, consisting of the primary transition of onset and its accumulation afterwards. The author uses longitudinal data to study the relationship of socioeconomic status on the risk of disability onset and the growth of disability among older adults (aged 65 or order) in US. The study draws 2456 samples from the four waves (1986-1987, 1989, 1992, and 1996) of the Established Populations for Epidemiologic Studies of the Elderly project (Taylor, 2011: 91). The author looks at factors such as age, gender, education, financial resources, social support that are associated with the likelihood of disability onset and the growth process of disability over time (timing and severity). The results show that being male was associated with a decreased likelihood of disability onset than being female (Taylor, 2011: 95). Older individuals were more likely to experience onset and to have an increase in growth process of disability over time (Taylor, 2011: 95). Both education and income were negatively associated with the likelihood of disability onset, and income was also inversely associated with the growth process of disability over time (Taylor, 2011: 96, 100). When including social support in the model, perceived social support is negatively associated with the likelihood of disability onset, and it appears to moderate the association between income and disability onset and growth over time by reducing the effect of income on disability onset and growth over time (Taylor, 2011: 100). When adding health characteristics in the model, being underweight or obese is associated

with an increased likelihood of disability onset, whereas mastery is associated with a decreased likelihood of disability onset (Taylor, 2011: 100). Having financial resources such as assets, Medicare coverage and health insurance were each associated with a decreased likelihood of disability onset (Taylor, 2011: 101).

Taylor (2011) shows that various factors are associated with the likelihood of disability onset and the outcomes of disability. These factors can be further categorized into individual characteristics such as age and gender, monetary resources such as income, assets, medical coverage and health insurance, non-monetary resources such as education, health and fitness, and social support. To further understand the different effects of factors on the consequences of disability, I will focus on economic, health and social outcomes of impairments, acknowledging the effects might overlap among different outcomes.

On labour market outcome

Taylor's findings suggest that disability is a trajectory, and individuals' access to economic capital not only influences their chance of disability onset, but it also influences their subsequent trajectory. Indeed, studies show that individuals with economic disadvantages before their injury often experience worse outcomes than those without disadvantages. For instance, Jenkins and Rigg (2004: 484) argue that individuals' post-disability economic disadvantages reflect their pre-existing situations rather than the onset effects of work-limiting disability. The authors use longitudinal data to examine the selection, onset and duration effects of disability and the impacts on individuals' household net incomes and employment. The study uses longitudinal data from the first eight waves (1991-1998) of British Household Panel Survey which is a nationally representative sample of the population of Great Britain (Jenkins and Rigg, 2004: 481). The sample consists of 280 working age individuals who experienced disability onset and 10,753 individuals

who were at risk of onset but did not experience it (individuals who had the onset characteristics such as disadvantages in income and employment status two years prior to disability onset) (Jenkins and Rigg, 2004: 483). The authors test the selection effect by comparing the economic outcomes of currently disabled and not disabled, and of those who were at risk of onset and became disabled and those who were at risk but did not become disabled (Jenkins and Rigg, 2004: 484). The results show that pre-existing characteristics such as educational qualification and pre-injury employment status are strongly associated with the likelihood of disability onset and economic outcomes after disability onset. Controlling for other factors, having no educational qualifications or being jobless is independently associated with increased likelihood of disability onset, and increased likelihood of low household income and post-injury unemployment (Jenkins and Rigg, 2004: 487). The results also show that the effects of disability onset and its duration on median income, proportion with low income, and proportion in paid work should be understood as a trajectory. For instance, from two years prior to onset to the onset year, the median income fell by 12%, the chance of low income rose by 18% and the proportion in paid work fell by 26% (Jenkins and Rigg, 2004: 489). The economic outcomes for those disabled for three years or more were generally worse than the outcomes for those disabled for a shorter period (Jenkins and Rigg, 2004: 488).

Polidano and Vu (2015) conducted a similar longitudinal study as Jenkins and Rigg in Australia with further distinctions between different types of employment and education. Instead of work-limiting disabilities, the analysis focuses on the functional disabilities which are health conditions that restrict everyday functioning. Specifically, the authors looked at the relationships between age, gender, types of education and pre-injury employment status and disability onset and long-term labour market outcomes. Labour market outcomes include employment probability, the

likelihood of becoming low-income, reliance on income support and the use of part-time work. The sample consists of 550 working-age individuals who incurred functional disability between 2003 and 2006, and whom the study observes at least 4 years of post-onset outcomes (Polidano and Vu, 2015: 305-308). The data draws from a subset of the 2001-2009 survey of Household Income and Labour Dynamics in Australia (HILDA). HILDA is a nationally representative panel survey of Australian households, including detail information about employment, health and family dynamics. The results show that people with disability had lower employment probability in the labour market three years prior to onset, compared to those with matching demographics but without experiencing disability onset (Polidano and Vu, 2015: 311). Disability onset was not only associated with a decreased likelihood of employment in the year of onset, but its duration was also associated with an increased likelihood of receiving income support and being in a low-income household (Polidano and Vu, 2015: 312). Similar to Jenkins and Rigg's findings, the study found no clear evidence that gender and age were associated with disability onset and post-injury outcomes (Polidano and Vu, 2015: 315).

Polidano and Vu contribute to further understanding of the long-term effects of education on economic outcomes. The authors argue that different levels of education had both initial and long-term effects on disability onset and the subsequent economic outcomes. The study estimated 4.9%, 6.4% and 11.5% reduction in employment probabilities in the year of onset for those with higher education, vocational education, no post-school qualifications (Polidano and Vu, 2015: 313). These differences in initial employment impacted by education appear to grow over time. Three to four years after onset, the likelihood of receiving income support increases by 11.9% for those without qualification, 3.8% for those with vocational education and 1.9% for those with

higher education (Polidano and Vu, 2015: 314). These results show that individuals' access to education plays an important role in the disability trajectory and its economic outcomes.

Indeed, studies of work-related impairments also show that individuals' access to education is an important predictor of their economic outcomes after impairments. For example, Cater et al. (2013) argue that human capital plays a key role in enabling some impaired workers to find employment after their injury. The authors look at the relationship between education, the types of impairment and the probability of post-injury employment and occupational shift for permanently impaired workers. The study includes a sample of 2617 men from the *Survey of Workers with Permanent Impairments* which was conducted by the WSIB between 1989 and 1990 (Cater et al., 2013: 2067-2068). The results show higher levels of education increase the probability of employment related to specific types of impairment (Cater et al., 2013: 2069). For shoulder injuries, primary education was associated with less than 20% employment probability, while some high school education was close to 50% and high school or more was over 70% employment probability two years after injury (Cater et al., 2013: 2069). Similarly, for those with knee injuries, the employment probability of primary education was 40% as compared to high school or more at roughly 80% two years after their injury (Cater et al., 2013: 2069). For hand impairments, the employment probability was 93% for those with high school or more and 78% for the less educated groups (Cater et al., 2013: 2069). While education level was associated with increased probability of employment for those with permanent back injuries, the relatively low employment probability (37% for high school or more) suggests that education alone appears to be insufficient to circumvent severe disabling effects (Cater et al., 2013: 2069). In terms of occupational shift, there is no evidence of job shifting for any education level; injured workers tended to return to their same occupation (Cater et al., 2013: 2070). Cater et al. (2013: 2071) suggest that occupation-

specific human capital plays a key role in enabling an impaired worker to meet that occupation's requirement. Education might facilitate the accumulation of that capital by allowing the individual to better understand adapted approaches to a task or it may simply result in increased productivity that acts as a sort of buffer against productivity loss (Cater et al., 2013:2071).

In addition, studies show that injured workers with low pre-existing socioeconomic status often experience negative economic outcomes in the labour market. For instance, Lilley et al. (2012) look at factors predicting unemployment among injured workers 3 months after injury in New Zealand and found that work-related injury is disproportionately associated with unemployment for individuals with low socioeconomic status. Between 2007 and 2009, 2615 workers from New Zealand's Accident Compensation Corporation compensation scheme participated in the study with self-reported survey and telephone interview (Lilley et al., 2012: 2). The results show that pre-injury socio-demographic factors such as low personal income, a blue-collar occupation, financial insecurity were associated with increased likelihood of not working 3 months after injury (Lilley et al., 2012: 3). In terms of pre-injury work conditions, working in painful/tiring or standing positions was associated with increased odds of not working (Lilley et al., 2012: 3). In terms of pre-injury organizational factors, workers with temporary/casual employment contracts, long work week schedules were associated with greater chance of not working (Lilley et al., 2012: 3). Workers who perceived their injury as life threatening and those who were admitted to hospital after their injury had increased odds of not working (Lilley et al., 2012: 3).

Similar patterns are observed in a study of long-term unemployment. Scott et al. (2018) looked at the relationship between permanently impairing occupational claims and early retirement decisions in Canada. Scott et al. (2018: 319) included a sample between 4610 and 4615 permanent,

partial impairment claimants from the Ontario workers' compensation between 1998 and 2006, linked to data from Statistics Canada's Longitudinal Administrative Databank. The authors defined early retirement as individuals with permanent impairments who earned, on average and over three years, half or less of income than individuals with matching characteristics but without impairments (Scott et al., 2018: 319). They hypothesized the degree of impairment, the nature of injury, physical demands of the pre-injury occupation, and pre-injury earning bracket are associated with the timing of retirement (Scott et al., 2018: 318). The results show that about 77% of the early retired claimants lost, on average, 75% or more of their earning in 3 years after injury compared to the control group (Scott et al., 2018: 320). Proportionately more of the workers retiring were older, worked in physically demanding jobs, earned less than $40,000 before injury, and experienced soft tissue injuries, and injury to the trunk, and more severe injuries (Scott et al., 2018: 322).

Furthermore, injured workers with low pre-existing socioeconomic status often fall into poverty. For example, Ballantyne et al. (2016) look at the levels of 'personal poverty' among workers with permanent impairments in Ontario. Personal poverty was measured in terms of before-tax 'low income measure' (50% of median household income) with an assumption that workers lived in single-person households (Ballantyne et al., 2016: 177). The authors draw samples from the Research Action Alliance on the Consequences of Work Injury (RAACWI) Health and Health Care Utilization Survey. The survey was conducted between 2008 and 2009, which included 494 claimants with permanent impairments from Ontario Worker Compensation Board (Ballantyne et al., 2016: 175). The results show that 46% of the participants lived in or close to post-injury personal poverty, and 9% lived in deep poverty (Ballantyne et al., 2016: 187). The poor were more likely than the non-poor to report having lower education achievement, sustaining

multiple injuries at work, having shorter job tenure and non-unionized positions before they became impaired (Ballantyne et al., 2016: 179-181). In addition, the authors found that employment advantages such as returning to one's pre-injury employer and having longer pre-injury job tenure were each associated with decreased likelihood of personal poverty after injury (Ballantyne et al., 2016: 187). On the other hand, factors such as single parenthood, living in larger sized communities and completing a post-injury retraining (regardless of employment status after retaining, workers who complete training have their benefits reduced because they are 'deemed' employable) were each associated with increased likelihood of post-injury personal poverty (Ballantyne et al., 2016: 187). The analysis suggests that workers with personal poverty in the pre-injury period are particularly vulnerable to post-injury poverty, and they faced a substantially higher risk of being unable to escape it after they got injured (Ballantyne et al., 2016: 185).

Pettinicchio and Maroto (2017) add gender into the analysis of labour market outcomes. The authors use longitudinal data to compare employment outcomes among men and women without and with disabilities, and with different types of disabilities. Disabilities were measured in six overlapping categories: work-limiting disability, physical disability, cognitive disability, sensory disability, self-care limitation or difficulty and multiple disabilities. The study includes 413,007 Americans who were working-age adults with earnings between 25 and 61 years old (Pettinicchio and Maroto, 2017: 12). The data draws from the 2010 to 2015 Current Population Survey Annual Social and Economic Supplement (CPS). The CPS comprises large yearly samples, and it includes detailed information on employment, earnings and worker class. In addition, the CPS also includes information on whether a disability is work limiting or not, as well as detailed measures of different types of disability (Pettinicchio and Maroto, 2017: 12). The authors look at the relationship of gender and disability on employment rates and logged annual earnings, after

accounting for human capital and demographic variables such as weekly hours of work, firm size, occupation, age, education, marital status, race and state of residence. The data shows that, between 2010 and 2015, about 12% of the working-age population reported a disability, difficulty or limitation (Pettinicchio and Maroto, 2017: 14). Within this group, about 9% reported a work-limiting disability and about 8% reported a difficulty or limitation (Pettinicchio and Maroto, 2017: 14).

Pettinicchio and Maroto (2017) show that both gender and disability/disability type were negatively associated with employment and income. After accounting for human capital and demographic variables, women without disability had 12-13% lower employment rates and about 33% less earnings than men without disability (Pettinicchio and Maroto, 2017: 16, 20). Disability was associated with lower rates of employment by 41-62%, varying with types of disability (Pettinicchio and Maroto, 2017: 16). Women with work-limiting disability had about 18% less earnings than men with similar disability (Pettinicchio and Maroto, 2017: 20). Women with any difficulty or limitation had about 28% less earnings than men with similar conditions (Pettinicchio and Maroto, 2017: 20). Women with multiple disabilities had the lowest employment rates and earnings levels (Pettinicchio and Maroto, 2017: 16). When all covariates were held at their means, men without disability had an employment rate of 82% and average earnings of $59,000 per year, but men with multiple disabilities had an employment rate of 17% and average earnings of $37,000 (Pettinicchio and Maroto, 2017: 24). For women with multiple disabilities, the corresponding employment rates and earnings were 16% and $29,000 (Pettinicchio and Maroto, 2017: 24). In addition, the authors argue that disability appeared to have stronger effects for men because of greater employment disparities between men with and without disabilities, and a diminished gender earning gap among workers with disabilities (Pettinicchio and Maroto, 2017: 16). Except

for individuals with independent living limitation (IDL) or sensory limitations, women appeared to experience smaller employment gaps than men across different types of limitations with the largest gender gaps present among individuals reporting physical limitations (Pettinicchio and Maroto, 2017: 16, 19). Similarly, the earning gaps between men with any types of disability and men without disability appeared to be greater than the earning gaps between women with and without similar conditions (Pettinicchio and Maroto, 2017: 22).

These studies of labour market outcomes contribute to the understanding of disability and its outcomes. Particularly, these studies highlight important factors that predict disability and its outcomes. Factors such as gender, age, education, pre-injury employment, pre-injury income, pre-injury work conditions, and severity of disability/impairment are important predictors of economic outcomes. Many of these factors can be understood as pre-existing socioeconomic statuses. In addition, the studies show that disability and permanent impairments should be understood as a trajectory. Although Taylor (2011), Jenkins and Rigg (2004), and Polidano and Vu (2015) focus on different groups of individuals with disability, the results consistently show that disability has long-term consequences, and individuals' pre-existing socioeconomic statuses are associated with the likelihood of disability, its duration and outcomes. Similarly, the studies of work-related impairments also show that workers' pre-existing socioeconomic statuses are important predictors of various post-injury economic outcomes (Cater et al., 2013; Lilley et al., 2012; Scott et al., 2018; Ballantyne et al., 2016).

However, these analyses of economic outcomes are under theorized. While these studies identify important factors in understanding disability and its outcomes, they rarely try to come up with an overarching theory for understanding the consequences and outcomes of disability. Few studies use human capital theory to explain the differences in economic outcomes of work-related

impairments (Cater et al., 2013; Scott et al., 2018). To this extend, I will briefly introduce the theory of human capital. Economists have developed different versions of human capital theory, but they would generally agree that human capital is "the stock of productive skills, talents, health and expertise of labour force" (Goldin, 2004: 22). That is, human capital is a form of resource that used in production, and it is often measured in the terms of productivity, similar to physical (economic) capital such as tools, equipment, machines. In addition, human capital is often measured in the economic analysis of costs and returns. Like investment in equipment and machines, human capital is the investment in people, which is expected to have investment returns. For instance, Gary Becker (1962) looks at the relationship between human capital and distribution of earnings. Becker disagrees with some human capital theorists who argue that unequal distribution of earnings is due to the difference in individual's natural talent (Becker, 1962: 45). Instead, Becker (1962: 43) argues that the unequal distribution is due to individual difference in human capital such as skills, education and health. That is, if everyone invests the same amount in human capital, the distribution of earnings would be equal (Becker, 1962: 47). He points out that individuals gain human capital from employment, education and training. Becker (1962: 46) acknowledges that factors in the labour market such as discrimination would influence the rate of return in human capital, which subsequently influences individuals' incentive to invest in it. Nevertheless, he believes that individuals' willingness is the key factor to determine the rate of return. That is to say, individuals who are willing to invest in human capital would overcome any obstacles, and their investments are rewarded with high earnings in return.

Both analyses of Cater et al. (2013) and Scott et al. (2018) use individual differences in human capital to explain unequal economic outcomes. In the case of Cater et al. (2013), human capital such as education and health (the types of impairments) allowed some impaired individuals

to return to the workforce and to maintain their productivity by taking on less physically demanding jobs. For Scott et al. (2018: 318), pre-injury income bracket was a proxy measure of human capital which allowed some individuals to have greater mobility and flexibility in labour market participation. In this sense, human capital theory as a theoretical framework accounts for individual agency because the theory explains how individuals use human capital as potential resources in the management of their impairments and labour market participation. In addition, the framework is suitable for empirical testing because human capital theory focuses on variables that can be quantified in economic terms.

However, human capital is limited because it understands pre-injury personal characteristics and post-injury labour market outcomes as inherently individual attributes. The framework makes little or no account of the social settings where impaired individuals are contextualized (experience the consequences of their impairments) and of the structural forces which are beyond individual controls. In particular, the formation of gender and race, which individuals are born into but have little control of, cannot be easily explained by human capital theory. For example, the gender analysis of Pettinicchio and Maroto (2017) serves as a critique of human capital theory, adding new layers to the understanding of disability and the labour market outcomes. Similar to the findings of Cater et al. (2013), Pettinicchio and Maroto show that the labour market outcomes were different according to different types of disability. For instance, men and women with sensory limitations experienced smaller employment and earnings disparities, people with work-limiting, multiple and cognitive disabilities experienced much larger labour market disparities. However, the two studies have different interpretations of the results. Cater et al. (2013) attribute the differences in economic outcomes to individual characteristics. For instance, higher education allowed some injured workers to mitigate certain degrees of negative effects of

impairments. On the other hand, Pettinicchio and Maroto (2017: 24) understand the economic differences in terms of intersectionality and suggest that the different barriers to employment inclusion for types of disability may be a result of the intersection of multiple statuses.

The gendered hierarchy in the labour market is difficult to be accounted for by human capital theory. The analysis of Pettinicchio and Maroto (2017) suggests that the labour market is dominated by masculinity. After accounting for human capital and demographic variables, women without disability had lower employment rates and less earnings than men without disability. In addition, the interactions between disability and gender create a complex hierarchy in the labour market. Pettinicchio and Maroto (2017: 24) show that women with disability generally experienced a "double penalty" in the labour market, and women with multiple and cognitive disabilities had the lowest employment rates and earnings levels. Furthermore, men with disabilities lost the privileges of masculinity in the workplace because disabilities were associated with negative stereotype and pre-conceptions. For this reason, men with disabilities generally experienced larger gaps in employment and earnings than women with disabilities, reducing the gender gaps among people with disabilities. In short, the analysis of Pettinicchio and Maroto highlights the importance of social settings which is missing in human capital theory.

The studies of work-related impairments support the argument of Pettinicchio and Maroto that the different economic outcomes go beyond individual characteristics because workers with low pre-existing socioeconomic status are consistently in disadvantages in the labour market before and after impairment onset (Ballantyne et al., 2016; Lilley et al., 2012; Scott et al., 2018). Some studies also point to the importance of compensation system in the economic outcomes of injured workers. For instance, Scott et al. (2018: 323) point out that the mechanisms to support workers' return to work should be more supportive of low-income claimants. The authors argue

that income is not just a measure of financial capital, but it is a measure of different forms of capital or an indicator of social position (Scott et al., 2018: 323). Workers with high pre-injury income are also likely to be well educated, have more flexibility in their work arrangements and more mobility throughout the labour market, and be more empowered to negotiate a workplace accommodation (Scott et al., 2018: 323). On the other hand, claimants with low pre-injury income are more likely to be in manual or mixed manual labour jobs, and they are less likely to get an accommodation from their jobs. For this reason, a fixed wage replacement which provides injury workers with a proportion of their pre-injury wage is inequitable for those with low socioeconomic status. In addition, Scott et al. suggest that in order to achieve the same labour market earnings, long-term rehabilitative care may be required for injured workers with low socioeconomic status (Scott et al., 2018: 323).

The position taken by Ballantyne et al. (2016) aligns with that of Scott et al. that current compensation system does not address the vulnerability of low-income workers. For instance, short-term rehabilitative programs such as mandatory participation in retraining may be inequitable for injured workers with low socioeconomic status. Workers who complete a retraining are 'deemed' employable and have their benefits reduced regardless their future employment status (Ballantyne et al., 2016). This short-term program is problematic for some because it does not consider the economic and health conditions of injured workers. It is also problematic because it presumes that injured workers can complete on an equal footing with younger and non-disabled bodies with equivalent training in the labour market. The results show that completing a retraining program was associated with an increased likelihood of personal poverty (Ballantyne et al., 2016: 187). In addition, the emphasis of return to work does not consider workers' health conditions. For example, MacEachen et al. (2012) conducted qualitative interviews with workers with

impairments and show that the emphasis of ability as a reintegration approach for impaired workers would be problematic, and vocational retraining programs may not be appropriate for workers with chronic or extreme health issues. Ballantyne et al. (2016: 187) suggest that legislation should accommodate injured workers with on-going support that may or may not involve employment, and it should also incentivize workplace safety for injury prevention. The authors rightly point out that the analysis of impairments should go beyond the aspect of economics. In the next section, I will demonstrate the importance of health in understanding the outcomes and consequences of impairments.

On health and mental health outcomes

We will begin by looking at the health consequences of work-related injury. For example, severity of injury is associated with the likelihood of post-injury health care utilisation. Brown et al. (2006) conducted a longitudinal study, comparing healthcare utilisation among work-related injury compensation claimants who did not require time off for their injury (NLT) and claimants who missed workdays due to their injury (LT) and non-injured workers (NI). The authors draw data from the British Columbia Linked Health Database (BCLHD) which links Medical Service Plan payment data, hospital discharge records and Worker Compensation data for the entire British Columbia population between 1989 and 1999 (Brown et al., 2006: 396). The sample included 52,319 LTs and 69,142 NLTs workers who were 25 year or older and filed a compensation claim in 1994 (Brown et al., 2006: 397). The non-injured group (NI) included 52,319 workers who were in the workforce and did not sustain injury between 1989 and 1999 (Brown et al., 2006: 397). Brown et al. are particularly interested in whether the utilisation of general practitioner, hospital, mental healthcare differs, 5 years before the injury and 5 years after injury, among the three groups. The pre-injury period statistics show that NLTs and LTs were more likely to register in the BC

Medical Service Plan than NIs (Brown et al., 2006: 397). The post-injury period results show that LTs had the greatest increase in their general practitioner and hospital visits each year after the injury followed by the NLTs, and NIs had the smallest increase (Brown et al., 2006: 399). Mental health care use and physician services for depression show similar patterns among the three groups (Brown et al., 2006: 400-401). While statistically significant, the increase in mental healthcare among injured workers is relatively modest compared to their general practitioner and hospital visits (Brown et al., 2006: 400-401).

Brown et al. (2007) use 1990-1999 BCLHD dataset to conduct a follow-up study of injury workers, comparing the social and economic outcomes of lost time workers (LT) and no lost time workers (NLT) who filed a compensation claim in 1994 in British Columbia (Brown et al., 2007: 635). The study looks at the relationship between the severity of injury, age, sex, family type, pre-injury and post-injury residential change, marital instability, and social assistance use (Brown et al., 2007: 636). To measure the severity of injury, the authors further divided LTs into two groups which a duration of lost time is less than 12 weeks and a duration is equal or greater 12 weeks (Brown et al., 2007: 635). The sample included 28,537 LTs (within 3,739 LTs took 12 or more weeks off work) and 40,793 NLTs with complete information on age, sex, and neighborhood income decile for the entire study period (Brown et al., 2007: 637). Individual who changed residence after injury (1995-1999) and moved to neighborhood with lower neighborhood income decile were considered to have a negative change in residence (Brown et al., 2007: 635). The pre-injury population characteristics show that LTs were slightly more likely to collect income assistance benefits, and 35% of the LTs reported repeat work-injury claims (Brown et al., 2007: 638). The analysis of post-injury period shows that being LTs were associated with increased likelihood of moving to a poorer neighborhood and collecting income assistance benefits

compared to NLTs (Brown et al., 2007: 638-639). Among LTs, having 12 or more weeks off work was associated with increased likelihood of collecting income assistance compared to having less than 12 weeks off work (Brown et al., 2007: 639). LTs were less likely than NLTs to have a marital break-up after injury (Brown et al., 2007: 641).

The analysis of Brown et al. (2006) uses the frequency of post-injury healthcare utilisation as an indirect measurement of the health outcomes of injured workers. The results suggest that health disadvantages maybe accumulated from pre-injury period to post-injury period. LTs and NLTs may have poor health prior to their injury because they were more likely to register in and use medical service before their injury. The results also indicate that severity of work injury was associated with negative health outcomes. The use of different types of healthcare also suggests that work injury had both physical and mental effects on the health of injured workers. The increase in frequency of post-injury healthcare utilisation by lost time workers after their injury suggests that severe injury had long-term effects on health outcomes. The combined results of Brown et al. (2006; 2007) show that pre-injury factors were associated with the likelihood of severe work injury, and work injury has long-term economic and health consequences.

The analysis of O'Hagan et al. (2012) further supports the Brown et al. (2006; 2007) findings that severe work injury has negative mental health consequences, and pre-existing factors such as education and pre-injury income can moderate the negative outcomes. O'Hagan et al. study the prevalence and timing of mental health issues in workers with permanent impairments. Specifically, the authors look at the relationship between pre-injury and post-injury period, pre-injury individual characteristics such as education, occupational class, personal income and post-injury mental health issues such as diagnosed depression, symptoms of anxiety, concentration problems, symptoms of depression and sleep problems (O'Hagan et al., 2012: 305). Occupational

class is categorized into white, pink, and blue-collar occupations, according to the Canadian National Occupation Classification (O'Hagan et al., 2012: 304). Like Ballantyne et al. (2016), the study is also based on the RAACWI survey which included 494 compensation claimants from Ontario Worker Compensation Board. The results show that 54% of the participants at an average of 52 months after the injury had a score of clinical depression, according to the Centre for Epidemiological Studies Depression Scale (CES-D) (O'Hagan et al., 2012: 305). After adjusting for other independent variables in the model, having high school or greater education and having high pre-injury personal income were independently associated with lower CES-D scores (O'Hagan et al., 2012: 305). Having high pre-injury income was also associated with decreased likelihood of reporting symptoms of depression (O'Hagan et al., 2012: 305). In addition, being male was associated with decreased likelihood of diagnosed depression and sleep problems, compared to being female (O'Hagan et al., 2012: 305). Older age is associated with decreased likelihood of reporting a diagnosis of depression and concentration problems (O'Hagan et al., 2012: 305). No significant relationship was found between education or occupational class and the likelihood of reporting the various mental health diagnoses or problems (O'Hagan et al., 2012: 305). On the other hand, timing was significantly associated with the likelihood of reporting various mental health issues. Diagnoses and problems were more likely to be reported as present in the post-injury period, rather than in the pre-injury period (O'Hagan et al., 2012: 305).

A longitudinal study conducted by Australian researchers provides further evidence that pre-existing wealth moderates the negative mental health consequences of disability over time. Kavanagh et al. (2015) look at the relationship between pre-existing wealth and changes in mental health before and after disability onset. The authors sampled 1977 adults who experienced functional disabilities between 2001 to 2012 from 12 waves of the Household, Income and Labour

Dynamics survey in Australia (HILDA) (Kavanagh et al., 2015: 3-5). Similar to Polidano and VU, Kavanagh et al. define functional disabilities as health conditions that restrict everyday functioning over a period of six months or more (Kavanagh et al., 2015: 3). The authors use Mental Component Summary (MCS) score, which is derived from the Medical Outcomes Study, to measure participants' changes in mental health over time, mainly assessing factors such as mental health, role functioning(emotional), vitality and social functioning (Kavanagh et al., 2015: 3). A decline in MCS score indicates mental health deterioration. The main predictor, household wealth, is measured in term of three tertiles of each year's total HILDA distribution, summing total assets minus total debt for individuals in each household (Kavanagh et al., 2015: 4). Other predictors also include age, gender, labour force status and occupational skill level (mutually exclusive categories: unemployed, not in the labour force, low skill, medium skill, and high skill), and household disposable income (Kavanagh et al., 2015: 4). The results show that acquisition of a disability was associated with deterioration in mental health because the average MCS scores from different status groups were lower after disability onset (Kavanagh et al., 2015: 6). The most disadvantaged groups (unemployed, high debt, low assets and low wealth) tended to have lower MCS score before and after disability onset (Kavanagh et al., 2015: 6). Age was positively associated with MCS score, and men tended to report higher MCS score than women before and after disability onset (Kavanagh et al., 2015: 6). After controlling for age, gender, labour force status and household disposable income, the analysis shows that pre-existing wealth moderated mental health deterioration after disability onset. While disability was associated with increased likelihood of mental health deterioration across all wealth tertiles, being in the lowest tertile was associated with the greatest increased in the likelihood of mental health deterioration (Kavanagh et al., 2015: 7).

Casey and Ballantyne (2017) show that permanent impairments are not only associated with mental health issues, but they are associated with long-term health consequences such as chronic health conditions. Casey and Ballantyne look at the likelihood of reporting chronic health conditions between workers with and without work-related impairments. The injured worker sample was based on the RAACWI survey which included 494 claimants from Ontario Worker Compensation Board (Casey and Ballantyne, 2017: 487-488). The general population sample included two versions of Canadian Community Health Survey (CCHS) in order to compare to the health conditions of injured workers from pre-injury and post-injury period. The general population samples from the CCHS included 4486 Ontarian respondents from 2003 and 4495 Ontarians from 2009-2010 who had matching characteristics of the injury worker sample (such as English speaker, gender and age) without reporting disability or work-related injury (Casey and Ballantyne, 2017: 488). The results from the pre-injury period show that individuals from the injured worker sample were less likely to have completed post-secondary education compared to the general population (Casey and Ballantyne, 2017: 489). Prior to their injury, workers from the injured worker sample were also less likely to work in white collar occupations and more likely to work in blue collar occupations (Casey and Ballantyne, 2017: 489). Prior to their injury, women from the injured worker sample were more likely to report asthma, stomach or intestinal ulcers, and depression than women from the general population, whereas men from the injured worker sample were less likely to report back problems than the CCHS respondents (Casey and Ballantyne, 2017: 491). Post-injury comparisons show that being female with work-related impairments was associated with increased likelihood of reporting every chronic health conditions except urinary and bowel disorders compared to women from the CCHS sample (Casey and Ballantyne, 2017: 491). Being male with work-related impairments was associated with increased likelihood of

reporting every chronic health condition except migraine headaches and asthma compared to men from the CCHS sample (Casey and Ballantyne, 2017: 491). Most strikingly, the likelihood of reporting a diagnosis of depression for women with permanent impairments was more than six times higher than for women in the CCHS sample, and the likelihood for men was over three times higher (Casey and Ballantyne, 2017: 491).

These studies of health outcomes not only consistently show that disability/impairment has various and long-term health consequences, but they also consistently support many findings of the economic outcomes. For instance, the results of Brown et al. (2006; 2007) show that health disadvantages maybe accumulated from pre-injury period to post-injury period. Similar to the longitudinal studies of disability and economic outcomes such as Taylor (2011), Jenkins and Rigg (2004), and Polidano and Vu (2015), the combined results of Brown et al. (2006; 2007) that pre-existing health factors were associated with the likelihood of severe work injury, and work injury has long-term economic and health consequences. In addition, the analyses of O'Hagan et al. (2012) and Kavanagh et al. (2015) show that disability/impairment was associated with negative mental health outcomes. As O'Hagan et al. point out, mental health diagnoses and problems were more likely to be reported in the post-injury period, rather than in the pre-injury period. Similarly, Kavanagh et al. show that acquisition of a disability was associated with deterioration in mental health. More importantly, both O'Hagan et al. (2012) and Kavanagh et al. (2015) point to the importance of pre-existing factors in understanding health outcomes. Both studies suggest that older age is associated with positive mental health outcomes, and men tended to report better mental health than women after disability onset. In addition, both studies demonstrate the effect of pre-existing factors in moderating the negative mental health outcomes. O'Hagan et al. points out that education and pre-injury personal income was inversely associated with depression score.

Kavanagh et al. argue that household wealth was positively associated with MCS score. Furthermore, Kavanagh et al. demonstrate that disability is a trajectory which changes mental health outcomes over time. Kavanagh et al. suggest that wealth may enable access to other resources which could have mental health benefits (Kavanagh et al., 2015: 2). On the other hand, factors such as unemployment, high debt, low assets and low wealth were associated with low MCS score before disability onset (Kavanagh et al., 2015: 6). Being in the lowest wealth tertile was associated with the greatest increase in the likelihood of mental health deterioration after disability onset (Kavanagh et al., 2015: 7).

The findings of Casey and Ballantyne in Ontario are consistent with the findings of Brown et al. in British Columbia. By comparing to two different time frames of CCHS data, Casey and Ballantyne show that the consequences of work-related impairments went beyond the initial injury, but they had long-term effects on the health outcomes. Compared to the general population, the high prevalence of chronic health conditions among impaired workers in the post-injury period supports the findings of Brown et al. that workers with severe injury were more likely to utilize healthcare over time. In addition, the findings of Casey and Ballantyne are consistent with other mental health studies such as Brown et al. (2006), O'Hagan et al. (2012) and Kavanagh et al. (2015) that impairments have negative impacts on individuals' mental health. Brown et al. show that work-related injury was associated with increased likelihood of mental healthcare utilisation. Casey and Ballantyne show that being in the injured worker sample was associated with increased likelihood of reporting a diagnosis of depression compared to the general population.

Furthermore, these studies on health outcomes contribute to further understanding of the relationships between gender, disability and health outcomes. Like the analysis of Pettinicchio and Maroto (2017), the results of Casey and Ballantyne (2017) and Kavanagh et al. (2015) suggest that

women with disabilities have worse health before and after their injury than men with disabilities. The findings show that women with disabilities prior to their injury were more likely to report chronic conditions and more likely to experience mental health issues than men with disabilities. In this sense, it is reasonable to argue that women with disabilities may have a worse health trajectory than men with disabilities.

Similar to the analyses of economic outcomes, however, many studies of health outcomes are under theorized. It is worth noting that Casey and Ballantyne (2017) apply cumulative disadvantage theory to explain the likelihood of reporting chronic health conditions. Cumulative disadvantage theory suggests that the costs of earlier-life disadvantages compound and inequality increases over time (Casey and Ballantyne, 2017: 487). That is to say, this approach not only understands disability as a trajectory, but it acknowledges the importance of social positions that individuals might not start at an equal footing. While Casey and Ballantyne focus on factors associated with chronic health conditions, I argue that the concept of early life cumulation would help to explain other outcomes of disability. For instance, this approach supports the findings of Brown et al. (2006; 2007) that health disadvantages maybe accumulated from pre-injury period to post-injury period. In addition, these studies of economic and health outcomes show that wealth and health are intertwined in understanding of disability outcomes. The concept of early life cumulation would also apply to the understanding of economic outcomes. Certain individual characteristics and pre-existing socioeconomic status not only influence the likelihood of disability onset, post-injury employment probability and income recovery, but it also influences post-injury health and mental health outcomes. That is to say, certain pre-existing risk factors such as low income, unemployment, low education, poor health, poor working conditions can be understood

as earlier-life disadvantages that compound over time. I will further discuss this theory in relation to Bourdieu's theory later in this chapter.

If we contextualize individuals with disabilities/impairments within particular social settings, it is important to consider the effects of social support in understanding the consequences of disability. In the next section, I will look at the relationship between disability, social support and stigma.

On Social supports and outcomes

As compared to the literature on economic and health outcomes, the study of social outcomes of disability is less established. Although many studies acknowledged the importance of social support in understanding disability, few quantitative studies focused on this topic (Taylor, 2011; Scott-Marshall et al., 2013; Emerson et al., 2014; Mithen et al., 2015). In addition, scholars use various definitions, methods and indicators to measure social capital and social support. For these reasons, I will include some qualitative studies to explore the possible associations between disability and social support, and I will explain how social support is defined and measured in these studies.

A qualitative study of Kosny et al. (2018) shows the importance of family in providing injured workers with social support. Kosny et al. look at the impact of compensable injuries on family and the roles of family in supporting injured individuals, their compensation process and return-to-work process. The authors recruited and interviewed 18 English-speaking participants from two compensation system and one transport accident authority (WorkSafe Victoria, Comcare and The Transport Accident Commission) in Victoria, Australia (Kosny et al., 2018: 937). The participants were 18 year or older and they were working at the time of injury who had an active compensation claim (Kosny et al., 2018: 937). A total of 9 family members of the injured

individuals was also included in the interview (Kosny et al., 2018: 937). Participants identified three main types of support family provided to the injured. First, family provided instrumental support to the injured, including helping with household chores, childcare, and bodily care (Kosny et al., 2018: 938). Second, administrative support included helping the injured to navigate the compensation, health, and legal systems (Kosny et al., 2018: 938). Third, emotional support involved listening to and comforting the injured and "managing" their emotions (Kosny et al., 2018: 938).

Kosny et al. (2018: 938) also point out that family can be considered as sources of strain and stress when the injured individuals felt that their independence was being undermined or privacy was being compromised. In addition, participants stated that family relationships would be strained by the injury, the compensation process and the subsequent psychological impact. For instance, a prolonged injury could have a major financial impact on the family (Kosny et al., 2018: 939). Added physical and emotional workload would also strain family relationships (Kosny et al., 2018: 939-940). Due to the injury or illness, intimacy between spouses would decrease or cease to exist (Kosny et al., 2018: 940). The authors point to the importance of context where family situations and the nature of injury would complicate the recovery process and shape the nature of family support (Kosny et al., 2018: 940).

The quantitative studies of Taylor (2011) and Emerson et al. (2014) look at the association between social support and disability and its outcomes. Taylor measured marital status (married or non-married), and he used 2-item scale to measure social support ("whether respondents could count on at least some family or friends for support in times of trouble, and whether respondents had at least some family or friends with whom they could discuss their problems" (Taylor, 2011: 92). The results show that there was no significant association between marital status and disability

onset, whereas perceived social support was inversely associated with the likelihood of disability onset (Taylor, 2011: 100).

Emerson et al. (2014) look at the relationship between disability onset and social inclusion among Australian adolescents and young adults. The study uses a subset of the first eight waves (2001-2008) of the survey of Household Income and Labour Dynamics in Australia (Emerson et al., 2014: 449). The study includes 136 participants from 15 to 29 years old who reported becoming disabled during the study period (Emerson et al., 2014: 449). The authors focus on adolescents and young adults who are establishing adult roles and subsequent well-being in this period (Emerson et al., 2014: 449). Social inclusion is measured by multiple indicators such as productive engagement (employment, education or training), financial hardship, social support (measured by HILDA Social Support Scale) and subjective well being (self-reported scale) (Emerson et al., 2014: 449). The results show that individual's overall social inclusion after disability onset was not only associated with individual's characteristics such as gender, age, county of birth, English fluency, but it is also associated with individual's family background such as family structure and parents' education (Emerson et al., 2014: 454). Being male, younger age of disability onset, being born overseas, not living with both parents at age 14, lower proficiency in English, and parental education being year 12 or below were factors that associated with the likelihood of sustained reduction in social inclusion after becoming disabled (Emerson et al., 2014: 454).

The quantitative analysis of Mithen et al. (2015) measures social support beyond the close bounds with family and friends. Specifically, Mithen et al. (2015: 27) measure variations in social capital and health between people with and without disability and according to types of impairment, and they examine the extent to which variations in social capital explain inequalities in health. The authors drew data from 2010 General Social Survey which was a cross-sectional, national

population-based survey conducted by the Australia Bureau of Statistics (Mithen et al., 2015: 28). The data included 3,734 people with disability and 11,294 people without disability who were in private dwellings in non-remote areas of Australia (Mithen et al., 2015: 28). Social capital was measured in three forms: informal networks (close bounds with family and friends), formal networks (active involvement in groups or ties to influential organizations) and social supports (financial, practical and emotional support) (Mithen et al., 2015: 28). The initial analysis shows that people with disability tended to be older, less likely to had completed secondary education, less likely to be in the labour force and more likely to be in the lower income quintile, compared to people without disability (Mithen et al., 2015: 29). After adjusting for demographic and socio-economic covariates, there was a weak association between disability and informal networking and no association between disability and having ties to organizations (Mithen et al., 2015: 30). However, being intellectually and psychologically impaired were associated with decreased likelihood of having contact with family and friends (Mithen et al., 2015: 30). Evidence was also found that people with physical impairments had lower odds of belonging to groups (Mithen et al., 2015: 30). The results also show that the prevalence of social support was lower for people with disability, compared to those without disability. Being disabled was associated with decreased likelihood of having financial and emotional support, and people with psychological and intellectual impairments had the least support (Mithen et al., 2015: 31). After adjusting for covariates, the odds of reporting good health were 86% lower for people with disability, and the odds were similar across all impairment types (Mithen et al., 2015: 32). For people with disability, social capital was estimated to account for 9.9% of the association between disability and health, and this was similar for all impairment types (Mithen et al., 2015: 32). After adjusting for all

measures of social capital, the odds of reporting good health were 85% lower for people with disability (Mithen et al., 2015: 32).

These studies show two general approaches in measuring social support. The first approach understands social capital as interpersonal relationships that serve particular functions, and social support is measured in terms of the perceived availability of functional support. The second approach understands social capital as different types of established social networks, and it focuses on the measurement of existence and quality of interpersonal social networks. Kosny et al. (2018) understand social support as interpersonal relationships that serve particular functions. This approach is also known as perceived availability of functional support. The measure of perceived functional support is often used in chronic health studies. For example, the Medical Outcomes Study Social Support Survey (MOS-SS) is a 19-item self-administered survey[2] which is well-developed and widely used in measuring social support of patients with chronic health conditions (Sherbourne and Stewart, 1991; Khazaee-Pool et al, 2018; Yu et al., 2015). MOS-SS measures five functional components of social support: "(1) emotional support (the expression of positive affect, empathetic understanding, and the encouragement of expressions of feelings), (2) informational support (the offering of advice, information, guidance or feedback), (3) tangible [instrumental] support (the provision of material aid or behavioral assistance), (4) positive social interaction (the availability of other persons to do fun things with you), and (5) affectionate support (involving expressions of love and affection)" (Sherbourne and Stewart, 1991: 707). The three types of support in the study of Kosny et al. (2018) match the descriptions of instrumental, informational and emotional support in MOS-SS.

[2] A simplified vision of MOS-SS with 8 items has developed in recent years (Hurria et al., 2007; Clough-Gorr et al., 2007; Moser et al., 2012). I will focus on the 19-item measurement because it includes different aspects of social support which are measured in the literature of work-related impairment and disability.

The analysis of Mithen et al. (2015) is a good example of how to measure established social networks (see Stone et al., 2003 for more examples of established social networks). The authors measured social capital in binary variables across three domains: informal networks, formal networks and social support. Specifically, informal networks referred to individuals' close bonds to families and friends (Mithen et al., 2015: 27). Informal networks were measured by direct contacts (whether individuals had face-to-face contacts with family or friends once a week or more) and indirect contacts (whether individuals had telephone, email or mail with family or friends a few times a week or more) (Mithen et al., 2015: 28). Similar to Kosny et al. (2018), Mithen et al. agree that emotional support mainly come from informal networks such as friends and family. In addition to informal networks, Mithen et al. argue that formal networks may also provide individuals with informational and instrumental support. Formal networks can be further characterized into individuals' bridging ties and linking ties. Bridging networks were "heterogeneous ties between people from dissimilar backgrounds…and have the potential to generate resources" not available through close bounds, whereas linking networks referred to individuals' relationship with those in positions of power and authority (Mithen et al., 2015: 27). Formal networks were measured by whether individuals had active involvement in a group in last 12 months, and whether individuals had ties to influential organizations such as state and local government, local council, big business and they would feel comfortable contacting for information or advice (Mithen et al., 2015: 29). Three variables were used to measure social support: financial support (whether individuals could raise $2000 within a week if needed), practical support (whether individuals could ask for small favours) and emotional support (whether individuals had at least a moderate number of friends and/or family members to confide in) (Mithen et al., 2015: 29).

The studies of Taylor (2011) and Emerson et al. (2014) measure both perceived social support and existence of social networks. Taylor measured the existence of informal networks by measuring marital status, and 2-item scale to measure informational and instrumental support. Compared to Taylor, the measurement of social support in Emerson et al. is more robust. Emerson et al. (2014) measure both perceived social support and existence of social networks on a continuous scale. Based on the ten questions of the HILDA Social Support Scale, participants were asked to indicate how strongly they agree or disagree with the questions on a scale from 1 (strongly disagree) to 7 (strongly agree) (Emerson et al., 2014: 449). While it is not clearly stated, the ten questions (five of which are reversed) measured different aspects of support. For instance, questions such as "people don't come to visit me as often as I would like; I seem to have a lot of friends" measured the existence of social networks (Emerson et al., 2014: 449). Similar to MOS-SS, instrumental support was indicated in questions such as "I often need help from other people but can't get it; when I need someone to help me out, I can usually find someone" (Emerson et al., 2014: 449). Emotional support was measured by questions such as "I don't have anyone that I can confide in; when something is on my mind, just talking with the people I know can make me feel better; I have no one to lean on in times of trouble" (Emerson et al., 2014: 449). Questions such as "there is someone who can always cheer me up when I am down; I often feel very lonely; I enjoy the time I spend with the people who are important to me" can be understood as the measurement of positive social interactions (Emerson et al., 2014: 449-450).

Although few quantitative studies look at the relationship between social support and the outcomes of disability, they demonstrate that the measurement of perceived functional support and social networks are useful tools. Overall, the study of disability and social support suggest that individuals may draw different types of functional support and resources from informal networks

of family in order to manage their disability. In particular, these studies suggest that informal social support of family is an important source of social support for individuals with injuries or disability. However, Kosny et al. (2018) also point out that family can be considered as sources of strain and stress. Indeed, the results of Mithen et al. (2015) further show that the prevalence of social support was lower for people with disability, compared to those without disability. In the next section, I will show the stigma and negative social consequences of disability.

On stigma and 'negative social support'

If social support is understood as forms of positive support that helps individuals with disability for social integration and participation, stigma can be understood as forms of negative support which limit individuals' social integration and participation. The qualitative study of work-related impairments demonstrates how stigmatization translates bodily disability to 'work disability' (Tarasuk and Eakin, 1995; Eakin et al., 2003; Lippel, 2003; Beardwood et al., 2005; Kirsh et al., 2012).

For instance, Kirsh et al. (2012) explores the nature, process and consequences of stigma experience by injured workers. The authors explain that stigmatization is "contingent on access to social, economic, and political power which enables identification of different-ness, construction of stereotypes, categorisation of labeled persons and execution of disapproval, exclusion and discrimination" (Kirsh et al., 2012: 144). Using a constructivist grounded theory approach, the authors aim to determine how stigma is exhibited and perpetuated, and the impact of stigma has upon injured workers (Kirsh et al., 2012: 147). The study was conducted between 2007 and 2009, and twenty-eight injured workers were recruited for this study, using injured workers networks and local community newspaper. Four focus groups were conducted with twenty-eight participants, exploring what it means to be an injured worker, and treatment and attitudes encountered as injured

worker (Kirsh et al., 2012: 145). Eighteen participants from the focus group volunteered to participate in a follow-up one-on-one semi-structured interview, identifying the impact of stigma on participants' social and work life (Kirsh et al., 2012: 146).

The results show stigma was manifested through the repetition and reinforcement of negative stereotypes in both workplace and other social settings (Kirsh et al., 2012: 147-148). Stigma was associated with unethical treatment from positions of power which includes racial/cultural insensitivity, focusing on profits over human support, and use of surveillance (Kirsh et al., 2012: 148-149). Stigma was also manifested through general insensitivity and maltreatment from a wide range of sources, including employers, the compensation system, co-workers and friends (Kirsh et al., 2012: 149). In addition, the results also show that stigma had the most significant impacts on injured workers' work, relationships and mental health. The experience of stigma associated with injury negatively affects workers' emotional connection to their work (Kirsh et al., 2012: 150). For instance, some participants pointed out that inappropriate modified work would be humiliating, and it would have negative effects on their identity and fulfillment (Kirsh et al., 2012: 150). The stigma also impacted workers' relationships within workplace, family and friends (Kirsh et al., 2012: 150-151). For instance, injured workers reported significantly changed relationships with co-workers and employers after their injury (Kirsh et al., 2012: 150). Many also pointed to the loss of their family role such as 'caregiver' or 'breadwinner' (Kirsh et al., 2012: 151). Furthermore, the study also revealed that the stigma had a profound impact on workers' mental health and self-esteem because the association of being an injured worker was often internalized as shame, stress and depression (Kirsh et al., 2012: 151). Kirsh et al. (2012: 151) suggest that mental health issues may be the cumulative effects of loss of the worker role, financial difficulties, lack of support and stigmatisation by others.

The longitudinal study of Scott-Marshall et al. (2013) adds gender into the analysis of social support by looking at the relationship between work-related impairments, gender and marital formation. The authors argue that marital formation is a critical indicator of social integration and support for individuals with permanent impairments, but the stigma associated with disability may affect meaningful interpersonal relationships (Scott-Marshall et al., 2013: 45). Stigma is understood as an attribute that is deeply discrediting that reduces the bearer from a whole and usual person to a tainted, discounted one (Goffman, cited in Scott-Marshall et al., 2013: 44). The study measured stigma by comparing the likelihood of marital formation between workers with and without permanent impairments in a period of 10 years from disability onset. Other predictor variables included levels of impairment, post-injury personal income, age, gender, number of children under 16, rural/urban residence (Scott-Marshall et al., 2013: 46). The injured workers data drew from the Longitudinal Administrative Data and the Ontario Worker Compensation Board claims data files (Scott-Marshall et al., 2013: 45-46). The sample included 537 Ontarian claimants who were between the age 25 to 40 and had incidents that resulted in a permanent impairment between 1990 and 1994 (Scott-Marshall et al., 2013: 46). A comparison sample of 3208 Ontarians without permanent impairments with matching characteristics (employed and unmarried in the year prior to the incident year) was selected from Statistics Canada's Longitudinal Administrative Databank (Scott-Marshall et al., 2013: 46).

After controlling for socio-demographic and economic factors associated with likelihood of getting married such as age and pre-injury personal income, the results show that being female with work-related impairments was associated with decreased likelihood of getting married in the ten-year period (Scott-Marshall et al., 2013: 48). Women with severe physical impairments were associated with decreased likelihood of getting married, compared to women without impairment

or with low level of impairment (Scott-Marshall et al., 2013: 48). Post-injury personal income was not a significant predictor of marital formation for women (Scott-Marshall et al., 2013: 48). On the other hand, among men with permanent impairments their level of impairment was not significantly associated with marital formation compared to their counterparts, after controlling for socio-demographic and economic factors (Scott-Marshall et al., 2013: 48). Instead, post-injury personal income had a positive association with the likelihood of marital formation for impaired men (Scott-Marshall et al., 2013: 48). Age had a negative association with the likelihood of marital formation for both women and men with impairments (Scott-Marshall et al., 2013: 48). Being younger and living with children under the age of 16 were each associated with increased likelihood of marital formation for both impaired women and men (Scott-Marshall et al., 2013: 48).

These studies show that disability is associated with stigma and negative social support. The qualitative study of Kirsh et al. (2012) shows that stigma as an outcome of work-related impairments is manifested through everyday interactions and structural exclusions. In particular, many injured workers experienced repeated negative stereotypes in both workplace and other social settings. Other studies of work-related impairments also show that injured workers often face mistrust and a discourse of abuse from co-workers and employers which further amplifies the stigmatizing effect of disability (Tarasuk and Eakin, 1995; Eakin et al., 2003; Lippel, 2003). In addition, Kirsh et al. (2012) point out that workplace structures and policies often do not support or even actively exclude workers with permanent impairments. Similar findings were shown in other studies such as Eakin et al. (2003) and Beardwood et al. (2005). Furthermore, the study of Kirsh et al. also reveals that the stigma has impacts on workers' mental health because stigma is often internalized by injured workers. This finding is also supported by the quantitative study of

health outcomes that disability is associated with negative mental health outcomes (O'Hagan et al., 2012; Kavanagh et al., 2015; Casey and Ballantyne, 2017).

Indeed, the results of Mithen et al. (2015) provide us with further evidence of the impacts of disability and stigma on social support and health. The results suggest an unequal distribution of social support between people with and without disability. While people with disability tended to report poor health, they were less likely to have social support compared to those without disability. In particular, people with intellectual and psychological impairments reported the worst health outcomes, and they tended to have the least social capital. These findings suggest that stigma associated with disability may attribute to weaker social networks and the lower levels of social support.

The longitudinal study of Scott-Marshall et al. (2013) further support that the disability trajectory has not only long-lasting effects on individuals' economic and health outcomes, but on social support. Like Taylor (2011), Scott-Marshall et al. understand marital status as a key indictor of social support. In this case, the presence or absence of social support was measured by the likelihood of martial formation. Similar to the analysis of Pettinicchio and Maroto (2017), the relationship between disability and social support was further complicated by gender. The results of Scott-Marshall et al. show that stigma affects men and women with disability differently in long-term marital formation. While being female with impairments was associated with decreased likelihood of marital formation, such association was not found in men with impairments. Instead, post-injury personal income was associated with the likelihood of marital formation for impaired men. The overall results suggest that women with disabilities tend to have less social support than men with disabilities.

In conclusion, the studies of social support and stigma use perceived social support and existence of social networks to measure social support, and they point to important social outcomes of disability. These studies consistently show that informal social support of family are important resources of social support for individuals with disability. They also show that disability is associated with stigma which may attribute to weak social networks and the low levels of social support. Similar to the studies of economic and health outcomes, however, there are gaps in the study of social outcomes because these studies tend to focus on their own areas of interests, providing limited theorical understanding of the overall outcomes of disability.

Both analyses of Scott-Marshall et al. (2013) and Mithen et al. (2015) provide us with a theorical framework in understanding inequalities in the outcomes of disability that could go beyond the social outcomes. Scott-Marshall et al. (2013) point to gender as a key factor and a framework in understanding social outcomes. Previous studies also suggest that gender is associated with differences in economic outcomes (Pettinicchio and Maroto, 2017) and health outcomes (O'Hagan et al., 2012; Casey and Ballantyne, 2017). The combined results of these studies highlight the existence of social hierarchy where women with disability tend to have less economic resources, poorer health and lower social support than men with disability. For this reason, it is useful to look at the explanatory power of gender in a bridging study of disability which includes economic, health and social aspects. In addition, the analysis of Mithen et al. (2015) introduce Bourdieu's theory of capital which can be useful in understanding economic, health and social outcomes of disability. Similar to the theory of human capital, Bourdieu's theory of capital understands economic capital and health as resources that individuals may utilize in managing their disability. Unlike human capital theory, the theory of capital not only understands social support as potential resources for individuals with disability, but it also understands the differences

in the outcomes of disability in terms of inequality rather than individual attributes. Like cumulative disadvantage theory, the theory of capital understands individuals might start at different social positions, and pre-existing advantages and disadvantages may affect disability trajectories. For these reasons, Bourdieu's theory is potentially a useful framework for understanding the outcomes of disability from individual characteristics to the broader social contexts. In the next section, I will explore Bourdieu's theory of capital and discuss its explanatory power in understanding the various outcomes of disability.

Theoretical Orientation

Bourdieu's theory of capital

In "The forms of capital", Bourdieu (1986: 1) argues that social history is "accumulated history" because the structure of the social world is largely represented by the distribution of different forms of capital. In general, capital can exist in material or immaterial form which can be held by or embodied in individuals (Bourdieu, 1986: 1). Each form of capital not only takes time to accumulate and tends to persist over time, but it also has a potential capacity to produce profits and to reproduce itself (Bourdieu, 1986: 1). Capital helps to shape and regulate social structures which in turn shape and regulate capital accumulation (Bourdieu, 1986: 1). Unlike the game of roulette which offers equal chances to win for each spin, as Bourdieu states, the chance of success in the social world is enabled and constricted by the access to capital (Bourdieu, 1986: 1-2).

Bourdieu argues for three fundamental forms of capital: economic, cultural and social capital. Economic capital includes money and anything directly convertible into money (Bourdieu, 1986: 3). For instance, individual's income, ownership of property, and paid employment, financial assets can be considered to be economic capital. Unlike economic capital which often exists in material form, cultural and social capital can present themselves in the immaterial form

(Bourdieu, 1986: 2). Cultural capital is an embodied form of 'know how' such as specific skills and knowledge, which may be institutionalized in the forms of educational and occupational qualifications (Bourdieu, 1986: 3). For example, individuals' accumulated knowledge from formal education or individuals' accumulated experience from their employment can be considered as cultural capital. Social capital is made up of social connections and obligations, which may be institutionalized in the forms of personal or institutional relationships (Bourdieu, 1986: 3). Because of their immaterial nature, cultural and social capital are more difficult to measure than the material forms of economic capital. Bourdieu (1986: 13) argues that although cultural and social capital can be derived from and converted to economic capital under certain conditions, they cannot be entirely reducible to an economic explanation. The reason is that the transformation from one type of capital to another takes time, and the conversion rate is uncertain (Bourdieu, 1986: 13). In short, economic capital includes what we have; cultural capital includes what we know, and social capital includes who we know. I will explain the concepts of cultural and social capital in further detail and how it differs from human capital theory by showing the complex relationships between individual capital and social location.

According to Bourdieu (1986: 3), cultural capital can exist in three states: the embodied state (i.e. mind and body), the objectified state (i.e. cultural goods such as literature and art), and the institutionalized state (i.e. educational qualifications). I will focus on the embodied state and the institutionalized state because they are most relevant to our topic. The embodied form of cultural capital can be understood as a form of 'know how' such as occupational skills or accumulated knowledge from formal education (Bourdieu, 1986: 3). Individuals must personally invest time and energy to accumulate the capital (Bourdieu, 1986: 4). The concept of embodiment is inseparable to embodied cultural capital in two ways. First, embodied cultural capital develops

through bodily participation in particular contexts over long period of time. Bourdieu argues that bodies form habitus unconsciously through everyday encounters. Bourdieu defines habitus as "systems of durable, transposable dispositions" (Bourdieu, 1977: 72). Habitus is formed in individuals' particular social locations, providing them an unconscious 'worldview' of how to react to different situations. For instance, habitus can translate into embodied cultural capital through bodily participation in work. A worker might develop expertise in logging after working in forestry for years. The skills and knowledge of using logging tools (such as how to swing an axe) are embodied in the habitus of the worker who might not be consciously aware of his/her every movement in work. In addition, Bourdieu (1986: 5) points out that embodied cultural capital is domain specific "competence" which may be recognized as legitimate competence in certain domain and may not be recognized in others. For example, employment experience is occupational specific which may or may not be recognized in other employment settings. Expertise in logging is a valuable skill in forestry setting, but it might not be very useful in office setting.

The embodied nature of cultural capital could be a limiting factor for capital accumulation because it is linked to individuals' biological capacity (Bourdieu, 1986: 5). As habitus develops over time, embodied cultural capital is internal to individuals. The accumulation is a gradual process which cannot go beyond one's capacities, and it declines and dies with its bearer (Bourdieu, 1986: 5). Because embodied cultural capital is linked to individual body, accumulation and access to embodied cultural capital depends on individual's health condition. In other words, physical and mental health issues might impact individuals' access to embodied cultural capital. In addition, the embodied nature of cultural capital could also be a limiting factor for measuring cultural competence because skills and knowledge are internal to individuals. As Bourdieu (1986: 4) says,

individuals might have to constantly prove themselves whenever their knowledge is called into question.

Fortunately, the embodied limitation can be neutralized by institutionalized form of cultural capital. Academic qualification, as a form of institutionalized cultural capital, is a certificate of cultural competence which officially recognizes and guarantees its holder's embodied cultural capital (Bourdieu, 1986: 8). Furthermore, institutionalized cultural capital establishes conversion rates between cultural capital and economic capital. Bourdieu (1986: 9) points out that institutional recognition of academic qualification makes it possible for individuals to use their qualification in exchange for monetary value in the labour market. In this sense, educational qualification is not only a measure of embodied cultural capital, but it is an indicator of economic capital.

The conversion between cultural capital and economic capital suggests that different rates of accumulating cultural capital would lead to different economic outcomes. Indeed, Bourdieu argued that social stratifications are systematically reproduced by legitimizing different rates of accumulating cultural capital. In his analysis of cultural capital and education, Bourdieu looks at how education system produces unequal academic achievement among children. He criticizes the explanation of human capital theory in which it is assumed that children's academic success or failure is based on their natural talent (Bourdieu, 1986: 4). Instead, Bourdieu (1986: 4) argues that children's chances of success in school depend on both economic and cultural investment of their family. He points out that talent itself is the product of an investment of time and the "domestic transmission of cultural capital" (Bourdieu, 1986: 4). Not all families have the economic and cultural means for prolonging their children's education beyond the minimum necessary for the reproduction of the labour-power (Bourdieu, 1986: 5). As a result, children from wealthy families

have more opportunities to achieve high levels of education than children from poor families. Education systems reproduce the existing social structure by "sanctioning the hereditary transmission" of capital (Bourdieu, 1986: 4). In one sense, the seemingly neutral system reproduces social stratifications by legitimizing different rates of accumulation within socio-economic groups. In another sense, the role of family in accumulating cultural capital shows the importance of social capital.

Social capital is made up of social connections and obligations (Bourdieu, 1986: 3). According to Bourdieu (1986: 9), social capital is "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition." In part, social capital is a group membership which provides each of its members with backing of the collectively owned capital (Bourdieu, 1986: 9). Examples would include family, class, tribe, school or party. Social connections also come with social obligations. Social capital must be maintained by material and symbolic exchanges, using economic and cultural capital (Bourdieu, 1986: 9). As Bourdieu (1986: 11) states, "the reproduction of social capital presupposes an unceasing effort of sociability, a continuous series of exchanges in which recognition is endlessly affirmed and reaffirmed." Individuals not only need to spend the necessary economic capital such as time and resources on maintaining their social network, but they also need the necessary cultural capital to maintain the symbolic exchanges.

In addition to economic, cultural and social capital, Bourdieu discusses how symbolic capital operates as a form of recognition or symbolic power which derives from the three fundamental forms of capital. In "Symbolic capital and social classes", Bourdieu (2013: 296) argues that symbolic capital, often known as legitimacy and prestige, is first recognized by material and embodied distinction (unequal distributions of capital). As Bourdieu (2013: 298) explains, the

ability to make material and symbolic exchanges (through the access of material goods, cultural knowledge or social ties) and to yield profits become signs of recognition which signify gaps or distances in relation to others. Then, these differential gaps or distances are retranslated into positive or negative values according to the specific logic of cultural fields (Bourdieu, 2013: 296-297). Cultural fields are networks of social relations which not only produce certain discourses and activities, but they also struggle over resources and access (Bourdieu, 1990). Similar to the accumulation of three forms of capital, the transformation of any forms of capital into symbolic capital always presupposes a form of labour, a visible expenditure of time, money and energy, a redistribution that is necessary to ensure the recognition of the distribution (Bourdieu, 2013: 299). For instance, Bourdieu points out that lifestyle is a contemporary example of symbolic manifestations. Clothing and furnishings function according to the logic of membership and exclusion by making differences in capital visible (scarce goods require cultural capital to appropriate and economic capital to get access) (Bourdieu, 2013: 299). Thus, lifestyle asserts recognition and legitimacy by translating material distinction into symbolic power (Bourdieu, 2013: 300).

Furthermore, the operation of symbolic capital reinforces social hierarchy. Bourdieu argues that symbolic capital is essentially relational because recognition is based on material and embodied distinction within specific cultural fields. Legitimacy and prestige mean nothing in themselves, but they depend on collective recognition which is agreed even by the members without prestige or those from the bottom of the hierarchy (Bourdieu, 2013: 298). Misrecognition and symbolic violence are the important mechanisms to gain “complicity” from the bottom of the hierarchy. Bourdieu (2013: 298) argues that symbolic capital is recognized but, at the same time, misrecognized because it is not recognized as unequal distributions of capital, but it is

misrecognized as individual's natural or inherent quality. Referring back to Bourdieu's critique of education, children's academic achievement is not recognized as the economic and cultural investment of their family, but it is often misrecognized as individual natural talent (Bourdieu, 1986: 4). Thus, attaining high level of educational qualification, which legitimizes the access of high-paying jobs, is seen as the result of individuals' talent and ability, rather then capital that individuals have inherited from their family. On the other hand, those with low attained education are also misrecognized as a lack of talent or ability. Limited social mobility is not seen as a consequence of unequal distributions of capital, but it is perceived as a lack of individual talent or ability. Indeed, Bourdieu (2013: 298) uses the term "symbolic violence" to conceptualize the phenomenon which individuals are subjected to different treatments due to unequal distributions of capital, but they perceive these treatments as natural and "taken for granted." Social hierarchy is not imposed, but it is maintained by 'taking for granted' that unequal distribution of capital as inherent quality. In other words, inequality is naturalized and retranslated into inherent quality through misrecognition and symbolic violence.

Now that we have a general understanding of Bourdieu's theory of capital, we will further explore theoretical application of Bourdieu's ideas by looking at relevant literature.

Relevant literature of Bourdieu's theory

Because Bourdieu's theory is closely linked to class analysis, many scholars apply his theory to analyze social reproduction and inequality. For instance, Paccoud et al. (2020) look at the class-related mechanisms of healthcare access for older Europeans. The authors used the fifth wave of the Survey of Health, Aging, and Retirement in Europe which is a panel data on health, socioeconomic status and social and family networks (Paccoud et al., 2020: 514). The survey is based on probability samples with full population coverage of 15 European countries, giving a

representative sample of 64,840 individuals who are 50-year-old and older (Paccoud et al., 2020: 514). The authors theorize that individuals with lower volume of capital use healthcare services out of medical necessity, whereas those with higher volume of capital utilize them as a form of health prevention (Paccoud et al., 2020: 512). Specifically, Paccoud et al. (2020: 514) look at the relative contribution of economic, cultural and social capital on the use of different healthcare and hospital services and the effects of different compositions of capitals on the use of healthcare services. Three binary outcome variables are used to measure the use of healthcare services, including consultations with a health professional, visits to dental services, and overnight stays in hospital in the last 12 months (Paccoud et al., 2020: 514). In terms of predictors, imputed total household wealth is used as an index of economic capital (Paccoud et al., 2020: 515). Cultural capital index measures dimensions of cultural capital which included respondents' education, parental education, the number of books in childhood (Paccoud et al., 2020: 516). Social capital index measures respondents' participation in social activities such as voluntary or charitable programmes, political or community related organizations, sport or other social groups (Paccoud et al., 2020: 516). The authors also use a cluster analysis to classify individuals into four groups according to both the type of capital and the volume of capital individuals possess (Paccoud et al., 2020: 516).

Paccoud et al. (2020: 520) found that inequalities in healthcare access are rooted in the different volume and compositions of capital. Controlling for demographics, country of residence, perceived health and insurance, the authors show that each of the three forms of capital plays a role in the use of healthcare services (Paccoud et al., 2020: 520-521). Specifically, economic capital was found to be the largest contributor of contacting with a health professional or visiting a dentist (Paccoud et al., 2020: 520). Economic and social capital had a protective effect in terms

of hospital admissions and the number of days stays in the hospital (Paccoud et al., 2020: 520). Cultural capital was strongly associated with visiting a dentist and had a small but significant contribution in visiting a health professional (Paccoud et al., 2020: 520). In terms of the effects of different compositions of capitals on the use of healthcare services, the findings reveal that inequalities in the use of healthcare services are sensitive to immaterial, sociocultural factors (Paccoud et al., 2020: 521). In every case, outcomes are best for those with both high economic and high sociocultural capital, followed by those with low economic but high sociocultural capital, then those with high economic capital but low sociocultural capital, and finally those with low volumes of all capitals (Paccoud et al., 2020: 521).

Paccoud et al. apply Bourdieu's theory to show that both material and immaterial forms of capital individuals possess would affect the long-term health consequences of the human body. Some scholars go a step further and argue that the human body is not only an embodiment of different forms of capital, but it is also a form of capital. For instance, Shilling (1993: 125) argues that the contemporary body is a form of "physical capital" by integrating Bourdieu's key concepts such as capital, habitus and tastes. Similar to the argument of Paccoud et al., Shilling argues that the development of the body is influenced by the access to different forms of capital. Shilling (1993: 129) explains that individuals' embodied experience such as habitus and tastes is based on their social location which contextualizes their material circumstances and everyday encounters. For example, tastes and preferences are rooted in material constraints, and individuals develop preferences out of availability (Shilling, 1993: 129). Adding to the argument of Paccoud et al., Shilling argues that the embodied experience (i.e., habitus and tastes that individuals develop from a particular social location and the access to different forms of capital) becomes a form of physical capital which can be further converted into different forms of capital. Unlike human capital theory

which understands the body as labour power, Shilling (1993: 125) argues that the body as physical capital is "a possessor of power, status and distinctive symbolic forms which is integral to the accumulation of various resources." The body can be converted into economic, cultural, social and symbolic capital through bodily participation in work, leisure and other social fields (Shilling, 1993: 125-126).

For instance, individuals' experience and their relation to the body may vary, depending on their social location and the access to different forms of capital. Shilling (1993: 130-132) points out that the working classes tend to develop an instrumental relation to their body, whereas the dominant classes tend to develop various symbolic relations to their body. Workers who engage in manual labour all day use their bodies as a means to an end, and they tend to have little time or energy to spend on "fitness and health" (Shilling, 1993: 130). Working-class women who face the 'double-burden' of waged and unwaged labour have a high risk of physical and mental illness because they tend to sacrifice their health in order to fulfil both financial and family responsibilities (Shilling, 1993: 131). While physical capital of the working class such as physical strength and agility can be directly converted into economic capital, it often has high risks and opportunity costs to be converted into other forms of capital (Shilling, 1993: 137). Sports, for example, allow the conversion of physical strength into economic and symbolic capital, but the conversion has high risks of injury and the opportunity costs of entering other careers (Shilling, 1993: 136). In contrast, the dominant classes have time and resources tend to treat their body as a "project" (Shilling, 1993: 132). The bourgeois may choose an appropriate 'lifestyle' to develop their body such as particular body shapes for symbolic presentations or fitness for health orientation, depending on the values of their social fields (Shilling, 1993: 132). As compared to the working class, the dominant classes have more opportunities to convert their physical capital into various forms of capital. For instance,

appropriate bodily demeanour may demonstrate cultural competence, allowing bourgeois to access elite social circles and to develop social capital (Shilling, 1993: 138). In this sense, privileged social locations and pre-existing capital allow individuals flexible accumulation and conversion of physical capital.

In addition, individuals' experience of bodily changes may vary, depending on their social location and capital. For instance, Shilling (1993: 139) argues that individuals from different social locations may experience aging differently. While Shilling (1993: 139) agrees that biological factors of aging may have a negative impact on the convertibility and productivity of physical capital, habitus and capital also play important roles. Specifically, the working classes tend to be more prepared to accept bodily decline as inevitable with age because bodily decline is linked to a decreasing convertibility of physical capital and a decline of living standards (Featherstone, cited in Shilling 1993: 139). On the other hand, the middle classes find the aging body as a source of anxiety because it is linked to uncertainty about work status, but they try to combat aging with available resources such as fitness (Shilling, 1993: 140). In contrast, the upper classes tend to 'wear' their age unselfconsciously as a mark of status and experience aging as "the prime of life" (Shilling, 1993: 140). This is because the bourgeois have time and resources to acquire appropriate symbolic orientations to their bodies (Shilling, 1993: 140). Using their social position and the volume of capital, the bourgeois are also able to influence the values of social fields such as what are the appropriate 'lifestyles and bodily demeanour' (Shilling, 1993: 140).

Similar to Shilling, some scholars of disability studies apply Bourdieu's theory to understand the embodied experience of disability and the consequences. For example, Edwards and Imrie (2003: 241) use Bourdieu's concept of habitus and symbolic capital to understand disabled individuals' corporeal identities, experience and encounters in a range of social settings.

The study included 30 volunteers with a range of mobility, hearing and vision impairments who were recruited by local access officers in Weymouth and Gateshead, England (Edwards and Imrie, 2003: 245). Two focus groups were conducted in Weymouth and two in Gateshead (Edwards and Imrie, 2003: 245). The results show that the disabled body was produced, in part, by negative classifications from the field of work and medicine (Edwards and Imrie, 2003: 247-248). For instance, the participants expressed that they routinely experienced marginalization from the labour market (Edwards and Imrie, 2003: 247). Negative stereotype and pre-conceptions from employers devalue disabled people and their bodily capabilities, reinforcing their employment disadvantage (Edwards and Imrie, 2003: 247). Similarly, the prominence of bio-medical discourses negatively affects disabled people's acquisition of cultural and symbolic capital (Edwards and Imrie, 2003: 248). Disabled people are often avoided and ignored by others because their bodily demeanour is often interpreted as deviant and disordered (Edwards and Imrie, 2003: 248). Such reactions to disabled people are often spontaneous and unconscious because the world is dominated by hegemonic, non-disabled bodies (Edwards and Imrie, 2003: 249). In addition, the label of 'disabled bodies' is sustained by the deprived habitus of disabled people. Some people with disability came to accept the devaluation of their bodily identity as 'natural' because social encounters reaffirmed their "devalued selves" (Edwards and Imrie, 2003: 250). As Edwards and Imrie (2003: 251-252) suggest, symbolic violence is achieved when the everyday cultural encoding of disability renders disabled people to think their body as broken, incompetent, powerless and dependent, and to become dependent on the medical and charitable interventions.

The analysis by Edwards and Imrie applies Bourdieu's key concepts that material or bodily distinction is recognized and retranslated into symbolic values according to the logic of the field. In both fields of work and medicine, disabled bodies are misrecognized as inherently individual

defects, and they are devalued and placed in the bottom of the hierarchy compared to non-disabled bodies. In the field of work, impairments are first signified by the differential gaps between 'abled' and 'disabled' bodies in economic and cultural capital such as different employment rate and bodily demeanour. Then, these differences are also retranslated into negative classifications (such as perceived employability and bodily capabilities) which further reinforce employment disadvantage of disabled bodies. Similarly, impairments are retranslated into abnormality and disorder in the bio-medical field. The disabled bodies are deprived of symbolic, cultural and social capital in the social hierarchy. Shilling would agree that physical capital of the disabled body is difficult to convert into other forms of capital because the social fields actively devalue and reject the participation of the disabled bodies. Thus, the disabled bodies are actively produced by the value and hierarchy of 'non-disabled' bodies. In addition, the analysis also shows the operation of symbolic violence which disabled bodies are not only produced by, but also produce and sustain the values of non-disabled bodies. People with disabilities may come to accept devaluation of their bodily identity through everyday social encounters and deprived habitus. In turn, they may also come to accept their "place" in the bottom of the social hierarchy because they are 'disabled' compared to the 'non-disabled' bodies. Other studies refer these values and hierarchy of non-disabled body as stigma. We will further explore the concept of stigma in the relation to social support.

The value and hierarchy of able bodies not only dominates the field of work and medicine, but it also dominates the field of sport. Townsend et al. (2018) use Bourdieu's concept of symbolic capital and social fields to analyze how disability was constructed in high-performance sport coaching and Paralympic sport. The authors conducted an ethnographic study in a national learning disability sport team in UK, and they conducted interviews with six coaches and managers and

focus groups with four athletes (Townsend et al., 2018: 4). The authors also conducted comparative in-depth semi-structured interviews with six Paralympic coaches and five athletes (Townsend et al., 2018: 5). The study focused on deconstructing taken-for-granted conditions that disabled athletes faced in sport where power relations mediate who has voice, autonomy and identity, and who does not (Townsend et al., 2018: 3). The data were analyzed inductively, using Bourdieu's theory as organizing categories. The analysis shows that the coaches who had symbolic power over the athletes attempted to 'normalize' the disabled body, using high-performance sport discourses and coaching practices. The coaches attempted to maximize their symbolic capital by consciously subverting attention away from 'negative' associations of disability because they believed that disability represented a form of negative symbolic capital when the field of sport is framed by high-performance sport discourses (Townsend et al., 2018: 8-9). Thus, disability was assimilated into the logic of high-performance sporting practices, where disability identity was closely related to performance and athletic bodies (able-bodied norms) (Townsend et al., 2018: 8-9). The coaches constituted a form of 'empowerment' practice where disabled athletes were subject to assumptions about their abilities framed by normalization and judgment against ableist standards (Townsend et al., 2018: 10). While the athletes were able to generate symbolic capital by recognizing competencies associated with high-performance sport, they also attempted to reconcile with their disability identity which was a legitimate part of their experience (Townsend et al., 2018: 8, 12). Townsend et al. argue that coaching practice functioned as an instrument of domination that was justified as an exercise of empowerment and disability-specific resistance by the coaches (Townsend et al., 2018: 13). The athletes accepted the coaches' 'legitimacy of domination' by conforming the coaching practice and embodying symbolic capital of high-performance ideals (Townsend et al., 2018: 14-15).

Similar to the analysis of Edwards and Imrie, Townsend et al. show that social hierarchy between non-disabled and disabled bodies existed even in the field of Paralympic sport where disabled athletes compete against others in similar conditions. Townsend et al. further show that symbolic capital was not distributed independently in each social field, but it was distributed in relation to relevant fields. Disability was consciously subverted because it was believed to be a form of negative symbolic capital in comparison to other fields of sport. Thus, disabled bodies were subject to judgment by the ableist norms and standards because of the struggle of symbolic resources between the fields. In addition, Townsend et al. demonstrate that normalization was a form of symbolic violence in Paralympic sport. The coaches repeatedly used high-performance sport discourses and coaching practices to attempt to 'normalize' the habitus of the disabled bodies. While the athletes were able to convert their physical capital into other forms of capital, as Shilling suggests, they had little control over the process. The athletes came to accept the coaches' legitimacy, and they were willing to embody the values and norms of ableist ideal after a period of normalization. In this sense, social hierarchy was simultaneously supported by those with power and those without power.

'Normalization' of disabled habitus is not only used in sport, but it is also a parenting strategy. Allen (2004) would agree with Edwards and Imrie and Townsend et al. that Bourdieu's concept of habitus is a useful framework in understanding the embodied experience of disability. He further argues that disabled people from different social positions may experience disability differently. Specifically, the author looks at the relationship between social class (privileged and deprived family) and the management of impaired body in space among visually impaired children (Allen, 2004: 488). Forty-four visually impaired children, between 5 and 16 years old, and their parents were interviewed twice (Allen, 2004: 488). The first interview encouraged the families to

describe their everyday experience of impaired body at home and urban space (Allen, 2004: 489). Based on the first interview, the second interview asked the families to describe strategies that they used to cope with or overcome problems in housing and urban space (Allen, 2004: 489). The analysis, then, split the interviewees into two loosely defined social categories, privileged and deprived, based on their home ownership, housing types, location, parental education and profession (Allen, 2004: 489). The results show that families from different social categories used different strategies to manage the impaired body of their children. The privileged families demanded certain forms of bodily comportment and mobility in order to overcome problems of impairment in social space (Allen, 2004: 488). Conversely, the deprived families had more restrictive spatial strategies because they confirmed and tacitly accepted their current and future "place-in-the-world" (Allen, 2004: 488). For instance, the privileged families were conscious about the importance of 'normal' bodily postures and the parents tried to 'train' their children to adopt 'normal' postures (Allen, 2004: 494-495). The privileged habitus allowed the families to individualize the impaired body (Allen, 2004: 497). They encouraged their children to achieve 'normality' and to expand their spatial boundary by providing them with safe environment, spatial routines and financial resources (Allen, 2004: 496-498). On the other hand, the deprived families passively accepted children's impairment as 'given' (Allen, 2004: 499). The parents restricted spatial boundary of their children because they considered the neighbourhood environment as unsafe (Allen, 2004: 499). The children from deprived habitus lack resources to defy their parents and to expand their spatial boundary (Allen, 2004: 500). In terms of strategy, deprived families tacitly politicalized and problematized the impaired body in order to allocate resources (Allen, 2004: 502). The emphasis of differences between impaired and able body reinforced the acceptance of impairment as an inherent individual attribute (Allen, 2004: 502).

Allen would agree with Shilling that social class and capital play important roles in understanding the embodied experience of disabled children. The children's experience and access to social space depended on the economic, cultural and social capital that their family may provide. That is to say, their habitus which is a form of embodied cultural capital is developed in close relation to the volume of capital of their family. Similar to the analysis of paralympic coaching, the privileged habitus encouraged children to normalize their disabled bodies and to embody the ableist values. For instance, the privileged families were conscious about embodied cultural capital, and they encouraged disabled children to develop 'normal' postures. They also had the means to provide children with opportunities and resources to expand their spatial boundary. In Bourdieu's terms, family as a form of social capital allowed children with disability to accumulate their embodied cultural capital. On the other hand, the deprived habitus restricted children's spatial boundary, and children were often told to accept their impairment as 'given.' Similar to the analysis of Edwards and Imrie, disabled children were restricted in the development of their own embodied capital because their bodies were misrecognized as inherently defective, and they were not provided with opportunities and recourse to expand their spatial boundary. Ultimately, both habitus perpetuated the social hierarchy of non-disabled bodies because they confirmed the imposition of bodily differences as legitimate. We can see that the concept of social class and capital are important factors to consider in understanding the embodied experience of disability.

Indeed, Newman et al. (2017) highlight how different forms of capital can leverage unequal access to digital participation for young people with disability. This study was based on the interviews with 18 young people who had cerebral palsy or acquired brain injury and were aged 10 to 18 years old, and with 17 of their family members (Newman et al., 2017: 566). The interviews were conducted between 2011 and 2012 in Australia, following an intervention that would provide

disabled youth with home-based training in the use of computer and internet to increase their social participation (Newman et al., 2017: 566-567). The results show that availability of assistive technologies (AT), as a form of digital economic capital, helped some participants to facilitate their computer or internet use (Newman et al., 2017: 571). For example, the use of AT allowed participants to mitigate some physical limitations to enhance their embodied and institutional cultural capital (Newman et al., 2017: 571). In addition, the authors argue that economic capital alone was not sufficient for digital engagement because most participants relied on family know-how and social support for assistance in information technology (IT) use (Newman et al., 2017: 572). Social capital in the form of contacts also provided the participants with technical expertise, equipment or help for online access (Newman et al., 2017: 572). These networks enabled some participants to further develop their IT abilities and their online social network (Newman et al., 2017: 572). In terms of cultural capital, the study shows that impairments shaped aspects of embodied cultural capital (Newman et al., 2017: 577). Newman et al. rightly point out that 'digital inclusion' assumed embodied cultural capital of non-disabled bodies such as capacity to read online text, physical dexterity to type on a keyboard and ability to communicate in writing (Newman et al., 2017: 576). These embodied capitals were often taken-for-granted by people without disability, but they were not easily achieved by children with cognitive and physical limitations (Newman et al., 2017: 576). The interviews also revealed that most parents lacked cultural capital to facilitate children's IT use because the parents did not have a good knowledge of IT and AT (Newman et al., 2017: 574).

Digital participation can be understood as a social field where inclusion is hierarchical. As Newman et al. points out, the use of mainstream information technology such as iPad can be recognized as a form of symbolic capital. Similar to the previous analyses of symbolic violence,

symbolic capital also comes with misrecognition. 'Digital inclusion' was a form of misrecognition and symbolic violence for disabled youths because it assumed the embodied cultural capital of non-disabled bodies. In addition, Newman et al. would agree with Shilling and Allen that the access to capital influenced children's embodied experience and capital accumulation. To fully participate in information technology, disabled youths often require additional resources. For instance, assistive technologies as a form of economic capital enabled some youths to further develop their cultural capital. Like Allen, Newman et al. point to the importance of social capital in capital accumulation of disabled children. Family and close friends, in this case, not only provided children with social support, but they also provided children with cultural and economic capital to facilitate their digital participation and the accumulation of cultural and social capital.

Similar to Paccoud et al. (2020), Mithen et al. demonstrate that Bourdieu's concept of social capital can be quantified by measuring the existence of social networks. The results of Mithen et al. supports Bourdieu's concept of capital accumulation. Similar to the analyses of Shilling (1993), Edwards and Imrie (2003) and Allen (2004), the deprived habitus discourages capital accumulation of disabled people which further placed them at disadvantage. In this case, people with disabilities not only had lower economic and cultural capital (in terms of income, employment and education), but they also had lower social capital and poorer health than people without disabilities. The results also suggest an unequal distribution of social support between the disabled and non-disabled bodies because people who were more likely to need support tended to have less supports. In particular, people with intellectual and psychological impairments reported the worst health outcomes, and they tended to have the least social capital. The authors point to other studies and suggest that the negative outcomes are related to the high levels of discrimination and stigma against people with severe disabilities. Referring back to Edwards and Imrie,

discrimination, stigma and symbolic violence often operate spontaneously and unconsciously in the world of hegemonic, non-disabled bodies. People with severe disabilities who have the least access to economic and embodied cultural capital tend to be misrecognized and stigmatized.

In short, these scholars have applied Bourdieu's theory to construct a comprehensive understanding of disability. In particular, the concepts of capital and habitus are not only useful in understanding the embodied experience of disability, but they are also useful in understanding the social locations of disabled bodies by connecting to the concepts of social class and social fields.

Theoretical applications of Bourdieu's theory

I argue that Bourdieu's theory is useful in understanding the differences in the economic, health and social outcomes of disability/impairments. Similar to cumulative disadvantage theory, Bourdieu's theory understands that pre-existing advantages and disadvantages (in the access of the forms and volumes of capital) accumulate over time. Individuals' access to capital not only influences the likelihood of disability onset, post-injury employment probability and income recovery, but it also influences post-injury health and mental health outcomes. Pre-existing capital is an indictor of their social location and habitus. In particular, the studies of economic and health outcomes highlight important pre-existing factors such as education (Jenkins and Rigg, 2004; Taylor, 2011; O'Hagan et al., 2012; Cater et al., 2013; Polidano and Vu, 2015; Ballantyne et al., 2016), pre-injury employment (Jenkins and Rigg, 2004; Polidano and Vu, 2015; Kavanagh et al., 2015), pre-injury income (Jenkins and Rigg, 2004; Lilley et al., 2012; O'Hagan et al., 2012; Kavanagh et al., 2015; Scott et al., 2018), pre-injury work conditions (Lilley et al., 2012; Ballantyne et al., 2016; Scott et al., 2018), pre-injury health conditions (Brown et al., 2006 & 2007; Taylor, 2011), and pre-existing social support (Taylor, 2011; Emerson et al., 2014) that predict

disability and its outcomes. These factors not only can be understood as forms of capital, but they are indictors of individuals' social location and habitus.

For example, the findings show that individuals with pre-injury employment were more likely to be employed after disability onset, compared to those without pre-injury employment (Jenkins and Rigg, 2004; Polidano and Vu, 2015). Pre-injury employment not only generates economic capital in the form of wages, but it also accumulates immaterial capital such as cultural capital (in the forms of specific skills and knowledge) and social capital (in the forms of workplace relationships) through bodily participation in work. Individuals might use these resources to manage their body and to compete in the labour market after disability onset. In addition, the findings show that pre-injury income was inversely associated with the likelihood of disability onset (Jenkins and Rigg, 2004; Taylor, 2011), the likelihood of unemployment (Lilley et al., 2012; Scott et al., 2018), and the likelihood of negative mental health outcomes (O'Hagan et al., 2012; Kavanagh et al., 2015). As a form of economic capital, pre-injury income not only allows individuals to access to medical coverage and health insurance which provides health and mental health benefits (Taylor, 2011; Kavanagh et al., 2015; Paccoud et al., 2020), but it is also an indicator of individuals' social position. As Scott et al. (2018: 323) argue, workers with high pre-injury income are also likely to be well educated, have more flexibility in their work arrangements and more mobility throughout the labour market, and be more empowered to negotiate a workplace accommodation. Indeed, Scott et al. (2018) rightly point out that pre-injury income, education and work condition/arrangement are closely connected.

Bourdieu's concept of habitus is useful in understanding these connections. As Shilling (1993) argues, habitus is gradually formed based on individuals' material circumstances and everyday encounters. Shilling theorizes that the middle and upper classes often have time and

sources to treat their body as a project, employing various body maintenance techniques to manage their health and behavior. The results of Taylor (2011) and Brown et al. (2006 & 2007) support Shilling's argument and show that pre-injury health is not only an indicator of individual's embodied cultural capital, but an indicator of social location and habitus. Taylor (2011) shows that health and fitness were inversely associated with the likelihood of disability onset, whereas Brown et al. (2006 & 2007) suggests that pre-existing poor health was associated with an increased likelihood of severe work injuries. In addition, the habitus is developed in close relation to the access of social capital. Bourdieu (1986) argue that children's chances of success in school depend on both economic and cultural investment of their family. The qualitative study of Allen (2004) and Newman et al. (2017) show that families with high volume of capital were associated with privileged habitus which allows more opportunities for children to develop their body and generate capital over time. The results of Emerson et al. (2014) support Bourdieu's argument that family is an important source of social support for individuals with disability. Specifically, family background such as family structure and parents' education were important predictors of social inclusion for disabled young adults (Emerson et al., 2014: 454). Kosny et al. (2018) also suggest that family provided injured workers with various social support. Taylor (2011) further shows that perceived social support was inversely associated with the likelihood of disability onset. As Shilling argues, the embodied experience is not only influenced by the access to different forms of capital, but it becomes a form of physical capital which can be further converted into different forms of capital. We would expect individuals with high volumes of pre-existing capital have advantages in the labour market and in health management over those with low volumes of capital.

Indeed, studies show that individuals' access to education are closely connected to their pre-injury work conditions, playing an important role in their disability trajectory and economic

and health outcomes. For example, the results of Polidano and Vu (2015) show that different volumes of cultural capital not only convert to economic capital at different rates, but the capital accumulation adds up over time as economic advantages or disadvantages. The results of Cater et al. (2013) show that individuals with high volume of capital tend to have more opportunities to convert their physical capital into other forms of capital even after disability onset. Edwards and Imrie (2003) would argue that individuals with limited pre-existing capital tend to live in deprived habitus which has limited access and ways to generate capital. Shilling (1993) would add that individuals with no education qualification often have limited opportunities to convert their physical capital into economic capital. Manual labour, for instance, allows direct conversion of economic capital without few education requirements, but it has a high risk of injury. For these reasons, individuals with low volume of cultural capital are associated with higher risk of disability onset because they tend to have careers with high risks of injury, and they have limited resources to maintain their body. In this sense, pre-injury work conditions are closely connected to individuals' social location and habitus. It explains why workers with poor work conditions prior to their injury (deprived habitus) were more likely to experience negative economic outcomes (Lilley et al., 2012; Ballantyne et al., 2016; Scott et al., 2018).

At this point, we can see that the body should be understood as corporeal and simultaneously social. Individuals' embodied experience is gradually formed based on their access of forms and volumes of capital, affecting their likelihood of disability onset, severity of disability and the outcomes of disability. For example, the experience and outcomes of aging body with disability are different according to individuals' social locations. Studies show that older individuals were more likely to experience disability onset (Taylor, 2011), and they were more likely to be unemployed after disability onset (Scott et al., 2018). On the other hand, older age was

associated with positive mental health outcomes (Kavanagh et al., 2015; O'Hagan et al., 2012). Shilling (1993) point out that biological factors of aging may have a negative impact on the convertibility and productivity of physical capital, habitus and capital also play important roles. For instance, Polidano and Vu (2015) argue that older adults with disability may voluntarily withdraw from the labour market due to retirement plans and pensions, whereas younger adults with disability may exit from the labour market involuntarily due to the rapid deterioration in health. Compared to individuals who acquired disability onset in the younger age, individuals who acquired disability onset in the older age may be in better social positions and have more sources to manage their health. As Shilling (1993) suggest, individuals with low volume of capital are associated with higher risk of disability onset because they tend to have careers with high risks of injury, and they have limited resources to maintain their body. For these reasons, older individuals with disability are more likely to have a positive outlook of their health trajectory not only because they expected to have bodily decline with age, but also because they had time to accumulate capital or to establish assess for their retirement.

In addition, although the severity of disability negatively affects the different outcomes such as employment, income, health and social support (Cater et al., 2013; Mithen et al., 2015; Pettinicchio and Maroto, 2017), certain social norms and structures might further amplify the effects of disability. For instance, Kirsh et al. (2012) point out that stigma associated with the disabled body negatively changed injured workers' relationship with workplace, family and friends. Bourdieu argue that social connections are maintained by material and symbolic exchanges, using economic and cultural capital. Injury may interrupt individuals' accumulation and access to economic and cultural capital, making social connections and exchanges difficult to maintain. Edwards and Imrie (2003) further point out that stigma or negative form of symbolic

capital is first signified by differences in capital. These differences are retranslated into negative classifications and perpetuated through everyday encounters. Indeed, Kirsh et al. (2012) show that stigma was manifested through the repetition and reinforcement of negative stereotypes in both workplace and other social settings. The results of Mithen et al. (2015) provide us with quantitative evidence of the impacts of disability and stigma on social support and health. The results reveal an unequal distribution of social support between the disabled and non-disabled bodies. In particular, people with intellectual and psychological impairments reported the worst health outcomes, and they tended to have the least social capital. These findings suggest that individuals with severe disabilities might have difficulty in maintaining their social connections and exchange, and stigma associated with the disabled body may attribute to weaker social networks and the lower levels of social support.

Furthermore, stigma would also be perpetuated through systematic exclusion. Edwards and Imrie (2003) argue that stigma may come from a wide range of sources, and it is often spontaneous and unconscious because the world is dominated by the values of hegemonic, non-disabled bodies. The findings of Kirsh et al. (2012), Eakin et al. (2003) and Beardwood et al. (2005) suggest that workplace structures and policies often do not support (or even actively exclude) bodily disability which retranslates into 'work disability.' As we recall, human capital theory assumes the naturality of the labour market. Different labour market outcomes are due to individual differences in human capital. On the other hand, Bourdieu argues that social stratifications are systematically reproduced by legitimizing different rates of accumulation. In his criticism of education systems, Bourdieu (1986) points out that the systems reward children's 'natural talent', but that this talent only appears to be natural. Children from wealthy families had more resources and opportunities to invest in their 'talent' than children from poor families. The education system reproduced the

existing social structure by legitimizing the "domestic transmission" of capital (Bourdieu, 1986: 4). Similarly, the labour market reproduces the existing social structure by 'normalizing' the disabled bodies (with ableist values). For instance, workplace accommodations and proportional wage replacement 'reward' individuals with high volumes of pre-existing capital (Cater et al., 2013; Scott et al., 2018). On the other hand, individuals with low volumes of capital are disproportionately associated with negative labour market outcomes (Lilley et al., 2012; Ballantyne et al., 2016; Scott et al., 2018). In addition, the emphasis on return to work indicates the ableist values in the field of work and it would be a form of symbolic violence to workers with permanent impairments. The findings of Ballantyne et al. (2016) show that completing a retraining program was associated with an increased likelihood of personal poverty. Short-term rehabilitation programs such as mandatory participation in retraining may be inequitable for injured workers with low volume of capital. This short-term program is problematic not only because it does not consider the economic and health conditions of injured workers, but because it presumes that injured workers can complete on an equal footing with younger and non-disabled bodies with equivalent training in the labour market. Townsend et al. (2018) would argue that short-term retraining programs, which assumes ableist norms and standards, can be understood as a form of symbolic violence, and it is an attempt to normalize the disabled bodies.

In addition to the labour market mechanisms, the study of gender and disability shows that gender formation further amplifies the negative effects of disability. Edwards and Imrie (2003) suggest that the field of work is dominated by the values of non-disabled bodies, whereas Pettinicchio and Maroto (2017) further suggest that the field of work is dominated by the values of non-disabled masculine bodies. As Pettinicchio and Maroto point out, women without disability had lower employment rates and less earnings than men without disability. In Shilling's terms, the

physical capital (symbolic capital) of female bodies has difficulty to convert into economic capital through the participation of work because the field of work is dominated by the values of masculine bodies. In addition, the interactions between disability and gender create a complex hierarchy in the field of work. Pettinicchio and Maroto (2017: 24) show that women with disability generally experienced a "double penalty" in the labour market, and women with multiple and cognitive disabilities had the lowest employment rates and earnings levels. Furthermore, men with disabilities faced greater disparities in the labour market because disability conflicts with both dominant values of non-disabled bodies and masculinity. Men with disabilities lost the privileges of masculinity in the workplace because disabilities were associated with negative stereotype and pre-conceptions. For this reason, men with disabilities generally experienced larger gaps in employment and earnings than women with disabilities, reducing the gender gaps among people with disabilities.

Gender formation not only disproportionately affects women with disability in the labour market outcomes, but also in the health and social outcomes. The results of Casey and Ballantyne (2017) show that gender formation amplified the accumulation of health disadvantage over time. Women with permanent impairments were more likely to report chronic conditions before and after their injury, compared to men with permanent impairment and to the general population. In particular, the odds of reporting a diagnosis of depression for women with permanent impairments was more than six times higher than for women without disability (Casey and Ballantyne, 2017: 491). Shilling argues that working-class women who face the 'double-burden' of waged and unwaged labour have a high risk of illness because they tend to sacrifice their health in order to fulfil both financial and family responsibilities. The argument that women from the injured worker sample faced the 'double-burden' are partially supported because injured workers from the pre-

injury period were more likely to be under-educated, over-represented in blue collar occupations, and were less likely to be ever single than the general population (Casey and Ballantyne, 2017: 488-489).

In addition, the results of Scott-Marshall et al. (2013) show the effect of gendered processes in bodily orientations and social support. The results suggest an unequal distribution of social capital between men and women with disability. While women with impairments were associated with decreased likelihood of marital formation, such association was not found in men with impairments. Instead, post-injury personal income was associated with the likelihood of marital formation for impaired men. In this sense, the female body tends to be recognized symbolically through physical attractiveness, whereas the male body tends to be recognized symbolically through earning capacity when seeking marital formation. For this reason, the disabled female body is particularly vulnerable to stigmatization compared to the disabled male body. As Scott-Marshall et al. show, women's levels of impairment had a negative association with the likelihood of marital formation. The lack of informal support for women with disability may be a possible explanation of why women with disability tend to have worse health trajectory than men with disability.

The study of gender and disability suggest that women with disability have different embodied experience compared to men with disability because women tend to access and generate less economic, cultural, and social capital than men. However, Bourdieu did not discuss the impacts of gender in his theory of capital. Indeed, Shilling (1993: 147) points out that important cross-class factors such as gender and race cannot be easily explained by Bourdieu's analysis of class and capital. Shilling argues that Bourdieu's theory tends to underestimate the effect of gendered and racialized processes in bodily orientations, and it is relatively weak in analyzing the

different forms of capital associated with gender and ethnicity. The criticism of Shilling can be applied to Bourdieu's analysis of disability (Edwards and Imrie, 2003; Townsend et al., 2018; Allen, 2004; Newman et al., 2017; Mithen et al., 2015). The fact that the scholars who applied Bourdieu's theory did not include gender in their analyses shows the gap in Bourdieu's theory. Thus, I aim to further expand Bourdieu's concept of capital beyond class-based analysis, looking at the gendered distribution of capital.

Novel application of Bourdieu's theory to understanding outcomes of work-related disability

In the previous sections, I identified the gaps in the empirical literature of disability and permanent impairments. Specifically, the existing literature is under theorized, and the quantitative study has been neglected in research on the relationship between different forms of social support and the outcomes of disability. I showed that Bourdieu's theory is a useful framework in bridging the conceptual gaps in the existing literature. Furthermore, I demonstrated that Bourdieu's theory can be applied to quantitative analyses of social support, using the study of Mithen et al. (2015) and Paccoud et al. (2020). In this section, I discuss how to apply Bourdieu's theory to empirical testing of the outcomes of permanent impairments.

I argue that the embodied experience of injured workers is grounded in material reality where their personal characteristics and resources would be understood as forms of capital. This approach enables me to derive and test specific predictions based on the possession of different forms of capital. Specifically, workers' personal and household income, ownership of property, and paid employment can be considered as economic capital. Educational qualification, occupational skills, and health can be understood as embodied cultural capital. As Mithen et al. (2015) and Paccoud et al. (2020) show, social capital can be measured in different forms of social

networks. Friends and family, for example, are important forms of informal social support for injured workers. Social support would also come from formal networks and public institutions. For instance, the workplace does not only provide workers with economic security, but it can also provide workers with employment benefits and work accommodation that would allow workers to re-engage with their occupation, protect them from harm or minimize the harm after injury. Other forms of formal social support also include employment insurance, disability pensions, mandated supports (income replacement and health care) from worker compensation boards to name a few. Table 2.1, below, summarizes a list of potential variables that proxy injured workers' forms of capital.

Table 2. 1: potential variables as proxy for injured workers' forms of capital

Economic capital	Employment: employment status
	Income: personal income, household income, and disposable income
	Financial resources: ownership of property, assets, and debts
Cultural capital	Education: levels of education
	Occupational skills: occupational classification
	Health: frequency of healthcare utilisation, health conditions, levels of impairments
Social capital	Informal social support: perceived availability of functional support (MOS-SS), marital status and existence of informal networks
	Formal social support: employment benefits, accommodation and compensation from workplace and public institutions
	Stigma or 'negative support': sources of stigma

In addition, Bourdieu's theory informs specific statistical models for empirical testing. The concept of capital accumulation suggests that both material and immaterial forms of capital tend to persist and accumulate over time, and they have the potential to produce profits and to reproduce themselves. That is to say, accumulated capital or the lack of it may produce accumulated advantages or disadvantages over time. This approach not only helps to account for and explain the different outcomes of permanent impairment. It also enables me to select specific statistical models (hierarchical regression) based on the temporal order of capital accumulation, including individual characteristics, pre-injury capital, and post-injury capital. Individual characteristics such as gender and age are exogenous variables that are in the first order of entry. Although gender and age are often treated as control variables in the studies of disability and permanent impairments, the previous literature suggests that gender and age are associated with different distribution and accumulation of capital. The analysis of gender and age would help to expand Bourdieu's concept of capital beyond class-based analysis. Pre-injury capital is the second order of entry, including different forms of capital that are acquired before the workplace injury that resulted in permanent impairments. As the previous literature shows, pre-existing economic, cultural and social capital are important predictors of individuals' economic and health trajectory. This order of entry highlights the importance of pre-existing capital, and it would test the impacts of accumulated advantages or disadvantages over time. Post-injury capital includes different forms of capital which are acquired after the permanent injury. This order of entry tests the unique associations of post-injury capital with the outcomes of disability beyond that already explained by other predictors (details will be explained in the method chapter).

Research Questions

The present study aims to test Bourdieu's theory of capital by analyzing a sample of 494 Ontarian workers with permanent impairments. I am interested in whether and how different forms of economic, cultural, social capital accumulated through injured workers' disability trajectory affect their wealth and health after impairments. I include three bivariate outcome variables as indictors of economic and health outcomes of permanent impairments: post-injury employment status, post-injury income recovery and perceived health change. Because all three outcome variables are bivariate by design, three structurally similar models of hierarchical logistic regression are used to test the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, and the binary outcomes of permanent impairment. Specifically, three blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order.

The main questions guiding this research are:

(1) to what extent do pre-existing characteristics and pre-injury forms of capital contribute to the variance explained in three outcomes of permanent impairments?
(2) What is the influence of social capital in explaining the outcomes of permanent impairments beyond that already explained by economic and cultural capital?

Hypotheses:

(i) According to Bourdieu's theory and the previous literature, I expect pre-existing characteristics such as gender and pre-injury economic and cultural of capital such as pre-injury employment, income, and education to be the largest contributors of explaining the economic and health outcomes.

(ii) I also expect post-injury social capital such as informal social support, institutional support and stigma to be significant predictors of injured workers' economic and health outcomes, moderating the negative effect of disability such as post-injury health conditions.

(iii) In terms of individual predictors, I expect that having pre-injury employment, higher pre-injury income, higher level of education, fewer pre-injury health conditions, higher level of informal social support are associated with post-injury employment, positive income recovery and health change.

(iv) I expect to document that age is inversely associated with post-injury employment and income recovery.

(v) I also expect the data to show that being female, having many post-injury health conditions, having higher level of institutional support, and having many sources of stigma are associated with post-injury unemployment, negative income recovery and health change.

Chapter 3: Methods

Study procedures

My analysis is based on a cross-sectional survey of 494 Ontario injured workers with permanent impairments. The data comes from the Research Action Alliance on the Consequences of Work Injury (RAACWI) Health and Health Care Utilization Survey (2008-2009). Details of recruitment screening and sample selection for this SSHRC-funded survey are described in O'Hagan et al. (2012) and Ballantyne et al. (2016) and outlined here. Eligibility for the RAACWI survey was limited to first-time/single time and English-fluent claimants of the Ontario Workplace Safety and Insurance Board (WSIB) who were between 25 and 55 years old with workplace injuries that occurred between 2002 and 2007 and receiving a non-economic loss award (NEL) certifying permanent impairment between 2005 and 2007. The study sample screening was established by the WSIB in a two-stage process: an initial sampling frame of 4,466 potentially eligible participants identified by administrative files, then verbal confirmation of eligibility via telephone contact. The WSIB produced a sampling frame of 2,004 eligible claimants, 1,503 of whom consented to be included on a recruitment roster. The WSIB forwarded a randomly ordered contact list to RAACWI investigators. Telephone recruitment of a sample of 662 injured workers who consented to participate was undertaken. Data collection via telephone interview was completed for 494 of 662 recruited participants by the York University Institute for Social Research between 2008 and 2009. (see Appendix 1 for Recruitment procedure and participant flow).

Sample characteristics

There were 195 (39.5%) male and 299 (60.5%) female participants. The survey participants were between 26 and 58 years old. The mean age (sd) was 46 (8.1). About 60% of the respondents were 45 years old and older. Fifty-one percent reported having high school education or less. About 49%

reported they lived in a large city in Ontario with more than 100,000 people. About 20% reported they were in a white-collar occupation before a workplace incident; about 37% reported in a pink-collar job; about 41% reported in a blue-collar job[3]. Forty percent of the respondents reported that over-exertion was the main cause of their workplace injury; 52% reported that they sustained a non-visible injury. Forty-five percent reported having multiple injuries following a workplace incident; 70% reported having a chronic pain disorder, and 52% reported a repetitive strain injury following the workplace incident. The average time from the injury date to the date of RAACWI data collection was about 52 months[4].

Measures

The RAACWI survey includes a series of questions regarding injured workers' self-reported socio-demographic status, injury details, health, healthcare utilization, and education/work and economic status. The survey content was a result of collaboration among university researchers and community members representing the injured worker community in Ontario. The RAACWI survey was purposively designed to replicate many questions from existing national health and labour force surveys for comparison purposes.[5] For instance, many questions regarding participants' chronic health conditions (see examples in the 'health burden' variables presented in this chapter) were asked identically in both the RAACWI survey and the Canadian Community Health Survey. In addition, the RAACWI survey also used the Centre for Epidemiological Studies Depression Scale (CES-D) to measure participants' depressive symptoms. Similarly, the survey

[3] National Occupational Classification was used to identify occupational class.

[4] The passage of time was necessary to establish which workers were assessed as having a permanent impairment (Ballantyne et al., 2016: 179).

[5] These surveys include the National Population Health Survey, the Canadian Community Health Survey, the Participation and Activity Limitation Survey, the Labour Force Survey, the Survey of Labour and Income Dynamics, and the McMaster Employment Strain Survey.

used the 19 items of the Medical Outcomes Study Social Support Scale (MOS-SS) to measure workers' perceived functional support (see the 'informal social support' variable for details).

While the RAACWI survey is cross-sectional, many questions were designed to measure participants' economic, health and social conditions over time which allows me to measure the relationship between capital accumulation and the disability trajectory. Drawing on Bourdieu's theory, I include various demographic characteristics of injured workers from the RAACWI dataset which have been theorized to be forms of capital which may influence the consequences of permanent impairments. Specifically, economic capital includes personal income and employment status; cultural capital includes education attainment and health burden; social capital includes informal social support, institutional support and perceived stigma (a novel measure I constructed to capture the absence of or 'negative' social support). Due to the findings of previous research, I also include age and gender in the analysis (Taylor, 2011; O'Hagan et al., 2012; Kavanagh et al., 2015; Mithen et al., 2015; Scott et al., 2018; Scott-Marshall et al., 2013; Pettinicchio and Maroto, 2017). I am particularly interested in whether different forms of capital accumulated through the disability trajectory affect workers' post-injury employment status, income recovery and perceived health change. Table 3.1, below, shows the distribution of all key variables in this research, and the descriptions that follow explain the relationship of derived variables to original variables emerging from specific questions in the RAACWI survey.

Table 3. 1: Variables included in the analyses

		%	(N)/n	Mean (SD)	Median
Dependent variables					
Post-injury employment status	Not working	45%	(222)		
	Employed (including on leave)	55%	(272)		
Income recovery	Negative income recovery	59%	(285)		
	Same or positive income recovery	41%	(195)		
Perceived health change	All other self-rated health	50%	(244)		
	Much worse self-rated health	50%	(244)		
Independent variables					
Individual characteristics					
Gender	Male	39.5%	(195)		
	Female	60.5%	(299)		
Age	Younger group (26-43)	36%	(176)		
	Middle group (44-50)	33%	(162)		
	Older group (51-58)	31%	(155)		
Pre-injury capital					
Education	Less than high school	10%	(50)		
	High school and incomplete post-secondary	41%	(200)		
	Trade, college, or university certificate	37%	(180)		
	Undergraduate/Graduate degree	12%	(61)		
Pre-injury health burden	(Number of conditions)		494	2.2(2.3)	2
Pre-injury personal income	Low-income group ($1,000-$26,000)	33%	(159)		
	Medium-income group ($27,000-$44,000)	31%	(150)		
	High-income group ($45,000-$140,000)	36%	(175)		
Post-injury capital					
Informal social support	(MOS total range19-95)		475	72(18)	74
Institutional support	(Number of supports)		494	1.1(0.92)	1
Perceived stigma	No perceived stigma	35%	(175)		
	One to four sources	31%	(155)		
	Five to twelve sources	34%	(164)		
Post-injury health burden	(Number of conditions)		494	7(4.2)	7

Dependent variables

I select variables from the RAACWI dataset that best capture injured workers' different forms of capital at different points in time through their disability trajectory. In some cases, as described in this chapter, original variables are modified to make them suitable for the analyses. Among different variables in the dataset, I include three bivariate variables 'post-injury employment status', 'income recovery' and 'perceived health change' to represent the social, economic and health outcomes of workers with permanent impairments. While both employment status and income are important indicators of economic consequences of disability, employment status is also an indicator of social inclusion (Edwards and Imrie, 2003; Emerson et al., 2014; Polidano and Vu, 2015; Pettinicchio and Maroto, 2017) and mental health (Kirsh et al., 2012; Kavanagh et al., 2015). For this reason, post-injury employment is treated as a dependent variable in the first model, but it is treated as a predictor variable in the second and third models where income recovery and perceived health change are dependent variables.

The variable 'post-injury employment status' captured respondents' employment status about 52 months after their injury.[6] The RAACWI data measured participants' post-injury employment status with a series of questions such as hours of employment, quality of employment, employment benefits, experience and periods of unemployment. Among these different measures, I used an original four-category post-injury employment status variable because it was an accurate representation of injured workers' post-injury employment status. The specific question and responses related to the distribution of post-injury employment status is shown in the Table 3.2 below:

[6] The average time from the injury date to the date of RAACWI data collection was about 52 months.

Table 3. 2: frequency table of post-injury employment status

Post-injury employment status:	*n*	*%*
Currently employed and working	252	51
Currently unemployed/not working but not retired	189	38.3
Retired	11	2.2
R volunteers: Employed but currently on paid leave	20	4
Status uncertain/respondent refused to respond	22	4.5

Note: Participants were asked "What is your current employment status? Are you currently employed and working, currently unemployed/not working but not retired, or retired?" There were 472 valid responses. About 45% (n = 222) respondents who were not working after their injury, and 55% (n = 272) who were employed after the injury.

I recoded this original variable into a dichotomous variable, reducing the four categories into two. My interest was in determining whether post-injury employment (employed/not employed) predicted income recovery or perceived health change. The other categories such as paid leave or retired were less relevant to my analysis. For this reason, the category 'employed but on paid leave' was combined with 'employed and working' to construct the 'employed' category. Similarly, the 'retired' category was combined with 'unemployed/not working'. Uncertain and refused responses were also merged with 'unemployed/not working' category to construct the 'not working' category.[7] For these reasons, a dichotomous outcome variable 'post-injury employment status' was constructed: 45% (222) of respondents reported they were 'not working' (served as the reference category for this dummy variable), and 55% (272) reported they were 'employed.'

Participants were asked to report both their pre-injury and post-injury personal incomes. Details about the specific questions used to capture pre-injury personal income and post-injury

[7] This enables comparison of those employed at the time of being interviewed for the RAACWI survey to those in all other categories of 'not working'.

personal income appear in Appendix 2. Using these original variables, a derived variable 'income change' was created. Income change is a measure of the change in personal income from pre-injury to post-injury, for each respondent, by subtracting the reported pre-injury personal income ($\overline{x}$ = $39,000; sd = 21,000) from the reported post-injury personal income ($\overline{x}$ = $32,000; sd = 24,000) from the RAACWI dataset. The mean (sd) income change was -$7,200 (21,000) with -0.67 skewness and 3.4 kurtosis. The range of income change was from -$104,000 to +$64,000. Because the variable is heavily skewed, the continuous variable of income change was recoded into a dichotomous variable 'income recovery' where the negative income recovery from pre- to post-injury period is coded as 0 (served as the reference category for this dummy variable), and the same or positive income recovery is coded as 1. About 59% of respondents experienced an income loss from pre-injury period to post-injury, that is, a 'negative income recovery', whereas 41% reported they had the same income or experienced a gain in personal income from pre- to post-injury, or a 'positive income recovery'.

The derived variable 'perceived health change' measures injured workers' reported change in health from the pre-injury period to the post-injury period based on an original survey question. As we recall, Bourdieu (1986) argued that capital can be embodied in individuals. In particular, embodied cultural capital such as occupational skills or accumulated knowledge are developed through bodily participation in workplace, training, or school over a long period of time. Because embodied cultural capital is inseparable from one's body, accumulation and access to embodied cultural capital depends on individual's health condition. As Shilling (1993: 125) suggests, the body is more than labour power, but it is a possessor of various resources. Work-related impairments which cause physical and/or psychological harm to workers' body not only interrupt workers' economic accumulation, but they may have long-lasting impacts on their capacity to

access embodied cultural capital. For instance, previous findings suggest that many injured workers not only continue to suffer from chronic pain long after a workplace incident, but they may also experience mental distress because their bodily capacity and work legitimacy are often questioned and challenged (Tarasuk and Eakin, 1995; Eakin et al., 2003; Beardwood et al., 2005; Kirsh et al., 2012).

The RAACWI data set measured participants' physical and mental health in different dimensions, including self-rated health, various diagnosed and self-reported health conditions, the CES-D scale as a measure of mental health, and sources of stress. Among these different measures, I used the question of self-rated current health (at the time of interview in 2008/2009) compared to the day before accident to capture injured workers' experience of health change from pre-injury period to post-injury period. The specific question and responses related to the distribution of self-rated health is shown in the Table 3.3 below:

Table 3. 3: frequency of five-category self-rated health

Five-category perceived health change:	*n*	*%*
Much better than before	16	3.3
Somewhat better	19	3.9
About the same	75	15.4
Somewhat worse	134	27.5
Much worse than before	244	50

Note: Participants were asked "What about your health now compared to the day before the workplace accident. Would you say your health is: much better than the day before your workplace accident, somewhat better, about the same, somewhat worse, or much worse now than the day before your workplace accident?" There were 488 valid responses.

The derived outcome variable 'perceived health change' was created by reducing the 5-category responses into a dichotomous variable where 'somewhat worse', 'about the same', 'somewhat better' or 'much better' self-rated health were coded as 0 (served as the reference category for this dummy variable), and 'much worse' self-rated health was coded as 1. I reduce the five-category variable into a two-category variable not only to construct a more even distribution of the responses, but also to highlight the 'accumulated disadvantages' of permanent impairments. Given the fact that the RAACWI survey took place an average of 52 months after the workplace injury and the average age of the injured workers were older, I expect respondents to report some health deterioration because of aging. More importantly, previous research suggests that aging with a disability accelerates health deterioration (Taylor, 2011; Casey and Ballantyne, 2017). The 'much worse' self-rated health was selected as a category of interest because it would likely provide a telling indication of the effect of 'accumulated disadvantages' of permanent impairment. Thus, a dichotomous outcome variable 'perceived health change' was constructed where those reported much worse health were compared to all other respondents (It also reduces the potential effects of recall bias). The distribution of cases for this variable was equally divided across the two categories (fifty percent or 244 participants fell into each category).

Independent variables

The independent predictors can be organized into three categories according to temporal order: a) exogenous, individual characteristics; b) pre-injury forms of capital; c) post-injury forms of capital.

Individual characteristics:

Although gender and age are often treated as control variables in the studies of disability and permanent impairments, the previous literature review suggests that age and gender are associated with different distribution and accumulation of capital. For example, some findings suggest that

older age is associated with positive mental health outcomes (Kavanagh et al., 2015; O'Hagan et al., 2012). On the other hand, other findings suggest that older individuals are more likely to experience disability onset (Taylor, 2011), and they are more likely to be unemployed after disability onset (Scott et al., 2018). Research on gender and disability suggests that women with disability tend to generate less economic, health, and social capital than men with disability (Pettinicchio and Maroto, 2017; O'Hagan et al., 2012; Kavanagh et al., 2015; Casey and Ballantyne, 2017; Scott-Marshall et al., 2013). I include age and gender as independent predictors because they are exogenous variables which might affect the distribution and accumulation of pre-injury and post-injury capital (Analytical models separating gender and age categories were considered, but not included in the current analysis because of inadequate sample size). To avoid non-linearity in the analysis, I constructed a dummy variable with three age categories: about 36% (176) participants were coded into the younger-age group which was between 26 to 43 years old (served as the reference category for this dummy variable); about 33% (162) were coded into the middle-age group which was between 44 to 50 years old; about 31% (155) were coded into the older-age group which was between 51 to 58 years old.

Pre-injury forms of capital:

Education is an important form of cultural capital. As Bourdieu (1986) argues, individuals must personally invest time and energy to accumulate cultural capital. Educational qualification, as a form of institutionalized cultural capital, is not only a measure of embodied cultural capital, but it is an indicator of other forms of capital. As the previous studies consistently suggest, education is associated with economic outcomes such as income and employment (Cater et al., 2013; Polidano and Vu, 2015). Similarly, education is also associated with health outcomes such as the likelihood of disability onset and mental health (Jenkins and Rigg, 2004; Taylor, 2011; O'Hagan et al., 2012).

The RAACWI data set measured injured workers' educational attainment in ten categories: participants were asked "*What is the highest level of education you have attained?*"[8] I created a derived variable 'education', reducing ten categories into a four-categories ('less than high school'; 'high school and incomplete post-secondary'; 'trade, college, or university certificate'; 'undergraduate or graduate degree'). My interest was in determining whether educational qualification predicted post-injury employment status, income recovery or perceived health change. The categories such as incomplete schooling and training were less relevant to my analysis because they might not be officially recognized as "cultural competence" (Bourdieu, 1986). For this reason, the incomplete training categories such as 'some trade school but no diploma', 'some community college but no diploma/certificate', and 'some university but no degree' were combined in a 'high school diploma and incomplete post-secondary' category. In addition, the categories 'trade certificate', 'diploma from community college', and 'university certificate below bachelor' were combined into one category because these certificates require similar time investment to complete. Undergraduate and graduate degree which require more time investment than other education qualifications were combined into one category because of uneven distribution. As a result, a dummy variable with four categories was constructed for 'education': about 10% (50) reported having less than high school education (reference category for this dummy variable), and 41% (200) reported having some or completing high school. About 37% (180) reported that they have trade, college or university certificate, and about 12% (61) reported that they have undergraduate or graduate degree.

[8] Survey response categories: 'less than high school'; 'high school graduate'; 'some trade school but no diploma'; 'trade certificate or vocational school diploma or apprenticeship training'; 'some community college but no diploma/certificate'; 'certificate or diploma from a community college, CEGEP, school of nursing, etc'; 'some university but no degree'; 'university certificate below bachelor's degree'; 'bachelor's degree'; 'university degree or certificate above bachelor's degree'; 'don't know'; 'refused'.

Similar to knowledge and skills, health is another important form of embodied cultural capital. Shilling (1993) argues that health is crucial to the conversion of economic, cultural, social and symbolic capital through bodily participation in work, leisure and other social fields. On the other hand, individuals with high health burden may find the bodily conversion of capital difficult. The RAACWI survey included a list of 48 questions to measure participants' health conditions and their timing. A total of 42 diagnosed conditions and reported symptoms were covered within the original list of 48 questions (six overlapping questions were asked in both diagnosed conditions and symptoms: depression, back problems, digestive problems, nerve pain, musculo-skeletal pain, and substance abuse). As an example, participants were asked whether have diagnosed depression or symptoms of depression: "*Have you been diagnosed with depression by a health professional?*" (Response categories: 'yes'; 'no'; 'don't know'; 'refused'). For affirmative responses, participants were asked whether the diagnosis was made (or the symptom appeared) before or after their injury: "*Did it start before or after your first workplace accident?*" (Response categories: 'before'; 'after'; 'don't know'; 'refused'). In this sense, the absence of or low numbers of reported health conditions represents low health burden, implying a higher volume of embodied cultural capital (see Appendix 3 for more detailed examples).

To measure participants' 'health burden', 48 binary variables were constructed from 48 questions of health conditions which a score of 1 was assigned to each reported 'yes' of health condition, and a score 0 was assigned to participants who reported 'no' to each condition. If a participant reported affirmative to the overlapping diagnosed conditions and symptoms (such as both diagnosed depression and symptom of depression), it would only count as one condition to the final score of heath burden variable. Then, a continuous variable 'pre-injury health burden' was constructed as a sum of a maximum of 42 diagnoses conditions and symptoms reported by

participants as present before their workplace injury. The number of observed pre-injury conditions ranged from 0 to 11. The mean (sd) was 2.2 (2.3). Low scores of 'pre-injury health burden' indicate high pre-injury embodied cultural capital.

In addition, I included injured workers' pre-injury personal income as an indicator of economic capital and as a key predictor of the three dependent variables. As Bourdieu (1986) argues, economic capital can be converted into other forms of capital by spending time and energy. Indeed, previous research suggests that having pre-existing economic capital such as income and employment[9] are positively associated with post-injury economic and health outcomes (Jenkins and Rigg, 2004; Scott et al., 2018; Taylor, 2011; O'Hagan et al., 2012; Kavanagh et al., 2015). The RAACWI dataset measured participants' pre-injury personal income, using two main questions (see Appendix 2 for details on the pre-injury income questions). Due to non-linear income distribution, I constructed a dummy variable 'pre-injury personal income' with three categories: about 33% (159) participants were coded into the low-income group which earned between $1,000 and $26,000 per year (served as the reference category for this dummy variable); about 31% (150) were coded into the medium-income group which earned between $27,000 and $44,000 per year; and about 36% (175) were coded into the high-income group which earned between $45,000 and $140,000 per year in the pre-injury period.

Post-injury forms of capital:

Social capital is a fundamental form of capital for Bourdieu. As we established in the literature review, the measurement of perceived functional support and the measurement of social networks are useful tools in evaluating social capital and social support for individuals with disability. Some

[9] Pre-injury employment was not included as a predictor because all participants were claimants of work-related impairments who were all employed before their injury.

studies suggest that individuals may draw different types of functional support and resources from informal network of family and friends in order to manage their body and disability (Emerson et al., 2014; Kosny et al., 2018). Similarly, the existence and quality of informal and formal/institutional network suggests that individuals may use different networks as resources and support (Mithen et al., 2015).

The RAACWI dataset includes a measure of post-injury perceived informal support, based on the 19 items of the Medical Outcomes Study Social Support Scale (MOS-SS) (Sherbourne and Stewart, 1991). The MOS-SS has good internal consistency[10], and it is widely used in measuring social support of patients with chronic health conditions (Sherbourne and Stewart, 1991; Khazaee-Pool et al, 2018; Yu et al., 2015). The MOS-SS is an indicator of informal network of family and friends, measuring five functional components of informal support injured workers perceived after their injury: emotional support, informational support, tangible (also known as instrumental) support, affectionate support and positive social interaction (see Appendix 4 for the original MOS-SS survey question scale and sub-scales). For each item, a score of 1 to 5 is assigned to the availability of support. For instance, a score of 1 is assigned to responses of 'none of the time,' and a score of 5 is assigned to responses of 'all of the time.' Thus, the possible range of scores on the MOS is from 19 to 95, where high scores indicate high levels of social support.

As shown in Table 2.1, the continuous variable 'informal social support' is a sum of total scores of the 19-item MOS social support survey questions included in the RAACWI survey. The valid response rate for all 19 items was 91.5%. An additional 4.7% received imputed values for

[10] The Cronbach's Alpha for the 19-item responses was 0.965.

cases with a single missing item in the four dimensions.[11] This resulted in a total of 96.2% (n = 475) valid response rates for the informal support variable. The observed range of scores for the sample is from 20 to 95. The mean score (sd) was 72 (18).

The presence of formal/institutional support is another way to measure injured workers' social support. The RAACWI dataset measured injured workers' post-injury sources of income, using 14 binary questions such as whether participant had income from wages, self-employment, employment insurance, workers' compensation, insurance plans, social assistance, and retirement benefits in 2007. For example, participants were asked "*Did you get income from employment insurance in 2007?*" (Response categories: 'yes'; 'no'; 'don't know'; 'refused') (see Appendix 5 for the remaining questions in this series and the summary table).

Among these sources of income, ten sources reflect the different types of institutional support provided by public institutions: employment insurance, workers' compensation, CPP retirement benefits, CPP disability pension from Canada, private or employer disability insurance plan/motor vehicle accident insurance, veteran disability pension plan, provincial or municipal social assistance or welfare, child tax benefit, private pension plan, and other income (e.g. federal or provincial assistance). Ten binary variables were constructed from these ten sources of income which a score of 1 was assigned to each reported 'yes' of income source, and a score 0 was assigned to participants who reported 'no' to each source or who reported uncertainty about this source. The interval variable, 'institutional support', was constructed by summing up the total number of binary sources of income, where the higher scores indicate higher institutional support. The observed range of institutional support was from 0 to 5, meaning some participants reported having no

[11] The missing response was manually added by the RAACWI survey researchers, using a modal replacement value for the sub-variable series that MOS question belonged to when all other items were consistently answered (i.e. all were the same score).

support from public institutions, while some reported having five different sources of institutional support. About 26% (126) of respondents reported no institutional support, and about 47% (234) had one source of support, and about 27% (134) had two to five sources of support. It is important to note that while the existence of institutional support (yes/no) was measured, its contribution (the quality of support) to the respondent's total personal or household income could not be calculated because the dollar value amount of support from each source was not measured.

If social capital is understood as a resource to support workers with permanent impairments, stigma can be understood as symbolic violence and a form of negative support which limits workers' social integration and participation. According to Bourdieu (2013: 296), symbolic capital is a form of recognition or symbolic power which derives from economic, cultural and social capital. On one hand, being wealthy or having high social status may lead to positive symbolic differences which call for recognition, support, and access to resources and opportunities. On the other hand, being poor or having low social status may result in stigmatization which may lead to lack of support and denial of resources and opportunities. As previous research suggests, negative economic, cultural and social consequences of disability may reinforce stigmatization and symbolic violence (Edwards and Imrie, 2003; Mithen et al., 2015; Scott-Marshall et al., 2013). For example, stigma may manifest through the repetition and reinforcement of negative stereotypes in the workplace and other social settings, amplifying the stigmatizing effect of disability (Tarasuk and Eakin, 1995; Eakin et al., 2003; Lippel, 2003; Beardwood et al., 2005; Kirsh et al., 2012).

I constructed a derived variable 'perceived stigma' as a measure of variations in (absence or presence of) social support experienced by injured workers in the post-injury period. Specifically, the RAACWI data captured perceived stigma with 13 binary questions (each having 'yes' or 'no' response categories). A main question measures perceived stigma: "*Have you ever*

felt that you were stigmatized because you are an injured worker?" (Response categories: 'yes'; 'no'; 'don't know'; 'refused'). For those who reported perceived stigma (n = 325), a series of subsequent 12 questions were asked to capture participants' experience of stigma from different sources (i.e., respondents were asked: "*Did you feel this from: a) a family member*; b) *a friend; c) an acquaintance; d) a neighbour, etc."*).

Twelve binary variables were constructed from these twelve sources of stigma to which a score of 1 was assigned to each affirmed source of stigma, and a score 0 was assigned when participants reported 'no' to each source or who reported uncertainty about stigma or any of the sources. The derived interval variable 'stigma scores' was constructed by summing up the 12 binary variables of stigma sources with the general question about the experience of stigma. The higher scores indicate higher perceived sources of stigma. Due to heavily skewed distribution, I constructed a dummy variable 'perceived stigma' with three categories to reflect the variations of absence or presence of social support: about 35% (175) of injured workers who reported no perceived stigma (served as the reference category for this dummy variable); about 31% (155) reported that they experienced one to four sources of stigma; and 34% (164) reported they experienced five to twelve sources of stigma. See Appendix 6 for details of this derived variable.

Finally, the variable 'post-injury health burden' measured the numbers of post-injury diagnoses or health conditions reported to have emerged after the injury. Similar to 'pre-injury health burden,' the construction of 'post-injury health burden' was based on the RAACWI participants' responses to the 48 questions of diagnosed conditions and symptoms. For instance, participants were asked whether they have diagnosed diabetes: "*Have you been diagnosed with diabetes by a health professional?*" (Response categories: 'yes'; 'no'; 'don't know'; 'refused'). For affirmative responses, participants were asked whether the diagnosis was made before or after

their injury. The continuous variable 'post-injury health burden' is a sum of a maximum of 42 diagnosed conditions and symptoms reported to have emerged after the workplace injury. The mean post-injury health burden (sd) was 7 (4.2). The number of conditions ranged from 0 to 22 (see Appendix 3 for details). Low scores of 'post-injury health burden' indicate high post-injury embodied cultural capital. Note that workers' severity of impairments was considered as a part of health burden. It was not included in the analyses because of incomplete data (See Appendix 8 for details).

Statistical design

I conduct initial bivariate analyses for each of the three outcome variables in order to understand predictors or risk factors for the outcome variables. The distribution of independent variables is divided into two groups based on the bivariate outcomes. I subsequently use hierarchical regression to account for the temporal order and the complex effects of accumulated capital which injured workers may acquire at different points in time over their disability trajectory. Hierarchical regression is a theory driven method[12] that is typically used to test theoretically based hypotheses (Cohen, 2001; Radmacher & Martin, 2001; Petrocelli, 2003; Shaffer et al., 2017). The order of entry is used to test the theoretical assumptions by adding predictor variables into the analysis sequentially. The relative importance of a predictor is based on whether it explains variance in a dependent variable (prediction of criterion) beyond that already explained by other predictors (Petrocelli, 2003: 10).

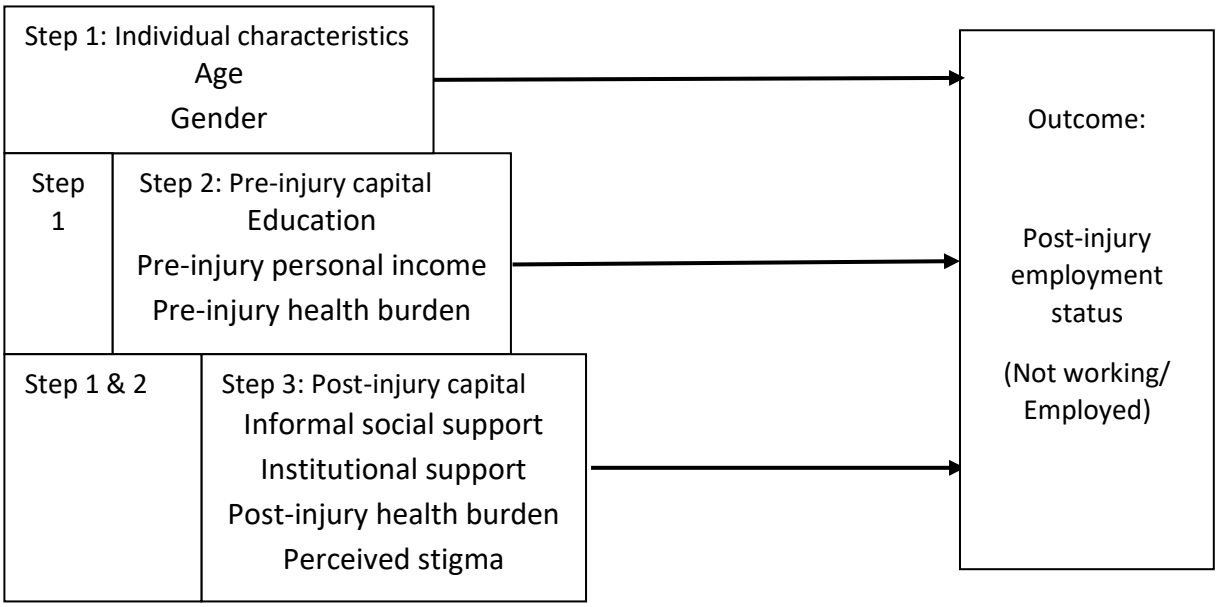
[12] It is important to note that hierarchical regression is different from hierarchical modeling (aka hierarchical regression model). Hierarchical modeling is a special case of generalized linear mixed models that is commonly used when the data are in a nested structure (Wong & Mason, 1985; Gatsonis et al., 1995; Mohammed et al. 2016; Houpt & Bittner, 2018; Lin et al., 2019; Erin et al. 2020). A Bayesian hierarchical logistic regression model was considered as a possible model design for this study because it is also conceptually compatible with Bourdieu's concept of capital accumulation. However, a Bayesian approach works the best on a longitudinal or time-series dataset because its accuracy heavily depends on informative priors.

Hierarchical regression is conceptually compatible with Bourdieu's theory of capital because I can use the order of entry to test the hypotheses of accumulated advantages and disadvantages. For example, I can determine the unique associations of post-injury capital based on its prediction of criterion beyond that already explained by other predictors (such as individual characteristics and pre-injury capital). In addition, the organization of independent predictors into three blocks of entry (individual characteristics, pre-injury capital, and post-injury capital) respects the principle of "causal priority" in hierarchical regression (Cohen & Cohen, 1983: 120-123). Although I am interested to find out the unique associations of social capital to the three binary outcomes, I decided to force all variables from post-injury capital into one block of entry instead of entering social capital separately. That is because the complex relationships between the post-injury variables make it difficult to determine the causal priority. For example, a high level of health burden may call for social support, but a lack of social support may also lead to higher levels of health burden.

Because all three outcome variables are bivariate by design, three structurally similar models of hierarchical logistic regression were used to test the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, and the binary outcomes of permanent impairment. Specifically, three blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order. In step 1, unique associations of individual characteristics such as injured workers' age and gender to the binary outcomes were tested. Pre-injury forms of capital such as education, pre-injury personal income, pre-injury health burden were added in step 2, testing unique associations of pre-injury capital with the binary outcomes beyond the effects of individual characteristics. Post-injury capital such as informal social support, institutional support, post-injury health burden, perceived stigma, and

post-injury employment status were added in step 3, testing the unique associations of post-injury capital with the binary outcomes beyond that already explained by other predictors (see Appendix 7 for correlation matrix of the continuous variables). The conceptual models for the three hierarchical regressions are shown below:

Figure 3. 1: conceptual model for the hierarchical regression of post-injury employment status

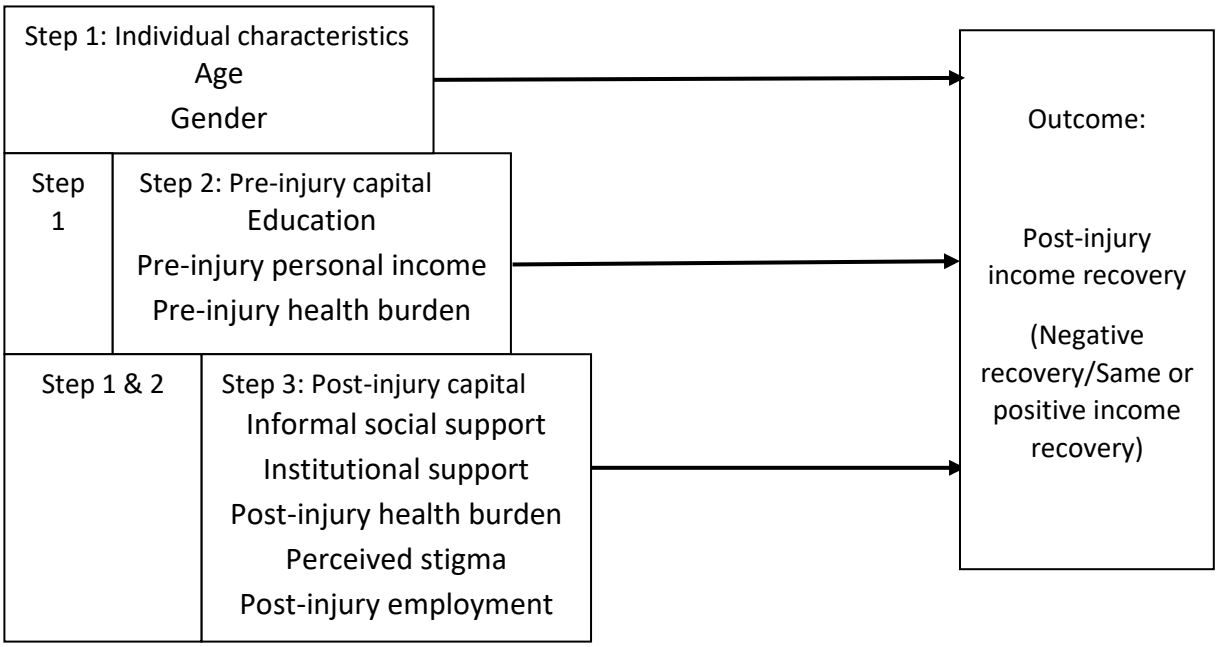


Model 1: Post-injury employment status

The first model tests the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, with post-injury employment status. In step 1, unique associations of individual characteristics to post-injury employment status were tested. Pre-injury capital was added in step 2, testing the combined effect of pre-injury capital and unique association of pre-injury variables with post-injury employment status beyond the effects of individual characteristics. Post-injury capital was added in step 3, testing the combined effect of post-injury

capital and unique association of post-injury variables with post-injury employment status beyond that already explained by other predictors. I hypothesize that pre-injury and post-injury capital (in the step 2 and 3) will each add additional variance accounted for to post-injury employment status beyond that already explained by individual characteristics.

Figure 3. 2: conceptual model for the hierarchical regression of income recovery

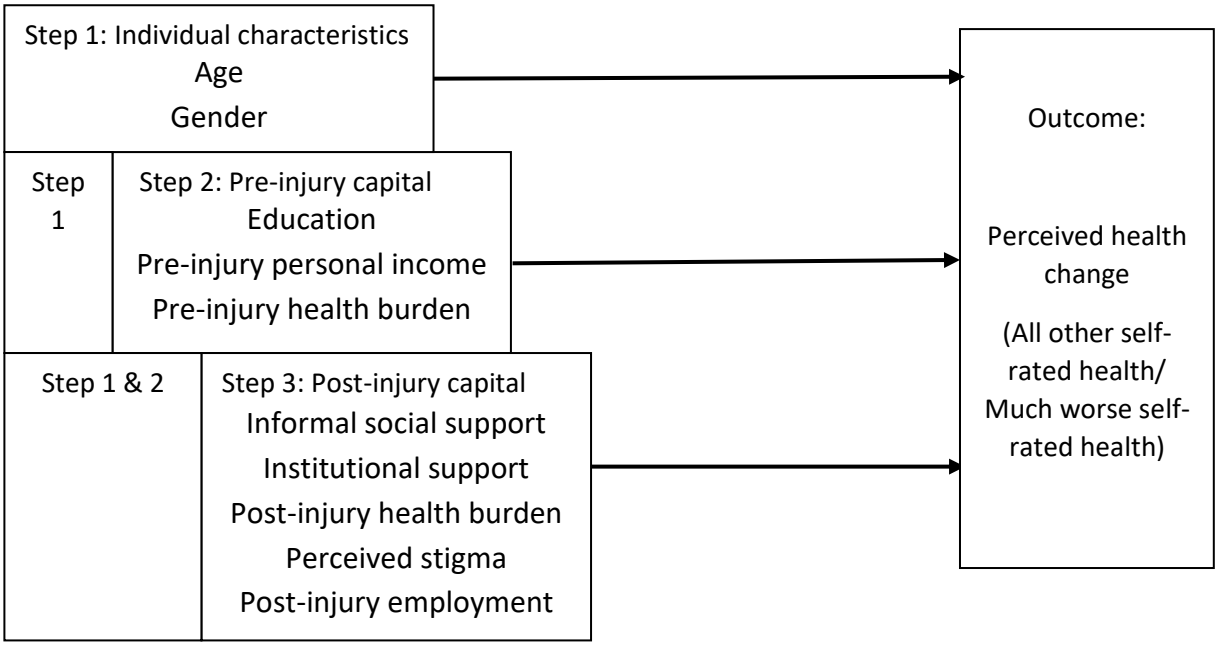


Model 2: Post-injury income recovery

The second model tests the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, with income recovery. In step 1, unique associations of individual characteristics to income recovery were tested. Pre-injury capital was added in step 2, testing the combined effect of pre-injury capital and unique association of pre-injury variables with income recovery beyond the effects of individual characteristics. Post-injury capital was added in step 3, testing the combined effect of post-injury capital and unique associations of post-injury capital with income recovery beyond that already explained by other predictors. I hypothesize that

pre-injury and post-injury capital (in the step 2 and 3) will each add additional variance accounted for to income recovery beyond that already explained by individual characteristics.

Figure 3. 3: conceptual model for the hierarchical regression of perceived health change



Model 3: perceived health change

The third model tests the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, with perceived health change. In step 1, unique associations of individual characteristics to perceived health change were tested. Pre-injury capital was added in step 2, testing the combined effect of pre-injury capital and unique associations of pre-injury variables with perceived health change beyond the effects of individual characteristics. Post-injury capital was added in step 3, testing the combined effect of post-injury capital and the unique associations of post-injury variables with perceived health change beyond that already explained by other predictors. I hypothesize that pre-injury and post-injury capital (in the step 2 and 3) will

each add additional variance accounted for to perceived health change beyond that already explained by individual characteristics.

In terms of statistical analysis, I use McFadden's pseudo R^2 index as an indicator of model fit for the three binary dependent variables. In hierarchical linear regression, R^2 (aka explained variance or coefficient of determination), change in R^2, the corresponding change in *F* and *p* values, are the key statistics of model comparison and selection. In hierarchical logistic regression, on the other hand, model comparison and selection can be tricky because the dependent variables are binary. Unlike the use of explained variance in ordinary least squares (OLS) regression analysis[13], there are many approaches to measure the strength of association between the dependent variable and the set of predictors in logistic regression (McFadden, 1974; McKelvey and Zavoina, 1975; Maddala, 1983; Agresti & Finlay, 1986; Cox & Snell, 1989; Nagelkerke 1991; Veall & Zimmermann, 1994). Statisticians have not come to a general consensus on the use of coefficient of determination in logistic regression because there are mathematical and conceptual differences between R^2 in OLS and logistic regression. For example, Menard (2000: 17) points out that there are several possible residual variation criteria (entropy, squared error, qualitative difference) for binary dependent variables, whereas there are only one reasonable residual variation criteria for continuous dependent variables.

I use McFadden's pseudo R^2 as an indicator of model fit because it is conceptually similar to the use of coefficient of determination in linear regression, and it is relatively independent from the base rate of the binary outcome variable (Menard, 2000: 24). McFadden's R^2 is also known as

[13] According to Efron (1978), ordinary least squares regression analysis has a general consensus on the use of explained variance as an indicator of model fit for quantitative dependent variables because it has only one reasonable residual variation criterion.

"likelihood-ratio index" because it reflects both the criterion being minimized in logistic regression estimation and the variance accounted for by the logistic regression model (Hu et al., 2006; Smith & McKenna, 2013). It is defined as $1 - \frac{LL(Full)}{LL(Null)}$: one minus the ratio of the full-model log-likelihood to the intercept-only log-likelihood (McFadden, 1974). Similar to OLS R^2 values, McFadden's pseudo R^2 varies between zero and one where higher values indicate better model fits. Some criticize McFadden's R^2 that it tends to underestimate the strength of the relationship between the predictors and the dependent variable (Hagle & Mitchell, 1992; Smith & McKenna, 2013). However, Smith and McKenna (2013: 25) acknowledge that the approximation of OLS R^2 values in logistic regression analysis may be misguided because the optimization procedure in logistic regression is often different from OLS. Indeed, McFadden (1977: 35) points out that the interpretation of pseudo R^2 values should not be the approximation of OLS R^2 values, and he suggests that values of 0.2 to 0.4 in McFadden's R^2 represent an excellent fit. In the present study, I compute pseudo R^2 values in each of the steps of entry to the binary outcomes. -2LL and χ^2 statistic are used to calculate the difference in residual deviance between sequential steps and the corresponding test of significant change[14]. A significant increase in pseudo R^2 value between sequential steps may suggest that additional variance is accounted for in the binary outcomes by the block of predictors

Because the selection of pseudo R^2 indices is contested, I also use the Bayesian information criterion (BIC) and Akaike's information criterion (AIC) as alternative guidelines for

[14] In logistic regression, two models are compared by computing the difference in their log-likelihoods, using chi square: χ^2= 2[(log-likelihood for bigger model) – (log-likelihood for smaller model)] (Tabachnick & Fidell, 2001 : 526). Similar chi-square is used to calculate the difference in residual deviance in sequential/hierarchical logistic regression: the difference between -2 times the log-likelihood for the smaller model and -2 times the log-likelihood for the bigger model (Tabachnick & Fidell, 2001 : 535).

model comparison.[15] BIC (also known as SIC Schwarz's information criterion) is purposed by Schwarz (1978), and it is defined as $2\left[l\left(\hat{\theta}_2\right) - l\left(\hat{\theta}_1\right)\right] - \log n(p_2 - p_1)$ [16]. In general, BIC assumes an identifiable true model, and the criterion measures "consistency" of model fits as the approximations of the true model for the data using maximum likelihood (Kuha, 2004: 205-217). BIC tends to prefer simple models[17] and it is sensitive to the choice of prior distributions (prior variance in particular), but BIC would perform well even in small and uneven sample sizes with informative prior (Kuha, 2004: 204). AIC is purposed by Akaike (1973), and it is defined as $2\left[l\left(\hat{\theta}_2\right) - l\left(\hat{\theta}_1\right)\right] - 2(p_2 - p_1)$. Unlike BIC, AIC does not believe that the true model is identifiable. The criterion emphasizes "asymptotic efficiency" which focuses on prediction of future data using the mean squared error of prediction (Kuha, 2004: 207-217). AIC tends to prefer complex models and it performs well in a large-sample estimate because large samples minimize the mean squared error of prediction (Kuha, 2004: 217).

Although BIC and AIC have different rationale and objectives in model selection, both criteria can be used together to set boundaries for the set of acceptable models and to ensure the robustness of model selection. As Kuha (2004: 224) points out, the criteria, even when they disagree on model selection, would provide boundaries for the set of acceptable models because BIC tends to accept simple models with strong effects and AIC tends to accept large models with complex effects. The selected model is robust when both AIC and BIC agree on the selected model because it meets the theoretical context of AIC and BIC (consistent and asymptotically efficient)

[15] The Deviance Information Criteria (DIC) was also taken into consideration, but it was not included in the analysis because it is a modification of BIC and it heavily discounts model complexity.

[16] $2\left[l\left(\hat{\theta}_2\right) - l\left(\hat{\theta}_1\right)\right]$ represents the likelihood ratio test statistic which is asymptotically distributed as x^2 with $p_2 - p_1$ degrees of freedom (Kuha, 2004: 189).

[17] As Kuha (2004: 213) points out, BIC prefers simple models and penalizes model complexity because a larger model "has to spread the prior probability more thinly over a larger dimensional parameter space, leaving less prior mass for the regions supported by the data."

(Kuha, 2004: 223). In the present study, both AIC and BIC were computed, using R. Models with comparatively low values of AIC or BIC are preferred. Three sets of values of AIC and BIC (first block of entry; first and second blocks of entry; first, second and third blocks of entry) were computed for each of the three binary outcomes. As model complexity increases, decreases in AIC or BIC values may suggest a better model fit for the outcome variables.

Chapter 4: Results

In the Methods chapter, I explained variable selection related to Bourdieu's theory of capital and the relevant literature, the construction of key variables, and the construction of analytic models. This chapter reports statistical results of three models of hierarchical logistic regression. For each model, I begin by providing bivariate analyses of the independent variables and the dependent variable. Chi-square tests and T-tests are used to determine the bivariate relationship. Then, I report the statistical results of each hierarchical logistic regression. All statistical tests were computed in R. The level of statistical significance is 0.05 for all tests.

Factors associated with injured workers' post-injury employment status

As previously established, the bivariate outcome variable 'post-injury employment status' has two categories: those who reported 'not working' and those reported being 'employed' at about 52 months (on average) after their initial injuries. While all injured workers in the RAACWI survey sample were employed before injuries, only 45% (N= 272) were employed at the post-injury period. The first model considers what factors distinguish the employed from the unemployed among the workers with permanent impairments, where being 'employed' is the variable of interest. To better understand the predictors of post-injury employment (or risk factors for post-injury unemployment), I conduct the bivariate analyses where the distribution of independent variables is divided into two groups based on post-injury employment status. Table 4.1, below, shows the bivariate comparisons of key variables and the dependent variable 'post-injury employment status'.

Table 4. 1: Bivariate relationship of independent variables and the dependent variable 'post-injury employment status'

	Post-injury employment status		
	'Not working' (N = 222)	'Employed' (N = 272)	*p*-value (significant residual)
Gender %			$p = 0.9$
Male	39.6	39.3	
Female	60.4	60.7	
Age groups %			$p = 0.5$
Younger 26-43	38.3	33.6	
Middle 44-50	32.0	33.6	
Older 51-58	29.7	32.8	
Education %			$p = 0.01$
Less than high school	14.1	7.0*	(-2.58)
High school & incomplete post secondary	43.6	38.4	
Trade, college, or university	32.3	40.2	
Undergraduate or graduate degree	10.0	14.4	
Pre-injury personal income %			$p = 0.09$
low $1,000-$26,000	35.9	30.3	
Medium $27,000-$44,000	33.2	29.2	
High $45,000-$140,000	30.9	40.4	
Perceived stigma %			$p < 0.001$
No perceived stigma	28.0	40.2*	(2.83)
One to four sources	26.6	35.8*	(2.17)
Five to twelve sources	45.4	24.0*	(-4.99)
Pre-injury health burden: $\overline{x}$ (sd)	2.18 (2.3)	2.22 (2.25)	$p = 0.84$
Post-injury health burden: $\overline{x}$ (sd)	10.7 (4.26)	8.04*** (4.34)	$p < 0.001$
Informal social support: $\overline{x}$ (sd)	68.2 (18.7)	74.5*** (16.5)	$p < 0.001$
Institutional support: $\overline{x}$ (sd)	1.41 (0.83)	0.87*** (0.91)	$p < 0.001$

Note: Pearson's Chi-squared tests were conducted for categorical variables between 'not working' and 'employed'. Following a significant chi-squared test, standardized residual values (*) were reported for the cell contributing significantly to the effect, where an absolute residual value of 1.96 or greater indicates significant effects. T-tests were conducted for continuous variables between 'not working' and 'employed': ***p < 0.001; **p < 0.01; *p< 0.05.

As Table 4.1 shows, the distribution of gender, age and pre-injury personal income in the 'not working' and 'employed' groups is similar. In terms of cultural capital, the employed group is less likely to report having 'less than high school' education than the unemployed group. While

both groups, on average, reported similar levels of pre-injury health burden, the employed group reported significantly fewer post-injury diagnoses or health conditions than the unemployed group. In terms of social capital, the employed group, on average, is more likely to report having higher scores of informal social support than the unemployed group. On average, the employed are more likely to report having lower scores of institutional support than the unemployed group on average. The employed group is also more likely to report 'no perceived stigma' and 'one to four sources' of stigma, and less likely to report 'five to twelve sources' of stigma than the unemployed group.

In summary, bivariate comparisons of independent variables and 'post-injury employment status' suggest that having 'no perceived stigma' or 'one to four sources' of stigma, few post-injury diagnoses or health conditions, high scores of informal social support, and low scores of institutional support are each independently associated with the likelihood of post-injury employment. On the other hand, having 'less than high school' education and having 'five to twelve sources' of stigma are associated with the likelihood of post-injury unemployment.

Now, I report the prediction of criterion of key variables in post-injury employment status, using the hierarchical logistic regression ('not working' as the reference category). This model tested the unique associations of injured workers' individual characteristics, pre-injury capital, post-injury capital, with post-injury employment status. Three steps/blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order. Table 4.2, below, shows the statistical summary of the first model and its descriptions.

Table 4. 2: Hierarchical logistic regression results of individual characteristics, pre-injury capital, and post-injury capital with injured workers' post-injury employment status

	Step 1: enter individual characteristics			Step 2: enter pre-injury forms of capital			Step 3: enter post-injury forms of capital		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
Gender: male (ref)									
Female	0.007	0.186	1.01	0.047	0.210	1.05	0.394	0.244	1.483
Age groups: younger 26-43 (ref)									
Middle 44-50	0.179	0.219	1.2	0.239	0.227	1.27	0.304	0.257	1.355
Older 51-58	0.230	0.222	1.26	0.237	0.229	1.27	0.038	0.262	1.039
Education: less than high school (ref)									
High school diploma & incomplete post secondary				0.506	0.331	1.66	0.225	0.373	1.252
Trade, college, or university				0.834	0.337	2.3*	0.571	0.378	1.77
Undergraduate or graduate degree				0.878	0.415	2.41*	0.168	0.471	1.183
Pre-injury health burden				0.013	0.043	1.01	-0.039	0.049	0.961
Pre-injury personal income: low $1,000-$26,000 (ref)									
Medium $27,000-$44,000				0.101	0.232	1.11	0.185	0.263	1.203
High $45,000-$140,000				0.434	0.242	1.54	0.658	0.277	1.931*
Informal social support							0.006	0.006	1.006
Institutional support							-0.531	0.129	0.588***
Perceived stigma: no perceived stigma (ref)									
One to four sources							0.450	0.270	1.649.
Five to twelve sources							-0.274	0.282	0.76
Post-injury health burden							-0.132	0.031	0.876***
Intercept (SE)	0.064 (0.183)			-0.803* (0.377)			0.431 (0.699)		
McFadden's R^2 (Change in R^2)	0.0018			0.022 (0.0202)			0.15 (0.128)		
AIC (BIC)	685 (702)			667 (709)			567 (629)		
-2LL	1.2			30.240***			109.933***		

Note: statistical significance and χ^2 test of significant change are indicated by***p < 0.001; **p < 0.01; *p< 0.05; . p < 0.1.

Individual characteristics, tested in step 1, explains 0.18% of the variance in injured workers' post-injury employment status, according to McFadden's pseudo R^2 index. Workers' gender and age are not significantly associated with employment status.

Pre-injury forms of capital, tested in step 2, explained an additional 2.02% of variance (2.2% total variance explained) in injured workers' post-injury employment status beyond the effects of individual characteristics and were associated with a significant -2LL change in the model. At step 2 of the model, workers with higher education have a higher odds of reporting post-injury employment than those with lower education, beyond the effects of gender, age, pre-injury personal income, and pre-injury health burden. Specifically, workers with 'trade, college or certificate' (OR = 2.3; p = 0.013) and those with 'undergraduate or graduate degree' (OR = 2.41; p = 0.034;) have a higher odds of reporting post-injury employment than workers with less than high school education.

Post-injury forms of capital, tested in step 3, explained an additional 12.8% of variance (15% total variance explained) in injured workers' post-injury employment status beyond effects of individual characteristics and pre-injury capital and were associated with a significant -2LL change in the model. At step 3 of the model, workers with a higher score of 'institutional support' (OR = 0.588; p < 0.001) have a lower odds of reporting post-injury employment than those with a lower score of institutional support, when controlling for gender, age, education, pre-injury personal income, pre-injury health burden, informal social support, perceived stigma, and post-injury health burden. Workers with a higher score of 'post-injury health burden' (OR = 0.876; p < 0.001) have a lower odds of reporting post-injury employment than those with a lower score of post-injury health burden, when controlling for all other factors.

In the final model including all factors, workers with high level of pre-injury personal income have a greater odds of reporting employment at about 52 months (on average) after their initial injuries, as compared to those with low level of pre-injury personal income (OR = 1.931; p = 0.017). Education is no longer a significant factor associated with post-injury employment in the

final model. The final model explains 15% of total variance in injured workers' post-injury employment status, according to McFadden's pseudo R^2 index. Both AIC and BIC agree that the final model would be the best model fit for post-injury employment status with comparatively low values of AIC (567) or BIC (629) among the three models.

Factors associated with injured workers' post-injury income recovery

The bivariate outcome variable 'income recovery' has two categories: those who reported a 'negative income recovery' or an income loss from pre-injury to post-injury period, and those who reported a 'same or positive income recovery' or having the same income or experienced a gain in personal income from pre- to post-injury. Only 41% (N= 195) of the workers with permanent impairments have recovered or improved on their pre-injury income at 52 months after their initial injuries. The second model considers what factors distinguish those with recovered/improved income from those whose post-injury income has remained below their pre-injury income. To better understand the predictors of 'same or positive' income recovery (or risk factors for 'negative' income recovery), I conduct the bivariate analyses where the distribution of independent variables is divided into two groups based on income recovery. Table 4.3, below, shows the bivariate comparisons of key variables and the dependent variable 'income recovery.'

Table 4. 3: Bivariate relationship of independent variables and dependent variable 'income recovery'

	Income recovery		
	'Negative income recovery' (N = 285)	'Same or positive income recovery' (N = 195)	*p*-value (significant residual)
Gender %			$p = 0.9$
Male	39.3	39.0	
Female	60.7	61.0	
Age groups %			$p = 1.0$
Younger 26-43	35.8	35.9	
Middle 44-50	32.6	31.8	
Older 51-58	31.6	32.3	
Education %			$p = 0.7$
Less than high school	11.0	8.3	
High school & incomplete post secondary	41.7	40.2	
Trade, college, or university	36.0	38.1	
Undergraduate or graduate degree	11.3	13.4	
Pre-injury personal income %			$p = 0.07$
low $1,000-$26,000	29.5	38.5 (*)	(2.05)
Medium $27,000-$44,000	34.4	26.2	
High $45,000-$140,000	36.1	35.4	
Perceived stigma %			$p < 0.001$
No perceived stigma	31.3	39.7	
One to four sources	28.8	37.1	
Five to twelve sources	39.9	23.2*	(-3.79)
Post-injury employment status %			$p < 0.001$
Not working	60.0	21.5*	(-8.33)
Employed	40.0	78.5*	(8.33)
Pre-injury health burden: $\overline{x}$ (sd)	2.2 (2.29)	2.2 (2.24)	$p = 0.987$
Post-injury health burden: $\overline{x}$ (sd)	10.1 (4.44)	7.92*** (4.24)	$p < 0.001$
Informal social support: $\overline{x}$ (sd)	70.2 (18.3)	73.6* (16.9)	$p = 0.046$
Institutional support: $\overline{x}$ (sd)	1.33 (0.91)	0.81*** (0.85)	$p < 0.001$

Note: Pearson's Chi-squared tests were conducted for categorical variables between 'negative income recovery' and 'same or positive income recovery'. Following a significant chi-squared test, standardized residual values (*) were reported for the cell contributing significantly to the effect, where an absolute residual value of 1.96 or greater indicates significant effects. Similarly, t-tests were conducted for continuous variables between ''negative income recovery' and 'same or positive income recovery': ***p < 0.001; **p < 0.01; *p< 0.05.

As Table 4.3 shown, the distribution of gender, age and education in the 'negative income recovery' group and the 'same or positive income recovery' group is similar. In terms of economic capital, it is worth noting that, at $p = 0.1$ significant level, the 'same or positive income recovery' group is more likely to report having low pre-injury personal income than the 'negative income recovery' group. The 'same or positive income recovery' group is much more likely report having post-injury employment than the 'negative income recovery' group. In terms of cultural capital, while both groups, on average, reported similar numbers of pre-injury health burden, the 'same or positive income recovery' group reported significantly fewer post-injury diagnoses or health conditions than the 'negative income recovery' group. In terms of social capital, the 'same or positive income recovery' group, on average, is more likely to report having higher scores of informal social support than the 'negative income recovery' group. Table 4.3 also shows that the 'same or positive income recovery' group is more likely to report having lower scores of institutional support than the 'negative income recovery' group on average. Participants in the 'same or positive income recovery' group are also less likely to report having five to twelve sources of stigma as compared to the 'negative income recovery' group.

In summary, bivariate comparisons of independent variables and 'income recovery' suggest that having reported high levels of perceived stigma is associated with a decreased likelihood of 'same or positive income recovery'. Having few post-injury diagnoses or health conditions, high scores of informal social support, and low scores of institutional support are each independently associated with the likelihood of 'same or positive income recovery'.

Next, I report the prediction of criterion of key variables in post-injury income recovery, using the hierarchical logistic regression ('negative income recovery' as the reference category). This model tested the unique associations of injured workers' individual characteristics, pre-injury

capital, post-injury capital, with post-injury income recovery ('negative income recovery' as reference category). Similar to the first model, three steps/blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order. Table 4.4, below, shows the statistical summary of the second model and its descriptions.

Table 4. 4: Hierarchical logistic regression of individual characteristics, pre-injury capital, and post-injury capital on injured workers' post-injury income recovery

	Step 1: enter individual characteristics			Step 2: enter pre-injury forms of capital			Step 3: enter post-injury forms of capital		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
Gender: male (ref)									
Female	0.015	0.191	1.015	-0.048	0.212	0.953	0.310	0.251	1.363
Age groups: younger 26-43 (ref)									
Middle 44-50	-0.030	0.226	0.970	-0.021	0.230	0.979	-0.123	0.265	0.884
Older 51-58	0.019	0.226	1.019	0.045	0.231	1.046	-0.198	0.271	0.820
Education: less than high school (ref)									
High school diploma & incomplete post secondary				0.252	0.344	1.286	-0.146	0.395	0.865
Trade, college, or university				0.349	0.348	1.417	-0.080	0.398	0.924
Undergraduate or graduate degree				0.505	0.419	1.658	0.033	0.486	1.034
Pre-injury health burden				-0.012	0.043	0.989	-0.064	0.051	0.938
Pre-injury personal income: low $1,000-$26,000 (ref)									
Medium $27,000-$44,000				-0.518	0.237	0.596*	-0.654	0.275	0.520*
High $45,000-$140,000				-0.344	0.242	0.709	-0.572	0.284	0.565*
Informal social support							-0.005	0.007	0.995
Institutional support							-0.432	0.134	0.649**
Perceived stigma: no perceived stigma (ref)									
One to four sources							0.367	0.271	1.443
Five to twelve sources							-0.082	0.304	0.921
Post-injury health burden							-0.080	0.032	0.923*
Post-injury employment status: not working (ref)									
Employed							1.418	0.243	4.129***
Intercept (SE)	-0.385* (0.188)			-0.346 (0.384)			0.553 (0.753)		
McFadden's R^2 (Change in R^2)	0.00008			0.010 (0.00992)			0.172 (0.162)		
AIC (BIC)	656 (673)			658 (700)			544 (610)		
-2LL	0.051			10*			90***		

Note: statistical significance and χ^2 test of significant change are indicated by***p < 0.001; **p < 0.01; *p< 0.05; . p < 0.1.

Individual characteristics, tested in step 1, explains 0.008% of the variance in injured workers' post-injury income recovery, according to McFadden's pseudo R^2 index. Workers' gender and age are not significantly associated with income recovery.

Pre-injury forms of capital, tested in step 2, explains an additional 0.992% of variance (1% total variance explained) in injured workers' post-injury income recovery beyond the effects of individual characteristics and were associated with a significant -2LL change in the model. At step 2 of the model, workers with medium ($27,000-$44,000) pre-injury personal income (OR = 0.596; p = 0.029) have a lower odds of reporting 'same or positive income recovery' than workers with low pre-injury personal income to report a 'same or positive' income recovery at 52 months after injuries, beyond the effects of gender, age, education, and pre-injury health burden.

Post-injury forms of capital, tested in step 3, explains an additional 16.2% of variance (17.2% total variance explained) in injured workers' post-injury income recovery beyond the effects of individual characteristics and pre-injury capital and were associated with a significant -2LL change in the model. At step 3 of the model, having a higher score of 'institutional support' (OR = 0.649; p = 0.001) has a lower odds of reporting 'same or positive' income recovery when controlling for gender, age, education, pre-injury health burden, pre-injury personal income, informal social support, perceived stigma, post-injury health burden and post-injury employment status. Similarly, having a higher score of 'post-injury health burden' (OR = 0.923; p = 0.013) is associated with a lower odds of reporting 'same or positive' income recovery when controlling for all other factors. In addition, controlling for all factors, post-injury employment is associated with a higher odds of reporting 'same or positive' income recovery as compared to post-injury unemployment at 52 months after injuries (OR = 4.129; p < 0.001).

In the final model including all factors, the association between pre-injury personal income and post-injury income recovery is strengthened. Having medium (OR = 0.52; p = 0.018) or high (OR = 0.565; p = 0.044) pre-injury personal income as compared to low pre-injury personal income are each negatively and independently related to worker's post-injury income recovery, when controlling for all other factors. The final model explains 17.2% of variance in injured workers' post-injury income recovery, according to McFadden's pseudo R^2 index. Both AIC and BIC agree that the final model would be the best model fit for post-injury income recovery with comparatively low values of AIC (544) or BIC (610) among the three models.

Factors associated with injured workers' perceived health change

The bivariate outcome variable 'perceived health change' has two categories: those who reported 'much worse' self-rated health in the post-injury period as compared to all others. Compared to the day before their workplace accident, fifty percent (N = 244) of respondents report 'much worse' self-rated health at about 52 months after injuries. The 'much worse' self-rated health is the category of interest in this model because it would likely provide a telling indication of the effect of 'accumulated disadvantages' of permanent impairment. To better understand the risk factors for 'much worse' self-rated health, I conduct the bivariate analyses where the distribution of independent variables is divided into two groups based on injured workers' 'perceived health change.' Table 4.5, below, shows the bivariate comparisons of key variables and the dependent variable 'perceived health change.'

Table 4. 5: Bivariate relationship of independent variables and dependent variable 'perceived health change'

	Perceived health change		
	All others: (reporting 'somewhat worse or better' self-rated health) (N = 244)	'Much worse' self-rated health (N = 244)	*p*-value (significant residual)
Gender %			$p = 0.03$
Male	44.3	34.4*	(-2.22)
Female	55.7	65.6*	(2.22)
Age groups %			$p = 0.2$
Younger 26-43	34.2	37.7	
Middle 44-50	30.9	34.4	
Older 51-58	35.0	27.9	
Education %			$p = 0.8$
Less than high school	8.6	11.2	
High school & incomplete post secondary	41.6	39.7	
Trade, college, or university	37.5	36.8	
Undergraduate or graduate degree	12.3	12.4	
Pre-injury personal income %			$p = 0.6$
low $1,000-$26,000	34.2	31.1	
Medium $27,000-$44,000	29.1	33.2	
High $45,000-$140,000	36.7	35.7	
Perceived stigma %			$p < 0.001$
No perceived stigma	49.4	20.7*	(-6.60)
One to four sources	30.5	33.2	
Five to twelve sources	20.2	46.1*	(6.06)
Post-injury employment status %			$p < 0.001$
Not working	32.8	57.0 *	(5.37)
Employed	67.2	43.0 *	(-5.37)
Pre-injury health burden: $\overline{x}$ (sd)	2.46 (2.26)	1.95* (2.25)	$p = 0.015$
Post-injury health burden: $\overline{x}$ (sd)	7.39 (4.08)	11.1*** (4.13)	$p < 0.001$
Informal social support: $\overline{x}$ (sd)	74.7 (17.4)	69*** (17.5)	$p < 0.001$
Institutional support: $\overline{x}$ (sd)	0.83 (0.81)	1.39*** (0.94)	$p < 0.001$

Note: Pearson's Chi-squared tests were conducted for categorical variables between 'all others' and 'much worse' self-rated health. Following a significant chi-squared test, standardized residual values (*) were reported for the cell contributing significantly to the effect, where an absolute residual value of 1.96 or greater indicates significant effects. Similarly, t-tests were conducted for continuous variables between 'all others' and 'much worse' self-rated health: ***p < 0.001; **p < 0.01; *p< 0.05.

As Table 4.5 shows, the age distribution of individuals in the 'much worse' and 'all others' group is similar. The 'much worse' group is more likely to be female than the 'all others' group. In terms of economic capital, there were no statistical differences in pre-injury personal income between the two groups. However, the 'much worse' group is less likely to report having post-injury employment as compared to the 'all others' group. In terms of cultural capital, there were no statistical differences in educational qualification between the two groups. On average, the 'much worse' group reported significantly fewer pre-injury diagnoses or health conditions, but significantly more post-injury diagnoses or health conditions than the 'all others' group. In terms of social capital, the 'much worse' group, on average, is more likely to report having lower scores of informal social support than the 'all others' group. Table 4.5 also shows that the 'much worse' group is more likely to report having higher scores of institutional support than the 'all others' group on average. The 'much worse' group is more likely to report experiencing 'five to twelve sources' of stigma and less likely to report perceiving no stigmatization, as compared to the 'all others' group.

In summary, bivariate comparisons of independent variables and 'perceived health change' suggest that being female, being unemployed after injury, having few pre-injury diagnoses or health conditions, having many post-injury diagnoses or health conditions, having low scores of informal social support, having high scores of institutional support, and reporting high levels of perceived stigma were each independently associated with the increased likelihood of reporting 'much worse' self-rated health.

Now, I report the prediction of criterion of key variables in perceived health change, using hierarchical logistic regression ('all others: somewhat worse or better self-rated health' as the reference category). The third model tested the unique associations of injured workers' individual

characteristics, pre-injury capital, post-injury capital, with injured workers' perceived health change. Similar to the previous models, three steps/blocks of entry were sequentially entered into the analyses in order to account for different forms of capital in temporal order. Table 4.6, below, shows the statistical summary of the third model and its descriptions.

Table 4. 6: Hierarchical logistic regression of individual characteristics, pre-injury capital, and post-injury capital on injured workers' perceived health change

	Step 1: enter individual characteristics			Step 2: enter pre-injury forms of capital			Step 3: enter post-injury forms of capital		
	B	*SE*	*OR*	*B*	*SE*	*OR*	*B*	*SE*	*OR*
Gender: male (ref)									
Female	0.418	0.188	1.519*	0.624	0.212	1.867**	0.210	0.261	1.234
Age groups: younger 26-43 (ref)									
Middle 44-50	-0.029	0.221	0.971	0.034	0.228	1.034	0.115	0.276	1.122
Older 51-58	-0.360	0.224	0.697	-0.320	0.230	0.726	-0.163	0.286	0.850
Education: less than high school (ref)									
High school diploma & incomplete post secondary				-0.347	0.337	0.707	0.139	0.403	1.149
Trade, college, or university				-0.376	0.341	0.686	0.112	0.408	1.118
Undergraduate or graduate degree				-0.416	0.416	0.660	0.465	0.508	1.592
Pre-injury health burden				-0.121	0.044	0.886**	-0.042	0.053	0.959
Pre-injury personal income: low $1,000-$26,000 (ref)									
Medium $27,000-$44,000				0.201	0.235	1.223	0.136	0.285	1.145
High $45,000-$140,000				0.215	0.242	1.240	0.281	0.299	1.325
Informal social support							0.001	0.007	1.001
Institutional support							0.455	0.143	1.576**
Perceived stigma: no perceived stigma (ref)									
One to four sources							0.415	0.281	1.514
Five to twelve sources							0.692	0.302	1.998*
Post-injury health burden							0.256	0.038	1.292***
Post-injury employment status: not working (ref)									
Employed							-0.251	0.244	0.778
Intercept (SE)	-0.128 (0.184)			0.179 (0.378)			-2.858***(0.818)		
McFadden's R^2 (Change in R^2)	0.012			0.028 (0.016)			0.253 (0.225)		
AIC (BIC)	675 (692)			660 (702)			503 (569)		
-2LL	7.84*			26.93***			169.28***		

Note: statistical significance and χ^2 test of significant change are indicated by***p < 0.001; **p < 0.01; *p< 0.05; . p < 0.1.

Individual characteristics, tested in step 1, explained 1.2% of the variance in injured workers' perceived health change, according to McFadden's pseudo R^2 index, represented a significant -2LL change in the model. Females (OR = 1.519; p = 0.026) have greater odds of reporting 'much worse' self-rated health than males, at about 52 months (on average) after their initial injuries.

Pre-injury forms of capital, tested in step 2, explained an additional 1.6% of variance (2.8% total variance explained) in injured workers' perceived health change beyond effects of individual characteristics and were associated with a significant -2LL change in the model. At step 2 of the model, females (OR = 1.867; p = 0.003) are shown to have a greater odds of reporting 'much worse' self-rated health as compared to males, beyond effects of age, education, pre-injury personal income, and pre-injury health burden. Workers with a high score of 'pre-injury health burden' (OR = 0.886; p = 0.006) have a lower odds of reporting much worse health than those with a lower score, when controlling for all other factors.

Post-injury forms of capital, tested in step 3, explained an additional of 22.5% variance (25.3% total variance explained) in injured workers' perceived health change beyond effects of individual characteristics and pre-injury capital and were associated with a significant -2LL change in the model. At step 3 of the model, workers with a high score of 'post-injury health burden' (OR = 1.292; p < 0.001) have a higher odds of reporting much worse health than those with a lower score, when controlling for gender, age, education, pre-injury health burden, pre-injury personal income, informal social support, institutional support, perceived stigma and post-injury employment status. Similarly, workers with a high score of 'institutional support' (OR = 1.576; p

= 0.002) have a higher odds of reporting much worse health than those with a lower score, when controlling for all other factors. In addition, having reported 'five to twelve sources' of stigma (OR = 1.998; p = 0.022) is associated with a higher odds of reporting much worse health, when controlling for all other factors.

In the final model including all factors, the associations between gender and perceived health change at step 1 and 2) are no longer significant. Similarly, pre-injury health burden is no longer a significant factor associated with perceived health change in the final model. The final model explained 25.3% of variance in injured workers' perceived health change, according to McFadden's pseudo R^2 index. Both AIC and BIC agree that the final model would be the best model fit for perceived health change with comparatively low values of AIC (503) or BIC (569) among the three models.

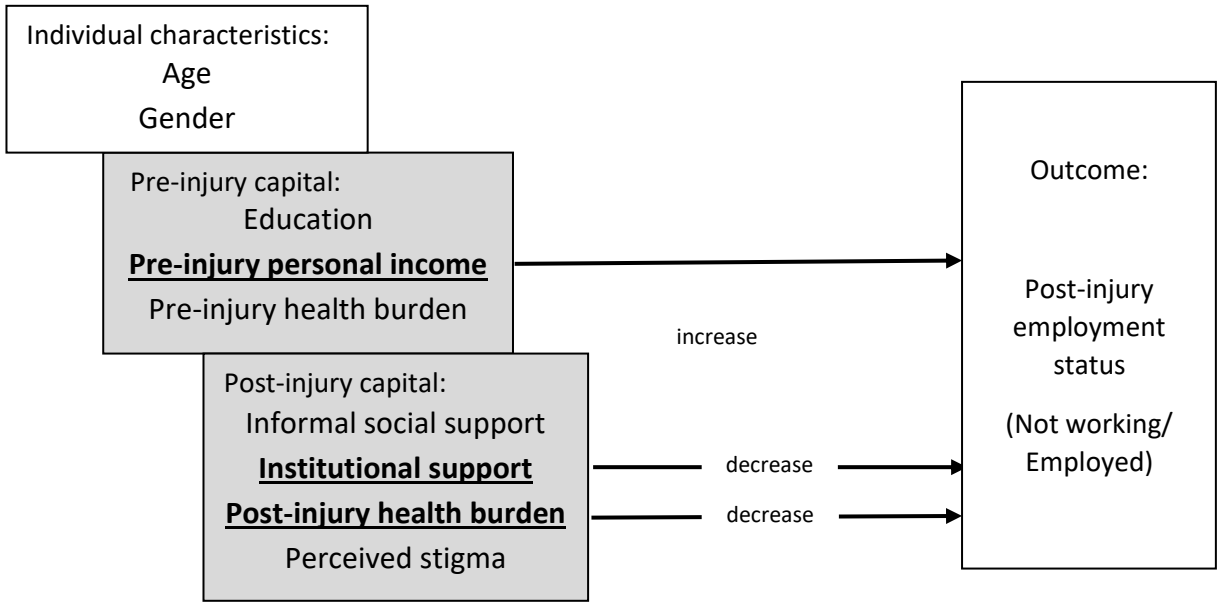
Chapter 5: Discussion and Conclusion

In this thesis, I tested Bourdieu's theory of capital using a sample of Ontario injured workers with permanent impairments. I theorized that different forms of economic, cultural, and social capital which injured workers possessed and/or acquire/accumulate at different points in time over their disability trajectory may affect the different consequences or outcomes of permanent impairments, including post-injury employment status, post-injury income recovery and workers' perceived health change. Initial bivariate analyses were conducted to assess the degree of association between different forms of capital and each of the three outcomes. Hierarchical regression analyses were subsequently used to assess the temporal order and the complex effects of accumulated capital, and to test the unique association of injured workers' individual characteristics, pre-injury capital, post-injury capital, and the consequences of permanent impairments.

The initial bivariate analyses suggest that different indicators of capital are significantly associated with variation in the consequences or outcomes of permanent impairment. While many of these bivariate associations are no longer significant in hierarchical regression models, the results of the hierarchical regressions show the importance of each form of capital. Specifically, factors related to individual characteristics, pre-injury and post-injury forms of capital were associated with injured workers' perceived health change, whereas pre-injury and post-injury capital were most relevant factors in explaining injured workers' post-injury employment status and income recovery. The findings suggest that some forms of capital which injured workers possessed or accumulated over their disability trajectory were important factors in predicting the consequences of permanent impairments. These findings partially support Bourdieu's theory that capital tends to persist over time, and capital or the lack of it then in turn becomes an accumulated advantage or disadvantage over time.

When looking at the significance of individual predictors, post-injury variables were most relevant in understanding the outcomes of permanent impairment. For instance, post-injury variables such as post-injury health burden and institutional support were each significant predictors of all three outcome variables. In addition, post-injury employment status was found to be important for predicting post-injury income recovery, and perceived stigma was important for predicting perceived health change. Among the pre-injury variables, pre-injury personal income was found to be the only significant predictor in explaining post-injury employment and income recovery. It is important to note that we should not over-emphasize the importance of individual predictor in the hierarchical regression analysis which is designed to test a specific theory (Petrocelli, 2003: 10). Nevertheless, it is useful to look at the relative importance of each predictor in relation to the hierarchical regression analyses to further understand the relationships between different forms of capital and the outcomes of permanent impairments. Diagrams 5.1-5.3, below, show the relationships between different forms of capital and the three bivariate outcomes.

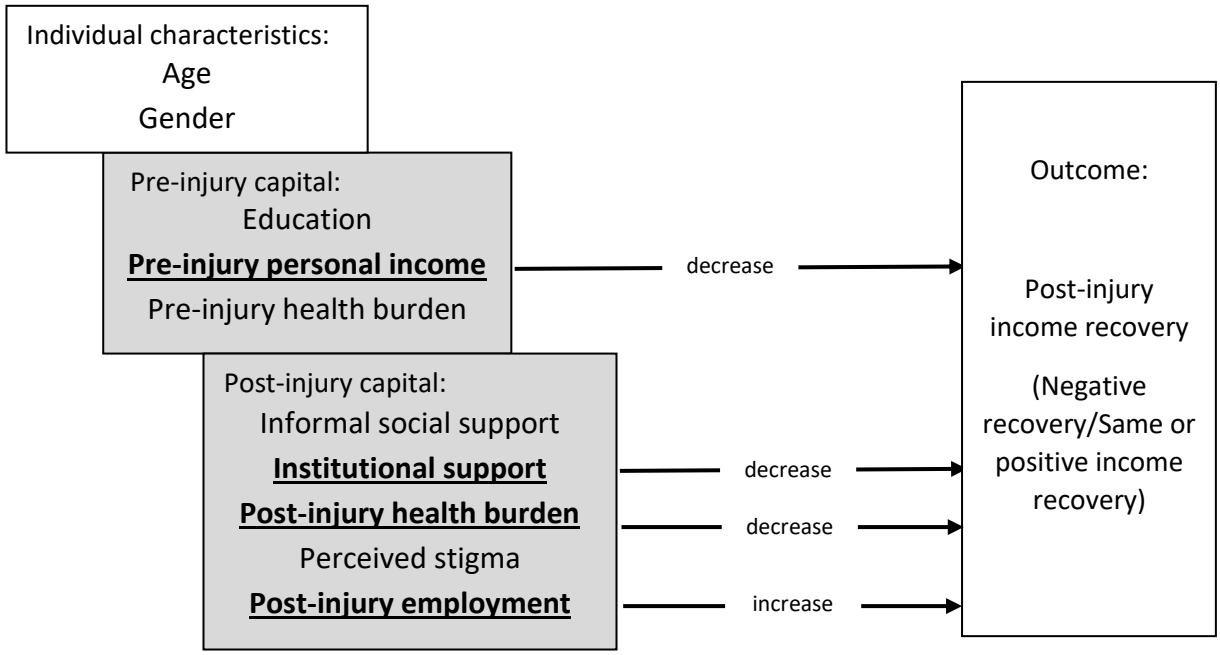
Diagram 5. 1: final model for the hierarchical regression of post-injury employment status



Final model: post-injury employment status

Notes: statistical significance of individual variables is indicated by bold-underlined text. Line arrow indicates the valence of effect of individual variables. Filled square indicates a statistical significance of additional variance accounted for to the outcome variable beyond that already explained by previous step.

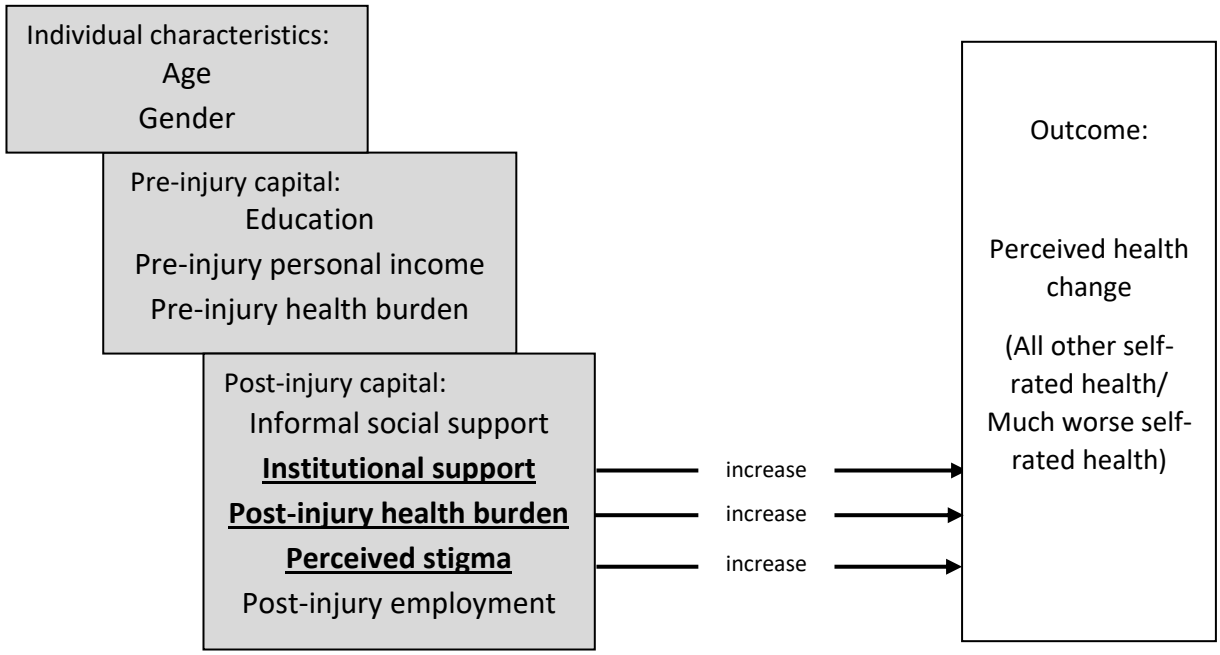
Diagram 5. 2: final model for the hierarchical regression of post-injury income recovery



Final model: post-injury income recovery

Notes: statistical significance of individual variables is indicated by bold-underlined text. Line arrow indicates the valence of effect of individual variables. Filled square indicates a statistical significance of additional variance accounted for to the outcome variable beyond that already explained by previous step.

Diagram 5. 3: final model for the hierarchical regression of perceived health change



Final model: perceived health change

Notes: statistical significance of individual variables is indicated by bold-underlined text. Line arrow indicates the valence of effect of individual variables. Filled square indicates a statistical significance of additional variance accounted for to the outcome variable beyond that already explained by previous step.

Capital and the outcomes of permanent impairments

The hierarchical regression analyses show evidence that individual characteristics such as gender and age were related to embodied cultural capital because they increased the variance explained in perceived health change (a significant deterioration in perceived health subsequent to the injury). In terms of the relative importance of individual factors, females are shown to have a greater odds of reporting 'much worse' self-rated health as compared to males, at Step 1 and 2 of the analysis. When post-injury forms of capital enter into Step 3 of the model, the association between gender

and perceived health change was no longer significant. It is possible that the effect of gender was nullified by more powerful and immediate predictors such as post-injury health burden. This finding partially supports Shilling's argument that gender is associated with unequal distribution and accumulation of embodied cultural capital (i.e., health and health trajectory over time). It also partially supports the previous studies that women with disabilities acquire less embodied cultural capital after their injury than men with disabilities (Kavanagh et al., 2015; Casey and Ballantyne, 2017; Pettinicchio and Maroto, 2017).

In addition, age was not significantly associated with perceived health change. Shilling theorizes that the bodily experience of aging and social location is closely linked. As previous studies suggest, being older is associated with both positive and negative health outcomes (Fortin et al., 2010; Taylor, 2011; O'Hagan et al., 2012; Kavanagh et al., 2015). Our data suggests that age is associated with increased likelihood of pre-injury health burden, but I found no significant association between age and post-injury health burden. It is possible that the older workers in this study have sources to manage their health burden and impairments. It is also possible that older workers with permanent impairments may face more health problems, but they may also have a more positive outlook of their health trajectory (being less likely to report 'much worse' health) because they expected to have more health problems as they get older.

While previous literature suggests that individual characteristics such as gender and age are related to economic accumulation, I did not find significant relationships between these variables and economic outcomes such as post-injury employment and income recovery. However, these results should be interpreted with caution, owing to previous findings. As Pettinicchio and Maroto (2017) show, being female and being disabled are each negatively associated with post-onset employment and income, whereas the intersection of gender and disability reduced the

labour market inequality between men and women with disabilities. Men with disabilities generally experienced larger gaps in employment and earnings than women with disabilities because disability conflicts with both dominant values of non-disabled bodies and masculinity (Pettinicchio and Maroto, 2017: 24). While the current study did not include severity of impairments due to its missing data, testing the interaction between gender and severity of permanent impairments may be a point of future interest.

In addition, the absence of clear differences in economic outcomes by age group should be interpreted with caution. Although the results of Jenkins and Rigg (2004) and Polidano and Vu (2015) found no significant association between age, employment and income after disability onset, the authors of both studies agree that different age groups with disability may withdraw from the labour market due to different reasons. Both studies suggest that some older adults with disability may voluntarily withdraw from the labour market due to retirement plans and pensions, whereas some younger adults with disability may exit from the labour market involuntarily due to the rapid deterioration in health (Polidano and Vu, 2015: 315). It is reasonable to suggest that the absence of clear differences in economic outcomes by age group, in the current sample of workers with permanent impairments, could also be due to different types of 'retirement'. In fact, the relative importance of institutional support and post-injury health burden in explaining post-injury economic outcomes seems to support this explanation (which will be discussed in the subsequent section).

The results suggest that pre-existing capital was important to post-injury economic and health outcomes. Specifically, the hierarchical regression analyses show that pre-injury forms of capital, including education, pre-injury health burden and pre-injury personal income, significantly increased the variance explained in all three outcomes variables beyond the effects of individual

characteristics. In terms of the relative importance of individual factors, the findings suggest that pre-injury personal income was a significant predictor of economic outcomes, whereas education and pre-injury health burden were not significantly associated with the three outcomes of permanent impairments. It is surprising that education, an important indicator of cultural capital, was not a significant predictor of any of the outcomes. It is worth noting, however, that a significant association between education and post-injury employment status was shown at Step 2 of the hierarchical model, but this association did not hold in the final model. At Step 2 of the hierarchical model when controlling for all other factors, workers with higher education have a higher odds of reporting post-injury employment than those with lower education. Yet, education was no longer a significant predictor of post-injury employment status when post-injury forms of capital enter into Step 3 of the model. This finding may suggest that the effect of education was nullified by more powerful and immediate predictors such as post-injury health burden (as our data show, many respondents had multiple conditions). As Cater et al. (2013: 2071) argue, a higher education allowed some workers with permanent impairments to access occupations that were less physically demanding, and thus, an increased likelihood of post-injury employment, but these effects of education were limited for workers with severe impairments. Shilling (1993) would agree that severe health conditions may interrupt the bodily participation in the field of work and the conversion of cultural capital into economic capital. Although previous literature suggests that education is related to positive health outcomes such as the encouragement of healthy practices (Paccoud et al., 2020) and the reduced risk of depression (O'Hagan et al., 2012), the results here did not reveal any significant associations.

In addition, our findings did not provide evidence to establish a direct association between pre-existing health and post-injury economic outcomes. It is worth noting that pre-injury health

burden was significantly associated with perceived health change at Step 2 of the hierarchical model, but this association did not hold in the final model. It is possible that the effect of pre-injury health burden was nullified by more powerful and immediate predictors such as post-injury health burden. While pre-injury health burden was not significant in predicting perceived health change, this finding suggests important insights. At Step 2 of the hierarchical model including all other factors, workers with a high score of 'pre-injury health burden' have a lower odds of reporting much worse health than those with a lower score. This suggests that workers' self-assessment of health after injury may be relative to their status before injury. That is to say, injured workers may not have interpreted their health status after injury as related only to their injury that resulted in a permanent impairment, but also to their pre-injury health status. This finding provides additional evidence that self-reported health and illness is a reliable and valid assessment of individuals' objective health (Katz et al., 1996; Idler & Benyamini, 1997; Bourne, 2009; Fosse & Haas, 2009).

Among the pre-injury variables, pre-injury personal income, a form of economic capital, was found to be important for predicting economic outcomes such as post-injury employment and income recovery. While previous research found positive associations between pre-existing economic capital and health outcomes (O'Hagan et al., 2012; Kavanagh et al., 2015), the results did not show a significant association between pre-injury personal income and perceived health change. As we recall, forty-five percent of the respondents returned to post-injury employment and fifty-five percent did not. In the final model of post-injury employment status, workers in the high pre-injury income category ($45,000-140,000) have a higher odds of reporting post-injury employment than workers in the low pre-injury income category ($1,000-26,000). Consistent with the previous literature, pre-existing economic capital is associated with the likelihood of positive post-injury economic outcomes (Jenkins and Rigg, 2004; Polidano and Vu, 2015). This finding

supports Bourdieu's theory that capital tends to accumulate and transforms into advantages over time.

Although pre-injury personal income was associated with an increased likelihood of reporting post-injury employment, it was also inversely associated with the likelihood of reporting the same or positive income recovery. As we recall, income recovery measures whether injured workers reported a personal income loss from pre- to post-injury (59%), or the same or a gain in personal income from pre- to post-injury (41%). In the final model of post-injury income recovery, workers with medium ($27,000-44,000) or high pre-injury personal income, as compared to those with low income, are less likely to maintain their pre-injury income after injury. There may be several reasons for the different associations between pre-injury income, post-injury employment status and post-injury income recovery. First, this finding suggests that post-injury employment may not guarantee a positive income recovery because employers may have changed the job available to the injured worker due to the additional costs to setup modified work (Eakin et al., 2003; Beardwood et al., 2005; Kirsh et al., 2012; Cater et al., 2013; Polidano and Vu, 2015). Second, it is possible that workers with high health burdens would not sustain full-time employment (Jenkins and Rigg, 2004; Cater et al., 2013; Denton et al., 2013; Polidano and Vu, 2015; Ballantyne et al., 2016; Pettinicchio and Maroto, 2017). Third, it is also possible that institutional support offered a higher proportion of income support to those without post-injury employment which reduces the post-injury income gap between the employed and unemployed. In another sense, high-income earners may be differentially more affected by income lost than low-income earners, given that income recovery is a relative term in this study. Overall, the results suggest that having higher pre-injury personal income provided injured workers with post-injury

advantages in re-entering the labour market, but higher pre-injury personal income creates disadvantage in re-establishing pre-injury earnings.

The hierarchical regression analyses show that post-injury forms of capital were important predictors because they significantly increased the variance explained in all three outcome variables beyond the effects of individual characteristics and pre-injury capital. In terms of the relative importance of individual factors, the findings suggest that institutional support and post-injury health burden were each significant predictors of all three outcomes, whereas informal social support was not significantly associated with any of the outcomes. Post-injury employment was significantly associated with post-injury income recovery, and perceived stigma was significantly associated with perceived health change.

Post-injury employment status was added to the analysis of post-injury income recovery and perceived health change. It is not surprising that post-injury employment status is a significant predictor of post-injury income recovery. In the final model of post-injury income recovery, post-injury employment is associated with a higher odds of reporting 'same or positive' income recovery as compared to those who reported unemployment after injuries. The results support the findings of previous studies that employment and income are closely associated (Jenkins and Rigg, 2004; Polidano and Vu, 2015; Ballantyne et al., 2016; Pettinicchio and Maroto, 2017). In Bourdieu's terms, employment allows workers to continue their accumulation of economic capital. However, the finding of pre-injury income suggests that post-injury employment may not guarantee a positive income recovery. It was noted in the data that there was significant movement to different jobs and employers on the part of participants. While it is not a focus of this analysis, the changes of employment may have contributed to income recovery, and it may be a point of future interest. In addition, although previous findings show a significant relationship between

health and employment (Jenkins & Rigg, 2004; Cater et al., 2013; Denton et al., 2013), the results here found that only post-injury unemployment was positively associated with 'much worse' health in the bivariate analysis. The hierarchical analysis revealed no significant association between post-injury employment status and perceived health change.

The findings consistently show that post-injury health burden, as an indicator of embodied cultural capital, was inversely associated with injured workers' post-injury economic capital. In the final model of "post-injury employment status", workers with a higher score of 'post-injury health burden' have a lower odds of reporting post-injury employment than those with a lower score of post-injury health burden. Similarly, in the final model of "post-injury income recovery", workers with a higher score of 'post-injury health burden' have a lower odds of reporting same or positive income recovery than those with a lower score of post-injury health burden. These findings provide quantitative support of Bourdieu's theory that accumulated health disadvantages would affect individuals' ability to recover employment and generate wealth (Shilling, 1993; Edwards & Imrie, 2003; Allen, 2004). These results are consistent with the previous literature that individuals who suffered from severe impairments (Cater et al., 2013), poor health conditions (Denton et al., 2013), a long duration of disability (Jenkins & Rigg, 2004) were more likely to be unemployed after disability onset. These results are also consistent with the previous literature that individuals who suffered from severe injuries or impairments (Brown et al., 2007; Mithen et al., 2015; Scott et al., 2018), high health burdens (Ballantyne et al., 2016), or a long duration of disability (Jenkins & Rigg, 2004) were more likely to be poor at the post-injury period.

In addition, it is not surprising that post-injury health burden was positively associated with injured workers' perceived health change. In contrast to the association of pre-injury health burden, workers with a high score of post-injury health burden have a higher odds of reporting much worse

health than those with a lower score, in the final model of "perceived health change." This finding shows consistent responses from workers with permanent impairments that their perception of health change matches the numbers of diagnosed conditions and symptoms they reported. The result is also consistent to the previous findings that permanent impairments have long-term consequences to injured workers' health trajectory (Brown et al., 2006; O'Hagan et al., 2012; Kavanagh et al., 2015; Casey & Ballantyne, 2017).

The results show that institutional support, as a form of social capital, was inversely associated with injured workers' post-injury economic capital and perception of health change. Specifically, workers with a higher score of institutional support have a lower odds of reporting post-injury employment than those with a lower score of institutional support, in the final model of 'post-injury employment status'. Similarly, workers with a higher score of institutional support have a lower odds of reporting same or positive income recovery than those with a lower score of institutional support, in the final model of 'post-injury income recovery'. In addition, workers with a higher score of institutional support have higher odds of reporting 'much worse' self-rated health than those with a lower score of institutional support, in the final model of 'perceived health change'.

These results seem to be counterintuitive at the first glance. However, they are consistent with my expectation that the use of institutional support is an indicator of social support, but a high score of institutional support suggests an indicator of disadvantages in capital accumulation. First of all, some of these institutional supports are only available to low-income earners (i.e., employment insurance, social assistance, or welfare). In addition, although institutional support is a form of financial support to help workers with permanent impairments for a period of time, it cannot make up for the erosion of other forms of capital that occurs following injury. Furthermore,

the use of income supports may be a source of stress and shame for its claimants. For example, studies show that compensation claimants often face unyielding bureaucracy, power imbalance and stigma from worker compensation boards (Kirsh & McKee, 2003; Beardwood et al., 2005; MacEachen et al., 2010; Kirsh et al., 2012). In this sense, workers who needed the most support were often the most disadvantaged. Indeed, the findings of Ballantyne et al. (2016: 183) show a similar trend that having completed a post-injury retraining programme was associated with an increased risk of post-injury poverty. Short-term rehabilitative programs such as mandatory participation in retraining are arguably the failed attempts to 'recapitalize' injured workers because they do not 'recapitalize' the loss of social and embodied capital as a consequence of workers' injury. Ballantyne et al. (2016: 186) argue that 'retraining' may be a marker of a worker's disability and unemployment (only injured workers without employment are eligible for retraining). Bourdieu would agree with Ballantyne et al. that such attempt is a form of symbolic violence. That is not only because capital accumulation requires long-term investment of time and energy, but the process of 'retraining' is also an attempt to normalize the disabled bodies (Allen, 2004; Townsend et al., 2018). The findings support previous literature that the deprived habitus discourages capital accumulation of disabled people which further placed them at a disadvantage (Shilling, 1993; Edwards and Imrie, 2003; Allen, 2004). The findings also provide additional evidence to the previous literature that the lack of economic capital is often associated with poor health (Brown et al., 2006, 2007; Taylor, 2011; Jenkins and Rigg, 2004; O'Hagan et al., 2012; Kavanagh et al., 2015; Ballantyne et al., 2016).

If the use of institutional support highlights one of the potential sources of stigma which injured workers might face in their disability trajectory, perceived stigma is designed to measure potential 'negative or absence' of social support from various social settings (see Appendix 6 for

the sources of stigma and their distribution). While previous research suggests that stigma is associated with poorer economic outcomes (Edwards and Imrie, 2003; Beardwood et al., 2005), the results here showed no significant association between perceived stigma and economic outcomes such as post-injury employment status and income recovery. However, in the final model of 'perceived health change', workers who reported 'five to twelve sources' of stigma had a higher odds of reporting much worse health than those reported 'no perceived stigma'. This finding partially supports Bourdieu's theory of accumulated disadvantages that poor health is often associated with absence of social support (Mithen et al., 2015). This finding is also consistent with the theory of stigma and previous literature that stigma associated with disability or permanent impairments would severely impact individuals' mental health and internalize loss of self-worth (Kirsh & McKee, 2003; Beardwood et al., 2005; MacEachen et al., 2010; Kirsh et al., 2012; O'Hagan et al., 2012; Kavanagh et al., 2015; Casey & Ballantyne, 2017).

Informal social support is an indicator of functional supports from close bonds from family, friends, and acquaintances, which can be a form of resource in Bourdieu's theory. While previous literature shows that functional support is important to individuals' economic and health outcomes (Kosny et al., 2018; Asher, 1984; Moser et al., 2012), the results found no significant association between informal social support and post-injury employment status, income recovery and perceived health change. It is possible that the capacity for informal social support to circumvent the negative effects of permanent impairment maybe far from complete. As previous literature shows, disabilities or permanent impairments have severe impacts on individuals' health and mental health (Brown et al., 2006; O'Hagan et al., 2012; Kavanagh et al., 2015; Casey & Ballantyne, 2017). It is possible that the effects of informal social support on perceived health change may be explained by the effects of post-injury health burden and perceived stigma. This

kind of complex explanation could be further elucidated through in-depth interviews with injured workers.

Strengths and Limitations

This study suggests that Bourdieu's theory of capital is a useful tool to conceptualize and analyze injured workers' disability trajectory and the consequences of permanent impairments. Specifically, I conceptualized the personal data of workers with permanent impairments as different forms of economic, cultural and social capital which they may possess and/or acquire/accumulate over their disability trajectory. In addition, the analytic approach was guided by Bourdieu's concept of capital accumulation. Hierarchical regression analyses were subsequently used to assess the temporal order and the complex effects of accumulated capital, and to test the unique association of injured workers' individual characteristics, pre-injury capital, post-injury capital, and the consequences of permanent impairments. Adding to the existing literature, the findings show the importance of economic and cultural capital (i.e., income, employment, and health) in understanding the outcomes of permanent impairments in the context of the workers compensation system. Specifically, health (embodied cultural capital) seems to be a key determinant of the recovery of economic capital (possibly social capital) for workers with permanent impairments. Half of injured workers in our sample self-reported at about 52 months after injuries that their health was much worse than the day before their initial work-place injuries. Their perception of health change is supported by the numbers of diagnosed conditions and symptoms developed beyond their initial injuries.

The unique contribution of this study is to apply Bourdieu's concept of social capital to the quantitative analysis of permanent impairments. To the best of my knowledge, few studies have taken in this approach. In particular, three forms of post-injury social capital were included to

further understand the relationships between social capital and the consequences of permanent impairments. Although qualitative studies suggest the importance of informal social support in the economic and health recovery of injured workers, the findings did not find significant associations between informal social support and the outcomes of permanent impairments. My findings suggest that stigma as a form of 'negative social support' had negative effects on workers' perception of health. While public institutional support provides financial support to injured workers, workers who needed the most support were the most disadvantaged (unemployed, lost income, and worse health after their injury). As previous literature suggests, injured workers are faced with the unyielding bureaucracy and stigmatization from compensation and other public systems (MacEachen et al., 2010; Scott et al., 2018; Kirsh & McKee, 2003; Lippel, 2007; Eakin et al., 2003; Dunstan & MacEachen, 2013; Beardwood et al., 2005). The findings show that workers with permanent impairments experienced stigma from various social settings and actors, many of which came from institutional settings.

While this data was collected at a single point in time, the survey questions captured important over-time experiences of workers who sustained a workplace injury that resulted in a permanent impairment: employment status, income, health were all measured in the pre- and post-injury frame. Such design allows us to assess the temporal order of capital (albeit with the problems associated with recall bias) and to capture the notion of capital accumulation over time. Nevertheless, this dataset has weaknesses, including inference to a larger population of injured workers, the nature of cross-sectional design, the reliance on self-reported data.

It is important to acknowledge that this dataset did not precisely represent all injured workers in Ontario with WSIB recognized work-related injuries resulting in permanent impairment. The survey sample included an over-representation of women and older age categories. The

exclusion of non-English-fluent claimants limited the representation of immigrants and the industry sectors with a large immigrant workforce. The data also did not represent injured workers who have been denied claims or deemed not to be permanently impaired, "no-lost-time" claimants, or injured workers who never filed a claim (O'Hagan et al., 2012; Ballantyne et al., 2016; Casey and Ballantyne, 2017). In addition, the variable selection and construction was limited by the cross-sectional design. For example, I had to reduce the levels of measurement for many variables because of the uneven distribution of the data. This problem can be mitigated by using a longitudinal dataset where data is collected at multiple points in time.

Since the data was collected at a single point in time, errors may occur in recalling life events because of the passage of time between the date of the survey and when the injury occurred. For example, while initially included in the RAACWI survey, details about workers' employment spells (i.e., changes in employment/unemployment after injury) were not included in the analyses here due to incomplete data resulting from respondents' poor recollection of the details of those transitions. Recognizing the data was based on respondents' self report, the series of questions on health conditions were designed to mitigate recall bias. Questions about the presence of diagnosed conditions were clearly framed to respond to an event of "diagnosis" by a health care professional, and they were broken down into discrete components. Each question of the presence and timing of onset of each affirmative health condition has the option of a "don't know" response, which orients the focus of response to the participants' interpretation of the presence of a problem (O'Hagan et al., 2012: 306). Indeed, many studies show that self-reported health and illness is a reliable and valid measure of objective health (Katz et al., 1996; Idler & Benyamini, 1997; Sanchez-Villegas et al., 2008; Bourne, 2009; Fosse & Haas, 2009). And our findings also suggest that self-rated health is a reliable and valid assessment of injured workers' health trajectory.

Workers' self-assessment of health after injury is relative to their status before injury. That is to say, injured workers were not interpreting their health status after injury as related only to their injury that resulted in a permanent impairment. Their perception of health change also consistently matches the numbers of diagnosed conditions and symptoms they reported. That said, readers are urged to keep in mind the possibility of recall errors of self-reported data.

Implications of research for actions

Long-term documentation of injured workers' post-injury health as well as long-term healthcare programs and interventions for injured workers are needed. The findings of my study suggest that embodied cultural capital (post-injury health status) is a key determinant of the recovery of economic capital for workers with permanent impairments. Injured workers with lower post-injury health burden are more likely to have employment and recover their personal income after injury. The findings also show that for these workers, having a permanent impairment has long-term health consequences. Half of injured workers in our sample self-reported at about 52 months after injuries that their health was much worse than the day before their initial work-place injuries. Their perception of health change is supported by the numbers of diagnosed conditions and symptoms developed beyond their initial injuries. This calls for targeting long-term healthcare programs and interventions for workers with permanent impairments. WCB decision-makers should not only be aware of but responsible for the long-term health consequences of permanent impairments. WCB's should work closely with health care providers to provide injured workers with long-term healthcare, which may relieve the health burdens that injured workers accumulated in their disability trajectory and may accelerate their economic recovery.

In addition, the legitimacy of injured workers' rights and issues must be fully recognized. The findings show that workers experienced stigma from various social settings and actors, many

of which came from institutional settings. Although public institutional support offered financial support to injured workers, workers who needed the most support were often the most disadvantaged. To combat the problem of stigmatization, the network of injured worker groups should organize a public education campaign to provide current information about the workplace compensation system, the public institutional supports and individuals who benefit from and depend on the system. The campaign should emphasize that anyone can experience a work-related incident, and it should be a right rather than a privilege to access public support when needed.

Furthermore, WCB's should recognize the potential problems of "re-capitalizing" workers with permanent impairments. Our data indicate that it is not enough to "make whole" the worker with permanent impairments through health care, public institutional support, or labour market retraining. For instance, short-term rehabilitative programs such as mandatory participation in retraining may be inequitable for injured workers with low volumes of capital. Workers who complete a retraining are 'deemed' employable and have their benefits reduced regardless their future employment status. Injured workers who have multiple health conditions or financial stress may be inappropriate to go through retraining programs. Even after completing retraining, injured workers may still have their "cultural competence" in question, and they have to compete against younger and non-disabled bodies with equivalent training in the labour market. In other words, injured workers will carry disadvantage with them as a consequence of their injury. The WCB needs to consider the relative disadvantages of injured workers in this context and should focus on supporting their needs. Short-term rehabilitative programs are perhaps more problematic and maybe not in the scope of the current compensation system.

Future research

Given the limitations of the current study, future research should test Bourdieu's theory of capital in a national representative sample of work-related disabilities. It would be ideal to use a longitudinal dataset that represents a sample of a worker population in Canada. This would include immigrant workers with disabilities, which better represents the industry sectors with a large immigrant workforce. A large sample size would likely to overcome the problem of uneven distribution, allowing multivariate analyses with dependent variables on continuous scales. Multivariate analyses could help further understanding of the relationship between capital and the disability trajectory. In addition, a longitudinal dataset would mitigate some issues of self-reported data. Because data is collected at multiple points in time, the possibility of recall errors would be reduced. For instance, variables such as severity of impairments and quality of employment would be valuable in understanding the disability trajectory.

The analysis of a longitudinal dataset could also further the understanding of how pre-injury forms of capital (such as a link to a tax data that would give a better indication of household and personal income, individuals' work conditions, informal and formal social ties and links) impacts the disability trajectory of injured workers. For example, Jenkins and Rigg (2004) show that individuals with disabilities, on average, have lower pre-existing economic capital (household income and employment) than individuals without disability before disability onset, and this economic gap increases after disability onset. Mithen et al. (2015) show the differences in post-onset social capital and health between individuals with and without disabilities. It would be valuable to measure the changes of individuals' informal and formal social ties and links before and after disability onset, and to test their effects on disability trajectory.

Conclusion

In this study, I tested Bourdieu's theory of capital using a sample of Ontario injured workers with permanent impairments. The findings provide support for the notion that different forms of capital which injured workers possessed and/or acquired/accumulated at different points in time over their disability trajectory affected the different consequences or outcomes of permanent impairments. Hierarchical analyses suggest that factors related to individual characteristics, pre-injury and post-injury forms of capital were associated with injured workers' perceived health change, whereas pre-injury and post-injury capital were most relevant factors in explaining injured workers' post-injury employment status and income recovery.

Specifically, the analyses show various forms of capital that distinguish impaired workers who are employed and not employed at an average of 52 months after their initial injury; workers who retain/improve and lose their personal income from pre- to post-injury; workers who report much worse self-rated health and all others health categories. I note the importance of pre-injury personal income for a better odds of post-injury employment but having medium and high pre-injury income are also associated with a higher risk of losing personal income from pre- to post-injury. I point to the importance of post-injury employment for a better odds of retaining or improved income from pre- to post-injury period. I note the disadvantages of experiencing numerous sources of stigma for heightened risk of reporting much worse self-rated health. I also note the disadvantages of having high scores of institutional support and of having high scores of post-injury health burden for heightened risk of reporting post-injury unemployment, heightened risk of losing personal income from pre- to post-injury, and heightened risk of reporting much worse self-rated health.

Reference

Agresti A and Finlay B (1986). Statistical methods for the social sciences (2nd ed.).

Akaike H (1973). Information Theory and an Extension of the Maximum Likelihood Principle, in *Second International Symposium on Information Theory*, edited by Petrov BN and Csaki F, 267-281.

Allen C (2004). Bourdieu's Habitus, Social Class and the Spatial Worlds of Visually Impaired Children. *Urban Studies, vol. 41(3)*, 487-506.

Asher CC (1984). The Impact of Social Support Networks on Adult Health. *Medical Care, vol. 22 (4)*: 349-359.

Association of Workers' Compensation Boards of Canada (AWCBC). Customized Key Statistical Measures Report; 2019. Available at: http://awcbc.org/?page_id=9755. Accessed October 15, 2019

Ballantyne PJ, Casey R, O'Hagan FT, Vienneau P (2016). Poverty status of worker compensation claimants with permanent impairment. *Critical Public Health, vol. 26(2)*: 173-190.

Beardwood BA, Kirsh B, Clark NJ (2005). Victims Twice Over: Perceptions and Experiences of Injured Workers. *Qualitative health research, vol.15 (1)*: 30-48.

Becker GS (1962). "Investment in Human Capital: A Theoretical Analysis", in Investment in Human Beings. *The Journal of Political Economy, vol. LXX (5)*: 9-49.

Bourdieu P (1986). "The Forms of Capital", in Handbook of Theory and Research for the Sociology of Education. Available at: https://www.marxists.org/reference/subject/philosophy/works/fr/bourdieu-forms-capital.htm. Accessed October 15, 2019.

Bourdieu P (1990). The Logic of Practice.

Bourdieu P (2013). Symbolic capital and social classes. *Journal of Classical Sociology, vol. 13 (2)*: 292-302.

Bourne PA (2009). The validity of using self-reported illness to measure objective health. *N Am J Med Sci., vol. 1 (5)*: 232-238.

Brown JA, McDonough P, Mustard CA, Shannon HS (2006). Healthcare use before and after a workplace injury in British Columbia, Canada. *Occup Environ Med, 63*: 396-403.

Brown JA, Shannon HS, Mustard CA, McDonough P (2007). Social and Economic Consequences of Workplace Injury: A Population-Based Study of Workers in British Columbia, Canada. *American Journal of Industrial Medicine, 50*: 633-645.

Casey R and Ballantyne PJ (2017). Diagnosed Chronic Health Conditions Among Injured Workers With Permanent Impairments and the General Population. *JOEM, vol. 59(5)*: 486-496.

Cater B, Kang S, Lew B, Pollanen M (2013). Permanent Injury and the Disability-Mitigating Effects of Education. *Economics Bulletin, vol. 33 (3)*: 2064-2079.

Clough-Gorr KM, Ganz PA, Silliman RA (2007). Older Breast Cancer Survivors: Factors Associated With Change in Emotional Well-Being. *Journal of Clinical Oncology, vol. 25 (11)*: 1334-1340.

Cohen J and Cohen P (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.).

Cox DR and Snell EJ (1989). The analysis of binary data (2nd ed.).

Cohen BH (2001). Explaining psychological statistics (2nd ed.).

Daley A, Phipps S., Branscombe NR (2018). The social complexities of disabilities: Discrimination, belonging and life satisfaction among Canadian youth. *SSM- Population Health, vol. 5*: 55-63.

Denton M, Plenderleith J and Chowhan J (2013). Health and Disability as Determinants for Involuntary Retirement of People with Disabilities. *Canadian Journal on Aging, vol. 32 (2)*: 159-172.

Dunstan DA and MacEachen E. (2013). Bearing the brunt: co-workers' experiences of work reintegration processes. *J Occup Rehabil., vol. 23 (1)*: 44-54.

Eakin JM, MacEachen E, Clarke J (2003). 'Playing it smart' with return to work: small workplace experience under Ontario's policy of self-reliance and early return. *Policy and Practice in Health and Safety, vol. 1 (2)*: 19-41.

Edwards C and Imrie R (2003). Disability and Bodies as Bearers of Value. *Sociology, vol. 37 (2)*: 239-256.

Efron B (1978). Regression and ANOVA with Zero-One Data: Measures of Residual Variation. *Journal of the American Statistical Association, vol. 73*, 113-121.

Emerson E, Kariuki M, Honey A, Llewellyn G (2014). Becoming disabled: The association between disability onset in younger adults and subsequent changes in productive engagement, social support, financial hardship and subjective wellbeing. *Disability and health Journal, 7*: 448-456.

Erin OA, Kolawole AD, Noah AO (2020). Risk governance and cybercrime: the hierarchical regression approach. *Future Business Journal, 6(12)*: 1-15.

Fortin M, Hudon C, Haggerty J, van den Akker M, Almirall J (2010). Prevalence estimates of multimorbidity: A comparative study of two sources. *BMC health Serv Res. vol. 10*: 111-116.

Fosse NE and Haas SA (2009). Validity and stability of self-reported health among adolescents in a longitudinal, nationally representative survey. *Prediatrics, vol. 123 (3)*: 496-501.

Gatsonis CA, Epstein AM, Newhouse JP, Normand SL, McNeil BJ (1995). Variations in the Utilization of Coronary Angiography for Elderly Patients with an Acute Myocardial Infarction: An analysis Using Hierarchical Logistic Regression. *Medical Care, 33 (6)*: 625-642.

Goldin C (2019). Human Capital. *Handbook of Cliomerics*. Available at: https://scholar.harvard.edu/files/goldin/files/human_capital_handbook_of_cliometrics_0.pdf. Accessed October 15, 2019.

Hagle TM and Mitchell GE (1992). Goodness-of-fit measures for probit and logit. *American Journal of Political Science, vol. 36*, 762-784.

Houpt JA and Bittner JL (2018). Analyzing thresholds and efficiency with hierarchical Bayesian logistic regression. *Vision Research, 148*: 49-58.

Hu B and Palta M (2006). Pseudo R^2 in logistic regression model. *Statistica Sinica, vol. 16*, 847-860.

Hurria A, Lichtman SM, Gardes J, Li D, Limaye S, Patil S, Zuckerman E, Tew W, Hamlin P, Abou-Alfa GK, Lacbs M, Kelly E (2007). Identifying Vulnerable Older Adults with Cancer: Integrating Geriatric Assessment into Oncology Practice. *JAGS, 55*: 1604-1608.

Idler EL and Benyamini Y (1997). Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies. *Journal of Health and Social Behavior, vol. 38 (1)*: 21-37.

Jenkins SP and Rigg JA (2004). Disability and Disadvantage: Selection, Onset, and Duration Effects. *Journal of Social Policy, vol. 33 (3)*: 479-501.

Katz JN, Punnett L, Simmons BP, Fossel AH, Mooney N and Keller RB (1996). Workers' Compensation Recipients with Carpal Tunnel Syndrome: The Validity of Self-Reported Health Measures. *American Journal of Public Health, vol. 86 (1)*: 52-56.

Kavanagh AM, Aitken Z, Krnjacki L, LaMontagne AD, Bentley R, Milner A (2015). Mental Health Following Acquisition of Disability in Adulthood –The Impact of Wealth. *PLOS ONE, vol. 10 (10)*: 1-13.

Khazaee-Pool M, Bahrami M, Luque JS, Pashaei T, Taymoori P, Roshani D (2018). Validation of the Farsi version of the medical outcomes study-social support survey for mammography. *BMC Public Health, 18*: 1-10.

Kinne S, Patrick DL, Doyle DL (2004). Prevalence of Secondary Conditions Among People With Disabilities. *American Journal of Public Health, vol. 93 (3)*: 443-445.

Kirsh B and McKee P (2003). The needs and experiences of injured workers: A participatory research study. *Work, vol. 21(3)*: 221-231.

Kirsh B, Slack T, King CA (2012). The Nature and Impact of Stigma Towards Injured Workers. *J Occup Rehabil, 22*: 143-154.

Kosny A, Newnam S, Collie A (2018). Family matters: compensable injury and the effect on family. *Disability and Rehabilitation, vol. 40 (8)*: 935-944.

Kuha J (2004). AIC and BIC: Comparisons of Assumptions and Performance. *Sociological Methods & Research, vol. 33 (2),* 188-229.

Lilley R, Davie G, Ameratunga S, Derrett S (2012). Factors predicting work status 3 months after injury: results from the Prospective Outcomes of Injury Study. *BMJ Open, 2*: 1-11.

Lin J, Myers MF, Koehly LM, Marcum CS (2019). A Bayesian hierarchical logistic regression model of multiple informant family health histories. *BMC Medical Research Methodology, 19: 56*: 1-10.

Lippel K (2003). The private policing of injured workers in Canada: legitimate management practices or human rights violations? *Policy and Practice in Health and Safety, vol. 1 (2)*: 97-118.

MacEachen E, Kosny A, Ferrier S and Chambers L (2010). The "Toxic Dose" of System Problems: Why Some Injured Workers Don't Return to Work as Expected. *J Occup Rehabil, vol. 20 (3)*: 349-366.

MacEachen E, Kosny A, Ferrier S, Lippel K, Neilson C, Franche RL, Pugliese D (2012). The 'Ability' Paradigm in Vocational Rehabilitation: Challenges in an Ontario Injured Worker Retraining Program. *J Occup Rehabil, 22*: 105-117.

Maddala GS (1983). Limited dependent and qualitative variables in economics.

McFadden D (1974). The Measurement of Urban Travel Demand. *Journal of Public Economics, vol. 3,* 303-328.

McFadden D (1977). Quantitative methods for analyzing travel behaviour of individuals: some recent development. *Cowles foundation discussion paper (474),* 1-47.

McKelvey RD and Zavoina W (1975). A statistical model for the analysis of ordinal level dependent variables. *Journal of Mathematical Sociology, vol. 4,* 103-112.

Menard S (2000). Coefficients of Determination for Multiple Logistic Regression Analysis. *The American Statistician, vol. 54 (1),* 17-24.

Mithen J, Aitken Z, Ziersch A, Kavanagh AM (2015). Inequalities in social capital and health between people with and without disabilities. *Social Science & Medicine, 126*: 26-35.

Mohammed MA, Manktelow BN, Hofer TP (2016). Comparison of hour methods for deriving hospital standardised mortality ratios from a single hierarchical logistic regression model. *Statistical Methods in Medical Research, 25(2)*: 706-715.

Morris S, Fawcett G, Brisebois L, Hughes J (2018). A demographic, employment and income profile of Canadians with disabilities aged 15 years and over, 2017. *Statistics Canada*. Available at: https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2018002-eng.htm. Accessed Nov. 24, 2021.

Moser A, Stuck AE, Silliman RA, Ganz PA, Clough-Gorr KM (2012). The eight-item modified Medical Outcomes Study Social Support Survey: psychometric evaluation showed excellent performance. *J Clin Epidemiol., vol. 65 (10)*: 1107-1116.

Nagelkerke NJD (1991). A note on a general definition of the coefficient of determination. *Biometrika, vol. 78,* 691-692.

Newman L, Browne-Yung K, Raghavendra P, Wood D, Grace E (2017). Applying a critical approach to investigate barriers to digital inclusion and online social networking among young people with disabilities. *Information Systems Journal, 27*: 559-588.

O'Hagan FT, Ballantyne PJ, Vienneau P (2012). Mental Health Status of Ontario Injured Workers With Permanent Impairments. *Canadian Journal of Public Health, vol. 103(4)*: 303-308.

Paccoud I, Nazroo J and Leist A (2020). A Bourdieusian approach to class-related inequalities: the role of capitals and capital structure in the utilisation of healthcare services in later life. *Sociology of Health & Illness, vol. 42 (3)*: 510-525.

Parr H and Butler R (1999). "New geographies of illness, impairment and disability", in Mind and Body Spaces: Geographies of Illness, Impairment and Disability: 1-24.

Pettinicchio D and Maroto ML (2017). "Employment Outcomes Among Men and Women with Disabilities: How the Intersection of Gender and Disability Status Shapes Labor Market Inequality", in Factors in Studying Employment for Persons with Disability: 3-33.

Polidano C and Vu H (2015). Differential labour market impacts from disability onset. *Health Economics, 24*: 302-317.

Sanchez-Villegas A, Schlatter J, Ortuno F, Lahortiga F, Pla J, Benito S and Martinez-Gonzalez A (2008). Validity of a self-reported diagnosis of depression among participants in cohort study using the structured clinical interview for DSM-IV (SCID-1). *BMC Psychiatry, vol. 8 (43)*: 1-8.

Schwarz G (1978). Estimating the Dimension of a Model. *Annals of Statistics, vol. 6,* 461-464.

Scott K, Liao Q, Fisher GG, Stallones L, DiGuiseppi C, Tompa E (2018). Early labor force exit subsequent to permanently impairing occupational injury or illness among workers 50-64 years of age. *Am J Ind Med, 61*: 317–325.

Scott-Marshall H, Tompa E, Liao Q, Fang M (2013). Marital formation in individuals with work-related permanent impairment. *Disability and Health Journal, 6*: 43-51.

Sherbourne CD and Stewart AL (1991). The MOS Social Support Survey. *Soc. Sci. Med., vol. 32 (6)*: 705-714.

Shilling C (1993). "The body and physical capital", in The Body and Social Theory: 127-149.

Smith TJ and McKenna CM (2013). A Comparison of Logistic Regression Pseudo R^2 Indices. *Multiple Linear Regression Viewpoints, vol. 39 (2),* 17-26.

Stone W, Gray M and Hughes J (2003). Social capital at work: how family, friends and civic ties relate to labour market outcomes. *Australian Institute of Family Studies (31)*: 1-34.

Tabachnick BG and Fidell LS (2001). Chapter 12: Logistic Regression, in Using Multivariate Statistics (4th ed.), 517-581.

Tarasuk V and Eakin JM (1995). The Problem of Legitimacy in the Experience of Work-Related Back Injury. *Qualitative health research, vol. 5 (2)*: 204-221.

Taylor MG (2011). The Causal Pathway From Socioeconomic Status to Disability Trajectories in Later Life: The Importance of Mediating Mechanisms for Onset and Accumulation. *Research on Aging, vol. 33 (1)*: 84-108.

Townsend RC, Huntley T, Cushion CJ, Fitzgerald H (2018). 'It's not about disability, I want to win as many medals as possible': The social construction of disability in high-performance coaching. *International Review for the Sociology of Sport*: 1-17.

Veall MR and Zimmermann KF (1994). Evaluating pseudo R^2's for binary probit models. *Quality and Quantity, vol. 28*, 151-164.

Wall K. (2017). Low income among persons with a disability in Canada. *Statistics Canada*. Available at: https://www150.statcan.gc.ca/n1/pub/75-006-x/2017001/article/54854-eng.htm. Accessed Nov. 24, 2021.

Wei L and Kondo FN (2019). Exploring Important Motivation Drivers for Completion of Massive Open Online Courses by Bayesian Hierarchical Logistic Regression Model. *8th International Congress on Advanced Applied Informatics, IIAI-AAI*: 196-202.

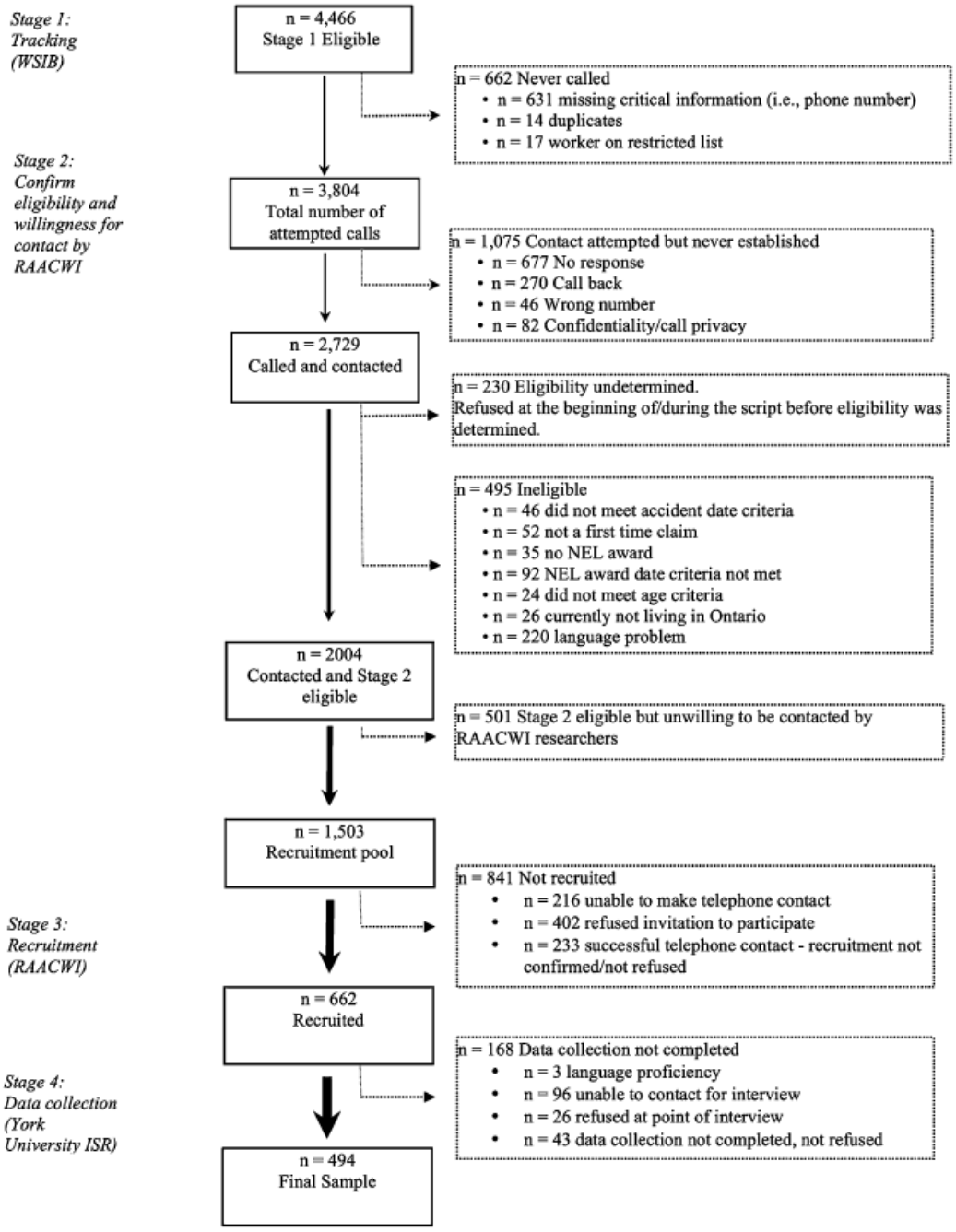
Wong GY and Mason WM (1985). The Hierarchical Logistic Regression Model for Multilevel Analysis. *Journal of the American Statistical Association, 80 (391)*: 513-524.

Workplace Safety and Insurance Board (WSIB). Benefits for non-economic loss; 2019. Available at: http:// www.wsib.ca/en/benefits-non-economic-loss. Accessed October 15, 2019.

Yu Y, Yang JP, Shiu CS, Simoni JM, Xiao SY, Chen WT, Rao D, Wang MJ (2015). Psychometric testing of the Chinese version of the Medical Outcomes Study Social Support Survey among people living with HIV/AIDS in China. *Applied Nursing Research, 28*: 328-333.

Appendix 1: Recruitment Procedure and Participant Flow

Figure of recruitment procedure and participant flow from O'Hagan et al. (2012) and Ballantyne et al. (2016):



Appendix 2: Income and Income recovery

Participants were asked to report both their pre-injury and post-injury personal incomes. Specifically, participants were asked to recall their personal income at the time of workplace incident: "*We want to ask about your income and benefits at the time of your workplace accident. Could you please tell me before your accident, what was your total annual income, before taxes and deductions, from all sources?*" (Response categories: 'less than $1000'; '1-997 enter amount (2 for $2,000, 20 for $20,000, 120 for $120,000)'; 'don't know'; 'refused'). For respondents who said 'don't know' or 'refused', they were asked to identify which broad income categories their income falls into: "*We don't need the exact amount; could you tell me which of these broad categories it falls into.*" (Response categories: 'less than $20,000'; 'between $20,000 and $30,000 ($29,999.99)'; 'between $30,000 and $40,000'; 'between $40,000 and $50,000'; 'between $50,000 and $60,000'; 'between $60,000 and $70,000'; 'between $70,000 and $80,000'; 'between $80,000 and $90,000'; 'between $90,000 and $100,000'; 'between $100,000 and $120,000'; 'between $120,000 and $150,000'; 'more than $150,000'; 'don't know'; 'refused').

Similarly, participants were asked to recall their post-injury personal income: "*What about you personally, how much income did you received in the year ending December 31st 2007, before tax. Please include income from all sources such as savings, pensions, rent, as well as wages. To the nearest thousand dollars, what was your total income before taxes and other deductions were made?*" For respondents who said 'don't know' or 'refused', they were asked to identify which broad income categories their income falls into: "*We don't need the exact amount; could you tell me which of these broad categories it falls into.*" (The response categories for post-injury personal income were identical to pre-injury personal income).

Both pre-injury and post-injury personal income were imputed in order to increase response rates. According to Ballantyne et al. (2016: 188), the response rates for pre-injury and post-injury personal income were 83% and 89.5%. An additional 15% and 9% elected to report personal income as a category from among 12 categorical responses for pre-injury and post-injury personal income. The mid-point of the income category was imputed for personal income in these cases. This resulted in personal income data for 98% of the sample in the pre-injury period, and for 98.4% of the sample in the post-injury period.

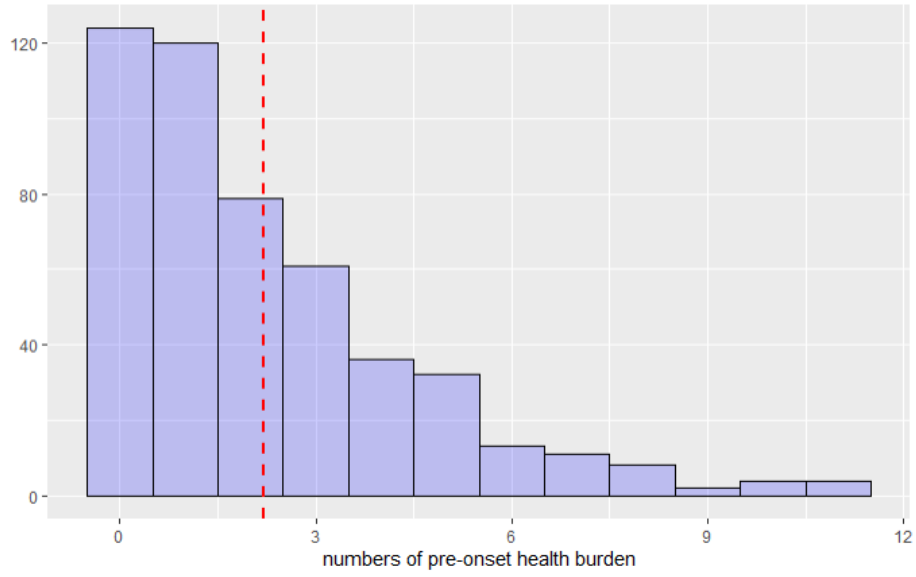
Appendix 3: Pre-injury health burden & post-injury health burden

The RAACWI survey includes 48 questions, measuring 42 diagnosed conditions and reported symptoms (such as allergies, asthma, arthritis, back problems, hypertension, migraine headaches, diabetes, memory impairment, depression, medication or alcohol abuse, anxiety, musculo-skeletal pain, and concentration problems). Six overlapping questions were asked in both diagnosed conditions and symptoms: depression, back problems, digestive problems, nerve pain, musculo-skeletal pain, and substance abuse. Among the 42 diagnosed conditions and symptoms, participants were asked whether they have diagnosed depression: "*We are interested in long-term conditions, that have lasted or are expected to last 6 months or more and have been diagnosed by a health professional. Have you been diagnosed with depression by a health professional?*" (response categories: 'yes'; 'no'; 'don't know'; 'refused'). For affirmative responses, participants were asked whether the diagnosis was made before or after their injury: "*Did it start before or after your first workplace accident?*" (response categories: 'before'; 'after'; 'don't know'; 'refused'). Similarly, participants were asked whether they have symptoms of musculo-skeletal pain: "*Now some questions about any additional long-term health conditions that have not been diagnosed by a health professional, but have an effect on your life. Do you experience musculo-skeletal pain?*" For affirmative responses, participants were asked whether the diagnosis was made before or after their injury: "*Did it start before or after your first workplace accident?*" (response categories: 'before'; 'after'; 'don't know'; 'refused').

To measure participants' 'health burden', 48 binary variables were constructed from 48 questions of health conditions which a score of 1 was assigned to each reported 'yes' of health condition, and a score 0 was assigned to participants who reported 'no' to each condition If a participant reported affirmative to the overlapping diagnosed conditions and symptoms (such as

both diagnosed depression and symptom of depression), it would only count as one condition to the finial score of heath burden variable. The derived continuous variable 'pre-injury health burden' was constructed as a sum of a maximum of 42 diagnoses conditions and symptoms reported by participants as present before their workplace injury. The number of observed pre-injury conditions ranged from 0 to 11. The mean (sd) was 2.2 (2.3). Low scores of 'pre-injury health burden' indicate high pre-injury embodied cultural capital. The frequency distribution of pre-injury health burden is shown in the figure below:

Frequency distribution of pre-injury health burden



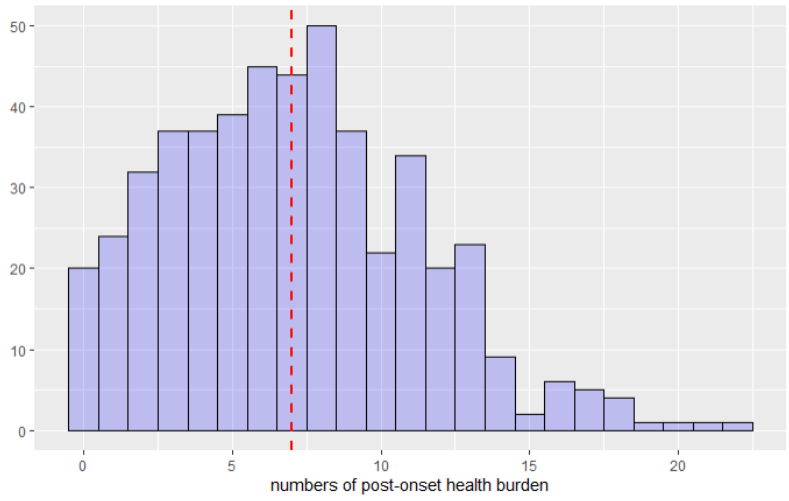
Note: There were 494 responses. Among the 42 diagnosed conditions and symptoms, the number of reported pre-injury conditions ranged from 0 to 11. The mean (sd) was 2.2 (2.3).

About 25% (124) of the participants reported they had no health conditions before injury, and about 40% (199) reported they had 1 to 2 diagnosed conditions or symptoms before their injury.

Similarly, the continuous variable 'post-injury health burden' is also based on the list of 48 questions about 42 diagnosed conditions and reported symptoms. It is a sum of the total numbers

of diagnosed conditions and symptoms reported to have emerged after the workplace injury. For instance, participants were asked whether they have diagnosed diabetes: "*Have you been diagnosed with diabetes by a health professional?*" (response categories: 'yes'; 'no'; 'don't know'; 'refused'). For affirmative responses, participants were asked whether the diagnosis was made before or after their injury: "*Did it start before or after your first workplace accident?*" (response categories: 'before'; 'after'; 'don't know'; 'refused'). One condition is counted if participants reported ('yes') that they have been diagnosed with diabetes, and they reported ('after') that the condition have emerged after the workplace injury. The number of post-injury conditions ranged from 0 to 22. The mean (sd) was 7 (4.2). The frequency distribution of post-injury health burden is shown in the figure below:

Frequency distribution of post-injury health burden



Note: There were 494 responses. Among the 48 diagnosed conditions and symptoms, the number of reported post-injury conditions ranged from 0 to 22. The mean (sd) was 7 (4.2).

About 30% (150) reported they had none to four post-injury health conditions, about 36% (178) reported they had five to eight conditions, and about 34% (166) reported they had nine or more health conditions that emerged after the occurrence of their workplace injury.

Appendix 4: Informal social support

The original MOS-SS survey questions from Sherbourne and Stewart (1991):

MOS Social Support Survey

Next are some questions about the support that is available to you.

1. About how many close friends and close relatives do you have (people you feel at ease with and can talk to about what is on your mind)?

   Write in number of close friends and close relatives: ☐☐

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

(Circle One Number On Each Line)

	None of the Time	A Little of the Time	Some of the Time	Most of the Time	All of the Time
2. Someone to help you if you were confined to bed	1	2	3	4	5
3. Someone you can count on to listen to you when you need to talk	1	2	3	4	5
4. Someone to give you good advice about a crisis	1	2	3	4	5
5. Someone to take you to the doctor if you needed it	1	2	3	4	5
6. Someone who shows you love and affection	1	2	3	4	5
7. Someone to have a good time with	1	2	3	4	5
8. Someone to give you information to help you understand a situation	1	2	3	4	5
9. Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
10. Someone who hugs you	1	2	3	4	5
11. Someone to get together with for relaxation	1	2	3	4	5
12. Someone to prepare your meals if you were unable to do it yourself	1	2	3	4	5
13. Someone whose advice you really want	1	2	3	4	5
14. Someone to do things with to help you get your mind off things	1	2	3	4	5
15. Someone to help with daily chores if you were sick	1	2	3	4	5
16. Someone to share your most private worries and fears with	1	2	3	4	5
17. Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
18. Someone to do something enjoyable with	1	2	3	4	5
19. Someone who understands your problems	1	2	3	4	5
20. Someone to love and make you feel wanted	1	2	3	4	5

The lists of survey questions of four dimensions (question 1 and 14 are not included in the dimensions) and their distribution are shown below:

Tangible [instrumental] support with 4 questions: 2) Someone to help you if you were confined to bed. 5) Someone to take you to the doctor if you needed it. 12) Someone to prepare your meals if you were unable to do it yourself. 15) Someone to help with daily chores if you were sick. There were 480 responses with 14 missing cases. The range of tangible support scores was between 4 and 20. The mean tangible support scores (sd) was 14 (4.3).

Affectionate support with 3 questions: 6) Someone who shows you love and affection. 10) Someone who hugs you. 20) Someone to love you and make you feel wanted. There were 484 responses with 10 missing cases. The range of affectionate support scores was between 3 and 15. The mean affectionate support scores (sd) was 12.4 (3.1).

Positive social interaction with 3 questions: 7) Someone to have a good time with. 11) Someone to get together with for relaxation. 18) Someone to do something enjoyable with. There were 481 responses with 13 missing cases. The range of positive social interaction scores was between 3 and 15. The mean positive social interaction scores (sd) was 11.5 (3.2).

Informational and emotional support with 8 questions: 3) Someone you can count on to listen to you when you need to talk. 4) Someone to give you good advice about a crisis. 8) Someone to give you information to help you understand a situation. 9) Someone to confide in or talk to about yourself or your problems. 13) Someone whose advice you really want. 16) Someone to share your most private worries and fears with. 17) Someone to turn to for suggestions about how to deal with a personal problem. 19) Someone who understands your problem. There were 471 responses with 23 missing cases. The range of informational and emotional support scores was between 8 and 40. The mean scores (sd) was 29.8 (8). The distribution summary of four dimensions is shown in the table below:

Distribution table of dimensions of informal support

Dimensions of informal support:	*n*	*Score range*	*Mean (SD)*
Tangible support	480	4-20	14 (4.3)
Affectionate support	484	3-15	12.4 (3.1)
Informational and emotional support	471	8-40	29.8 (8)
Positive social interaction	481	3-15	11.5 (3.2)

Individual dimensions of informal support were not included in the analysis for two reasons. First of all, the imputed total scores of MOS improved the overall response rates for the informal support variable. The valid response rate for all 19 items was 91.5%. An additional 4.7% received imputed values for cases with a single missing item in the four dimensions. This resulted in a total of 96.2% (n = 475) valid response rates for the variable. Secondly, individual dimensions of informal support were highly correlated. Similar to the findings of Sherbourne and Stewart (1991: 709), the four dimensions of informal support are highly and significantly correlated in the RAACWI dataset. The correlation matrix is shown below:

Correlation matrix of individual dimensions of informal support

	TS	AS	IES	PSI
Tangible support (TS)	1	0.68***	0.72***	0.73***
Affectionate support (AS)	0.68***	1	0.71***	0.79***
Informational and emotional support (IES)	0.72***		1	0.83***
Positive social interaction (PSI)	0.73***	0.79***	0.83***	1

Note: Pearson correlation is used to determine the test of significance: ***p < 0.001; **p < 0.01; *p< 0.05.

In addition, the first question of the original MOS-SS survey ("how many close friends and close relatives do you have?") was considered as a possible independent variable for measuring participants' number of social ties. The frequency table of the 'number of social ties' is shown below:

Frequency table of the umber of social ties

	n	%	%cum
0	23	4.7	4.7
1	29	5.9	10.5
2	59	11.9	22.5
3	54	10.9	33.4
4	41	8.3	41.7
5	55	11.1	52.8
6	29	5.9	58.7
7	13	2.6	61.3
8	16	3.2	64.6
9	2	0.4	65.0
10	67	13.6	78.5
12	15	3.0	81.6
13	1	0.2	81.8
14	2	0.4	82.2
15	20	4.0	86.2
16	1	0.2	86.4
20	25	5.1	91.5
23	1	0.2	91.7
25	4	0.8	92.5
30	11	2.2	94.7
40	3	0.6	95.3
45	1	0.2	95.5
50	2	0.4	96.0
51	10	2.0	98.0
NA	10	2.0	100.0
Total	494	100.0	100.0

Note: Participants were asked “how many close friends and close relatives do you have?” There were 484 valid responses. About 33% (165) reported they had zero to three social tie(s), about 32% (156) reported they had four to nine social ties, and 35% (163) reported they had more than nine social ties.

The ‘number of social ties’ was not included in the current analyses because its distribution was heavily skewed, and it did not account for additional variance accounted in each of the regression models. For example, ‘number of social ties’ (as an additional variable in step 3 of the hierarchical logistic regression) explained an additional of 0.2% variance in post-injury employment status (an additional of 0.1% variance in income recovery; an additional of 0.3% variance in perceived health changes).

Appendix 5: Measurement of Institutional support

Fourteen survey questions of income sources are shown blow (Response categories: 'yes'; 'no'; 'don't know'; 'refused'):

1) "*Did you get income from employment insurance in 2007?*;

2) *Did you get income from workers' compensation in 2007?*;

3) *Did you get retirement benefits from Canada Pension Plan in 2007?*;

4) *Did you get disability pension from Canada or Quebec Pension Plan in 2007?*;

5) *Did you get income from insurance plans, such as a private or employer disability insurance plan or motor vehicle accident insurance in 2007?*;

6) *Did you get income from a veteran disability pension plan in 2007?*;

7) *Did you get income from provincial or municipal social assistance or welfare in 2007?*;

8) *Did you get income from the child tax benefit in 2007?*;

9) *Did you get retirement income from a private pension plan in 2007?*;

10) *What loss of earnings are you receiving each month?*;

11) *Did you get income from other income sources, such as dividends and interest on bounds, deposits and savings, alimony, child support, scholarships etc. in 2007?*;

12) *Did you have other income (for example federal or provincial assistance) not mentioned above etc. in 2007?*;

13) *Did you get income from wages and salaries in 2007?*;

14) *Did you get income from self-employment in 2007?"*

Among these sources of income, ten sources reflect the different types of institutional support provided by public institutions. Ten sources are listed in the table below, with frequencies of 'yes' responses for each:

Frequency table of institutional support

Ten sources of income	n	%
1) employment insurance	56	11.3
2) workers' compensation	261	53
3) CPP retirement benefits	12	2.4
4) CPP disability pension from Canada	25	5.1
5) private or employer disability insurance plan/motor vehicle accident insurance	20	4
6) veteran disability pension plan	2	0.4
7) provincial or municipal social assistance or welfare	25	5.1
8) child tax benefit	107	21.7
9) private pension plan	21	4.3
10) other income (e.g. federal or provincial assistance)	19	3.8

Notes: Participants were asked whether they received any income sources from public institutions. Sources of income were made up of these 10 individual items for describing different h income sources. The denominator for each cell is 494 cases.

The observed range of institutional support was from 0 to 5, meaning some participants reported having no support from public institutions, while some reported having five different sources of institutional support. About 26% (126) of respondents reported no institutional support, and about 47% (234) had one source of support, and about 27% (134) had two to five sources of support.

Appendix 6: Measurement of 'negative support' based on perceived stigma

The main question about the experience of stigma and the subsequent twelve questions of stigma sources with a are listed in the table below, with frequencies of 'yes' responses for each:

Frequency table showing presence of stigma and perceived sources of stigma

Sources of stigma	n	%
Do you experience stigma as an injured worker (Yes/No)	325	65.8
1) a family member	110	22.3
2) a friend	135	27.3
3) an acquaintance	159	32.2
4) a neighbour	86	17.4
5) a community member	120	24.3
6) a co-worker	224	45.3
7) a work supervisor	199	40.3
8) any other workplace personnel	164	33.2
9) a medical doctor	100	20.2
10) other medical staff such as a nurse, office staff, etc	58	11.7
11) a prospective employer	86	17.4
12) WSIB staff	194	39.3

Notes: Participants were asked whether they experienced stigma as an injured worker: 325 indicated affirmatively; 165 indicated 'no', and 4 refused or were uncertain about their experience of stigma. Those responding affirmatively were asked about the sources of stigma. The denominator for each cell is 494. Among 494 cases, the most common reported sources of stigma came from a co-worker (45.3%, n = 224), a work supervisor (40.3%, n = 199), and WSIB staff (39.3%, n = 194).

Twelve binary variables were constructed from these twelve sources of stigma which a score of 1 was assigned to each reported 'yes' of stigma source, and a score 0 was assigned to participants who reported 'no' to each source or who reported uncertainty about stigma or any of the sources. The derived interval variable 'stigma scores' was constructed by summing up the 12

binary variables of stigma sources with the general question about the experience of stigma. The higher scores indicate higher perceived sources of stigma. The frequency table of stigma scores is shown below:

Frequency table of stigma scores

	n	%	%cum
0	170	34.4	34.4
1	26	5.3	39.7
2	28	5.7	45.3
3	45	9.1	54.5
4	56	11.3	65.8
5	54	10.9	76.7
6	35	7.1	83.8
7	22	4.5	88.3
8	22	4.5	92.7
9	17	3.4	96.2
10	8	1.6	97.8
11	6	1.2	99.0
12	5	1.0	100.0
Total	494	100.0	100.0

Note: A score of 1 was assigned to each reported 'yes' of stigma source, and a score 0 was assigned to participants who reported 'no' to each source or who reported uncertainty about stigma or any of the sources. The derived interval variable 'stigma scores' was constructed by summing up the 12 binary variables of stigma sources with the general question about the experience of stigma. The range of stigma scores was between 0 (no stigma reported) and 12 (12 sources of stigma affirmed). The mean scores (sd) was 3.3 (3.2).

Due to heavily skewed distribution, I constructed a dummy variable 'perceived stigma' with three categories to reflect the variations of absence or presence of social support: about 35% (175) of injured workers who reported no perceived stigma (served as the reference category for this dummy variable); about 31% (155) reported that they experienced one to four sources of stigma; and 34% (164) reported they experienced five to twelve sources of stigma.

Appendix 7: Correlation matrix

The correlation matrix for the continuous variables in the current analysis is shown below:

Correlation matrix for scores on pre-injury health burden, post-injury health burden, informal social support and institutional support

	Pre-injury health burden	Post-injury health burden	Informal social support	Institutional support
Pre-injury health burden	1	0.37***	-0.07	0.01
Post-injury health burden	0.37***	1	-0.32***	0.32***
Informal social support	-0.07	-0.32***	1	-0.14**
Institutional support	0.01	0.32***	-0.14**	1

Note: Pearson correlation is used to determine the test of significance: ***$p < 0.001$; **$p < 0.01$; *$p< 0.05$.

The table shows that post-injury health burden is significantly and independently correlated with pre-injury health burden, informal support and institutional support ($p < 0.001$) with a moderate effect size (Cohen, 1988). Informal social support is significantly correlated with institutional support ($p < 0.01$) with a modest effect size.

Appendix 8: Severity of impairments

Participants were asked to report their designated percentage of impairment which was assigned by the WSIB when a claimant is assessed as having reached maximum medical rehabilitation. It was not included in the current analyses because 41.4% reported ‘don’t know’ for their percentage impairment. For those who reported their designated impairment level, the average impairment rating was about 20% and the medium was about 15%.