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Master thesis

Employment and socioeconomic status among individuals with spinal cord injury in Norway

a longitudinal cohort study

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Abstract

Background: Spinal Cord Injury (SCI) is a severe neurological condition with long-term consequences affecting several dimensions of life, including physical function, social participation, and economic well-being. In Norway, despite a robust welfare system and advanced rehabilitation services, individuals with SCI continue to encounter persistent barriers to employment and socio-economic integration. This study examined longitudinal changes in employment and subjective social status over a six-year follow-up period among individuals with SCI in Norway, and explored factors associated with financial satisfaction.

Methods: Data were drawn from participants (n = 236) who responded to both rounds of the Norwegian arm of the International Spinal Cord Injury Survey (InSCI) (2017/2018 and 2023/2024). Descriptive analyses, paired statistical tests, and multivariable regression models were used to assess changes in employment and subjective social status, and to examine factors associated with these outcomes and with financial satisfaction at follow-up.

Results: Employment and subjective social status remained relatively stable over time, with baseline status emerging as the strongest predictor of follow-up outcomes. A modest, non-significant decline in employment was observed, partly reflecting age-related transitions. No significant changes in subjective social status were detected across survey rounds. Younger age and higher education were associated with increased odds of employment, whereas injury-related characteristics showed limited associations overall, except for complete tetraplegia. Employment was associated with higher financial satisfaction, although this association was attenuated after adjusting for household income. Among non-employed participants, a desire for paid work was linked to lower financial satisfaction.

Conclusion: The findings highlight stability in employment and subjective social status among individuals with SCI in Norway. Continued employment was strongly associated with prior employment, while transition into work remained limited. In combination with the stable subjective social status, these results suggest that subjective socioeconomic well-being may not necessarily align with objective socioeconomic circumstances. Together, these findings underscore the importance of considering both dimensions of socioeconomic well-being following SCI and call for tailored policies and rehabilitation approaches to support labor market inclusion and financial satisfaction in this population.

Keywords: InSCI, spinal cord injury, employment, subjective social status, Norway, longitudinal study

Acknowledgement

This thesis marks the completion of my master's degree in Public Health and Epidemiology at the University of Oslo, concluding an academic journey comprised of one bachelor's degree and two master's degrees – a period that has been incredibly exciting and meaningful.

The opportunity to work with longitudinal data from the InSCI-Nor study has been both academically challenging and highly rewarding, and the process has further strengthened my interest in the intersection between health, statistics, social participation, and welfare.

I would like to sincerely thank my supervisors, Vegard Strøm and Frank Becker, for their time, guidance, support, and constructive feedback throughout this process. Both have been incredibly passionate and inspiring role models, contributing to my experience during the final stage of this degree. I am very grateful for the opportunity to work with the InSCI-Nor data.

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Abbreviations

American Spinal Injury Association Impairment Scale – AIS

SES – socioeconomic status

SCI – spinal cord injury

InSCI – International Spinal Cord Injury Survey

InSCI-Nor – the Norwegian arm of the International Spinal Cord Injury Survey

ICF – International Classification of Functioning, Disability and Health

YLD – years lived with disability

R1 – Round 1 (R1)

R2 – Round 2 (R2)

WHO – World Health Organization

Definitions within this thesis

Employment

In this thesis, employment is defined by the survey question: ´Do you have paid work?`(yes/no). This measure does not distinguish between contract type, occupation, or working hours. The terms employment, paid work, and (paid) labor are used interchangeably throughout the thesis and refer to this binary indicator.

InSCI survey waves

This longitudinal cohort study examines changes between two waves of the International Spinal Cord Injury Community Survey (InSCI). The terms wave and round are used interchangeably. The first wave is referred to as Round 1 (R1) and represents baseline, while the second wave, Round 2 (R2), represents follow-up.

Introduction

Spinal cord injury (SCI) is a life-altering neurological condition that extends beyond its acute consequences and often results in permanent functional impairment, shaping long-term disability (Ahuja et al., 2017; World Health Organization, 2024). Globally, an estimated 15.4 million people lived with SCI in 2021 (World Health Organization, 2024). While some suggest that global incidence rates may have stabilized or slightly decreased (Liu et al., 2025), others project an increase in absolute incidence between 2022 and 2046 (Zhang et al., 2025). Nevertheless, the overall burden of SCI continues to rise, reflected in increasing prevalence and years lived with disability (YLDs), largely driven by population growth, aging, and advances in medicine (Liu et al., 2025; Safdarian et al., 2023; World Health Organization, 2024; Zhang et al., 2025).

Life expectancy and long-term outcomes among individuals with SCI are strongly influenced by injury characteristics, secondary health complications, and access to health and rehabilitation services (Lee et al., 2014; Singh et al., 2014; World Health Organization, 2015, 2024). Living with SCI often involves complex physical, psychological, and social challenges that can affect independence and everyday functioning. Barriers related to mobility, accessibility, and health complications may further restrict their opportunities to participate fully in society (Bickenbach et al., 2013, pp. 197-204; Fekete et al., 2017; Ottomanelli & Lind, 2009; Post et al., 2020).

Participation in the labor market is a central indicator of independence, social inclusion, and economic security. Employment is often considered a key milestone in the recovery and social reintegration process (Leiulfsrud et al., 2016; Meade et al., 2015), and the importance of returning to work following SCI was emphasized as early as (Guttman). Employment has been associated with improved financial security, social participation, and quality of life, and may thus contribute favorably to both physical and mental health (Bickenbach et al., 2013; Guttman, 1959; Halvorsen et al., 2023; Ottomanelli & Lind, 2009). Nevertheless, employment rates among individuals with SCI remain substantially lower than those observed in the general population (Post et al., 2020), making sustained labor-market participation an ongoing public health and social policy concern.

Beyond the employment status itself, broader socioeconomic outcomes are also important to understand lived experiences following SCI. Socioeconomic status (SES),

including both objective indicators and subjective dimensions, reflects individuals' access to resources, opportunities, and social participation (Fekete et al., 2017; Ullah et al., 2018). Subjective social status, in particular, captures the way in which individuals perceive their position within the social hierarchy and has been associated with health, well-being, and quality of life (Adler et al., 2000).

Despite growing research on the clinical and functional consequences of SCI, there is still limited understanding of how labor market participation and socioeconomic outcomes develop over time (Halvorsen et al., 2023; Lascu et al., 2025; Liu et al., 2025; Ottomanelli & Lind, 2009; Post et al., 2020; Schwegler et al., 2024; Solheim & Leiulfsrud, 2018; Zhang et al., 2025). The International Spinal Cord Injury Survey (InSCI) is a standardized, cross-national data collection initiative designed to strengthen disability data collection and reduce barriers to health and participation (World Health Organization, 2015). InSCI provides information about health, function, quality of life, participation, employment, and economic situation among individuals with SCI (Fekete et al., 2017; Post et al., 2011). Its design enables both cross-country comparisons and longitudinal analyses, constituting a unique opportunity to examine socioeconomic trajectories over time.

Drawing on longitudinal survey data from the Norwegian arm of InSCI, this master's thesis examines changes in employment and subjective social status among individuals with SCI in Norway. Additionally, the study investigates factors associated with employment and financial satisfaction at follow-up. By examining longitudinal changes in both employment and subjective socioeconomic outcomes, this study aims to contribute to a more comprehensive understanding of socioeconomic trajectories following SCI, with possible implications for labor market inclusion, rehabilitation services, and welfare policy.

To date, no publications have reported findings from the second InSCI-Nor survey round, and no longitudinal analyses on the InSCI-Nor data have yet been published. Furthermore, limited research has examined employment and socioeconomic outcomes over time among individuals with SCI in Norway.

Background

Spinal cord injuries

Spinal cord injury (SCI) is a relatively rare, yet severe and highly disabling condition associated with substantial physical, psychological, and social consequences (Ahuja et al., 2017). SCIs are commonly categorized, according to etiology, as either '*traumatic'* or '*non-traumatic'* (Bickenbach et al., 2013). Traumatic SCIs result from external events such as traffic accidents, falls, or violence, whereas non-traumatic SCIs arise from underlying pathological processes, including tumors, infections, and degenerative or vascular conditions (Bickenbach et al., 2013, p. 6; Sunnaas sykehus HF, 2023). Regardless of cause, SCI often leads to lifelong impairments that impact multiple domains of daily life, including employment, mobility, independence, and social participation (Bickenbach et al., 2013, pp. 6-10; World Health Organization, 2015, 2024).

Clinically, SCI is characterized by neurological level and injury severity (Bickenbach et al., 2013). The neurological level refers to the lowest segment of the spinal cord at which normal motor and sensory function are preserved. Injuries in the cervical region result in *tetraplegia* (previously referred to as quadriplegia), affecting motor and/or sensory function in both upper and lower extremities. Injuries below the cervical level result in *paraplegia*, primarily affecting function in the trunk and legs (Kirshblum et al., 2011). While injury severity is commonly classified using the American Spinal Injury Association Impairment Scale (AIS), which ranges from AIS A to AIS E (Landsforeningen for Ryggmargsskadde, 2012). AIS A represents a *complete* injury, defined as the absence of sensory and motor function in the lowest sacral segments (S4-S5), whereas AIS B-D represents varying degrees of *incomplete* injuries with partial preservation of function below the injury site, including the sacral segments. AIS E represents normal function, meaning total recovery (Kirshblum et al., 2011; National Institute of Neurological Disorders and Stroke). In epidemiological research, this classification is often simplified into complete versus incomplete injuries, as applied in the present study.

A global health concern

From a public health perspective, SCI represents a major global concern, with substantial regional variation in incidence and survival. A comprehensive international mapping estimated a worldwide incidence of approximately 23 cases per million population per year,

corresponding to around 179.000 new cases annually (Lee et al., 2014). Earlier estimates have suggested an even higher rate: between 250.000 and 500.000 new cases globally each year (Bickenbach et al., 2013, p. 15). However, reported incidence rates vary considerably across regions, particularly in low- and middle-income countries, where data quality is limited, and surveillance systems may be underdeveloped (Bickenbach et al., 2013, pp. 177-178; Lee et al., 2014).

Recent global estimates further highlight the increasing burden of SCI. In 2019, approximately 20 million people worldwide were living with SCI, with both prevalence and incidence substantially rising since 1990 (Safdarian et al., 2023). While improved survival following injury contributes to this trend, it also underscores the growing numbers of people living with prolonged health consequences and public burden associated with SCI.

Historically, SCI most commonly affected individuals aged 15-40 years (Lee et al., 2014; Singh et al., 2014), a period coinciding with educational completion, vocational development, and labor market participation (Ottomanelli & Lind, 2009). Recent evidence suggests a demographic shift of SCI incidents towards older age groups, especially in high income countries (Ahuja et al., 2017). Nevertheless, SCI often occurs before retirement age and may thus disrupt life-course trajectories, affecting educational attainment, career progression, and long-term economic well-being.

These consequences extend beyond individual health outcomes and may generate wider societal effects through reduced labor market participation, increased reliance on social protection systems, and long-term economic costs (Bickenbach et al., 2013, pp. 197-204). As survival improves and individuals with SCI have greater life expectancies, social and economic integration becomes increasingly important. Among domains of participation, employment plays a particularly central role, providing both financial security and wider societal inclusion (Bickenbach et al., 2013, pp. 197-204; Ottomanelli & Lind, 2009). These considerations highlight the importance of understanding employment trajectories and perceived economic conditions over time among individuals living with SCI.

Employment

The right to work is recognized by the Universal Declaration of Human Rights, which states that 'everyone has the right to work, to free choice of employment, to just and favorable conditions of work and to protection against unemployment' (UN General Assembly, 1948, Article 23-1). Employment, therefore represents a cornerstone of social participation and is one of the strongest predictors of quality of life and community integration.

In the context of SCI, employment may also serve as an indicator of successful rehabilitation (Bickenbach et al., 2013; Halvorsen et al., 2023). The importance of returning to work after SCI was emphasized as early as 1959 by Guttmann, who argued that rehabilitation remains incomplete without social and vocational reintegration (Guttman, 1959). Work provides not only income, but also structure, identity, and opportunities for social engagement, whereas unemployment has been linked to financial stress, social exclusion, and poorer health outcomes (Ottomanelli & Lind, 2009).

Despite its recognized importance, international studies consistently show that employment rates among SCI patients are substantially lower than in the general population (Oña et al., 2024; Ottomanelli & Lind, 2009; Post et al., 2020). A systematic review across 22 countries reported an average employment rate of 38%, with considerable cross-country variation ranging from 10.3% to 61.4%; the lowest was in Morocco and the highest in Switzerland (Post et al., 2020). Differences in labor market structures, welfare policies, educational opportunities, and injury characteristics likely contribute to this heterogeneity. Higher educational attainment, younger age at injury, less severe impairment, and strong pre-injury labor market attachment consistently predict better employment outcomes (Bickenbach et al., 2013, p. 178; Ottomanelli & Lind, 2009; Post et al., 2020; Strøm et al., 2017).

Socioeconomic status

Socioeconomic status (SES) is a central determinant of health and is commonly measured using objective indicators such as income, education, and occupation (American Psychological Association). While employment is closely linked to socioeconomic status, economic position exceeds binary employment status. Many individuals with SCI rely partly or fully on disability benefits, which may provide income security but do not necessarily translate into financial satisfaction or perceived economic adequacy (OECD, 2003). Economic

strain has been associated with poorer health and decreased well-being, illustrating the importance of examining subjective financial outcomes alongside employment status (Dahlgren & Whitehead, 1991).

Thus, objective measures do not entirely capture how individuals experience their position within society. Subjective social status refers to an individual's perception of their relative position within the social hierarchy, often assessed using self-reported measures such as the MacArthur ladder (Adler et al., 2000).

Subjective social status is independently associated with a range of both psychosocial and physiological outcomes, even after adjustment for objective measures of SES (Adler et al., 2000; American Psychological Association). This suggests that subjective social measures capture dimensions of social stratification beyond those captured by objective indicators. In particular, subjective social status reflects how people perceive their relative standing in society, which may influence health through psychosocial pathways such as perceived control, stress, and social comparison (Adler et al., 2000).

Within SCI research, this measure may provide important insight into how individuals perceive their social and economic position following injury. While welfare systems may provide financial support (Strøm et al., 2017), individuals may still experience reduced social participation and changes in social roles, which may influence perceived social standing. Subjective measures, therefore offer a complementary perspective to objective indicators when examining socioeconomic outcomes after SCI.

The InSCI survey

The International Spinal Cord Injury survey (InSCI) is the largest international initiative designed to systematically collect data on health, function, quality of life, participation, employment, and economic situation among individuals with SCI (Post et al., 2011). The survey was developed to enable comparability within and across countries and health systems through the use of a standardized questionnaire grounded in the International Classification of Functioning, Disability and Health (ICF). Its main objective is to generate internationally comparable data on the lived experiences of people with SCI, with a particular focus on functioning, health maintenance, and subjective well-being (Fekete et al., 2017; Post et al., 2011).

InSCI was initiated as part of the Learning Health System for Spinal Cord Injury (LHS-SCI) (Fekete et al., 2017), an initiative aligned with the World Health Organization's (WHO's) Global Disability Action Plan 2014-2021, which emphasized strengthening disability data collection and reducing barriers to health and participation (World Health Organization, 2015). The questionnaire instrument was developed through international collaboration involving researchers, clinicians, and individuals with SCI, ensuring feasibility, validity, reliability, and cross-country comparability (Fekete et al., 2017).

The survey is designed to support both cross-sectional and longitudinal analyses, with repeated data collection (Swiss Paraplegic Research). To date, the InSCI study has been administered in two waves (2017–2018 and 2023–2024). Norway has participated in both rounds of the survey, InSCI-Nor, providing data on individuals living with SCI in the Norwegian context (Strøm, 2025). The availability of repeated measurements provides a rare opportunity to examine within-person changes over time, including changes in employment status and perceived socioeconomic status.

Norwegian context

In Norway, the annual incidence of SCI is estimated at approximately 120 new cases, and between 4.500 and 5.000 individuals are currently living with SCI (Sunnaas sykehus HF, 2023). Although relatively modest in absolute numbers, SCI is a considerable burden for those affected, their families, and society.

Specialized rehabilitation and follow-up services are centralized in three spinal units: Sunnaas Hospital HF, Haukeland University Hospital HF, and St. Olavs Hospital HF. Rehabilitation in these centers includes interdisciplinary assessment, functional training, compensatory strategies, assistive technology provision, and environmental adaptations tailored to the individual's level of injury and functional capacity. The overall aim is to promote independence, participation, and long-term social reintegration (Strøm et al., 2017; Sunnaas sykehus HF, 2023).

In Norway, clinical and epidemiological knowledge about SCI is supported by the Norwegian Spinal Cord Injury Registry (NorSCIR), representing a national medical quality registry that collects standardized information on individuals admitted to specialized SCI units. NorSCIR provides important information on the incidence, injury characteristics, rehabilitation, and early outcomes during the post-injury phase (St. Olavs Hospital, 2026).

However, registry data are mainly linked to clinical rehabilitation and do not fully capture long-term social, economic, and subjective outcomes. In this regard, InSCI-Nor complements NorSCIR by providing survey-based longitudinal data on lived experiences, participation, employment, quality of life, and socioeconomic conditions among individuals living with SCI in the community.

Welfare frameworks

Norway functions within a comprehensive welfare state model characterized by universal health coverage, income protection schemes, and active labor market policies that facilitate participation and return to work (Mæland et al., 2026; Pedersen, 2026). Employment outcomes following SCI must therefore be understood within broader social and institutional contexts (Strøm et al., 2017). Comparative welfare-state research has challenged the notion that generous welfare arrangements undermine work motivation among individuals with weaker labor-market attachment. For instance, (Oña et al., 2024) found that a higher proportion of individuals were concerned about losing disability benefits if they entered employment.

However, other evidence suggests that more generous and activating welfare states are associated with higher employment commitment, including among groups characterized by poor health or marginal labor-market positions (van der Wel & Halvorsen, 2015). From a welfare resources perspective, employment trajectories among individuals with SCI reflect the interaction between health, rehabilitation, and institutional conditions rather than only individual characteristics (Hill & Irving, 2020).

Within the Norwegian welfare system, individuals with reduced capacity may receive sickness or disability benefits, and work assessment allowance (Strøm et al., 2017). These schemes provide income security while also supporting labor market participation when possible. Disability benefits may, for instance, be combined with partial employment, reflecting a policy priority on maintaining labor market attachment even among individuals with permanent health limitations (Mæland et al., 2026; Pedersen, 2026). The Norwegian pension system also allows flexible retirement from the age of 62, although 67 years remains the traditional retirement age (Pedersen, 2026). For many individuals with SCI, disability pension is their primary source of income prior to retirement age (Halvorsen et al., 2023). While the pension system provides a guaranteed safety net for every resident, reduced labor

market participation may influence long-term economic trajectories compared with the general population (Pedersen, 2026).

Employment in Norway

Despite these institutional arrangements, individuals with SCI in Norway continue to have lower employment rates than the general population and often report financial problems (Halvorsen et al., 2023; Solheim & Leiulfsrud, 2018). Results from the first InSCI round showed that Norway had an observed employment rate of 51.9%, exceeding the international average of 38%, but remaining lower than the general population (Halvorsen et al., 2023; Post et al., 2020). While Norway demonstrated one of the most favorable differences between observed and expected employment rates based on international prediction models, Switzerland reporter even higher levels (61.4%) (Post et al., 2020). This suggests that contextual factors such as pre-injury work patterns, rehabilitation systems, and social support may influence labor market outcomes (Bickenbach et al., 2013, p. 178; Halvorsen et al., 2023; Lidal et al., 2007; Ottomanelli & Lind, 2009; Strøm et al., 2017).

However, relative success in international comparisons does not eliminate national differenes. A registry-based study from Norway found that six-years post-injury, 63% of individuals with SCI received income from employment compared with 91% of matched controls, while 67% relied on sickness or disability benefits compared with 13% of controls (Halvorsen et al., 2023). Research on long-term outcomes also shows that employment remains challenging even 20 years post-injury (Lidal et al., 2009). These results indicate persistent labor market gaps despite Norway's generous welfare system.

Understanding employment, perceived social status, and financial well-being of individuals with SCI within this institutional context is therefore an important area of research.

The present thesis

Rationale for the study

The two InSCI-Nor survey rounds represent a unique opportunity to investigate within-person changes in employment and financial satisfaction over time. By focusing on repeated measures from the same individuals, this study intends to support a more nuanced understanding of long-term outcomes following SCI beyond cross-sectional snapshots.

Previous research

Existing Norwegian research has examined employment after SCI using cross-sectional survey designs (Solheim & Leiulfsrud, 2018) and registry-based longitudinal cohort studies (Halvorsen et al., 2023). While these studies provide valuable insights into labor market participation and post-injury trajectories, they do not assess within-person changes in employment status or subjective experiences such as perceived social status and financial situation.

Internationally, InSCI-based studies have predominantly documented cross-sectional differences in employment across countries (Post et al., 2020). More recent national analyses, such as the Romanian study by Lascu et al. (2025), continue to highlight disparities within specific welfare systems and contexts. Even longitudinal evidence from Switzerland has focused mainly on labor gaps relative to the general population (Schwegler et al., 2024) rather than on within-person changes and subjective measures.

Consequently, there is limited evidence on how individuals with SCI in Norway navigate their employment trajectories and perceive their own socioeconomic standing over time.

Research objective and questions

The overall objective of this thesis is to assess changes in employment and subjective social status among individuals with SCI in Norway over an approximately six-year follow-up period between InSCI-Nor survey rounds (R1; 2017/2018 and R2; 2023/2024), and to explore factors associated with employment and financial satisfaction at R2. The study is guided by the following research questions:

- *How have employment and subjective social status among individuals with SCI in Norway changed between InSCI-Nor rounds 1 and 2?*

- *What factors are associated with employment and subjective social status, respectively, among individuals with SCI?*
- *What is the relationship between employment status and financial satisfaction in InSCI-Nor round 2?*

Hypotheses

Based on previous literature, the following hypotheses are proposed:

- ***H1:*** Employment rates among individuals with SCI in Norway have changed between the two survey rounds.
- ***H2:*** Self-reported subjective social status has changed over time.
- ***H3:*** Younger age, higher education, and less severe injury are associated with more favorable employment and subjective social status outcomes at follow-up (R2).
- ***H4:*** Paid employment at R2 is positively associated with higher financial satisfaction.

Significance and contribution of the study

The present study may contribute to existing literature by examining longitudinal, within-person changes in both objective and subjective socioeconomic outcomes following SCI. Although administrative data give insights into objective participation rates, research on perceived financial satisfaction and perceived social status over time remains scarce.

Addressing this gap and recognizing these factors is vital for evaluating whether existing rehabilitation and welfare policies adequately support not only labor market inclusion but also sustained social participation and economic well-being among individuals with SCI.

Methodology

This study was conducted in accordance with a predefined research protocol developed as part of the course *'FHE5120 – Project Planning and Appraisal of Epidemiological Studies'*. The protocol specified the study design, variable selection, and analytical strategy prior to data analysis. Reporting of the study is guided by the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) recommendations for longitudinal cohort observational studies (von Elm et al.)

A structured literature search was conducted to identify relevant studies on the topic and to inform the interpretation and contextualization of the findings (Carter & Lubinsky, 2016a). A detailed description of the search strategy and search terms is provided in Appendix 1.

Deviations from protocol

In the original protocol, financial satisfaction was defined as a secondary outcome. However, this variable was only introduced in R2 of the InSCI survey, precluding longitudinal analysis.

In dialogue with the project supervisor, subjective social status was instead included as a longitudinal outcome to capture perceived social status over time, as comparable data were available in both survey rounds. Financial satisfaction was nevertheless analyzed cross-sectionally at R2 to examine its association with employment status.

Study design

The present study is a longitudinal cohort analysis based on approximately six years of follow-up data from the Norwegian arm of the InSCI Community Survey (InSCI-Nor). Individual-level survey responses from baseline (R1; 2017/2018) and follow-up (R2; 2023/2024) were paired at the participant level to assess within-person changes over time. Although each survey round represents a cross-sectional sample of individuals living with SCI in Norway, capturing participants' status at a particular time point, the present study is restricted to participants who responded in both rounds (Fig. 1). This forms the longitudinal cohort, which is well-suited for examining prognostic and etiological questions (Parfrey & Barrett, 2021, pp. 11-12).

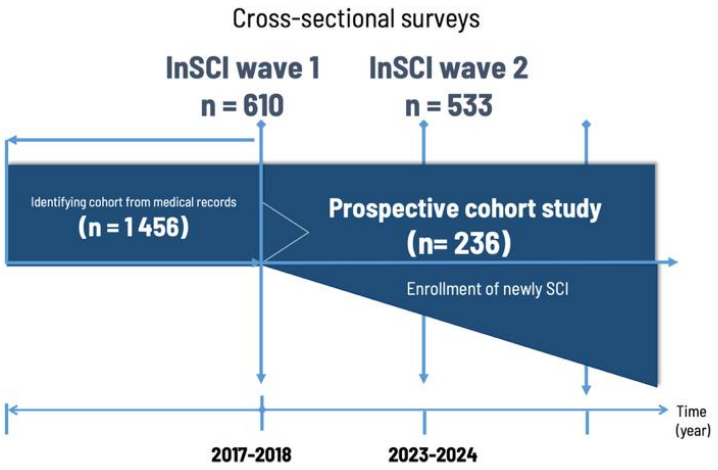

Figure 1: *Study design of the InSCI-Nor survey and longitudinal cohort*
The figure illustrates the two cross-sectional InSCI survey waves and the participants who responded in both survey rounds (2017/2018 and 2023/2024), forming the longitudinal cohort used in the present study.

Setting and participants

Data collection

Data were drawn from the InSCI-Nor study, collected by standardized, self-completed questionnaires. The questionnaire was developed through international collaboration with researchers and clinicians, coordinated by the Swiss Paraplegic Research, and designed to collect data on health, functioning, participation, and socioeconomic conditions among individuals with SCI (Fekete et al., 2017; Post et al., 2011).

The instrument is based on the International Classification of Functioning, Disability and Health (ICF), a grand theory that serves as a framework for organizing information on human functioning and its restrictions (Carter & Lubinsky, 2016b, pp. 15-16). The questionnaire was developed through an iterative consensus-building involving experts and individuals with SCI, guided by four principles: efficiency, feasibility, comparability, and validity/reliability (Fekete et al., 2017).

The final questionnaire consists of 125 questions covering six domains that align with the ICF model: body functions and structures, activities and participation, environmental factors, personal factors, lesion characteristics, and appraisal of health and well-being (Carter & Lubinsky, 2016b, pp. 15-16; Fekete et al., 2017). Further details on the development and structure of the InSCI-survey are described elsewhere (Fekete et al., 2017; Gross-Hemmi et al., 2021; Post et al., 2011).

InSCI-Nor population

Eligible participants in InSCI-Nor were community-living adults (≥18 years) residing in Norway with traumatic or non-traumatic SCI sustained between 2000 and 2022. For R1, eligible injuries occurred between 2000 and 2016, while for R2, the eligibility period was extended to include injuries up to 2022. Exclusion criteria involved age <18 years, progressive neurological diseases causing spinal cord dysfunction, insufficient Norwegian language proficiency, or inability to provide informed consent (Strøm et al., 2017). These criteria (Table 1) were predefined to ensure that the findings can be generalized to a specific population (Carter & Lubinsky, 2016b, p. 93).

A total of 1.456 individuals were initially identified as eligible through medical records, which served as the sampling frame. Of these, 610 participated in R1 (response rate 42%), and in R2, both previous respondents and newly eligible cases totaled 1.833, whereas 533 participated (response rate 29%). The present study is restricted to the 236 individuals who responded in both survey rounds, constituting the longitudinal cohort (Strøm, 2025), which may differ from the full sample in each round.

Although no formal sample size calculation was performed for this secondary analysis, the cohort exceeds the minimum sample size of 200 participants per country determined by a prior power analysis for the InSCI study (Post et al., 2020). The available cohort is therefore considered adequate for exploratory longitudinal and multivariable analyses, which allow for adjustments. However, statistical power can be limited for subgroup and interaction analyses.

Table 1: *Inclusion and exclusion criteria for InSCI-Nor*

Inclusion:	**Exclusion**
- Community living individuals in Norway	
- Aged ≥ 18 years	- Aged < 18 years

- SCI sustained between 2000-2022
  o Round 1: injury 2000-2016
  o Round 2: injury 2000-2022	

- Traumatic or non-traumatic SCI	- SCD due to progressive neurological diseases
- Sufficient Norwegian language proficiency to complete the questionnaire and provide informed consent	- Inability to provide informed consent

Data management

Data management procedures were implemented to ensure quality, storage, and information retrieval (Carter & Lubinsky, 2016b, p. 171). Only variables relevant to the predefined research questions were made available for this thesis. To maintain confidentiality and privacy, all data were anonymized before access. Participants were identified solely by study identification numbers, ensuring that no direct personal identifiers were accessible to the researcher (Parfrey & Barrett, 2021, pp. 57-58).

Variables

All variables were derived from the standardized InSCI questionnaire and were based on self-reported information. The full wording of the selected survey items is provided in Appendix 2, based on the R2 questionnaire.

Outcome variables

Employment status

Employment status captured any form of paid employment, regardless of contract type or working hours, and was measured as a binary variable (yes/no). Employment at R1 was included as a baseline predictor to account for prior employment and capture change over time.

Subjective social status

Subjective social status was measured using the MacArthur Scale of Subjective Social Status, an ordinal scale in which participants were asked to place themselves on a ladder from 1 (lowest) to 10 (highest), relative to others in society (Adler et al., 2000).

Financial satisfaction

Financial satisfaction was measured in R2 using a single-item ordinal scale assessing satisfaction with the household financial situation, ranging from 1 (very dissatisfied) to 10 (very satisfied).

Sociodemographic variables

Descriptive variables were selected to characterize the study population.

Age

Age was derived as a continuous variable (years), based on year of birth.

Region

Region of residence was recorded as a categorical variable reflecting participants' place of residence in Norway.

Sex

Sex was recorded as a categorical variable (male/female). Although an additional response category ('other') was introduced in R2, no participants were recorded in this category.

Marital status

Marital status was assessed using five response categories: single, married, cohabiting/in a relationship, separated/divorced, and widowed.

Education

Education was defined as the highest level of completed education. The variable included nine ordered categories ranging from primary to doctoral, as well as an 'other – specify' option.

Employment prior to SCI

Paid work prior to injury was assessed using a self-reported item asking whether participants were employed before the onset of spinal cord injury. Participants who reported prior employment were additionally asked to specify their occupational title in an open-text field. In the dataset, the variable was provided and used as a binary measure (yes/no).

Household income

Household income was measured as total household income using 10 ordered response categories. In R1, categories ranged from below NOK 245,000 to above NOK 1,11 million, and in R2 from below NOK 284,000 to above NOK 1,709 million.

Injury-related variables

Injury-related variables were included to describe and explore clinical characteristics of the study population.

Injury onset

Injury onset was assessed by year of injury in R1 and by year and month of injury in R2.

Injury cause

Participants could report several causes of injury within either accidents or disease, which were subsequently categorized as either traumatic or non-traumatic.

Neurological level and injury severity

Neurological level was measured as either paraplegia or tetraplegia, while AIS grade was measured as complete or incomplete. For R2, an additional category, 'back to normal,' was included for both measures.

Other exploratory variables

Additional variables were included as exploratory variables, including receipt of disability benefits, vocational rehabilitation, desire for paid work, and work ability.

Disability benefits and vocational rehabilitation

Disability benefits and vocational rehabilitation were recorded as binary variables (yes/no).

Desire for employment and perceived work ability

Desire for employment and work ability were measured among participants who reported not being in paid work. The desire for labor market participation was assessed as a binary variable (yes/no). Work ability was assessed using a self-reported item asking whether they felt able to perform paid work. Response options reflected estimated weekly work capacity: 1–11 hours, 12–20 hours, more than 20 hours, or not at all. The variable was treated as an ordinal measure of perceived work ability.

Derived variables

To facilitate statistical analyses, several variables were recoded or derived from the original dataset. A detailed overview of all study variables, including coding and recoding procedures, is provided in Appendix 3.

Age

Age was originally collected as year of birth and provided in the dataset as a continuous (years) variable at the time of survey participation. In the analyses, age was retained as a continuous variable and additionally categorized into five groups: 18-29 years, 30-44 years, 45-59 years, 60-74 years, and ≥75 years, consistent with the dataset's categorization.

Marital status

Marital status was recoded into three groups: single, married/partnership or cohabiting, and separated/divorced or widowed. This recoding was performed to reduce the number of categories, facilitate interpretation, and distinguish partnership status.

Household income

Household income was grouped into three categories (low, medium, high), to approximate tertiles. Categories 1-3 were defined as low, 4-6 as medium income, and 7-10 as high

income. The grouping was informed by the distribution of response categories and broadly reflects lower-, middle-, and higher-income levels in Norway (Fløtre & Strand, 2025), although the exact cut-offs do not correspond to percentile-based thresholds.

Education

Education was recoded into three categories: basic (primary and lower secondary education), intermediate (upper secondary and postsecondary education), and advanced (tertiary to doctoral education). The recoding followed the categorization applied in the dataset.

Age at injury

Age at injury was derived from the reported year of the injury onset and expressed as a continuous variable (years).

Time since injury

Time since injury was calculated as the number of years between injury onset and survey years of participation in R1.

Combined injury variable

Neurological level (paraplegia/tetraplegia) and AIS grade (complete/incomplete) were combined into a single composite variable consisting of four impairment groups to better reflect overall functional impairment following SCI.

Transition variables

Based on responses from R1 and R2, transition variables were created for employment status and vocational rehabilitation. Each variable was categorized into four groups reflecting change between survey rounds: No → No, No → Yes, Yes → No, Yes → Yes.

Statistical methods

All analyses were performed using STATA 18. Statistical significance was assessed at the 5% level using two-sided tests. Effect estimates are presented with 95% confidence intervals (CI). Analyses were conducted using complete cases for the variables included in each model. Two main outcomes were analyzed: (i) employment status and (ii) subjective social status. The full do-file is presented in Appendix 4.

Descriptive statistics were used to summarize baseline characteristics of the study population. Continuous variables are presented as means with standard deviations (SD), while categorical variables are reported as frequencies and percentages (%). Baseline characteristics were described for the full cohort without stratification, as no clear theoretical rationale for subgroup comparisons was identified. Employment status and subjective social status were described for both InSCI rounds and across demographic subgroups, including age, sex, education, and injury severity.

McNemar's test was used to examine changes in paid employment between R1 and R2 ***(H1)***, as appropriate for paired binary outcomes. Transitions between employment states were additionally described using cross-tabulations.

Changes in subjective social status between the two rounds ***(H2)*** were assessed using the Wilcoxon signed-rank test, as the MacArthur ladder scale represents an ordinal measure and was not assumed to be normally distributed.

To examine factors associated with employment and subjective social status at R2 ***(H3)***, multivariable logistic and linear regression models were fitted, respectively. The logistic regression model used paid employment as the outcome (R2). Subjective social status was analyzed using linear regression, treating the ladder score as a continuous variable. Covariates included employment status at R1, age at baseline, sex, education level, impairment group, and time since injury at R1. Employment prior to injury was not included in the multivariable model, as baseline employment (R1) was considered a more proximal measure of labor market attachment. Results are presented as odds ratios (OR) with 95% CI for the logistic regression, while regression coefficients (β) with 95% CI are reported for the linear regression.

Financial satisfaction (1-10 scale) was analyzed cross-sectionally at R2 as an additional subjective socioeconomic measure. The association between paid employment and financial satisfaction ***(H4)*** was assessed using linear regression, with financial satisfaction

at R2 as the outcome and employment status at R2 as the primary exposure. Both crude and adjusted models were estimated. The adjusted model controlled for age, sex, education level, injury severity, and time since injury.

Sensitivity analyses were conducted by restricting the sample to participants younger than 67 years at R2, corresponding to Norway's legal retirement age (Mæland et al., 2026). The age restriction was based on respondents' age at R2 to account for potential retirement-related influences on employment status and to ensure that participants were below retirement age when the outcome was assessed.

Given that only two InSCI survey rounds were available and the primary interest in within-person change and predictors of outcomes at R2, paired tests and standard regression models were considered more appropriate and interpretable than repeated-measures approaches such as generalized estimating equations.

Additional analyses included variables regarding work ability and the desire for paid work, which were primarily directed at participants who were not engaged in paid employment. Analyses involving these variables were therefore restricted to relevant subgroups.

Confounding adjustment and DAG

The minimal sufficient adjustment set consisted of age, sex, education, impairment group, and time since injury, all measured at R1. Variable selection was guided by directed acyclic graphs (DAGs) developed prior to analyses based on existing literature (Greenland et al., 1999). Full DAGs are provided in Appendix 5.

Household income and vocational rehabilitation were examined descriptively, but were not included in the main models. Household income was considered a potential mediator between employment and financial satisfaction, and vocational rehabilitation was treated as a time-dependent variable that can occur both before and between rounds, complicating its role as a confounder.

Additionally, desire for paid work was analyzed among non-employed participants at baseline to assess its association with subsequent employment at R2. Receipt of disability benefits and subjective work ability were also included as exploratory variables.

Ethics

This study is based on secondary analyses of InSCI-Nor data. The InSCI-Nor project has previously received ethical approval granted by the Regional Committees for Medical and Health Research Ethics (REK), reference number 2016/1184. The present master's thesis was conducted within the approved framework, as it uses already collected and anonymized data. However, this project was initially reported to the Norwegian Agency for Shared Services in Education and Research (SIKT) for an assessment of data protection and privacy compliance. Following dialogue with SIKT (Appendix 6), the notification was later withdrawn, as the study was considered to fall within the existing REK approval and involves only anonymized data.

Participation in the InSCI-Nor study was voluntary, and all participants provided informed consent prior to participation. Participants were informed of their right to withdraw at any point without consequences, as well as their right to access their stored data and request removal of their information (Bonita, 2006, pp. 58-59; Sunnaas sykehus HF et al., 2023). However, these rights do not apply once the data have been anonymized or included in completed analyses. The InSCI-Nor team is responsible for administering consent procedures and handling any withdrawal requests (Sunnaas sykehus HF et al., 2023).

The dataset used in this thesis was fully anonymized, and no identification information or linkage key to enable re-identification of participants was available to the researcher. Data transfer followed a two-step security procedure, with the encrypted file provided separately from the password. Data were stored and handled in accordance with the General Data Protection Regulation (GDPR).

As this study is a secondary analysis of anonymized data and does not involve contact with participants or collection of new data, it is considered to pose minimal risk to participants.

Results

This section presents the findings of the present master's thesis in accordance with the hypotheses. Additional exploratory analyses related to work ability and disability benefits are presented in Appendix 7.

Descriptive statistics

The longitudinal cohort included 236 individuals who participated in both waves of the InSCI-Nor survey, conducted approximately six years apart. As shown in Table 2, the participants were predominantly male (68.6%), with a mean age of 56.6 years (SD 14.0) at baseline (R1). The age distribution showed an older cohort, with 46.2% aged 60–74 years, while younger age groups were underrepresented. Participants were geographically distributed across Norway, with the largest proportions residing in Akershus (14.4%), Oslo (14.0%), and Trøndelag (12.3%). More than half of the participants (52.6%) had advanced education, and most participants (60%) were either married or in a partnership. The mean age at spinal cord injury onset was 48.6 years (SD 15.2), and the mean time since injury was 9.0 years (SD 4.7). Most injuries were traumatic (65.7%), and the majority were classified as incomplete (87.6%). Paraplegia was more common than tetraplegia (64.5% vs. 35.5%). Baseline characteristics were broadly similar to those in Norwegian Spinal Cord Injury Registry (NorSCIR) (Halvorsen & Pettersen, 2019).

These characteristics define the baseline composition of the longitudinal cohort and provide the basis for subsequent analyses examining changes in outcomes between InSCI-Nor R1 and R2.

Table 2: *Demographic and clinical characteristics of the study cohort at baseline (R1)*

	N = 236
General characteristics	
Sex	
Male	162 (68.6%)
Female	74 (31.4%)
Age (years) *	56.6 (14.0)
Age groups	
18-29 years	12 (5.1%)
30-44 years	37 (15.7%)
45-59 years	67 (28.4%)
60-74 years	109 (46.2%)
75+ years	11 (4.7%)
Province	
Østfold	13 (5.5%)
Akershus	34 (14.4%)
Oslo	33 (14.0%)
Hedmark	15 (6.4%)
Oppland	7 (3.0%)
Buskerud	21 (8.9%)
Vestfold	11 (4.7%)
Telemark	10 (4.2%)
Aust-Agder	6 (2.5%)
Vest-Agder	12 (5.1%)
Rogaland	5 (2.1%)
Hordaland	9 (3.8%)
Sogn og Fjordane	3 (1.3%)
Møre og Romsdal	10 (4.2%)
Trøndelag	29 (12.3%)
Nordland	10 (4.2%)
Troms	6 (2.5%)
Finnmark	2 (0.8%)
Education	
Basic or less	24 (10.3%)
Intermediate levels	87 (37.2%)
Advanced levels	123 (52.6%)
Household income	
Low income	63 (27.4%)
Middle income	70 (30.4%)
High income	97 (42.2%)
Marital status	
Single	41 (17.4%)
Married or in partnership	141 (60.0%)
Widowed or divorced	53 (22.6%)
Injury-related characteristics	
Age at SCI onset (years) *	48.6 (15.2)
Years since SCI *	9.0 (4.7)
Injury cause	
Traumatic	155 (65.7%)
Non-traumatic	81 (34.3%)
Impairment group	
Paraplegia incomplete	117 (53.2%)
Paraplegia complete	22 (10.0%)
Tetraplegia incomplete	75 (34.1%)
Tetraplegia complete	6 (2.7%)

Note: n (%). *Mean (SD). SCI = Spinal Cord Injury

H1 – Changes in employment

Round 1

At baseline (R1), 107 (45.3%) participants were in paid work, while 129 (54.7%) were not (Table 3). This is somewhat lower than the overall employment rate reported in the full InSCI-Nor sample (51.9%) (Post et al., 2020). Men were more frequently represented among those in paid work than women, and employed participants were generally younger than those not employed, with the highest representation among participants aged 45–59 years (39.3%).

Higher educational attainment was more common among those employed; similarly, they were also more likely to have been employed prior to their injury. Participants in paid work were additionally more often represented in higher household income groups.

In contrast, there were no substantial differences between the groups in years since injury or impairment groups. Some variation was observed in injury characteristics, with a higher proportion of traumatic injuries and paraplegia among those in paid work.

Table 3: *Demographic and clinical characteristics at baseline (R1) by employment status*

	Paid work at baseline		
	No	Yes	Total
N	129 (54.7%)	107 (45.3%)	236 (100.0%)
General characteristics			
Sex			
Male	83 (64.3%)	79 (73.8%)	162 (68.6%)
Female	46 (35.7%)	28 (26.2%)	74 (31.4%)
Age (years)	60.6 (13.7)	51.7 (12.8)	56.6 (14.0)
Age groups			
18-29 years	6 (4.7%)	6 (5.6%)	12 (5.1%)
30-44 years	13 (10.1%)	24 (22.4%)	37 (15.7%)
45-59 years	25 (19.4%)	42 (39.3%)	67 (28.4%)
60-74 years	75 (58.1%)	34 (31.8%)	109 (46.2%)
75+ years	10 (7.8%)	1 (0.9%)	11 (4.7%)
Education			
Basic or less	19 (15.0%)	5 (4.7%)	24 (10.3%)
Intermediate levels	52 (40.9%)	35 (32.7%)	87 (37.2%)
Advanced levels	56 (44.1%)	67 (62.6%)	123 (52.6%)
Employment prior to SCI			
No	31 (24.6%)	9 (8.4%)	40 (17.2%)
Yes	95 (75.4%)	98 (91.6%)	193 (82.8%)
Household income			
Low income	47 (38.2%)	16 (15.0%)	63 (27.4%)
Middle income	47 (38.2%)	23 (21.5%)	70 (30.4%)
High income	29 (23.6%)	68 (63.6%)	97 (42.2%)
Injury-related characteristics			
Years since SCI	8.9 (4.6)	9.1 (4.9)	9.0 (4.7)
Injury cause			
Traumatic	77 (59.7%)	78 (72.9%)	155 (65.7%)
Non-traumatic	52 (40.3%)	29 (27.1%)	81 (34.3%)
Impairment group			
Paraplegia incomplete	52 (44.1%)	65 (63.7%)	117 (53.2%)
Paraplegia complete	11 (9.3%)	11 (10.8%)	22 (10.0%)
Tetraplegia incomplete	51 (43.2%)	24 (23.5%)	75 (34.1%)
Tetraplegia complete	4 (3.4%)	2 (2.0%)	6 (2.7%)

Note: n (%). *Mean (SD). SCI = Spinal Cord Injury

Round 2

At follow-up (R2), 93 participants (39.7%) were in paid work, while 141 (60.3%) were not (Table 4).

The distribution of demographic and clinical characteristics at R2 largely mirrored that observed at baseline (R1). Participants in paid work were generally younger and more frequently represented among those with higher education, prior employment, and represented more frequently a higher household income.

As in R1, no substantial differences were observed in years since injury or impairment groups. However, at R2, a subgroup of participants were classified as fully recovered, and these individuals were more frequently represented among those in paid work.

Table 4: *Demographic and clinical characteristics at follow-up (R2) by employment status*

	Paid work at follow-up		
	No	Yes	Total
N	141 (60.3%)	93 (39.7%)	234 (100.0%)
General characteristics			
Sex			
Male	93 (66.0%)	68 (73.1%)	161 (68.8%)
Female	48 (34.0%)	25 (26.9%)	73 (31.2%)
Age (years) *	69.0 (11.8)	53.5 (12.4)	62.8 (14.2)
Age groups			
18-29 years	1 (0.7%)	1 (1.1%)	2 (0.9%)
30-44 years	8 (5.7%)	24 (25.8%)	32 (13.7%)
45-59 years	16 (11.3%)	33 (35.5%)	49 (20.9%)
60-74 years	61 (43.3%)	32 (34.4%)	93 (39.7%)
75+ years	55 (39.0%)	3 (3.2%)	58 (24.8%)
Education			
Basic or less	21 (15.2%)	2 (2.2%)	23 (10.0%)
Intermediate levels	54 (39.1%)	32 (34.4%)	86 (37.2%)
Advanced levels	63 (45.7%)	59 (63.4%)	122 (52.8%)
Employment prior to SCI			
No	23 (16.8%)	10 (10.8%)	33 (14.3%)
Yes	114 (83.2%)	83 (89.2%)	197 (85.7%)
Household income			
Low income	47 (35.1%)	9 (9.7%)	56 (24.7%)
Middle income	62 (46.3%)	22 (23.7%)	84 (37.0%)
High income	25 (18.7%)	62 (66.7%)	87 (38.3%)
Injury-related characteristics			
Years since SCI *	14.2 (4.9)	14.6 (4.8)	14.4 (4.9)
SCI cause			
Traumatic	101 (71.6%)	71 (76.3%)	172 (73.5%)
Non-Traumatic	40 (28.4%)	22 (23.7%)	62 (26.5%)
Impairment group			
Paraplegia incomplete	12 (8.6%)	10 (10.8%)	22 (9.4%)
Paraplegia complete	64 (45.7%)	40 (43.0%)	104 (44.6%)
Tetraplegia incomplete	4 (2.9%)	2 (2.2%)	6 (2.6%)
Tetraplegia complete	43 (30.7%)	20 (21.5%)	63 (27.0%)
Fully recovered	17 (12.1%)	21 (22.6%)	38 (16.3%)

Note: n (%). *Mean (SD). SCI = Spinal Cord Injury. “Fully recovered” reflects self-reported perceived functional recovery at follow-up.

Change in employment status

Of the 236 participants included in the cohort, 234 had complete employment data in both survey rounds and were included in the paired analyses. Two participants had missing employment data at Round 2 and were excluded.

Among participants not in paid work at R1, the majority remained out of paid work at R2 (89.8%), while 10.2% entered paid employment. Among those in paid work at R1, 75.5% remained employed, and 24.5% left paid employment (Table 5).

Table 5: *Change in paid work status between baseline (R1) and follow-up (R2) (N = 234)*

Paid work at R1	Paid work R2		
	No	Yes	Total
No	115 (89.84)	13 (10.16)	128 (100.00)
Yes	26 (24.53)	80 (75.47)	106 (100.00)
Total	141 (60.26)	93 (39.74)	234 (100.00)

Note: n (%).

Overall, more participants exited employment (n=26) than entered (n=13), representing a net decline in paid employment over time. The proportion in paid employment decreased from 45.3% at R1 to 39.7% at R2, corresponding to a difference of 5.6 percentage points (95% CI: −0.05 to 11.2). However, McNemar's test indicated no statistically significant change in paid work status between survey rounds (p = 0.053).

Age-restricted analysis

Among participants aged 67 years or older at follow-up (n = 112), paid employment at follow-up was uncommon (11.6%). None of those not employed at R1 entered paid work by R2, while 43.3% of those employed at R1 remained in work at follow-up.

In contrast, among participants younger than 67 years at follow-up (n = 122), both entry and exit from paid employment were observed, with slightly more participants entering employment (13 vs 9). Although this difference was small and not statistically significant (McNemar's p = 0.524).

Vocational counseling and employment status

Transitions in vocational counseling between the survey rounds were examined descriptively (n = 220). Most participants reported no vocational counseling at either round (67.7%), while 17.3% reported receiving counseling at both rounds. Fourteen participants (6.4%) reported no counseling at R1 but counseling at R2, suggesting receipt of services between the survey rounds.

Changes in employment status differed across vocational counseling patterns ($\chi^2(9) = 17.9$, $p = 0.036$). Ongoing counseling was most common at both rounds among participants who remained in paid employment (30.4%), while counseling between rounds was reported by 15.4% of those who entered employment.

H2 – Subjective social status

Subjective social status data were available for 231 participants at R1 and 226 at R2, with 221 participants contributing to paired analyses. The distribution of subjective social status was highly similar across survey rounds. At both R1 and R2, scores were concentrated in the middle-to-upper range of the MacArthur ladder, with the largest proportions reporting scores between 5 and 8. Mean subjective social status was similar at both survey rounds (6.08 at R1 and 6.15 at R2), and the distributions were slightly negatively skewed at both rounds (Figure 2). Higher subjective social status tended to coincide with higher educational attainment and household income, whereas lower scores were more common among participants with lower education and income levels.

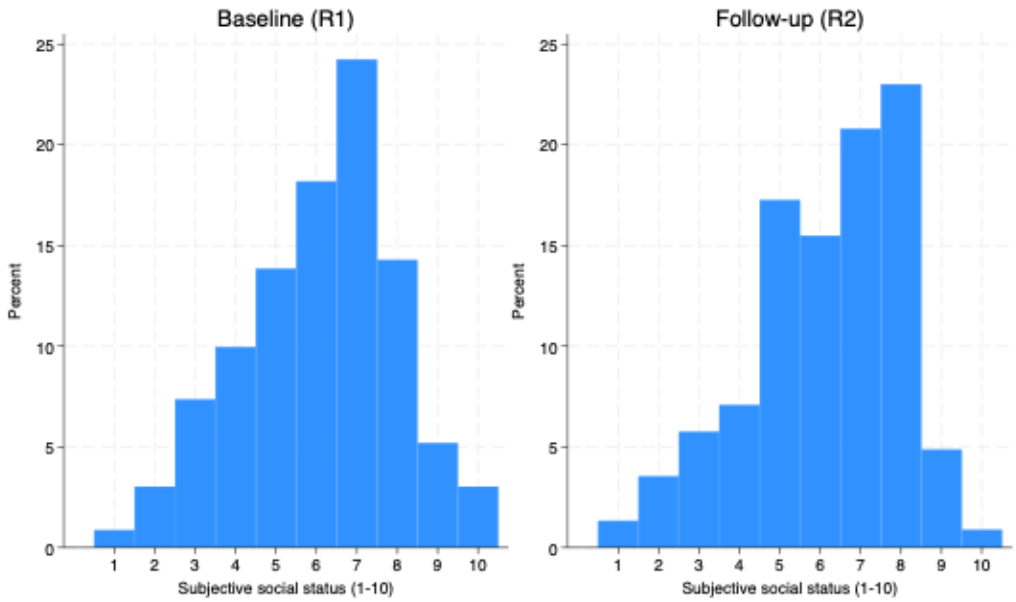

Figure 2: Distribution of subjective social status at baseline (R1) and follow-up (R2).
Note: Subjective social status was measured using the MacArthur Scale (1–10), where higher scores indicate higher perceived social position.

Within-person changes over time were assessed using a Wilcoxon signed-rank test, with roughly equal proportions reporting increases (30.8%), decreases (33%), and no change (36.2%). There was no statistically significant change in subjective social status between R1 and R2 ($z = -0.39$, $p = 0.698$).

Sensitivity analyses stratified by employment transitions showed no statistically significant changes in subjective social status within any group ($p = 0.703$, 0.100, 0.812, and 0.755 for transition groups 1–4, respectively). Although participants transitioning into employment showed a slight tendency toward higher subjective social status over time, no consistent pattern of change was observed across groups *(data not shown).*

H3 – Factors associated with employment and subjective social status

Multivariable logistic and linear regression were conducted to examine factors associated with paid employment and social status at Round 2.

Employment

Multivariable logistic regression revealed that having paid employment at R1 and a younger age were strongly associated with employment at R2 (Table 6). Compared with participants with basic education, those with higher educational attainment had higher odds of employment at R2 (Fig. 3). Injury characteristics showed limited associations overall, except that participants with complete tetraplegia had substantially lower odds of employment.

Table 6: *Multivariable logistic regression for paid work at follow-up (R2)*

	OR	95% CI	p-value	Sig
Paid work at R1	43.36	[13.98 – 134.48]	<0.001	***
Age (years) R1	0.88	[0.84 – 0.92]	<0.001	***
Sex (R1)				
Male	ref	.	.	
Female	0.47	[0.16 – 1.37]	0.167	
Level of education				
Basic	ref			
Intermediate levels	7.31	[1.00 – 53.2]	0.050	*
Advanced levels	7.3	[1.02 – 52.24]	0.048	*
SCI severity				
Paraplegia incomplete	ref	.	.	
Paraplegia complete	1.66	[0.29 – 9.51]	0.571	
Tetraplegia incomplete	1.95	[0.65 – 5.94]	0.242	
Tetraplegia complete	0.03	[0.00 – 0.48]	0.013	*
Years since SCI R1	1.02	[0.92 – 1.12]	0.753	

*Note: *** p<.001, ** p<.01, * p<.05. OR = odds ratio; CI = confidence interval. N = 215.*

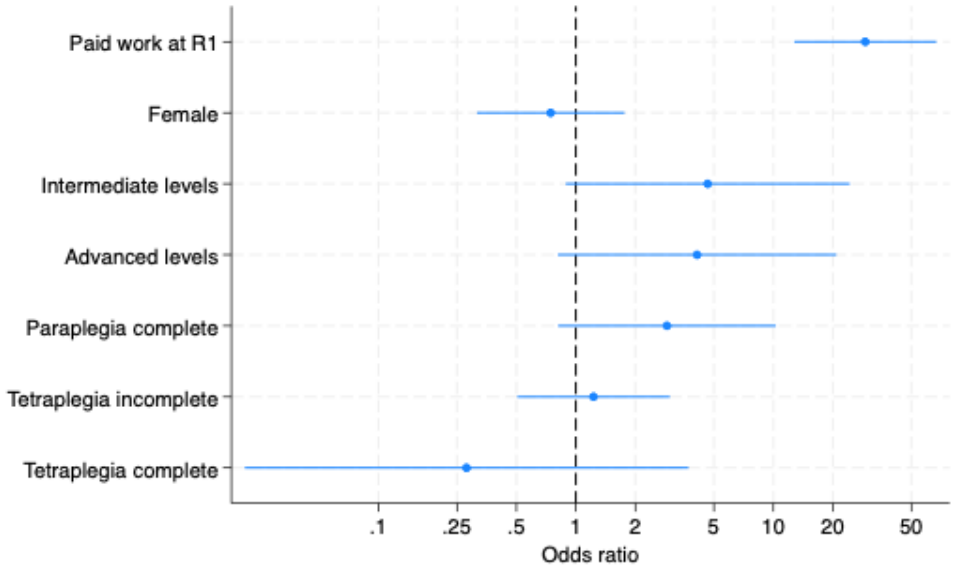

Figure 3: Forest plot of adjusted odds ratios (95% CI) for factors associated with paid work at R2
Note: Age and time since injury were modeled as continuous variables and are not displayed

Sensitivity analyses

Sensitivity analyses for age and prior employment were performed to evaluate the robustness of the findings. An additional adjustment for marital status did not change the results *(data not shown)*, and estimates remained largely consistent with those of the main model.

Age-restricted

Restricting the analyses to participants younger than 67 years at follow-up (n = 113) yielded similar overall patterns. Paid work at R1 remained the strongest predictor of employment at R2 (OR = 28.96, 95% CI: 8.14-102.97, p < 0.001), while increasing age was associated with lower odds of employment (OR = 0.93 per year, 95% CI: 0.88-0.98, p = 0.013), although the magnitude of the age effect was attenuated.

Employment prior to injury

Additional analyses, including employment prior to injury, were conducted. While pre-injury employment was positively associated with paid work at follow-up (OR = 5.66, 95% CI: 0.96–33.44, p = 0.056), this did not materially change the estimates, and baseline employment remained the dominant predictor (OR: 41.98) *(data not shown).*

Subjective social status

Baseline subjective social status was strongly associated with follow-up status (β = 0.56, 95% CI 0.43–0.69, p < 0.001). Participants in paid work at R1 reported higher subjective social status at follow-up than those who were not employed at baseline.

No clear associations were observed for age, sex, education level, injury characteristics, or time since injury. The model (Table 7) explained 41% of the variance in subjective social status (R^2 = 0.41).

Table 7: *Linear regression model for subjective social status at follow-up (R2)*

	β	95% CI	p-value	Sig
Subjective social status at R1	0.56	[0.43 – 0.69]	<0.001	***
Paid work at R1	0.49	[0.03 – 0.96]	0.039	*
Age (years) R1	0.01	[-0.01 – 0.03]	0.192	
Sex R1				
Male	ref	.	.	
Female	-0.22	[-0.68 – 0.24]	0.352	
Level of education				
Basic levels	ref	.	.	
Intermediate levels	-0.24	[-1.02 – 0.54]	0.546	
Advanced levels	-0.23	[-1.07 – 0.61]	0.594	
SCI severity				
Paraplegia incomplete	ref	.	.	
Paraplegia complete	0.34	[-0.39 – 1.08]	0.358	
Tetraplegia incomplete	0.02	[-0.45 – 0.5]	0.923	
Tetraplegia complete	-0.21	[-1.49 – 1.06]	0.74	
Years since SCI R1	0.01	[-0.04 – 0.05]	0.768	

Note :
**** p<.001, ** p<.01, * p<.05*
β = *unstandardized regression coefficient; CI = confidence interval. N = 204.*

H4 – Financial satisfaction

Financial satisfaction was measured at Round 2 using a 10-point scale. Participants in paid work reported higher mean financial satisfaction compared with those not in paid work (Table 8), although this difference was not statistically significant (mean difference = 0.42, 95% CI: -0.15 to 1.00, p = 0.149)

Table 8: *Financial satisfaction at follow-up (R2) by employment status*

Paid work	N	Mean	SD
No	138	6.88	2.22
Yes	93	7.30	2.13

In multivariable linear regression analysis, participants in paid work at Round 2 reported slightly higher financial satisfaction compared with those not in paid work (β = 0.82, 95% CI 0.11–1.52, p = 0.023).

Increasing age was also associated with higher financial satisfaction, and there was some variation across injury impairment groups, though no consistent pattern emerged.

No statistically significant associations were observed for sex, education level, or time since injury. The model explained 12% of the variance in financial satisfaction (R^2 = 0.12).

Household income

In sensitivity analyses, additional adjustment for household income weakened the association between paid work and financial satisfaction, and the association was no longer statistically significant (β = −0.05, 95% CI −0.75 to 0.65). Household income was strongly associated with higher financial satisfaction, with higher-income groups reporting progressively greater satisfaction. Compared with the low-income group, financial satisfaction was higher in the middle-income group (β = 1.19, 95% CI: 0.48–1.90, p = 0.001), and highest among the high-income group (β = 2.54, 95% CI: 1.71–3.37, p < 0.001).

Desire for paid work and financial satisfaction among non-employed participants

Among participants not in paid employment at Round 2, those who expressed a desire for paid work were significantly less satisfied with their finances.

In crude analysis, those reporting a desire to work scored on average 1.57 points lower on the 1–10 satisfaction scale than those not expressing such a desire (95% CI −2.56 to −0.59, p = 0.002). This association remained virtually unchanged after adjustment for age and self-reported work ability (β = −1.56, 95% CI −2.72 to −0.40, p = 0.009).

Discussion

This master's thesis examined longitudinal changes in employment and subjective social status among individuals with SCI in Norway over an approximate six-year follow-up period, as well as factors associated with employment and financial satisfaction at follow-up (R2).

The cohort was characterized by relatively high educational attainment and a predominance of incomplete injuries. This distribution is consistent with both national and global epidemiological trends of SCI (Halvorsen et al., 2023; Lascu et al., 2025; Liu et al., 2025; Safdarian et al., 2023). Although both educational level and injury characteristics are known to influence functional independence and employment trajectories (Escorpizo et al., 2024; Halvorsen et al., 2023; Ottomanelli & Lind, 2009; Solheim & Leiulfsrud, 2018), the present findings suggest that injury-related characteristics played a more limited role in predicting employment outcomes than expected.

Key findings

Overall, employment status was highly stable across both survey rounds. A slight decline was observed, though the change was not statistically significant. Subjective social status showed even greater stability over time, with no significant within-person changes.

In the multivariable analyses, baseline employment and younger age emerged as the strongest predictors of paid work at follow-up. Higher educational attainment was associated with increased odds of employment, although estimates were imprecise. Injury characteristics were generally not associated with employment, except for individuals with complete tetraplegia, who had substantially lower odds of paid work.

For subjective social status, baseline status was the dominant predictor of status at R2, while no clear associations were observed for age, education, or injury characteristics.

Participants in paid work reported somewhat higher financial satisfaction; however, this association attenuated after adjusting for household income, suggesting that it largely reflects differences in financial resources. Among non-employed participants, expressing a desire for paid work was strongly associated with lower financial satisfaction, suggesting that unmet vocational aspirations may be linked to lower perceived economic well-being. These overall patterns provide the basis for the hypothesis-specific interpretations.

H1 – Changes in employment

H1: Employment rates among individuals with SCI in Norway have changed between the two rounds, but this was not supported as no statistically significant difference was observed between R1 and R2. Although a modest net decline was observed, with more participants exiting paid work than entering, this difference did not reach statistical significance (McNemar's p = 0.053). However, the data show a slight decline in overall employment over the observation period, which warrants further exploration.

An important finding was the strong persistence of the employment status. The majority of participants remained in the same employment category across survey rounds: 75.5% of those employed at baseline remained in paid work at follow-up, and 89.8% of those not employed remained out of paid work, indicating substantial labor market stability over time. This pattern is consistent with the concept of cumulative (dis)advantage, whereby early labor market attachment increases the likelihood of continued participation, while initial exclusion may reinforce detachment (Crystal et al., 2017; DiPrete & Eirich, 2008). It also aligns with previous findings on employment trajectories following SCI (Guttman, 1959; Ottomanelli & Lind, 2009). These findings underscore the importance of preventing premature exit from the labor market.

Given that the majority of participants had been employed prior to injury, the observed work patterns likely reflect a continuity in labor market attachment rather than entirely new labor market entry following SCI. Simultaneously, many individuals may not be able to return to their previous occupation or level of work, indicating that SCI also constitutes a critical disruption in employment trajectories (L et al., 2017). This suggests that employment trajectories following SCI are shaped by an interplay between disruption and continuity, in which pre-injury labor-market attachment remains important, but does not fully determine post-injury participation.

Exploratory analyses of vocational counseling help provide additional context for these patterns. The majority of participants reported no counseling at either time point, suggesting a low uptake of services, a finding consistent with earlier research. Comparative evidence from other European contexts further confirms these challenges. For instance, low vocational rehabilitation uptake in Romania (18.7%) highlights the need for systematic, accessible rehabilitation services across Europe (Lascu et al., 2025). While change in employment status differed across counseling patterns, ongoing vocational rehabilitation

was more commonly observed among those who remained in paid work, whereas counseling between rounds was less frequently reported among those entering employment. Although these findings are descriptive and the temporal relationship cannot be fully established, they may suggest that vocational counseling was more commonly observed among those entering employment. This interpretation is consistent with the broader finding of limited mobility into employment, as observed in the present study. Nevertheless, these findings should therefore be interpreted as descriptive associations, rather than causal relationships.

Increasing age was also associated with lower odds of employment, and age-restricted analyses suggest that part of the observed decline in paid work reflects transitions into retirement. At follow-up, among participants aged 67 years or older at, entry into paid work was not observed, while a substantial proportion exited employment, consistent with Norway's legal retirement age (Pedersen, 2026). In contrast, both entry into and exit from paid employment were observed in participants younger than 67 years at follow-up. This indicates that the decline in employment in the full sample is partly driven by retirement transitions rather than a general reduction in labor market participation among working-age individuals.

Together, these findings suggest that employment trajectories following SCI are characterized by stability, alongside a modest tendency towards lower employment at follow-up. While part of this pattern likely reflects transitions to retirement among older participants rather than SCI-related issues, the strong persistence of employment status illustrates the importance of early labor market attachment in forming long-term participation. This may lead to increasingly stratified employment trajectories over time, in which employed individuals remain attached to the labor market, while those outside it encounter barriers to re-entry.

Although Norway scored comparatively high employment rates following SCI than several other countries (Post et al., 2020), the present findings suggest that labor market inclusion and transitions into paid work remain challenging for individuals with SCI. Continued efforts aimed at improving vocational support and reducing barriers to labor market participation therefore remain important.

H2 – Subjective social status

Contrary to the initial hypothesis *H2: self-reported subjective social status has changed over time*, measures remained highly stable across survey rounds. Mean scores were nearly identical at R1 and R2, with no statistically significant changes within-person. This stability also persisted in sensitivity analyses stratified by employment transitions.

Although employment status also remained relatively stable over time, subjective social status showed even less variation, indicating that changes in objective socioeconomic measures, such as employment status, do not necessarily translate into changes in subjective social status. This supports previous research suggesting that subjective measures capture broader dimensions of social positioning than objective indicators (Adler et al., 2000), and may thus add to a more nuanced understanding.

Several mechanisms may explain this pattern, including adaptive and social comparison processes, as well as the Norwegian welfare context. According to Festinger's (1954) social comparison theory, perceived status is shaped relative to others rather than absolute conditions. Following this idea, individuals can base their self-assessments on relative comparisons within consistent reference groups, thereby attenuating the importance of employment changes. In addition, adaptive processes may contribute to stability, since individuals may recalibrate the meaning of social position over time. This response shift can result in stable self-assessments, despite changes in objective circumstances (Vanier et al., 2021). The Norwegian welfare context can further buffer the impact of employment changes by reducing the economic hardship associated with non-employment (Mæland et al., 2026).

From a methodological perspective, the absence of change should also be interpreted with caution. Although widely recognized, the MacArthur ladder is a single question measure and may have limited sensitivity to detect subtle changes in complex constructs (Adler et al., 2000; Fekete et al., 2017).

Altogether, these findings highlight the importance of distinguishing between objective socioeconomic indicators and subjective perception in longitudinal research to capture lived experiences (Adler et al., 2000; Fekete et al., 2017; Ullah et al., 2018).

H3 – Factors associated with employment and subjective social status

H3, which proposed that *younger age, higher education, and less severe injury are associated with more favorable trends in paid employment and higher social status at R2*, was only partially supported.

Employment

Younger age was strongly associated with paid work at follow-up. Educational attainment was positively associated with employment, with participants with intermediate and advanced levels having higher odds than those with basic education, although the estimates were imprecise. This is consistent with earlier research that identified education as a key predictor of employment following SCI (Ottomanelli & Lind, 2009; Solheim & Leiulfsrud, 2018).

In contrast, injury characteristics were not independently associated with employment in the adjusted analysis, except for complete tetraplegia, which was associated with substantially lower employment odds. While more severe injuries are generally expected to limit participation in the labor market (Kirshblum et al., 2011), previous findings have been mixed, suggesting that functional ability, workplace adaptations, and contextual support may be more important than diagnostic categories alone (Ottomanelli & Lind, 2009).

While not part of the original hypothesis, baseline employment emerged as the strongest predictor of paid work at follow-up, suggesting that initial labor-market integration may be more important than baseline demographic or injury-related characteristics in shaping long-term employment outcomes. This finding further supports the concept of cumulative (dis-)advantage theory (DiPrete & Eirich, 2008).

Altogether, these findings provide only partial support for the hypothesized role of structural factors. While age appears to be a robust determinant of employment, the effects of education and injury severity were weaker or less consistent than expected.

Subjective social status

For subjective social status, the hypothesis was not supported. Neither age, education, nor injury characteristics were associated with subjective social status at follow-up in the adjusted model. Instead, baseline subjective social status was the dominant predictor of follow-up status, indicating substantial stability over time, similar to that observed for paid work.

Employed participants also reported higher subjective social status at R2. However, this likely reflects stable differences between individuals rather than changes over time, as no systematic within-person changes in subjective social status were observed. This highlights that cross-sectional associations do not necessarily translate into longitudinal change.

Overall, the findings indicate that while structural and demographic factors, particularly age, are relevant for employment outcomes, partly reflecting retirement transitions among older participants, they appear to play a limited role in shaping subjective social status. This divergence suggests that objective and subjective dimensions of socioeconomic position are influenced by different mechanisms, with subjective social status being more strongly anchored in prior perceptions than in observable socioeconomic characteristics (Adler et al., 2000).

Exploratory analyses – work ability and desire for paid work

Exploratory analyses added further insights into this dynamic. Self-reported work ability was strongly associated with a desire for paid employment at baseline, but the relationship weakened substantially at R2. This may indicate a shift in vocational expectations over time, potentially reflecting adaptation (Vanier et al., 2021), unmet aspirations and discouragement (Meade et al., 2015; Ottomanelli & Lind, 2009), or underscore transitions into retirement.

Alternatively, it can indicate gradual disengagement from the labor market. These processes may help explain why structural factors showed limited associations with employment in the adjusted models, as motivation and perceived opportunities may change over the life course, especially if experiencing continued barriers to participation (Meade et al., 2015).

H4 – Financial satisfaction

The results partially support *H4: Paid employment at R2 is positively associated with higher financial satisfaction.* Participants in paid work at follow-up reported higher financial satisfaction compared to those not in paid work. However, after adjusting for household income, this association disappeared, suggesting that the association between employment and financial satisfaction may largely be explained by differences in financial resources rather than exerting an independent effect. This is consistent with previous research showing that income is a central determinant of financial well-being (Halvorsen et al., 2023; Oña et al., 2024).

Within the Norwegian welfare context, social protection systems may also help buffer financial strain among individuals not in paid employment (Mæland et al., 2026; Strøm et al., 2017; van der Wel & Halvorsen, 2015). This may help explain why the differences in financial satisfaction between employed and non-employed participants were relatively modest, and why the association was largely attenuated after adjusting for income.

Desire for paid work among non-employed participants

Additional exploratory analyses among non-employed participants further support this interpretation. Lower financial satisfaction was observed among non-employed individuals who expressed a desire for paid work, and this association remained after adjusting for age and self-reported work ability. These results indicate that the relationship was not explained by demographic factors or perceived work capacity.

These findings may suggest that unmet vocational aspirations are associated with lower perceived financial satisfaction, beyond differences in age and self-reported work ability. In this context, financial satisfaction may reflect not only available resources, but also the gap between desired and actual labor-market participation.

Limitations

While efforts were made to identify and address potential sources of bias in the present study at both the design and analysis stages, several limitations should be considered when interpreting the findings of this thesis.

Selection bias

To reduce selection bias, the study was restricted to individuals who participated in both InSCI-Nor rounds, supporting within-person longitudinal comparisons. Measurement bias was minimized by using the InSCI questionnaire, with nearly identical instruments across both rounds (Fekete et al., 2017).

Although cohort studies are generally less prone to selection bias than cross-sectional designs (Bonita, 2006, p. 50), participation in the InSCI-Nor survey was voluntary, introducing the possibility of selection bias, specifically volunteer bias (response bias). This occurs because individuals who choose to participate may differ systematically from non-responders in terms of health, education, and socioeconomic characteristics (Parfrey & Barrett, 2021, p. 21).

The present analyses were further restricted to the 236 respondents who participated in both survey waves, introducing potential attrition bias (Parfrey & Barrett, 2021, pp. 21-22). If individuals lost to follow-up differ systematically from those retained, particularly in terms of their health status or labor market attachment, employment rates and socioeconomic outcomes may be overestimated (Bonita, 2006, pp. 53-54). This can reflect a form of 'healthy responder' bias (Parfrey & Barrett, 2021, p. 40). The relatively high levels of educational attainment and stable employment observed may partly reflect such mechanisms, thereby limiting the generalizability of the findings.

Information bias

All variables were self-reported and may therefore be subject to misclassification (Bonita, 2006, pp. 54-55), a systematic error in the measurement of exposures and outcomes (Parfrey & Barrett, 2021, p. 37). Questionnaire-based data collection is a cost-efficient and widely used method (Bonita, 2006, pp. 46-48), but it relies on participants accurately reporting their behaviors, experiences, and perceptions (Carter & Lubinsky, 2016b, p. 215).

While employment status is relatively straightforward, subjective measures such as social status and financial satisfaction are based on self-perceived evaluations rather than

objective indicators. However, these measures capture perceived standing, rather than objective conditions (Carter & Lubinsky, 2016b, pp. 198-199), and should be interpreted accordingly.

In addition, the use of single-item questions to capture complex constructs such as financial adequacy can lack the granularity of more psychometric tools (Fekete et al., 2017). This could have contributed to modest changes in subjective outcomes between R1 and R2, and the findings should therefore be interpreted as indicative rather than definitive.

Confounding

As this master's project uses already gathered data, confounding was addressed through multivariable regression modeling (Bonita, 2006, pp. 55-57), with covariate selection guided by DAGs (Greenland et al., 1999). Age, sex, education, injury impairment, and time since injury were included as the minimum sufficient adjustment set. Etiology was not included, as its effect is mostly mediated through injury impairment groups, which were already adjusted for.

Nevertheless, residual confounding cannot be excluded. As the present study relied on secondary data from the InSCI survey, the ability to address additional confounding factors was limited to the variables available in the dataset. Thus, other relevant factors, such as specific secondary health conditions, workplace accommodations, access to vocational rehabilitation, and local labor market conditions, may influence employment outcomes but were not fully captured in this project. This can partly explain why some associations were attenuated or did not reach statistical significance, despite plausible underlying relationships.

Sample size

The modest sample size (n = 236) limits statistical power, particularly for subgroup and interaction analyses. Some categories contained relatively few observations, increasing uncertainty in estimates and resulting in wider confidence intervals (Parfrey & Barrett, 2021, p. 98). This was evident in several regression estimates, where wide CIs indicated limited precision.

The absence of statistically significant findings may therefore reflect limited power, rather than the absence of a true association, increasing the risk of type II error. Although the sample size exceeds the minimum recommended for national InSCI estimates (Post et

al., 2020), no formal power analysis was conducted for this thesis. The findings should therefore be interpreted with greater emphasis on effect sizes and precision rather than statistical significance alone.

Model specification and multicollinearity

Several variables were combined or categorized to improve interpretability and ensure sufficient group sizes (Parfrey & Barrett, 2021, p. 100). For example, injury level and severity were combined into a composite variable reflecting functional impairment by integrating both anatomical level and neurological degree (AIS). While this is a common approach in studies with limited sample sizes to support model stability, it may lead to information loss and obscure heterogeneity within categories.

Categorization of continuous or detailed variables may also introduce residual confounding within groups. Such categorization decisions were informed by clinically relevant groupings and established practice, and, where possible, by prior research. While these strategies may reduce issues related to multicollinearity and sparse data (Tjønndal, 2018, pp. 165-166), they introduce a trade-off between interpretability, statistical precision, and the ability to detect more nuanced associations.

Additionally, some categories contained sparse data. Notably, the complete tetraplegia category included only 6 observations, which may have increased the risk of type II errors and contributed to imprecise estimates (Parfrey & Barrett, 2021, pp. 94-95).

Internal validity

Internal validity refers to the degree to which the observed associations are valid for the study population and not explained by systematic errors (Bonita, 2006, p. 58). In the present study, internal validity is supported by the longitudinal design, which allows for within-person comparisons over time. Combined with the use of a standardized and validated questionnaire, and DAGs to guide multivariable modeling, further minimizes confounding.

However, internal validity may still be affected by residual confounding, loss to follow-up, and information bias (Bonita, 2006, p. 58). In particular, as the data is self-reported, results may be subject to misclassification and desirability bias, which could influence both exposure and outcome measures.

Scope and analytical limitations

Finally, the scope of this study is constrained by its design as a 30-credit master's thesis. Analyses were limited to a predefined set of variables, research questions, and relatively standard statistical approaches. While the full InSCI dataset allows for a wide range of analyses, including more complex modeling strategies, these were beyond the scope of this project due to time and resource constraints.

Strengths

Despite these limitations, the study has several important strengths.

The longitudinal design represents a key strength, enabling within-person analyses of changes over time (Parfrey & Barrett, 2021, pp. 10-11). This reduces the influence of between-person heterogeneity and strengthens internal validity compared with cross-sectional designs.

Furthermore, the study draws on data from the Norwegian arm of the InSCI survey, which uses a standardized, internationally validated instrument (Fekete et al., 2017), supporting the reliability and comparability of the measures. The use of (near-)identical instruments across both survey rounds (Gross-Hemmi et al., 2021; Post et al., 2011) further strengthens the validity of longitudinal comparisons, as observed changes are less likely to reflect measurement differences.

In addition, consistent measurement also reduces the risk of differential misclassification. Any remaining misclassification is therefore likely to be non-differential with respect to follow-up, which would tend to attenuate associations rather than produce spurious findings (Carter & Lubinsky, 2016b, p. 215).

Another important strength is that the longitudinal cohort was broadly comparable to national SCI populations in Norway as reported in NorSCIR (Halvorsen & Pettersen, 2019), with respect to several demographic and injury-related characteristics, supporting the external validity of the findings.

The use of self-administered questionnaires may also reduce social desirability bias compared with interviewer-based methods, particularly for subjective outcomes such as social status and financial satisfaction (Grimm, 2010).

Finally, by including both employment status and subjective social status outcomes, this thesis aims to provide a more comprehensive assessment of socioeconomic well-being following SCI.

Contextual considerations

The present results should be interpreted in light of several contextual factors.

COVID-19 and remote work

The two InSCI rounds were conducted before and after the COVID-19 pandemic, a period marked by increased adoption of remote and hybrid work arrangements. Evidence suggests a sustained rise in post-pandemic work-from-home opportunities and job seekers' preferences for flexibility (Adrjan et al., 2025). This trend may reduce certain physical and logistical barriers to employment and could be particularly relevant for individuals with SCI.

However, empirical evidence regarding the impact of remote work on employment outcomes among individuals with SCI remains limited. Further research examining occupational characteristics prior to injury and the positions held post-injury would be necessary to better understand these dynamics.

Policy and welfare structures

The findings must also be interpreted within the Norwegian welfare system, which allows for combinations of paid work and disability benefits (Mæland et al., 2026; Pedersen, 2026). This likely contributes to the observed overlap between employment and benefit receipt, suggesting that labor market participation must be understood alongside welfare structures, rather than as a binary outcome. Despite Norway's comprehensive welfare system (van der Wel & Halvorsen, 2015), the observed trends indicate that increasing labor market participation after SCI remains challenging.

The ability to combine disability benefits with paid work may help sustain financial security and social standing. However, stability in subjective social status may partially mask ongoing structural challenges in the labor market. Persistent difficulties in increasing employment participation indicate that welfare provisions alone are insufficient to address all barriers to labor market inclusion. This highlights the need for policies and interventions that go beyond income support, focusing also on opportunities for meaningful employment and social participation. Future research should further explore how welfare systems shape both perceived and actual socioeconomic integration among people with disabilities.

Generalizability

Generalizability, or external validity, refers to the extent to which study results can be applied outside the people, settings, or times included in the study (Parfrey & Barrett, 2021, pp. 10-11). For the present study, the focus is primarily on community-dwelling individuals with SCI in Norway who participated in both survey rounds.

While the longitudinal cohort represents a substantial proportion of individuals with SCI in the national registry, it is subject to volunteer bias. Participants who self-selected into the study and remained in the cohort may differ from those excluded from the sample.

To assess the representativeness of the longitudinal cohort, baseline characteristics were compared with national registry data from NorSCIR. Data from 2018 was considered most comparable, as it aligned most closely with the study's baseline. The annual NorSCIR report from 2018 (n=125) had a mean age of 51.2 years and was predominantly male (68.8%), with a relatively even distribution of traumatic and non-traumatic injuries (53% vs 48%). A high proportion of cases were classified as AIS D (58.4%), corresponding to incomplete injuries, and tetraplegia was somewhat more common (43.2%) than paraplegia (36.8%), although 20% of cases were categorized as unknown or unregistered (Halvorsen & Pettersen, 2019).

Similarly, the longitudinal cohort was predominantly male (68.6%) and characterized by a high proportion of incomplete injuries, particularly incomplete paraplegia. However, participants included in the present study were somewhat older on average (mean age 56.6 years), and the proportion of traumatic injuries was also somewhat higher (65.7%). Additionally, whereas the NorSCIR report reflects newly registered incidents from 2018 (Halvorsen & Pettersen, 2019), the present study population represents a more chronic, community-living population with a longer time since injury. Overall, the cohort appeared broadly comparable to national SCI populations in Norway, although differences in setting and population characteristics should be considered when interpreting the findings. Other sociodemographic characteristics could not be gathered, and generalizations must be treated with caution, as findings may not fully represent those with more severe complications or lower SES (Bonita, 2006, p. 58).

Furthermore, the generalizability is limited by the study's setting (Carter & Lubinsky, 2016b, p. 29). Since the results are tied to the specific health care and social protection frameworks of the Norwegian welfare state, they may not be directly transferable to settings

with different health care systems, labor market conditions, or social protection frameworks. Finally, time generalizability may be threatened as social trends and knowledge change over time, if future shifts in policy or medical management alter the relationship between SCI and employment (Carter & Lubinsky, 2016b, p. 89).

While internal validity is a prerequisite for external validity, it does not guarantee that findings can be generalized beyond this specific population (Bonita, 2006, p. 58).

Conclusion

Employment and subjective social status among individuals with SCI in Norway seem to be relatively stable over the approximately six-year follow-up period. Continued employment was strongly associated with labor market attachment at baseline, while labor market entry among those not employed at baseline remained uncommon. Together, these patterns suggest persistent inequalities in labor market participation following SCI.

Although a modest, non-significant decline in paid work was observed, part of this likely reflects age-related transitions. In contrast, subjective social status remained highly stable, highlighting a distinction between subjective perceptions and objective socioeconomic circumstances. Patterns related to financial satisfaction further indicate that subjective economic well-being does not necessarily align with objective measures.

Within the Norwegian welfare system, the possibility of combining paid work with disability benefits may support sustained labor market participation for some individuals and enhance financial security. Nevertheless, increasing employment remains challenging, particularly for individuals already outside the labor market.

Overall, the results underscore the importance of considering both objective and subjective dimensions of socioeconomic well-being following SCI. Early targeted rehabilitation and vocational interventions aimed at reducing barriers to labor market participation may therefore be important for promoting long-term employment outcomes and broader social participation following SCI.

Implications and future research

Although no statistically significant decline in paid work was observed, employment rates did not increase over time, and transitions into paid work remained limited. This trend, combined with a significant reduction in the reported desire to work, warrants attention, as it runs counter to policy goals aimed at increasing labor market participation following SCI.

The observed overlap between employment and disability benefits (Appendix 5), as well as the attenuation of patterns after restricting analyses to participants below retirement age, further indicates that labor market participation is closely linked to welfare structures. Future research should therefore examine transitions between disability benefits, partial work participation, and retirement, and how these influence socioeconomic outcomes.

The relative stability in subjective social status may further indicate that welfare structures buffer some of the socioeconomic consequences associated with non-employment. Future research should explore the mechanisms underlying the observed stability in subjective social status despite changes in objective measures. In particular, the roles of adaptations, response shift, and social comparison warrant further investigation. Qualitative approaches may be particularly valuable in this regard.

In addition, more comprehensive measures of socioeconomic status, including education, household income, and occupational characteristics, may provide a more nuanced understanding of socioeconomic trajectories following SCI. For instance, previous research shows that individuals previously engaged in physically demanding, low-income occupations may face greater barriers to re-employment after injury (Oña et al., 2024).

Longer follow-up, including future InSCI waves, will be important to assess whether the observed patterns persist over time. Comparative analyses across other regions may further elaborate on how different welfare regimes shape labor outcomes.

Finally, larger sample sizes would allow for more precise estimation of subgroup effects, particularly with respect to injury characteristics. Such knowledge may help inform future rehabilitation programs and the development of appropriate labor-market and welfare policies aimed at improving long-term socioeconomic participation following SCI.

Other information

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References

Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. *Health Psychol*, *19*(6), 586-592. https://doi.org/10.1037//0278-6133.19.6.586

Adrjan, P., Ciminelli, G., Judes, A., Koelle, M., Schwellnus, C., & Sinclair, T. M. (2025). Working from home after COVID-19: Evidence from job postings in 20 countries. *Labour Economics*, *96*, 102751. https://doi.org/https://doi.org/10.1016/j.labeco.2025.102751

Ahuja, C. S., Wilson, J. R., Nori, S., Kotter, M. R. N., Druschel, C., Curt, A., & Fehlings, M. G. (2017). Traumatic spinal cord injury. *Nature Reviews Disease Primers*, *3*(1), 17018. https://doi.org/10.1038/nrdp.2017.18

American Psychological Association. (Nov. 15th 2023). *socioeconomic status (SES)*. Retrieved April 1st 2026 from https://dictionary.apa.org/socioeconomic-status

Bickenbach, J., Officer, A., Shakespeare, T., von Groote, P., World Health, O., & The International Spinal Cord, S. (2013). *International perspectives on spinal cord injury* World Health Organization. https://iris.who.int/handle/10665/94190

Bonita, R. (2006). *Basic epidemiology* (2nd edition. ed.). World Health Organization.

Carter, R. E., & Lubinsky, J. (2016a). Finding Research Literature. In *Rehabilitation research : principles and applications* (5th ed.). Elsevier.

Carter, R. E., & Lubinsky, J. (2016b). *Rehabilitation research : principles and applications* (5th ed.). Elsevier.

Crystal, S., Shea, D. G., & Reyes, A. M. (2017). Cumulative Advantage, Cumulative Disadvantage, and Evolving Patterns of Late-Life Inequality. *Gerontologist*, *57*(5), 910-920. https://doi.org/10.1093/geront/gnw056

Dahlgren, G., & Whitehead, M. (1991). *Policies and strategies to promote social equity in health*. Insitute for Future Studies.

DiPrete, T., & Eirich, G. (2008). Cumulative Advantage as a Mechanism for Inequality: A Review of Theoretical and Empirical Developments. *Annual Review of Sociology*, *32*. https://doi.org/10.1146/annurev.soc.32.061604.123127

Escorpizo, R., Naud, S., Post, M., Schwegler, U., Engkasan, J., Halvorsen, A., Geraghty, T., & Sadowsky, C. (2024). Relationship between employment and quality of life and self-perceived health in people with spinal cord injury: an international comparative study based on the InSCI Community Survey. *Spinal Cord*, *62*(3), 110-116. https://doi.org/doi:10.1038/s41393-023-00953-8

Fekete, C., Post, M. W. M., Bickenbach, J., Middleton, J., Prodinger, B., Selb, M., & Stucki, G. (2017). A Structured Approach to Capture the Lived Experience of Spinal Cord Injury. *American Journal of Physical Medicine & Rehabilitation*, *96*(2). https://doi.org/10.1097/phm.0000000000000622

Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations*, *7*, 117 - 140.

Fløtre, I. A., & Strand, H. H. (2025). *Hva er vanlig lønn i Norge?* Statistisk Sentralbyrå. Retrieved 17th March 2026 from https://www.ssb.no/arbeid-og-lonn/lonn-og-arbeidskraftkostnader/artikler/hva-er-vanlig-lonn-i-norge#:~:text=Nedre%20kvartil%20(25%20prosent%20tjener,på%20over%20216%20000%20kroner.

Greenland, S., Pearl, J., & Robins, J. M. (1999). Causal Diagrams for Epidemiologic Research. *Epidemiology*, *10*(1). https://journals.lww.com/epidem/fulltext/1999/01000/causal_diagrams_for_epidemiologic_research.8.aspx

Grimm, P. (2010). Social Desirability Bias. In *Wiley International Encyclopedia of Marketing*. https://doi.org/https://doi.org/10.1002/9781444316568.wiem02057

Gross-Hemmi, M. H., Gemperli, A., Fekete, C., Brach, M., Schwegler, U., & Stucki, G. (2021). Methodology and study population of the second Swiss national community survey of functioning after spinal cord injury. *Spinal Cord*, *59*(4), 363-372. https://doi.org/10.1038/s41393-020-00584-3

Guttman, L. (1959). The Place of our Spinal Paraplegic Fellowman in Society. *Rehabilitation*, 15-27.

Halvorsen, A., & Pettersen, A. L. (2019). *Årsrapport 2018*. https://www.stolav.no/4a8387/siteassets/fag-og-forskning/medisinske-kvalitetsregistre/norscir/arsrapporter/norscir-arsrapport-2018.pdf

Halvorsen, A., Steinsbekk, A., Leiulfsrud, A. S., Post, M. W. M., Biering-Sørensen, F., & Pape, K. (2023). Labour market participation after spinal cord injury. A register-based cohort study. *Spinal Cord*, *61*(4), 244-252. https://doi.org/10.1038/s41393-023-00876-4

Higgins, J. P. T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2019). *Cochrane Handbook for Systematic Reviews of Interventions*. John Wiley & Sons, Incorporated. http://ebookcentral.proquest.com/lib/hioa/detail.action?docID=5906330

Hill, M., & Irving, Z. (2020). Conclusion: A divided world of social policy? In *Exploring the World of Social Policy: An International Approach*. Policy Press.

Kirshblum, S. C., Burns, S. P., Biering-Sorensen, F., Donovan, W., Graves, D. E., Jha, A., Johansen, M., Jones, L., Krassioukov, A., Mulcahey, M. J., Schmidt-Read, M., & Waring, W. (2011). International standards for neurological classification of spinal cord injury (Revised 2011). *The Journal of Spinal Cord Medicine*, *34*(6), 535-546. https://doi.org/10.1179/204577211X13207446293695

L, O., LL, G., SD, B., E, N., TM, D., SA, H., JP, L., D, O., S, S., & KT, W. (2017). Individual Placement and Support in Spinal Cord Injury: A Longitudinal Observational Study of Employment Outcomes. *Archives of Physical Medicine and Rehabilitation*, *98*(8), 1567-1575.e1561. https://doi.org/doi:10.1016/j.apmr.2016.12.010

Landsforeningen for Ryggmargsskadde. (2012). *ABC om ryggmargsskade for helsepersonell*. Landsforeningen for Ryggmargsskadde. https://www.legeforeningen.no/contentassets/f0852754bf0a4307b83ffa1b87d888ce/abc-om-ryggmargsskade-helsepersonell.pdf

Lascu, C., Popa, D., Buhaș, C., Voiţă-Mekereş, F., Popa, F., Teodorescu, M., Căiță, G., Szilagyi, G., Schwarz-Madar, A., Bodea, M., & Hozan, C. (2025). Employment and Its Determinants for Spinal Cord Injury Population in Romania. *NeuroSci*, *6*(1). https://doi.org/doi:10.3390/neurosci6010010

Lee, B. B., Cripps, R. A., Fitzharris, M., & Wing, P. C. (2014). The global map for traumatic spinal cord injury epidemiology: update 2011, global incidence rate. *Spinal Cord*, *52*(2), 110-116. https://doi.org/10.1038/sc.2012.158

Lidal, I. B., Hjeltnes, N., Røislien, J., Stanghelle, J. K., & Biering-Sørensen, F. (2009). Employment of persons with spinal cord lesions injured more than 20 years ago. *Disabil Rehabil*, *31*(26), 2174-2184. https://doi.org/10.3109/09638280902946952

Lidal, I. B., Huynh, T. K., & Biering-Sørensen, F. (2007). Return to work following spinal cord injury: a review. *Disabil Rehabil*, *29*(17), 1341-1375. https://doi.org/10.1080/09638280701320839

Liu, W., Samuhaer, A., Lin, K., Li, M., Zang, C., Liu, H., Fan, H., Shi, K., & Li, D. (2025). Global epidemiological trends and burden of cervical and subcervical spinal cord injuries, 1990–2021: a multidimensional analysis using global burden of disease data. *Journal of Orthopaedic Surgery and Research*, *20*(1), 657. https://doi.org/10.1186/s13018-025-05985-9

Meade, M., Reed, K., Saunders, L., & Krause, J. (2015). It's All of the Above: Benefits of Working for Individuals with Spinal Cord Injury. *Topics in spinal cord injury rehabilitation*, *21*(1), 1-9. https://doi.org/doi:10.1310/sci2101-1

Mæland, J. G., Hatland, A., & Pedersen, A. W. (2026, February 4th 2026). *Folketrygden*. Store Norske Leksikon. Retrieved March 8th. 2026 from https://snl.no/folketrygden

National Institute of Neurological Disorders and Stroke. (April 7th 2025). *Spinal Cord Injury*. National Institutes of Health, . Retrieved February 13th 2026 from https://www.ninds.nih.gov/health-information/disorders/spinal-cord-injury

OECD. (2003). *Transforming Disability into Ability: Policies to Promote Work and Income Security for Disabled People*. OECD Publishing. https://doi.org/10.1787/9789264158245-en

Oña, A., Schwegler, U., Leiulfsrud, A., Kouda, K., Boekel, A., & Pacheco, D. (2024). *Disability, Unemployment, and Inequality: A Cross-Country Comparison of the Situation of Persons With Spinal Cord Injury* (Vol. 54). https://doi.org/doi:10.1177/27551938241235780

Ottomanelli, L., & Lind, L. (2009). Review of Critical Factors Related to Employment After Spinal Cord Injury: Implications for Research and Vocational Services. *The Journal of Spinal Cord Medicine*, *32*(5), 503-531. https://doi.org/10.1080/10790268.2009.11754553

Parfrey, P., & Barrett, B. (2021). *Clinical Epidemiology Practice and Methods: Practice and Methods*. https://doi.org/10.1007/978-1-0716-1138-8

Pedersen, A. W. (2026, February 5th 2026). *Alderspensjon*. Store Norske Leksikon. Retrieved March 8th 2026 from https://snl.no/alderspensjon

Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2024). Chapter V: Overviews of Reviews. In J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions* (6.5 ed.). www.training.cochrane.org/handbook

Post, M. W., Brinkhof, M. W., von Elm, E., Boldt, C., Brach, M., Fekete, C., Eriks-Hoogland, I., Curt, A., & Stucki, G. (2011). Design of the Swiss Spinal Cord Injury Cohort Study. *Am J Phys Med Rehabil*, *90*(11 Suppl 2), S5-16. https://doi.org/10.1097/PHM.0b013e318230fd41

Post, M. W., Reinhardt, J. D., Avellanet, M., Escorpizo, R., Engkasan, J. P., Schwegler, U., Engkasan, J. P., Middleton, J. W., Stucki, G., Brach, M., Bickenbach, J., Fekete, C., Thyrian, C., Battistella, L., Li, J., Perrouin-Verbe, B., Gutenbrunner, C., Rapidi, C.-A., Wahyuni, L. K.,...Leiulfsrud, A. S. (2020). Employment Among People With Spinal Cord Injury in 22 Countries Across the World: Results From the International Spinal Cord Injury Community Survey. *Archives of Physical Medicine and Rehabilitation*, *101*(12), 2157-2166. https://doi.org/10.1016/j.apmr.2020.05.027

Safdarian, M., Trinka, E., Rahimi-Movaghar, V., Thomschewski, A., Aali, A., Abady, G. G., Abate, S. M., Abd-Allah, F., Abedi, A., Adane, D. E., Afzal, S., Ahinkorah, B. O., Ahmad, S., Ahmed, H., Amanat, N., Angappan, D., Arabloo, J., Aryannejad, A., Athari, S. S.,...Zhang, Z.-J. (2023). Global, regional, and national burden of spinal cord injury, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet Neurology*, *22*(11), 1026-1047. https://doi.org/10.1016/S1474-4422(23)00287-9

Schwegler, U., Galvis Aparicio, M., Staubli, S., Austin-Cliff, G., & Brinkhof, M. (2024). *Labor Market Participation of Persons With Spinal Cord Injury Living in Switzerland Between 2012 and 2022: A Comparison to the General Population* (Vol. 103). https://doi.org/doi:10.1097/PHM.0000000000002594

Singh, A., Tetreault, L., Kalsi-Ryan, S., Nouri, A., & Fehlings, M. G. (2014). Global prevalence and incidence of traumatic spinal cord injury. *Clin Epidemiol*, *6*, 309-331. https://doi.org/10.2147/clep.S68889

Solheim, E. F., & Leiulfsrud, A. S. (2018). Employment after Spinal Cord Injury in Norway: A Cross-Sectional Survey. *Scandinavian Journal of Disability Research*.

St. Olavs Hospital. (2026). *NorSCIR: Om oss*. Retrieved April. 27th 2026 from https://www.stolav.no/fag-og-forskning/medisinske-kvalitetsregistre/norsk-ryggmargsskaderegister-norscir/om-oss/

Strøm, V. (2025). Den Internasjonale Ryggmargsskadeundersøkelsen: International Spinal Cord Injury Community Survey (InSCI) Norway (InSCI-Nor). In (pp. 11).

Strøm, V., Månum, G., Leiulfsrud, A., Wedege, P., Rekand, T., Halvorsen, A., Fjellheim, L. A., & Stanghelle, J. K. (2017). People with Spinal Cord Injury in Norway. *Am J Phys Med Rehabil*, *96*(2 Suppl 1), S99-s101. https://doi.org/10.1097/phm.0000000000000572

Sunnaas sykehus HF. (2023, Feb. 16th 2023). *Ryggmargsskade*. Helsedirektoratet. Retrieved April 13th 2025 from https://www.helsenorge.no/sykdom/skader-og-sykdommer-i-hjernen/ryggmargsskade/

Sunnaas sykehus HF, St. Olavs Hospital, Haukeland universitetssjukehus, Landsforeningen for Ryggmargsskadde, & Norsk ryggmargsskaderegister. (2023). *Samtykkeskjema 2023*. https://www.stolav.no/4ae207/contentassets/55524bc3488f4d5a8fedf3e50fce0398/informert-samtykke-insci-nor_2023_final.pdf

Swiss Paraplegic Research. *Welcome to the InSCI Community*. Retrieved Feb. 16th 2026 from https://insci.network

Tjønndal, A. (2018). *Statistisk analyse i Stata*. Cappelen Damm akademisk.

Ullah, M., Fossey, E., & Stuckey, R. (2018). The meaning of work after spinal cord injury: a scoping review. *Spinal Cord*, *56*(2), 92-105. https://doi.org/doi:10.1038/s41393-017-0006-6

UN General Assembly. (1948). *Universal declaration of human rights*. Retrieved from https://www.un.org/en/about-us/universal-declaration-of-human-rights

van der Wel, K. A., & Halvorsen, K. (2015). The bigger the worse? A comparative study of the welfare state and employment commitment. *Work, Employment & Society*, *29*(1), 99-118. https://www-jstor-org.ezproxy.uio.no/stable/26499235

Vanier, A., Oort, F. J., McClimans, L., Ow, N., Gulek, B. G., Böhnke, J. R., Sprangers, M., Sébille, V., & Mayo, N. (2021). Response shift in patient-reported outcomes: definition, theory, and a revised model. *Qual Life Res*, *30*(12), 3309-3322. https://doi.org/10.1007/s11136-021-02846-w

von Elm, E., Altman, D., Egger, M., Pocock, S., Gotzsche, P., & Vandenbroucke, J. (October 1st 2025). *The Strengthening the Reporting of Observational Studies in Epidemiology*

(STROBE) Statement: guidelines for reporting observational studies. equator network,. Retrieved February 26th 2026 from https://www.equator-network.org/reporting-guidelines/strobe/

World Health Organization. (2015). *WHO global disability action plan 2014-2021. Better health for all people with disability*. https://iris.who.int/server/api/core/bitstreams/66d03dfb-99ae-4e8e-bb62-48a62311f305/contenth8

World Health Organization. (2024). *Spinal cord injury*. who.int. Retrieved March 4th 2026 from https://www.who.int/news-room/fact-sheets/detail/spinal-cord-injury

Zhang, Y., Zhao, W., Peng, X., Yang, F., & Zong, S. (2025). Global, regional, and national burden of spinal cord lesion at neck level a systematic analysis of incidence, prevalence, YLDs with projections to 2046. *Front Public Health*, *13*, 1659091. https://doi.org/10.3389/fpubh.2025.1659091

Appendices

Appendix 1: Literature search

To identify relevant previous research, an iterative search process was conducted, allowing for refinement based on preliminary findings (Higgins et al., 2019, p. 88).

First, studies using InSCI data were identified through a focused PubMed search using 'InSCI' as the search term. This approach aimed to capture core methodological papers and empirical studies directly related to InSCI. These results informed the contextualization and refinement of the RQs.

Second, broader searches were conducted in the EBSCO-host database, and encompassed search terms related to spinal cord injury, employment, and economic outcomes (e.g. "spinal cord injury" AND employment, work, income, or financial satisfaction). This strategy was intended to identify relevant literature beyond the InSCI framework and situate the study within the broader SCI employment and socioeconomic literature, both nationally and internationally.

While the search was conducted in a structured and transparent manner, the primary aim of this thesis is quantitative data analysis rather than a comprehensive synthesis of existing research. Consequently, the literature search does not entail the rigor of a full-scale literature review (Higgins et al., 2019; Pollock et al., 2024).

PubMed search string

Literature search conducted Sun 8th of February, 2026

History and Search Details

Download Delete

Search	Actions	Details	Query	Results	Time
#6	···	›	Search: ((((spinal cord injuries[MeSH Terms]) OR (sci[Title])) OR (spinal cord injur*[Title])) OR (spinal injur*[Title])) AND ((((((employment[MeSH Terms]) OR (employment[Title])) OR (work[Title])) OR (career[Title])) OR (job[Title])) OR ((labor force participation[Title]) OR (return to work[Title]))) Filters: from 2014 - 2026	226	06:01:52
#5	···	›	Search: ((((spinal cord injuries[MeSH Terms]) OR (sci[Title])) OR (spinal cord injur*[Title])) OR (spinal injur*[Title])) AND ((((((employment[MeSH Terms]) OR (employment[Title])) OR (work[Title])) OR (career[Title])) OR (job[Title])) OR ((labor force participation[Title]) OR (return to work[Title])))	502	06:01:30
#4	···	›	Search: (((((employment[MeSH Terms]) OR (employment[Title])) OR (work[Title])) OR (career[Title])) OR (job[Title])) OR ((labor force participation[Title]) OR (return to work[Title]))	235,817	06:01:18
#3	···	›	Search: (labor force participation[Title]) OR (return to work[Title])	3,577	06:01:08
#2	···	›	Search: ((((employment[MeSH Terms]) OR (employment[Title])) OR (work[Title])) OR (career[Title])) OR (job[Title])	235,780	06:00:12
#1	···	›	Search: (((spinal cord injuries[MeSH Terms]) OR (sci[Title])) OR (spinal cord injur*[Title])) OR (spinal injur*[Title])	70,487	05:59:46

Showing 1 to 6 of 6 entries

Appendix 2: InSCI R2 questionnaire

Vennligst skriv inn dato for besvarelse av spørreskjema (dd/mm/åååå): ✎...../...../.....

Personopplysninger

1. Kjønn

- ○ Mann
- ○ Kvinne
- ○ Annet

2. Fødselsår:

ÅÅÅÅ

□□□□ ✎.....

3. I hvilket land er du født?

✎.....

4. Hvilket fylke bor du i?

Fylke ✎.....

Angi om du bor urbant eller ikke-urbant

- ○ Urbant
- ○ Ikke-urbant

5. Sivilstand:

- ○ Enslig
- ○ Gift
- ○ Samboer eller i et forhold
- ○ Separert eller skilt
- ○ Enke/-mann

6. Hvem bor i husholdningen sammen med deg?

Kryss av for alt som passer

- ☐ Jeg bor alene
- ☐ Barn under 14 år, antall: ✎.....
- ☐ Ungdom mellom 14 og 18 år, antall: ✎.....
- ☐ Personer mellom 18 og 64 år, antall: ✎.....
- ☐ Personer over 64 år, antall: ✎.....
- ☐ Jeg bor på institusjon, *f.eks. omsorgsbolig eller sykehjem*

7. Får du hjelp til dine daglige gjøremål hjemme eller utenfor hjemmet?

- ○ Nei
- ○ Ja, av følgende personer:

  Kryss av for alt som passer

  - ☐ Familie
  - ☐ Venner
  - ☐ Fagpersonell eller betalte assistenter

8. Høyeste fullførte utdannelse:

- ○ Ingen skolegang
- ○ Barneskole/folkeskole
- ○ Ungdomsskole
- ○ Videregående skole/gymnas/realskole
- ○ Fagskole/påbygging til videregående utdanning
- ○ Kortere høyere utdanning
- ○ Bachelorgrad eller tilsvarende fra universitet eller høgskole
- ○ Mastergrad/hovedfag, sivilingeniør, siviløkonom eller tilsvarende utdanningsnivå
- ○ Doktorgrad
- ○ Annet, forklar nærmere: ✎ .....

9. Hvor mange års skolegang, inkludert høyere utdanning har du fullført?

Totalt antall år med skolegang/utdanning: ✎..... *(Antall år)*

Antall år med skolegang/utdanning fullført etter ryggmargsskaden: ✎..... *(Antall år)*

10. Hva er husholdningens samlede brutto årsinntekt?

- ○ Under 284 000 kr per år
- ○ 284 001 - 385 000 kr per år
- ○ 385 001 - 495 000 kr per år
- ○ 495 001 - 601 000 kr per år
- ○ 601 001 - 725 000 kr per år
- ○ 725 001 - 888 000 kr per år
- ○ 888 001 – 1 083 000 kr per år
- ○ 1 083 001 - 1 319 000 kr per år
- ○ 1 319 001 - 1 709 000 kr per år
- ○ Over 1 709 001 kr per år

11. Hvor fornøyd er du med husholdningens økonomiske situasjon?

Svært misfornøyd									*Svært fornøyd*
○	○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9	10

12. Forestill deg at denne stigen representerer hvor befolkningen i Norge befinner seg.

På toppen av stigen står de som er best stilt, dvs. de som har mest penger, høyest utdannelse og de mest respekterte jobbene. På bunn av stigen står de som er dårligst stilt, dvs. de som har minst penger, lavest utdannelse og de minst respekterte jobbene eller ingen jobb. Jo høyere oppe du er på stigen, desto nærmere er du de som er best stilt, og jo lavere du er på stigen, desto nærmere er du de som er dårligst stilt.

Hvor vil du plassere deg selv på denne stigen?

Sett et stort **X** på det trinnet som du mener du befinner deg på nå, i forhold til andre i **Norge.**

Skadebeskrivelse

13. På hvilket nivå er ryggmargsskaden din?

- ○ Paraplegi (påvirker underkroppen, har normal bevegelse og følelse i armer, hender og fingre)
- ○ Tetraplegi (bortfall eller unormal bevegelse eller følelse i armer, hender eller fingre samt i underkropp)
- ○ Tilbake til normal følelse og bevegelse, ingen nedsatt blære- eller tarmfunksjon på grunn av ryggmargsskaden

14. Er ryggmargsskaden din komplett eller inkomplett?

- ○ Komplett (ingen følelse eller bevegelse i noen del av kroppen nedenfor skadenivå)
- ○ Inkomplett (har følelse eller kan bevege noen deler av kroppen nedenfor skadenivå)
- ○ Tilbake til normal følelse og bevegelse, ingen nedsatt blære- eller tarmfunksjon på grunn av ryggmargsskaden

15. Hva er årsaken til ryggmargsskaden din?

Ulykke:

Kryss av for alt som passer. Hvis du f.eks. krysser av for "arbeidsulykke", ber vi deg også krysse av for om det var et fall eller en annen skadeårsak.

- ☐ Ulykke under utøvelse av sport
- ☐ Ulykke under utøvelse av fritidsaktivitet
- ☐ Arbeidsulykke
- ☐ Trafikkulykke
- ☐ Skade forårsaket av vold *f.eks. skuddskade*
- ☐ Fall fra under 1 meter
- ☐ Fall fra over 1 meter
- ☐ Følge av medisinsk behandling eller operasjon
- ☐ Annen skadeårsak: ✎.....

Sykdom:

Kryss av for alt som passer

- ☐ Degenerative forandringer i ryggsøylen
- ☐ Tumor – godartet
- ☐ Tumor – ondartet (kreft)
- ☐ Vaskulær årsak *f.eks. lokal blodmangel, blødning eller misdannelse i ryggmargen*
- ☐ Infeksjon *f.eks. bakterie eller virus*
- ☐ Annen sykdom: ✎ .....

16. Når oppsto ryggmargsskaden?

MM / ÅÅÅÅ ✎...../.....

41. Har du fått arbeidsrettet rehabilitering etter ryggmargsskaden?

F.eks. yrkesveiledning, omskolering, kompetanseutviklingstiltak eller arbeidsutprøving

- ○ Ja
- ○ Nei

42. Etter utskrivelse fra ditt primæropphold ved sykehuset, hvor lang tid tok det før du begynte i eller var tilbake i betalt arbeid, helt eller delvis?

- ○ Jeg har ikke arbeidet etter primæroppholdet
- ○ Umiddelbart etter primæroppholdet
- ○ Jeg begynte/var tilbake i arbeid etter ..... år og ..... måneder etter primæroppholdet

43. Mottar du for tiden uførepensjon eller tilsvarende ytelse for uførhet?

- ○ Ja
- ○ Nei

45. Har du for tiden betalt arbeid?

- ○ Ja
- ○ Nei → *Gå til spørsmål nr. 50*

50. Ønsker du å ha betalt arbeid?

- ○ Ja
- ○ Nei

51. Føler du deg i stand til å utføre betalt arbeid?

- ○ Ja, i 1 – 11 timer i uken
- ○ Ja, i 12 – 20 timer i uken
- ○ Ja, i mer enn 20 timer i uken
- ○ Nei, ikke i det hele tatt

Appendix 3: Overview of variables and recoding

Variables	Original response categories	Original code		Recoding	Final categories
Employment status	Yes/no	Yes / no		Not recoded	Yes / no
Employment status transition	No = 0 Yes = 1	R1 0 0 1 1	R2 0 1 0 1	 1 2 3 4	No → No No →Yes Yes → No Yes → Yes
Subjective social status	MacArthur ladder	1 – 10		Not recoded	1 - 10
Financial satisfaction *(R2)*	Ordinal scale	1 – 10		Not recoded	1 - 10
Descriptive variables					
Age at questionnaire	Year of birth	Age (years)		Not recoded	Age (years)
Age groups	(from year of birth)	1 2 3 4 5		Not recoded	1 = 18-29 years 2 = 30-44 years 3 = 45-59 years 4 = 60-74 years 5 = <75 years
Sex	Male / Female	1=Male 2=Female		Not recoded	1=Male 2=Female
Marital status	Single Married Cohabiting or in a relationship Separated or divorced Widow/-er	1 2 3 4 5		0 1 1 2 2	1 = single 1 = partnership or cohabiting 2 = widowed or divorced
Education level	No formal education	.		.	.

	Primary/elementary school	1	0	0 = basic
	Lower secondary school	2	0	1 = intermediate
	Upper secondary/high school	3	1	2 = advanced
	Vocational/supplementary upper secondary education	4	1	
	Short cycle higher education	5	2	
	Bachelor's degree or equivalent from a university or college	6	2	
	Master's degree / cand.mag. / engineering or business degree equivalent, or similar level of education	7	2	
	Doctoral degree	8 (R1; 11)	2	
	Other, specify:	.	.	.
Region of residence	Østfold	Region of living in Norway	Not recoded	Østfold
	Akershus			Akershus
	Oslo			Oslo
	Hedmark			Hedmark
	Oppland			Oppland
	Buskerud			Buskerud
	Vestfold			Vestfold
	Telemark			Telemark
	Aust-Agder			Aust-Agder
	Vest-Agder			Vest-Agder
	Rogaland			Rogaland
	Hordaland			Hordaland
	Sogn og Fjordane			Sogn og Fjordane
	Møre og Romsdal			Møre og Romsdal
	Sør-Trøndelag			Sør-Trøndelag
	Nord-Trøndelag			Nord-Trøndelag
	Nordland			Nordland
	Troms			Troms
	Finnmark			Finnmark
Household income *(R1)*	Less than 245 000 NOK a year	1	0	0 = low
	245 001 – 345 000 NOK a year	2	0	1 = medium
	345 001 – 435 000 NOK a year	3	0	2 = high
	435 001 – 520 000 NOK a year	4	1	
	520 001 – 615 000 NOK a year	5	1	

	615 001 – 705 000 NOK a year	6	1	
	705 001 – 795 000 NOK a year	7	2	
	795 001 – 915 000 NOK a year	8	2	
	915 001 – 1 110 000 NOK a year	9	2	
	More than 1 110 001 NOK a year	10	2	
Household income *(R2)*	Less than 284 000 NOK a year	1	0	0 = low
	284 001 - 385 000 NOK a year	2	0	1 = medium
	385 001 - 495 000 NOK a year	3	0	2 = high
	495 001 - 601 000 NOK a year	4	1	
	601 001 - 725 000 NOK a year	5	1	
	725 001 - 888 000 NOK a year	6	1	
	888 001 – 1 083 000 NOK a year	7	2	
	1 083 001 - 1 319 000 NOK a year	8	2	
	1 319 001 - 1 709 000 NOK a year	9	2	
	More than 1 709 001 NOK a year	10	2	
Employment prior to SCI	Yes/no	Yes / no	Not recoded	Yes / no
Injury-related variables				
Age at injury		Age (years)	Not recoded	Age (years)
Injury cause	Multiple causes reported (Appendix 2)	Traumatic / Non-traumatic	Not recoded	Traumatic / Non-traumatic
Impairment group	Neurological level	Paraplegia Tetraplegia		1 = Paraplegia incomplete 2 = Paraplegia complete 3 = Tetraplegia incomplete 4 = Tetraplegia complete 5 = Fully recovered
	AIS grade	Incomplete Complete		
Time since injury *(R1)*	.	Years since injury	(Age - Age at injury onset)	Years

Vocational rehabilitation	Yes/no	Yes / no		Not recoded	Yes / no
Vocational rehabilitation transition	No = 0 Yes = 1	R1 0 0 1 1	R2 0 1 0 1	1 2 3 4	No → No No →Yes Yes → No Yes → Yes
Work ability	Yes, 1 – 11 hours a week Yes , 12 – 20 hours a week Yes , for more than 20 hours a week No, not at all	Self-rated work ability (1-4)		Not recoded	1 = 1-11 hours/week 2 = 12-20 hours/week 3 = >20 hours/week 0 = .
Desire for paid work	Yes / no	Yes / no		Not recoded	Yes / no
Disability benefits	Yes / no	Yes / no		Not recoded	Yes / no

Appendix 4: Do-file from STATA

```
use "/Users/charlottemyhrensvendsen/Documents/Charlotte.dta",
clear

* Describe the dataset
codebook, compact

ssc install asdoc


label variable int2_province_2 "Province R2"

label variable Bostedsfylke_1 "Province R1"

label variable Sex_1 "Sex R1"

label variable int2_work_desire_2 "Desire to work R2"

label variable int2_disab_pension_2 "Disability pension R2"

label variable int2_job_bef_2 "Job before SCI R2"

label variable int2_paid_work_2 "Paid work R2"

label variable int2_voc_counselling_2 "Vocational counseling R2"

label variable int2_work_ability_2 "Work ablity R2"

label variable int2_work_start_2 "Work start R2"

label variable ParaTetra_1 "Injury level R1"

label variable Complete_Incomplete_1 "Injury severity R1"

label variable int2_sci_degree_2 "Injury severity R2"

label variable int2_sci_type_2 "Injury level R2"

label variable Cause_1 "Injury cause R1"

label variable Age_1 "Age (years) R1"

label variable Paidwork_1 "Paid work at R1"

label variable int2_age_quest_2 "Age (years) R2"




*Generate variable similar to InSCI 2 age-groups.
gen age_group_1 = .
replace age_group = 1 if Age_1 >= 18 & Age_1 <30
replace age_group = 2 if Age_1 >=30 & Age_1 <45
```

```
replace age_group = 3 if Age_1 >=45 & Age_1 <60
replace age_group = 4 if Age_1 >=60 & Age_1 <75
replace age_group = 5 if Age_1 >=75


*Label the variable
label variable age_group "Age groups R1"
*Naming groups
lab define age_cat_group 1 "18-29 years" 2 "30-44 years" 3
"45-59 years" 4 "60-74 years" 5 "75+ years"

lab values age_group_1 age_cat_group

*Checking
tab age_group_1



*Generating educational groups based on round 2 grouping
gen education_1grouping = .
replace education_1grouping = 0 if (Education_1== 1 | Education_1
== 2)
replace education_1grouping = 1 if (Education_1== 3 | Education_1
== 4)
replace education_1grouping = 2 if (Education_1== 5 | Education_1
== 6 | Education_1== 7| Education_1==11)

label define education_groups 0"Basic or less" 1"Intermediate
levels" 2"Advanced levels"

label values education_1grouping education_groups


*label grouping education
label variable EducationGrouping_2 "Education grouping R2"
label variable education_1grouping "Education grouping R1"



*Income grouping
gen income_group1 = .
replace income_group1 = 0 if inrange(Incomehousehold_1, 1,3)
replace income_group1 = 1 if inrange(Incomehousehold_1, 4,6)
replace income_group1 = 2 if inrange(Incomehousehold_1, 7,10)

label define inc_grouping 0 "Low income" 1 "Middle income" 2
"High income"
label values income_group1 inc_grouping
```

```
label variable income_group1 "Household income R1 (grouped)"


gen income_group2 = .
replace income_group2 = 0 if inrange(int2_income_household_2, 1,3)
replace income_group2 = 1 if inrange(int2_income_household_2, 4,6)
replace income_group2 = 2 if inrange(int2_income_household_2, 7,
10)

label values income_group2 inc_grouping
label variable income_group2 "Household income R2 (grouped)"



*Generate time since injury based on r1
gen tsi_r1 = 2018 - YearofSCI_1
label variable tsi_r1 "Years since SCI R1"

*generate time since injury based on r2
gen tsi_r2 = int2_quest_year_2 - int2_sci_year_2
label variable tsi_r2 "Years since SCI R2"


*Label according to codebook
label define start_work 1"I never worked after initial inpatient
rehabilitation" 2 "Immediately after initial rehabilitation" 3"I
resumed work after … years and … months"
label values Workstart_1 start_work
label values int2_work_start_2 start_work


*Generate yes/no labels
label define yes_no 0"No" 1"Yes"

*Label values
label values int2_job_bef_2 yes_no

label values int2_work_desire_2 yes_no

label values int2_paid_work_2 yes_no

label values JobbeforeSCI_1 yes_no

label values int2_disab_pension_2 yes_no


*Generate age at SCI
gen age_SCI = YearofSCI_1 - YearofBirth_1
```

```
label variable age_SCI "Age at SCI onset (years)"

*Generate variable similar to InSCI age-groups.
gen age_group_SCI = .
replace age_group_SCI = 1 if age_SCI < 18 & age_SCI !=.
replace age_group_SCI = 2 if age_SCI >= 18 & age_SCI <30
replace age_group_SCI = 3 if age_SCI >=30 & age_SCI <45
replace age_group_SCI = 4 if age_SCI >=45 & age_SCI <60
replace age_group_SCI = 5 if age_SCI >=60 & age_SCI <75
replace age_group_SCI = 6 if age_SCI >=75 & age_SCI !=.


*Label variable
label variable age_group_SCI "Age groups SCI onset"
*Naming groups
lab define age_cat_group_SCI 1 "<18 years" 2 "18-29 years" 3
"30-44 years" 4 "45-59 years" 5 "60-74 years" 6 "75+ years"

lab values age_group_SCI age_cat_group_SCI


*Generating groups for maritial status
gen maritial_grouping1 = .
replace maritial_grouping1 = 0 if (MaritalStatus_1== 1)
replace maritial_grouping1 = 1 if (MaritalStatus_1== 2 |
MaritalStatus_1== 3)
replace maritial_grouping1 = 2 if (MaritalStatus_1== 4 |
MaritalStatus_1== 5)

label define maritial_groups 0"Single" 1"Married or in
partnership" 2"Widowed or divorced"

label values maritial_grouping1 maritial_groups

gen maritial_grouping2 = .
replace maritial_grouping2 = 0 if (int2_marital_status_2== 1)
replace maritial_grouping2 = 1 if (int2_marital_status_2== 2 |
int2_marital_status_2== 3)
replace maritial_grouping2 = 2 if (int2_marital_status_2== 4 |
int2_marital_status_2== 5)


label values maritial_grouping2 maritial_groups
```

```
185 *Generating variable for combined injury
186 gen combined_severity = .
187 replace combined_severity = 1 if ParaTetra_1 == 1 &
Complete_Incomplete_1 == 2
188 replace combined_severity = 2 if ParaTetra_1 == 1 &
Complete_Incomplete_1 == 1
189 replace combined_severity = 3 if ParaTetra_1 == 2 &
Complete_Incomplete_1 == 2
190 replace combined_severity = 4 if ParaTetra_1 == 2 &
Complete_Incomplete_1 == 1
191
192
193 *Generating variable for combined injury
194 gen combined_severity2 = .
195 replace combined_severity2 = 1 if int2_sci_type_2 == 3 &
int2_sci_degree_2 == 1
196 replace combined_severity2 = 2 if int2_sci_type_2 == 3 &
int2_sci_degree_2 == 2
197 replace combined_severity2 = 3 if int2_sci_type_2 == 6 &
int2_sci_degree_2 == 1
198 replace combined_severity2 = 4 if int2_sci_type_2 == 6 &
int2_sci_degree_2 == 2
199 replace combined_severity2 = 5 if int2_sci_type_2 == 9 &
int2_sci_degree_2 == 0
200
201 label define sevcomb 1 "Paraplegia incomplete" 2 "Paraplegia
complete" 3 "Tetraplegia incomplete" 4 "Tetraplegia complete" 5
"Fully recovered"
202
203 label values combined_severity sevcomb
204
205 label variable combined_severity "Impairment groups R1"
206
207 label values combined_severity2 sevcomb
208
209 label variable combined_severity2 "Impairment groups R2"
210
211
212
213
214 describe
215 /* show the full dataset */
216
217
218 duplicates report
219
220
221
```

```
*Descriptive statistics, export
dtable i.Sex_1 Age_1 i.age_group_1 i.Bostedsfylke_1 i.
education_1grouping i.income_group1 i.maritial_grouping1 age_SCI
tsi_r1 i.Cause_1 i.combined_severity, continuous(, statistics(
mean sd)) nformat(%9.1f mean sd) sformat((%s) sd) title (Table 1
: Demographic and clinical characteristics of the cohort) note(
"*Mean (SD)") export(table1.docx, replace)


*characteristics for Paidwork_1
dtable i.Sex_1 Age_1 i.age_group_1 i.education_1grouping i.
JobbeforeSCI_1 i.income_group1 tsi_r1 i.Cause_1 i.
combined_severity, by(Paidwork_1) continuous(, statistics(mean
sd)) nformat(%9.1f mean sd) sformat((%s) sd) title (Table 2:
Demographic and clinical characteristics at baseline (R1) by
employment status) note("*Mean (SD)") export (table2.docx,
replace)


*characteristics for paid work r2
dtable i.int2_sex_2 int2_age_quest_2 i.AgeGroups_2 i.
EducationGrouping_2 i.int2_job_bef_2 i.income_group2 tsi_r2 i.
int2_sci_cause_type_2 i.combined_severity2, by(int2_paid_work_2)
continuous(, statistics(mean sd)) nformat(%9.1f mean sd) sformat
((%s) sd) title (Table 3: Demographic and clinical
characteristics at follow-up (R2) by employment status) note(
"*Mean (SD)") export (table3.docx, replace)









*EMPLOYMENT**

*Table change R1 and R2, export
asdoc tab Paidwork_1 int2_paid_work_2, row title (Table 4: Change
in paid work status between R1 and R2 (N = 234)) note("*Mean
(SD)")


*Only N=234, checks
gen in_mcnemar = !missing(Paidwork_1) & !missing(int2_paid_work_2)

tab in_mcnemar

*Checking N=234 is correct
tab Paidwork_1 int2_paid_work_2

```

```
* McNemar test
mcc Paidwork_1 int2_paid_work_2


*Sensitivity analysis
*Subgroup of retirement age
tab Paidwork_1 int2_paid_work_2 if int2_age_quest_2 >= 67, row

* Restricting age due to retirement age
mcc Paidwork_1 int2_paid_work_2 if int2_age_quest_2 < 67



*generate a variable for work transisiton between rounds
gen work_transition = .
replace work_transition = 1 if Paidwork_1==0 & int2_paid_work_2==0
replace work_transition = 2 if Paidwork_1==0 & int2_paid_work_2==1
replace work_transition = 3 if Paidwork_1==1 & int2_paid_work_2==0
replace work_transition = 4 if Paidwork_1==1 & int2_paid_work_2==1

label define transit 1 "No->No" 2"No->Yes" 3"Yes->No" 4"Yes->Yes"
label values work_transition transit


*Table prior to SCI
tab work_transition JobbeforeSCI_1



*VOCATIONAL
tab Vocationalservices_1
tab int2_voc_counselling_2

codebook Vocationalservices_1 int2_voc_counselling_2

*something not right with label values - checking with supervisor
*correcting it to coincide with codebook
label values Vocationalservices_1 yes_no
label values int2_voc_counselling_2 yes_no

*generate a variable for vocational rehab between rounds
gen voc_transition = .
replace voc_transition = 1 if Vocationalservices_1==0 &
int2_voc_counselling_2==0
replace voc_transition = 2 if Vocationalservices_1==0 &
int2_voc_counselling_2==1
replace voc_transition = 3 if Vocationalservices_1==1 &
int2_voc_counselling_2==0
```

```
replace voc_transition = 4 if Vocationalservices_1==1 &
int2_voc_counselling_2==1

label values voc_transition transit


*checking between transitions
tab work_transition voc_transition, row chi2


*H2
*descriptive
dtable i.Sex_1 Age_1 i.age_group_1 i.education_1grouping i.
JobbeforeSCI_1 i.income_group1 tsi_r1 i.Cause_1 i.
combined_severity, by(Subjectivesocialstatus_1) continuous(,
statistics(mean sd)) nformat(%9.1f mean sd) sformat((%s) sd)

dtable i.int2_sex_2 int2_age_quest_2 i.AgeGroups_2 i.
EducationGrouping_2 i.int2_job_bef_2 i.income_group2 tsi_r2 i.
int2_sci_cause_type_2 i.combined_severity2, by(
int2_subjective_pos_2) continuous(, statistics(mean sd)) nformat
(%9.1f mean sd) sformat((%s) sd)


/* Sign rank test for social status*/
* tabulate both variables
tab Subjectivesocialstatus_1
tab int2_subjective_pos_2

*sum both for percentiles
sum Subjectivesocialstatus_1 int2_subjective_pos_2, detail

* different observations, handle missing
*generating new variable
gen subjpos = !missing(Subjectivesocialstatus_1) & !missing(
int2_subjective_pos_2)
tab subjpos
* summarizing if both are answered
sum Subjectivesocialstatus_1 int2_subjective_pos_2 if subjpos==1
sum Subjectivesocialstatus_1 int2_subjective_pos_2 if subjpos==1,
detail


*Wilcoxon test
signrank Subjectivesocialstatus_1 = int2_subjective_pos_2 if
subjpos==1
```

```
332
333
334 *checking change/direction between round 1 and 2 - exploratory
335 gen diff_subjpos = int2_subjective_pos_2 -
Subjectivesocialstatus_1 if subjpos==1
336 tab diff_subjpos
337
338
339 *Histogram of social position
340 hist Subjectivesocialstatus_1, discrete percent title (Baseline (
R1)) xlabel(1(1)10) xtitle (Subjective social status (1-10))
name(graph1, replace)
341
342 hist int2_subjective_pos_2, discrete percent title (Follow-up (R2
)) xlabel(1(1)10) xtitle (Subjective social status (1-10)) name(
graph2, replace)
343
344 graph combine graph1 graph2, imargin(0 0 0 0)
345
346
347 *Sensitivity analyses by change in employment
348 signrank Subjectivesocialstatus_1 = int2_subjective_pos_2 if
work_transition == 1
349 signrank Subjectivesocialstatus_1 = int2_subjective_pos_2 if
work_transition == 2
350 signrank Subjectivesocialstatus_1 = int2_subjective_pos_2 if
work_transition == 3
351 signrank Subjectivesocialstatus_1 = int2_subjective_pos_2 if
work_transition == 4
352
353
354
355
356 *H3
357
358 *Checking VIF
359 pwcorr ParaTetra_1 Complete_Incomplete_1, sig
360
361 reg ParaTetra_1 Complete_Incomplete_1
362 estat vif
363
364
365 ***Logistic regression PAID WORK 2
366 logistic int2_paid_work_2 Paidwork_1 Age_1 i.Sex_1 i.
education_1grouping i.combined_severity tsi_r1
367
368
369 *Table
370 asdoc logistic int2_paid_work_2 Paidwork_1 Age_1 i.Sex_1 i.
```

```
education_1grouping i.combined_severity tsi_r1, cformat(%9.2f)
pformat(%9.3f) setstars(***@.001, **@.01, *@.05) replace
371
372
373
374 ****FOREST PLOT****
375 *log reg for paid work 2
376 logistic int2_paid_work_2 Paidwork_1 i.Sex_1 i.
education_1grouping i.maritial_grouping1 i.combined_severity
377
378 *Save regression
379 est store employmentlog
380 ssc install coefplot
381
382 coefplot employmentlog
383 coefplot employmentlog, eform drop(_cons) xscale(log) xline(1)
xlabel(0.1 0.25 0.5 1 2 5 10 20 50) xtitle("Odds ratio")
384
385
386 ****SENSITIVITY
387 *Age restricted
388 logistic int2_paid_work_2 Paidwork_1 Age_1 i.Sex_1 i.
education_1grouping i.combined_severity tsi_r1 if
int2_age_quest_2 < 67
389
390 ***Employment prior to sci
391 logistic int2_paid_work_2 Paidwork_1 Age_1 i.Sex_1 i.
education_1grouping i.combined_severity tsi_r1 JobbeforeSCI_1
392
393
394
395 *H3 - social status
396 *log reg for social status 2
397 reg int2_subjective_pos_2 Subjectivesocialstatus_1 Paidwork_1
Age_1 i.Sex_1 i.education_1grouping i.combined_severity tsi_r1
398
399 *Table for reg
400 asdoc reg int2_subjective_pos_2 Subjectivesocialstatus_1
Paidwork_1 Age_1 i.Sex_1 i.education_1grouping i.
combined_severity tsi_r1, cformat(%9.2f) pformat(%9.3f) setstars
(***@.001, **@.01, *@.05) replace
401
402
403
404
405
406 *****H4 Financial satisfaction
407 ttest int2_income_sat_2, by(int2_paid_work_2)
408
```

```
409 asdoc tabstat int2_income_sat_2, by(int2_paid_work_2) stat(N mean
sd) dec(2)
410
411 reg int2_income_sat_2 i.int2_paid_work_2 Age_1 i.Sex_1 i.
EducationGrouping_2 i.combined_severity2 tsi_r1
412
413 *Sensitivity by income group at R2
414 reg int2_income_sat_2 i.int2_paid_work_2 Age_1 i.Sex_1 i.
EducationGrouping_2 i.combined_severity2 tsi_r1 i.income_group2
415
416
417
418
419
420
421
422
423
424
425
426
427
428 *explanatory - if time allwow
429
430 *Match the values from R1
431 label define abilitytowork 1"Yes, for 1-11 hours a week" 2 "Yes,
for 12-20 hours a week" 3"Yes, for more than 20 hours a week"
432
433 label values int2_work_ability_2 abilitytowork
434
435 tab Workability_1
436
437 tab int2_work_ability_2
438
439
440 *checking that they are not in work atm
441 tab Workability_1 Paidwork_1
442
443 tab int2_work_ability_2 int2_paid_work_2
444
445
446 *inconsistency in r2 (one yes)
447 *checking that respondent
448 list int2_paid_work_2 int2_work_ability_2 int2_work_desire_2 if
int2_paid_work_2==1 & !missing(int2_work_ability_2)
449
450 *running table again by restricting paid work
451 tab int2_work_ability_2 int2_work_desire_2 if int2_paid_work_2==0
, row chi2
452
453 tab Workability_1 Workdesire_1, row chi
454
455
456 * regression
457 reg int2_income_sat_2 i.int2_work_desire_2 if int2_paid_work_2==0
```

```
458
459 * adjusting for age and work ability
460 reg int2_income_sat_2 i.int2_work_desire_2 int2_age_quest_2
int2_work_ability_2 if int2_paid_work_2==0
461
462
463
464 *Disability exploratory
465 tab Paidwork_1 Disabilitypension_1
466
467 tab int2_paid_work_2 int2_disab_pension_2
468
469
470
471 *Restricting age
472 tab Paidwork_1 Disabilitypension_1 if Age_1 <= 67
473
474 tab int2_paid_work_2 int2_disab_pension_2 if int2_age_quest_2 <=
67
475
476
477
478 *checking financial satisfaction
479 tab int2_income_sat_2 int2_disab_pension_2
480
481 tab int2_income_sat_2 int2_disab_pension_2 if int2_age_quest_2 <=
67
```

Appendix 5: Direct Acyclic Graphs

The three DAGs informed the identification of minimal sufficient adjustment sets for each analysis. Covariates included in the regression models were selected based on these DAGs to appropriately control for confounding while avoiding adjustment for mediators or colliders.

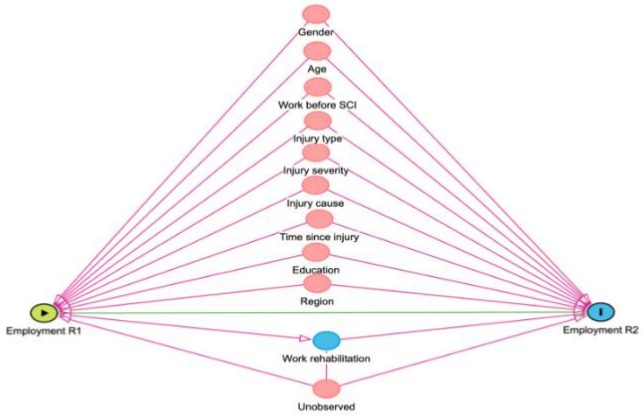


Figure 1: DAG representing hypothesized determinants of employment from round 1 (R1) to round 2 (R2). Employment at R2 is influenced by baseline employment, work rehabilitation, and individual and injury-related factors. Work rehabilitation is a mediator and is not adjusted when estimating the total effect.

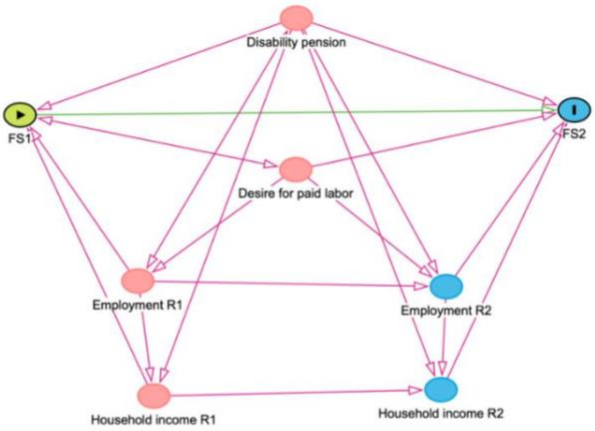


Figure 2: DAG showing the assumed relationships between employment, household income, disability pension, and financial satisfaction (FS) across rounds 1 and 2. Employment is hypothesized to influence FS both directly and indirectly through income, with disabiltiy pension and desire for paid labor acting as modifying factors.

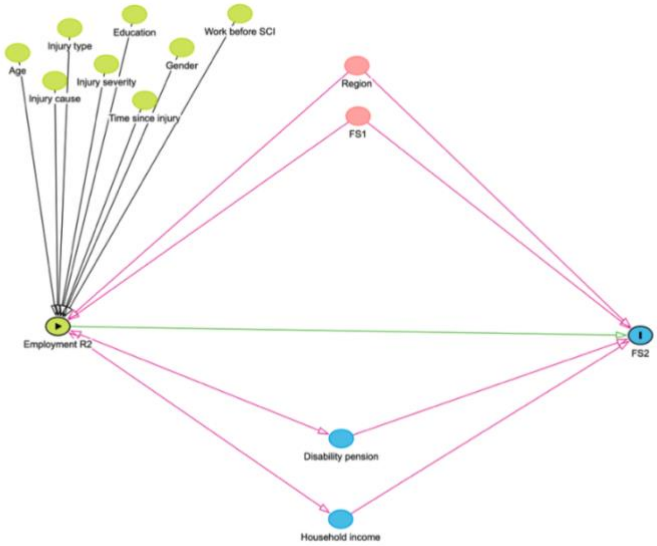
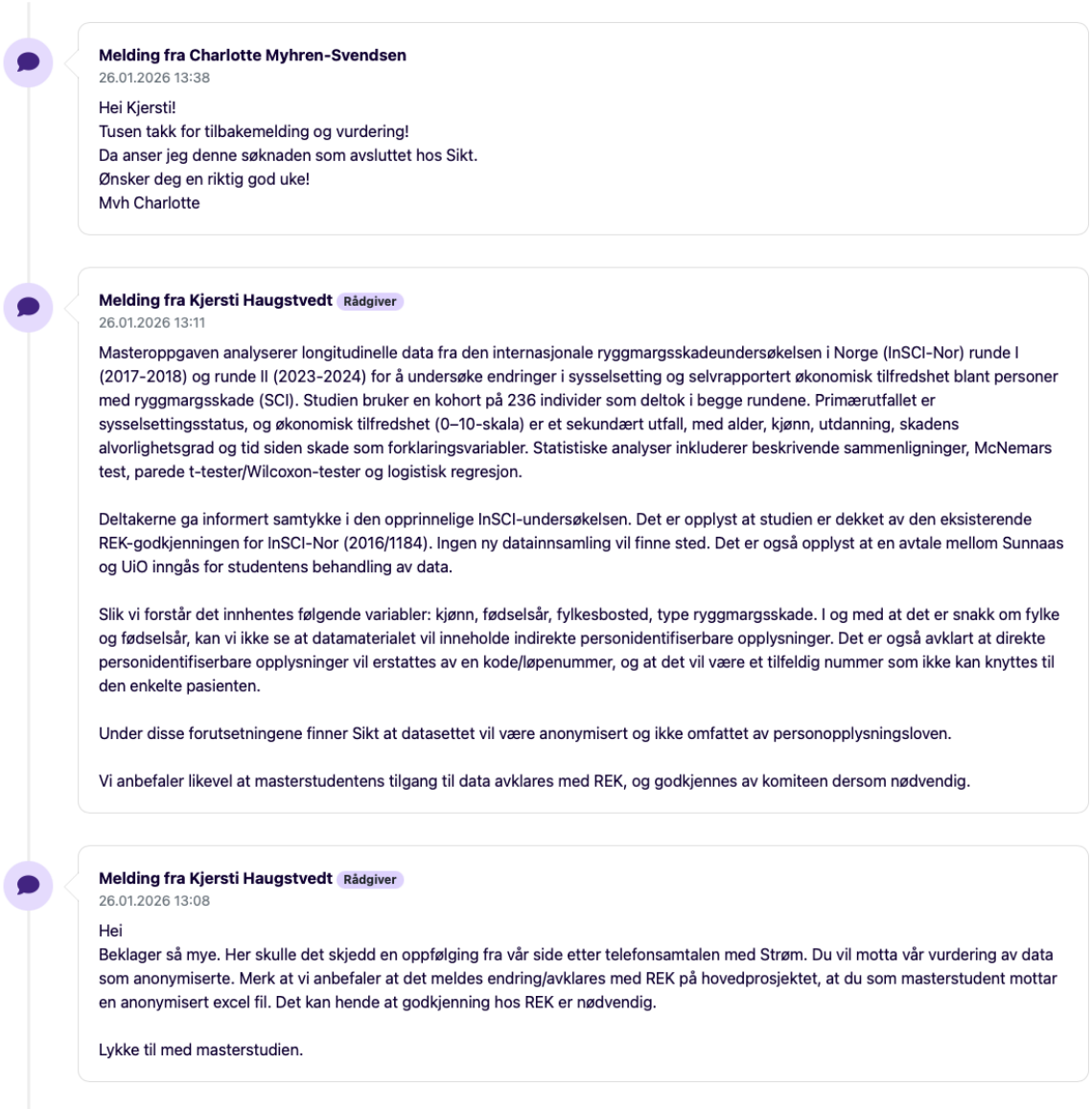


Figure 3: DAG for the association between employment status (R2) and financial satisfaction (R2). Baseline variables, FS1, and Employment R1 confound the relationship; income and disability pension are mediators (excluded for the total effect).

Appendix 6: Correspondence with SIKT

Presenting the correspondence between Sikt, represented by Kjersti Haugstevedt, and the researcher, Charlotte Myhren-Svendsen, regarding the need for data protection approval. Based on the provided project description and dialogue with my supervisor, Sikt concluded that the dataset would be considered anonymized and therefore not subject to the Personal Data Act. As the project is covered under an existing REK approval (ref. no 2016/1184), under which the researcher is registered, a separate notification for the project was not required.



Melding fra Charlotte Myhren-Svendsen
26.01.2026 13:38

Hei Kjersti!
Tusen takk for tilbakemelding og vurdering!
Da anser jeg denne søknaden som avsluttet hos Sikt.
Ønsker deg en riktig god uke!
Mvh Charlotte

Melding fra Kjersti Haugstvedt Rådgiver
26.01.2026 13:11

Masteroppgaven analyserer longitudinelle data fra den internasjonale ryggmargsskadeundersøkelsen i Norge (InSCI-Nor) runde I (2017-2018) og runde II (2023-2024) for å undersøke endringer i sysselsetting og selvrapportert økonomisk tilfredshet blant personer med ryggmargsskade (SCI). Studien bruker en kohort på 236 individer som deltok i begge rundene. Primærutfallet er sysselsettingsstatus, og økonomisk tilfredshet (0–10-skala) er et sekundært utfall, med alder, kjønn, utdanning, skadens alvorlighetsgrad og tid siden skade som forklaringsvariabler. Statistiske analyser inkluderer beskrivende sammenligninger, McNemars test, parede t-tester/Wilcoxon-tester og logistisk regresjon.

Deltakerne ga informert samtykke i den opprinnelige InSCI-undersøkelsen. Det er opplyst at studien er dekket av den eksisterende REK-godkjenningen for InSCI-Nor (2016/1184). Ingen ny datainnsamling vil finne sted. Det er også opplyst at en avtale mellom Sunnaas og UiO inngås for studentens behandling av data.

Slik vi forstår det innhentes følgende variabler: kjønn, fødselsår, fylkesbosted, type ryggmargsskade. I og med at det er snakk om fylke og fødselsår, kan vi ikke se at datamaterialet vil inneholde indirekte personidentifiserbare opplysninger. Det er også avklart at direkte personidentifiserbare opplysninger vil erstattes av en kode/løpenummer, og at det vil være et tilfeldig nummer som ikke kan knyttes til den enkelte pasienten.

Under disse forutsetningene finner Sikt at datasettet vil være anonymisert og ikke omfattet av personopplysningsloven.

Vi anbefaler likevel at masterstudentens tilgang til data avklares med REK, og godkjennes av komiteen dersom nødvendig.

Melding fra Kjersti Haugstvedt Rådgiver
26.01.2026 13:08

Hei
Beklager så mye. Her skulle det skjedd en oppfølging fra vår side etter telefonsamtalen med Strøm. Du vil motta vår vurdering av data som anonymiserte. Merk at vi anbefaler at det meldes endring/avklares med REK på hovedprosjektet, at du som masterstudent mottar en anonymisert excel fil. Det kan hende at godkjenning hos REK er nødvendig.

Lykke til med masterstudien.

Appendix 7: Additional exploratory analyses

The following analyses were conducted as exploratory and were not specified in the primary hypotheses.

Work ability and desire for paid work among non-employed participants

Analyses were restricted to participants not in paid employment at each survey round.

At Round 1, work ability was strongly associated with desire for paid employment ($\chi^2(3) = 38.81$, $p < 0.001$). Among participants able to work 1–11 hours per week, 74% expressed a desire to work. Similarly, 69% of those able to work 12–20 hours reported wanting employment. Additionally, 13% of participants reporting no work ability expressed a desire to work.

At Round 2, the association remained statistically significant but was considerably weaker ($\chi^2(3) = 11.82$, $p = 0.008$). Among those able to work 1–11 hours per week, 21% expressed a desire for employment, and 47% of those able to work 12–20 hours reported wanting paid work. The proportion desiring paid work among those reporting no work ability remained low at R2 (10,5%) and was thus stable across rounds.

Overall, the proportion of non-employed participants expressing a desire for paid work declined from 37% at Round 1 to 17% at Round 2.

Disability benefits

Descriptive analyses indicated that the receipt of disability benefits was more common among non-employed. However, after restricting the sample to participants younger than 67 years, this pattern was less pronounced. This suggests that transitions to age-related retirement may influence the observed associations.

Financial satisfaction appeared to vary by disability benefit status, although patterns were less consistent after age restriction.

Appendix 8: Declaration of the use of AI

Artificial Intelligence (AI) tools, including UiO GPT, ChatGPT, and NotebookLM, were used throughout this master project. The tools were primarily used to support language revision.

In the early stages of the project, AI tools were used to explore potential research topics and assist in gathering background information related to the area before moving forward with the final project idea. During the writing process, the tools were further used to suggest alternative formulations and streamline the content to enhance overall coherence and text flow. AI-generated suggestions were used as supportive proposals rather than being incorporated directly without revision. All text included in the final thesis was reviewed, modified where necessary, and evaluated by the author.

AI tools were not used to generate original empirical findings, statistical analyses, or interpretations of the study results. This thesis does, therefore, not rely on external input from AI-generated content. However, considering the generative AI systems, to ensure validity and accuracy, all AI-assisted revisions and suggestions were critically reviewed against the original intended meaning and the study findings before inclusion in the final thesis.