



## Long-term labour-market performance of whiplash claimants

Søren Leth-Petersen<sup>a,\*</sup>, Gabriel Pons Rotger<sup>b</sup>

<sup>a</sup> University of Copenhagen, Department of Economics, Øster Farimagsgade 5, building 26, DK-1353 Copenhagen K, Denmark

<sup>b</sup> AKF, Danish Institute of Governmental Research, Nyropsgade 37, DK-1602 Copenhagen V, Denmark

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### ABSTRACT

A whiplash is a sudden acceleration–deceleration of the neck and head, typically associated with a rear-end car collision that may produce injuries in the soft tissue. Often there are no objective signs or symptoms of injury, and diagnosing lasting whiplash-associated disorders (WAD) is difficult, in particular for individuals with mild or moderate injuries. This leaves a scope for compensation-seeking behaviour. The medical literature disagrees on the importance of this explanation. In this paper we trace the long-term earnings of a group of Danish individuals with mild to moderate injuries claiming compensation for having permanently lost earnings capacity and investigate if they return to their full pre-whiplash earnings when the insurance claim has been assessed. We find that about half of the claimants, those not granted compensation, return to an earnings level comparable with their pre-whiplash earnings suggesting that these individuals do not have chronic WAD in the sense that their earnings capacity is reduced. The other half, those granted compensation, experience persistent reductions in earnings relative to the case where they had not been exposed to a whiplash, even when they have a strong financial incentive to not reduce earnings. This suggests that moderate injuries tend to be chronic, and that compensation-seeking behaviour is not the main explanation for this group. We find that claimants with chronic WADs used more health care in the year prior to the whiplash than claimants with non-chronic cases. This suggests that lower initial health capital increases the risk that a whiplash causes persistent WAD.

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### 1. Introduction

Experts estimate that every year at least 1.5 per thousand of the population experience a whiplash (Lønnberg, 2001). A whiplash is a sudden acceleration–deceleration of the neck and head that may produce injuries in the soft tissue, i.e. muscles, tendons, ligaments, joints or nerves. The typical situation leading to a whiplash injury is a rear-end collision. In this type of collision, the cervical spine initially adopts an S-shape with hyperextension at the lower cervical spine levels, and hyperflexion at the upper levels, followed by a C-shaped configuration of the cervical spine with a hyperflexed neck in the rebound phase. This sudden extension and flexion of the cervical spine or neck is an injury-generating mechanism known as whiplash. Whiplash can also be produced with side or front collisions or in other types of situations, but rear-end impacts are the most frequent cause of whiplash injury (e.g. Spitzer et al., 1995).

A whiplash may injure muscles, ligaments, tendons, facet joints, intervertebral discs and nerve tissues; all these injuries are known

as whiplash injuries. A person who has been injured by whiplash can immediately or some days after the collision experience a range of symptoms including neck pain, back pain, neck weakness, back weakness, vision disorder, dizziness, headaches, unconsciousness, or neurological symptoms. These are frequently labelled whiplash-associated disorders (WAD) (Spitzer et al., 1995).

The existence of temporary symptoms is well-documented, and most people who are injured by whiplash recover within a few weeks. The particular injury producing persistent WAD is still, however, not well known, c.f. Johansen et al. (1999).<sup>1</sup> A discussion about the existence of chronic WAD is going on in the medical literature, with some researchers attributing chronic disorders to specific injuries and others sceptical towards the existence of persistent WAD (Livingston, 2000). The first group, mainly rooted in health-care disciplines, has shown some evidence on the origin of chronic pain. The most relevant argument of this group is that a whiplash movement of the neck may injure the facet joints of spinal disc, rich in nerve endings, even with a low-speed rear-end collision, see Panjabi et al. (2004). The other group questions the existence of

\* Corresponding author. Tel.: +45 35323084.

E-mail addresses: [soren.leth-petersen@econ.ku.dk](mailto:soren.leth-petersen@econ.ku.dk) (S. Leth-Petersen), [gpr@akf.dk](mailto:gpr@akf.dk) (G.P. Rotger).

<sup>1</sup> The same type of tissue injuries in other parts of the body than the neck produces only temporary effects.

chronic WAD on the basis of statistical analysis. For example, in a study of 210 persons experiencing rear-end collisions in Lithuania, Obelieniene et al. (1999) found that those involved in the collisions reported no more symptoms than a group of controls.<sup>2</sup> Other studies find large variations in incidence and chronicity across countries, cf. Ferrari and Russel (1999), and argue that only psychological, cultural and socio-economic factors can explain the presence of chronic WADs. In cases with mild to moderate injuries there are often no objective signs or symptoms of injury, and diagnosing lasting whiplash-associated disorders is difficult. This leaves a scope for compensation-seeking behaviour. Cassidy et al. (2000) have shown that removing the possibility for compensation for pain and suffering in a Canadian province in 1995 was associated with a reduced number of insurance claims and a more rapid recovery. Their results suggest that the economic costs and benefits associated with the compensation system influence the propensity to claim compensation. Importantly, however, for many claimants the recovery was not fast or complete after the compensation scheme was changed. Moreover, recent evidence suggests that a substantial number of injured people do not recover quickly, Côté et al. (2000, 2004) and Cassidy et al. (2007) showed that neck pain in the general population tends to be persistent, even when not related to motor vehicle crashes.

In Denmark a unique system for evaluating the extent of chronic WAD exists. Persons or insurance companies can have whiplash cases assessed by an independent governmental body, the National Board of Industrial Injuries (henceforth NBII), before the conflict reaches the judicial system. The NBII evaluates each case based on statements from medical experts and occupational history before and after the collision, including information about income and tax payments, and information from the employer, and decides on a degree of lost earnings capacity (henceforth LEC), which in turn decides the level of compensation paid by the insurance company according to the Damage Liability Act. The assessment made by the NBII is only advisory, but in most cases the decision of the NBII is followed by both parties without a subsequent trial. The degree of LEC is settled when the point of maximum medical improvement has been reached, and compensation is awarded when the LEC is 15% or more. The case is then closed and compensation is paid out as a lump-sum transfer. From this point the case cannot be reopened to reduce compensation if the claimant returns to full pre-whiplash earnings. In this case the claimant does not have any financial incentive to stay out of work.

The objective of this paper is to give a description of whiplash claimants with mild or moderate cases in terms of their pre-whiplash characteristics and to explore the extent to which they return to full pre-whiplash earnings when they have a strong financial incentive to do so. If they return to the pre-whiplash earnings level we take it as evidence that they are likely not to have persistent WADs and if they do not return then we take it as evidence that they are likely to have persistent WAD affecting their earnings capacity. We pursue the objective by considering the long-term labour force participation and earnings of persons claiming to have chronic WAD and whose case has been assessed by the NBII. The NBII supplies us with an assessment of the severity of WAD in terms of their assessment of the degree of permanent LEC. The analysis focuses on a sample of persons assessed to have mild or moderate degree, i.e. maximally 30%, of permanent LEC. This selection is made because these cases are most likely to involve

persons who have no physical and objective damages, thus implying a large scope for being susceptible to economic incentives and hence a potential for disagreement between claimants and insurance companies. The data set is based on records from NBII about some 1200 persons claiming to have WAD following collisions occurring in 1996–1998, and who are assessed to have mild or moderate chronic WADs. These records are merged at person level to public administrative records with longitudinal information covering 1994–2002 about the purchase of prescription drugs, use of the public hospital system, earnings, information about family composition and other demographics. The same information is obtained for a 2% random sample of the Danish population serving as a control group. This information allows us to identify earnings, indicators of health, and other characteristics of WAD claimants measured before the collision occurs and to compare subsequent labour-market performance up to 5 years after the collision, i.e. after the case is closed and potential compensation paid out, with non-claimants who are otherwise similar with respect to these characteristics.

This paper is, to our knowledge, the first within the economic literature to analyse the effects of WAD on long-term labour-market performance. Measuring effects of non-work related injuries is rare since this category of injuries is usually not well-documented. We are able to examine the effects of WAD because Denmark has a unique system for assessing this type of injuries. Since a considerable fraction of the population is likely to be affected by WADs every year it is interesting in its own right to investigate the economic consequences of WADs.

This study also advances the medical literature on WADs in several ways, and the contribution derives from the richness of the data. The data set is unique along at least three dimensions. First, it contains information about an unusually large number of WAD claimants, including both individuals who were not given compensation and individuals who were given compensation for lost earnings capacity. Previous studies, except Cassidy et al. (2000), are mainly based on small samples obtained from medical trials, see for example Kwan and Friel (2003), and such trials are known to under-sample cases with mild and moderate WAD. This is because of the difficulties associated with diagnosing and implying that people are often given different diagnoses. This, in turn, implies that the statistical documentation is often incomplete, especially with regard to mild to moderate cases. As mentioned, the data exist because of the unique Danish system for evaluating WADs. Second, unlike any previous study, the data set contains a large number of variables with pre-collision characteristics of the claimants, including earnings and health indicators. This feature is unique and it permits us to give a detailed description of the selection into choosing to claim compensation for permanent LEC. Second, the medical literature does not present consistent evidence of any independent association between pre-whiplash health and recovery, cf. Côté et al. (2001). The pre-collision characteristics allow us to identify prognostic factors for whiplash recovery, and this is important because it facilitates clinicians and insurers to more accurately predict the outcome of patients with whiplash injuries. Third, it contains a large control group for which similar information is collected. The size of the data set, the historic information and the control group allow us to control for selection effects to a larger extent than was previously possible and to give a rich description of the heterogeneity in responses.

Measuring the long-term earnings of whiplash claimants is important for more general considerations about the design of compensation schemes. The lack of objective damages creates a situation where claimants potentially know more about the true state of nature than does the insurer. Therefore, individuals may choose to claim compensation without actually having chronic WADs or to

<sup>2</sup> This study is, however, hampered by the fact that 30–40% of the cohort had symptoms at the time of interception into the study. It is thus not surprising that the prevalence of neck pain at the follow-up was similar with that of the controls. We thank David Cassidy for pointing this out.

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