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Severity of disability related to road traffic crashes in the Spanish adult population

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ABSTRACT

Background: The severity of disability related to road traffic crashes has been little studied, despite the significant health and socio-economic impacts that determine victims' quality of life.
Objective: To estimate the consequences of road traffic crashes on the severity of disability, in terms of individuals' capacity to execute activities and perform tasks in their current environment, using aids.
Methods: Cross-sectional study conducted on community-dwelling participants in the "2008 National Survey of Disability", with data on 91,846 households having 20,425 disabled persons, 443 of whom had disability due to road traffic crashes. We measured severity using two indicators, i.e., the Capacity (CSI) and Performance (PSI) Severity Indices.
Results: The highest proportion of disability was mild (CSI = 70.5%; PSI = 80.8%), while 7.6% (CSI) and 4.9% (PSI) was severe/complete respectively. The moderate/severe disability rate was 0.6 per thousand on the CSI, decreasing to 0.4 per thousand on the PSI. No differences were observed by age or sex. Moderate/severely disabled persons had a fourfold higher probability of being retired or unfit for work. Mental and nervous system impairments were more closely related to moderate/severe/complete problems of capacity and performance ($p < 0.001$), disability for carrying out general tasks and demands, and interpersonal interactions and relationships ($p < 0.001$). Being permanently bedridden ($p < 0.001$), receiving aids ($p < 0.001$), family support ($p < 0.05$) and moving home ($p < 0.05$) increased with an increase in the level of severity.
Conclusion: Road traffic crashes mainly cause mild disability. Moderate/severe disability is associated with lower work capacity, greater functional dependence, and increased need of aids, moving home and family support.

1. Introduction

Injuries due to road traffic crashes (RTCs) generate important consequences for human lives, in terms of physical, psychological (Mayou et al., 2002), social (Heron-Delaney et al., 2013), occupational and economic harm (Barnes and Thomas, 2006). In accordance with their duration, severity and level of involvement, functional impairments which restrict activities of daily living (Holtslag et al., 2007) and social participation (Mayou and Bryant,

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2001) influence individuals' normal development and quality of life (Nhac-Vu et al., 2014).

Annually, 20–50 million people around the world are injured as a result of RTCs, and over 5 million are disabled for life. RTCs are the 9th leading cause of disability-adjusted life years world-wide, and the cost of dealing with the consequences is estimated at billions of dollars (World Health Organization, 2013a). Although developed countries are experiencing an important reduction in road traffic crashes in general, particularly those causing fatalities and severe injuries, the latter are not only decreasing at a slower pace but in overall terms far outnumber deaths (Malm et al., 2008).

In Spain, there has been a considerable drop in RTC victims over the last ten years, with a substantial decrease in deaths (8%) and serious injuries (11%) (Dirección General de Tráfico, 2014). Even so, the data show that for each RTC-related death, there are six severely injured persons requiring hospitalization and a further 68 who need medical assistance; close on 60% of in-patients are classified as seriously injured (MAIS 3+) (Haasper et al., 2010), with an important risk of death and/or permanent disability (Dirección General de Tráfico, 2014). Despite this, there is a lack of studies addressing the consequences in terms of activity limitations and participation restrictions (disability), functional and/or structural changes to the individual (impairments), and their contextual factors, elements which currently define disability (World Health Organization, 2001).

There are few studies which have analyzed long-term road traffic disability (RTD) (Palmera-Suárez et al., 2015), there is little unity of criteria when it comes to measurement, and there is a low correlation between initial assessment of severity and its long-term effects (Malm et al., 2008). As a result, information on the impact of RTCs on the severity of permanent disability is very limited (Airey et al., 2001; Murray et al., 2012) and its use as an element of analysis, monitoring and assessment of the consequences of RTCs is thus a priority.

Accordingly, the aim of this study was to estimate the consequences of RTCs on the severity of disability, in terms both of *capacity*, an individual's ability to execute a task or an action, and of *performance*, i.e., an individual's execution of tasks in his/her current (i.e., usual) environment using technical aids and/or personal assistance.

2. Material and methods

2.1. Type of study and population

A cross-sectional study was undertaken using population-based data from the "2008 National Survey of Disability, Personal Autonomy, and Situations of Dependency" (EDAD2008). The survey covered all regions of Spain during the period from November 2007 to February 2008 and it was targeted at all persons living in households (Instituto Nacional de Estadística, 2009b). The EDAD2008 was based on a two-stage, stratified sampling design, with the first-stage units being census sections and the second-stage units being households. A sample size of 96,073 households was established. 28,033 households were replaced, when not being able to make contact with the dwellings of the original sample; the interview was made in 91,846 households which corresponds to an effective response rate of 74% and a coverage of 96% of the original sample size (Instituto Nacional de Estadística, 2009a), yielding data on 213,626 persons over the age of 15 years, including 20,425 disabled persons, 443 of whom had disability due to RTCs. The data-collection method used was by personal interview (Instituto Nacional de Estadística, 2009b).

2.2. Measuring disability and severity

The EDAD2008 partly followed the conceptual framework of the International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001), according to which RTD is defined as, "A set of limitations of activities of daily living and participation restrictions (handicaps), which have lasted or are envisaged to last for more than one year, have their origin in some impairment and were caused by a road traffic crash, even though they may have been overcome with the use of external technical aids and/or personal assistance". The questions in the survey have allowed the determination that the disability is as a consequence of the previous occurrence of the RTCs.

Severity was measured using two indicators useful in distinguishing different patterns of severity among people with similar global ICF scores, as measured by the EDAD2008, and constructed by matching questions from the "ICF short list" on "activity limitations and participation restrictions" (World Health Organization, 2001) with variables from the EDAD2008 relating to execution of tasks and general demands, communication, mobility, self-care, domestic life and interaction and interpersonal relationships. Details on the construction of the two indicators can be found in Maierhofer et al. (2011). The indices assessed the level of severity in relation to two constructs, i.e., "Capacity", the ability of the individual to execute a task or action, considering their intrinsic limitations in a standardized environment, and "Performance", the participation of the individual in the execution of activities in the individual's current environment using technical or personal aids, which were defined in this study like Capacity Severity Index—CSI and Performance Severity Index—PSI. These indicators were used jointly to measure severity, since they assess the two conceptual components of disability, activity and participation, in a complementary way.

2.3. Variables

The severity indicators were divided into four categories according to "ICF difficulty level", namely, mild (0–24%), moderate (25–49%), severe (50–95%) and complete (96–100%); these percentages refer to the time during which the problem was present, its level of intensity and the degree to which it affected daily activities during the preceding 30 days (Maierhofer et al., 2011; World Health Organization, 2001). Due to limitations of sample size, however, the categories had to be regrouped, by pooling the highest levels of severity. As a consequence, we calculated proportions using three levels of severity, i.e., mild, moderate and severe (severe/complete), and prevalences using two levels, i.e., mild and moderate/severe (moderate/severe/complete).

The indicators were analyzed using the following variables: sex; age (four groups); educational level (low: no formal education/primary; intermediate: secondary/school-leaving certificate/intermediate vocational; and high: higher vocational/university); marital status (single, married, widowed and divorced/separated); nationality (Spanish and foreign/dual nationality); occupation (gainfully employed, unemployed, retired/unfit for work, and other unpaid work); monthly household income (<€1000; €1000–<€2000; ≥€2000); impairments (mental, visual, hearing, language/speech/voice, osteoarticular, nervous system, visceral, and other); disabilities (communication, general tasks and demands, mobility, self-care, domestic life, and interpersonal interactions and relationships); health factors (health status, permanently bedridden, accidents, poisoning and/or burns in the preceding year, and need of medical/social assistance); social factors (aids received, discrimination, and family support, a variable created from the following three: having parents, sons, siblings or other relatives; living in the same household, building, neighborhood, town or city as these; and seeing them every day