

Assessing injury-related movement difficulties: A method for analyzing the association between functional limitations and social participation

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Abstract

Background: The conceptualization of disability has shifted from a medical to a social model with a consequent focus away from impairments and toward activities and participation. The *International Classification of Functioning, Disability and Health (ICF)* provides a common point of reference and a common language in a developing disability discourse.

Objectives: We sought to apply a model for the measurement of disability based on the activity and participation constructs of the *ICF* to persons with movement difficulty as a result of injury-related causes.

Methods: Data from sample adults aged 18 years and over in the 2001–2006 National Health Interview Survey (NHIS) were used for analysis. Disability among adults with injury-related movement difficulty was assessed through measures of difficulty performing basic actions (movement, sensory, emotional, and/or cognitive functioning); and limitations of complex activities (defined through measures of self-care, social participation, and work participation). SUDAAN 9.0 was used in all analyses to account for the complex sampling design and weighting of the NHIS data.

Results: Approximately 16% of noninstitutionalized adults who reported movement difficulty mentioned injury as a cause. On average, between 2001 and 2006, about 7.6 million adults had injury-related movement difficulty in the United States. Overall, 50% of adults who experienced injury-related movement difficulty also experienced some complex activity limitation.

Conclusions: Using NHIS data, we have demonstrated the applicability of an approach using basic actions difficulty and complex activity limitations to measure functioning and participation in individuals with a specific type and cause of difficulty: injury-related movement difficulty. The operationalization of these constructs provides a possible tool to monitor progress toward the attainment of the equalization of opportunities among people with injury-related movement difficulty. Published by Elsevier Inc.

Keywords: Injury; Disability; NHIS; DALY; ICF

The definition and measurement of disability have been topics of international interest and debate in recent years, and the literature provides several examples from the growing disability discourse. Among issues of particular relevance to this paper are the shift in focus from the medical to the biological/psychological/social model [1–4], the application and operationalization of the *International Classification of Functioning, Disability and Health (ICF)* [4–7], and, most recently, the growing debate on the

suitability of disability-adjusted life years (DALYs) for measuring or summarizing disability [8–11].

We demonstrate an approach to measuring disability that is based on the activity and participation components of the *ICF* and that represents a contrast to the more medically oriented approach offered by DALYs, and we apply this model to injury-related movement difficulty. The groundwork for the work we present here was first outlined in a position paper [12, 13] of the United Nations Washington Group on Disability Statistics [14]. It was further developed by Badley [6] and recently operationalized by Altman and Bernstein in *Disability and Health in the United States, 2001–2005* [15].

The measurement of disability involves the operationalization of 2 constructs: basic actions and complex activities. According to Madans et al. [12], basic actions describe movements or actions of specific body parts in deliberate, intentional processes that would accomplish a physical activity, like moving, bending, grasping, seeing, or hearing. Complex activities represent a more complicated level of

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measurement that incorporates multiple, organized tasks, such as the combination of sensory activities, physical movement, intellectual activity, and the use of assistive devices in an organized process to achieve a recognized goal such as getting dressed or going to the doctor.

The operationalization of these constructs will reflect an individual's functional status (through an assessment of basic actions difficulties) and his or her participation (through assessment of complex activity limitations).

This functional approach to measuring disability differs substantially from the impairment-based approach of DALYs. DALYs were developed as a summary measure in response to a call to assess the global burden of disease [16], and they combine years of life lost due to premature mortality with the loss experienced by living with a disability [9]. While DALYs have been used to measure health outcomes, the inadequacies of this approach have been widely documented [9,11] and an alternative approach has been postulated [10].

Both DALYs and the approach described here are grounded in the ICF (Fig. 1). DALYs focus on health conditions and subsequent impairments (the medical model) and reference disability as a *burden* to society and the individual. The aforementioned approach we use here, on the other hand, concentrates on activity limitations that place an individual at risk of participation restrictions with a goal to maximize participation and equalize opportunities.

Increased risk of participation restrictions is the result of difficulties experienced in the basic functional domains: seeing, hearing, moving, cognition, and communication. The “at-risk” population identified will include persons with difficulties in basic actions who may or may not also experience restrictions in participation. Those in the latter group would include people who experience basic actions difficulty but, due to the availability of technical aids, personal assistance, or an accommodating environment, are able to achieve participation without restriction.

Adults with injury-related movement difficulties were selected as the focus of this report to provide an illustrative example of the usefulness of this approach to measuring disability and functioning based on the activity and participation components of the *ICF*, to meet the demands of a more robust measure that captures the dynamic aspects of disability and functioning, and to provide the groundwork for the implementation of a measure that may produce comparable results when used in other, similar research.

There are several reasons for focusing on injury-related movement difficulties:

1. Injuries are among the most serious public health problems in the United States and internationally. Unintentional injuries were the leading cause of death in the United States for those 1 to 44 years of age [17]. For medically treated injury in the United States in 2000, the combined economic burden of medical treatment and lost productivity was an estimated

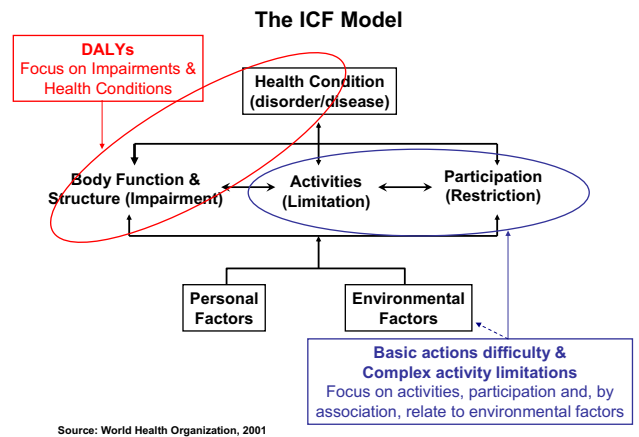


Figure 1. The ICF model of disability and the superimposition of 2 disability measurement models.

\$406 billion. More than 70% of that burden was attributable to injuries among people aged 44 and younger [18]. According to the World Health Organization, injuries and their consequences are leading contributors to the global burden of death and disability for all age groups below age 60 [19].

2. Regardless of age, sex, or leading external cause of injury, and with few exceptions, the body regions most often affected by an injury incident include upper and lower extremities (combined, about 61%) [20, Table 6, p. 26]. While injuries to these body regions may be of varying degrees of severity—from minor to severe—they represent those body parts most often associated with movement difficulties.
3. Movement difficulties are the most prevalent among basic actions difficulties. Approximately 1 in 5 U.S. adults reported at least some difficulty with basic movement, and difficulties with basic physical actions (i.e., activities such as walking, bending, reaching or using fingers to grasp) account for almost 74% of all basic actions difficulties in the U.S. population [15, Fig. 1, p. 7].

Much of the available literature on injury and disability describes results of assessments of functional status for persons with specific types of injury or trauma in rehabilitation settings [21]. Here, we present an application of a model for the measurement of disability based on the activity and participation constructs of the *ICF*. Specifically, basic actions difficulty and complex activity limitations are used to describe functional status among adults with injury-related movement difficulty.

Methods

Data source and study population

Data from the 2001–2006 National Health Interview Survey (NHIS) were used for analysis [22–27]. (Due to a change in the hearing question in the 2007 NHIS, only data from 2001

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