Paralympic Classification: Conceptual Basis, Current Methods, and Research Update

Sean M. Tweedy, PhD, Emma M. Beckman, PhD, Mark J. Connick, PhD

Paralympic classification systems aim to promote participation in sport by people with disabilities by controlling for the impact of impairment on the outcome of competition. Valid systems of classification ensure that successful athletes are those who have the most advantageous combination of anthropometric, physiological, and/or psychological attributes, and who have enhanced them to the best effect. Classification systems that are not valid pose a significant threat to Paralympic sport and, therefore, the International Paralympic Committee (IPC) has a Classification Code which includes policy commitment to the development of evidence-based methods of classification. The aim of this article is to provide an overview of current best practice in classification for athletes with physical impairments, and to update research advances in the area. Currently, classification has 4 stages: (1) establish whether the athlete has a health condition that will lead to one or more of the 8 eligible types of physical impairment, (2) determine whether the athlete has an eligible impairment type, (3) determine whether the impairment is severe enough, and (4) determine in what class the athlete should compete. A sequential 4-step process that outlines how to initiate and develop evidence-based methods of classification is described: (1) specification of impairment types that are eligible for the sport; (2) development of valid measures of impairment(s); (3) development of standardized, sport-specific measures of performance; and (4) assessment of the relative strength of association between measures of impairment and measures of performance. Of these, the development and reporting of valid measures of impairment is currently the most pressing scientific challenge in the development of evidence-based methods of classification.

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INTRODUCTION AND CONCEPTUAL BASIS OF PARALYMPIC CLASSIFICATION

Classification is a process in which a single group of entities (or units) is ordered into a number of smaller groups (or classes) based on observable properties that they have in common [1,2]. In the specialty of physical medicine and rehabilitation (PM&R), the International Classification of Functioning, Disability and Health [3] is one of the most important and widely accepted classification systems used, which provides a standardized language and structure for describing and understanding health-related functioning in a variety of contexts. The language and structure of the International Classification of Functioning, Disability and Health (ICF) is central to Paralympic classification, and the concepts of impairment and activity limitation are particularly important [2].

The ICF divides impairments into 2 different types: impairments of body functions, such as impairments of visual function, intellectual function, and neuromusculoskeletal functions (eg, muscle strength); and impairment of body structures, which are anatomic parts (eg, amputation). An activity is defined as the execution of a task or action by an individual (eg, running, jumping, swimming), and activity limitations are difficulties that an individual has in executing an activity [3]. Eight types of physical impairment are classified in Paralympic sports, and they are the focus of this article: 5 impairments of function (ie, impaired strength, impaired range of movement, hypertonia, ataxia, and athetosis) and 3 impairments of structure (ie, limb deficiency, leg length difference, and

S.M.T. The University of Queensland, School of Human Movement Studies, Brisbane, Australia. Address correspondence to: S.M.T.; e-mail: seant@hms.uq.edu.au

E.M.B. The University of Queensland, School of Human Movement Studies, Brisbane, Australia

M.J.C. The University of Queensland, School of Human Movement Studies, Brisbane, Australia

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short stature). The activities of focus are the Paralympic sports in which athletes compete.

Systems of classification are not unique to Paralympic sport but are a feature of most modern sports, examples being classification according to performance level (eg, the handicap system used in nondisabled golf), age, or body mass. In sport, classification systems provide a framework for competition that increases the likelihood of close competition [2]. The prospect of close competition is known to be a potent social motivator for sports participation [4], and, in this way, classification systems promote sports participation among people with widely varying skills and abilities, thereby expanding the participation base.

Paralympic classification systems aim to promote participation in sport by people with disabilities [2] by controlling for the impact of impairment on the outcome of competition. Valid systems of classification will ensure that successful athletes will be those who have the most advantageous combination of anthropometric, physiological, and/or psychological attributes, and have enhanced them to the best effect; athletes would not succeed simply because their impairments are less severe than those of their competitors [2].

Classification that is not valid or that is not perceived to be valid poses a significant threat to Paralympic sport. At the elite level, the legitimacy of an individual's competitive success or athletic achievement can be significantly diminished by the perception that he or she is in the wrong class, with the potential for considerable personal and financial cost as well as for discrediting the Paralympic movement. At the grassroots level, a classification system that is perceived to be unfair will discourage participation among people with disabilities rather than achieve the goal of increasing participation. Transparent, defensible systems of classification are so important to Paralympic sport that the IPC has a policy commitment to the development of evidence-based methods of classification [5]. The purpose of this article is 2-fold: (1) to provide an overview of the methods currently used to classify impairments in Paralympic sport, and (2) to identify and prioritize lines of research inquiry that can improve the evidence on which Paralympic classification systems are based.

CURRENT METHODS OF PARALYMPIC CLASSIFICATION

There are 28 Paralympic sports, 23 summer and 5 winter (Table 1). Twenty-five sports have classification systems for physical impairments (goalball, judo, and 5-a-side football are for vision impaired only). Nine of the sports are governed by the IPC, with the 19 other sports governed by bodies that are members of the IPC but that are structurally and administratively independent. Independence extends to systems of classification, and, consequently, it is difficult to

Table 1. *Sports governed by the International Paralympic Committee (IPC) and its member federations as at January 2014*

IPC Sports*	Sports Governed by IPC Member Federations	
	Sport*	Organization
Alpine skiing (W)	Archery	World Archery
Athletics	Boccia	Boccia International Sports Federation
Ice sledge hockey (W)	Canoe	International Canoe Federation
Nordic skiing (biathlon and cross-country skiing) (W)	Cycling	International Cycling Union
Powerlifting	Equestrian	International Equestrian Federation
Shooting	Football 5-a-side	International Blind Sport Association
Swimming	Football 7-a-side	Cerebral Palsy International Sport and Recreation Association
Wheelchair dance sport	Goalball	International Blind Sport Association
	Judo	International Blind Sport Association
	Rowing	International Rowing Federation
	Sailing	International Federation for Disabled Sailing
	Table tennis	International Table Tennis Federation
	Triathlon	International Triathlon Union
	Volleyball (sitting)	World ParaVolley
	Wheelchair basketball	International Wheelchair Basketball Federation
	Wheelchair fencing	International Wheelchair and Amputee Sports Federation
	Wheelchair rugby	International Wheelchair Rugby Federation
	Wheelchair tennis	International Tennis Federation
	Wheelchair curling (W)	World Curling Federation

*Winter sport is denoted by (W).

make general statements about classification methods that are entirely accurate or without exception. However, in 2007, the IPC membership approved the IPC Classification Code and International Standards [5], which provided a general framework for Paralympic classification across all sports. Since 2007, a number of other documents have been developed and approved by the IPC that are helping to align classification methods, policies, and procedures as well as approaches to research [2,5-7]. The methods described in this document are consistent with the IPC-approved