

SPECIAL COMMUNICATION

Theoretical Foundations for the Measurement of Environmental Factors and Their Impact on Participation Among People With Disabilities



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Abstract

The ascendancy of the World Health Organization's *International Classification of Functioning, Disability and Health* (ICF) as the global standard for describing and characterizing aspects of disability has refocused attention on the role that environmental factors (EFs) have on the health and participation of people with disabilities, both as individuals and as a group. There has been a rise in the development of instruments designed to measure EFs alone and in relation to participation. Some instrument developers have used the ICF as a theoretical base for instrument development and to substantiate content validity claims. We contend that this is a misapplication of the ICF. There is a need to step back and reexamine the role that environmental theories can play in developing a conceptually driven approach to measuring the interaction between EFs and participation. For this review, we draw on the fields of social, community, and developmental psychology; disability studies; gerontology; public health; and rehabilitation. We discuss different approaches to the measurement of EFs. We suggest that given the complex nature of EFs and their influence on participation, there is a need for a fresh approach to EF measurement. The thoughtful application of theories and the use of advanced psychometric, measurement, and e-technologies and data visualization methods may enable researchers and clinicians to better quantify, document, and communicate the dynamic interrelationship between EFs and participation and health outcomes for people with disabilities at the individual, group, and population levels.

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Health care delivery worldwide is undergoing rapid and dramatic changes. As health care delivery systems shift from hospital and clinic-based care to a greater emphasis on community-based services, there is growing attention to the role that built, social, and

economic environmental factors (EFs) play in facilitating or limiting health, disability, and rehabilitation outcomes.^{1,2} One outcome of high importance to rehabilitation consumers, caregivers, providers, and policymakers is participation, including opportunities for education, employment, leisure, and full inclusion in all aspects of community life and citizenship.³

In spite of landmark legislation such as the Americans with Disabilities Act (ADA) and documents such as the United Nations Convention on the Rights of People with Disabilities, people with disabilities continue to experience participation restrictions and disparities compared with their peers without disabilities. Effective client-centered practice, service allocations, and measurement of participation outcomes require the development of

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psychometrically robust and theoretically grounded measures that capture the dynamic interaction between participation and EFs.⁴ The effort to conceptualize the relational aspects of persons and environments extends beyond the assessment of rehabilitation outcomes to a broader societal-level understanding of people with disabilities' participation and enfranchisement.

Researchers and scholars from diverse disciplines have sought to conceptualize the relationship between the environment, health, and adaptation since Darwin first published *The Origin of Species* in 1859. Darwin's fundamental insight is that organisms' behaviors and opportunities are shaped by the environments in which they live. Humans are unique as a species in our ability to not only react to the environment, but also to modify and improve environments to create opportunities for individuals, communities, and society as a whole.⁵ Humans engage in reciprocal relationships within and across physical and social environments. As such, human behavior shapes and is shaped by these environments. The ability to identify the influence of relevant EFs can guide modification of environments to meet the needs of people in general and people with disabilities in particular.

The purpose of this article is to review the conceptual foundations of EFs as they relate to their impact on participation, and propose how theory can support the development of environmental measures. We underscore the need (1) for greater conceptual clarity in the dynamic relationship between EFs and participation, and (2) for the development and application of EF measures that build on these conceptual foundations in order to evaluate the environment's impact on people's rights, opportunities, and abilities to participate fully in all aspects of society. While this work is grounded in the disability experience, there are clear implications for diverse groups, particularly those whose health and social conditions make them vulnerable to environmental barriers.

Importance of theory to rehabilitation research and practice

In the 2007 John Stanley Coulter Lecture "A Grand Unified Theory of Rehabilitation (We Wish!)," John Whyte⁶ asserted that "many areas of rehabilitation are underdeveloped from a theoretical perspective,"^{6(p209)} and challenged rehabilitation researchers and practitioners to support theoretical development in physical medicine and rehabilitation as vigorously as we support the gathering of evidence. Whiteneck and Dijkers⁷ provide a detailed and thoughtful assessment of the state of participation and EF measurement, highlighting that these constructs, while fundamentally important to the rehabilitation enterprise, are "difficult to measure."^{7(pS22)} They point out that although rehabilitation practitioners have long recognized the important role that EFs have on the ability of people with disabilities to live and participate in the community, disability and rehabilitation research

has largely ignored the impact that the environment has on long-term health and participation outcomes.^{7,8} Indeed, EFs are among the "messy variables" that make the measurement of distal, long-term community outcomes so difficult.^{3,9} Measuring the environment is challenging precisely because of the myriad physical and social EFs that influence participation across diverse settings and situations.^{6,7} It is perhaps best to think not of the environment but of environments, and transitions between them—for example, rehabilitation facility to home, home to work, and home to community. People in different places and at different times may experience the enabling or hindering effects of EFs differently. We are not the first nor will we be the last group to seek to clarify the dynamic relationship between EFs and participation. It is, however, our intent to promote a renewed focus on a theory-driven approach to understanding and measuring the interrelationship of EFs and participation.

International Classification of Functioning, Disability and Health

The World Health Organization's *International Classification of Functioning, Disability and Health* (ICF)¹⁰ has emerged as the global standard for describing and characterizing aspects of disability. The ICF emphasizes the importance of factors in the immediate (eg, products and technology) and more distant environments (social services and policies).^{2,11} The ICF has been credited for identifying the EFs that affect health and participation,¹² and helping to legitimize EFs as a focus for intervention.⁸

The ICF reflects a biopsychosocial framework of disability, integrating 2 competing perspectives for describing disability: the medical and social models of disability.¹³ The ICF provides a useful classification schema or taxonomy for identifying environmental barriers and facilitators, and has created a more holistic approach to understanding disability by integrating biological and environmental factors. The ICF does not, however, provide a comprehensive conceptualization of the relationship within and between factors in the built, social, and policy environments. Understanding these relationships is important to identify and investigate the ways that EFs interact to influence participation. As a classification system, the ICF does not provide a framework for understanding the reciprocal relationships between EFs at the individual, community, and societal levels that are often seen as different levels of analysis but which all influence participation outcomes for people with disabilities as individuals and as a social group.¹⁴ We assert that the use of the ICF as a theoretical approach is beyond the scope for which it was developed. Understanding the influence that EFs have on participation helps identify targets for intervention. Unless we are able to differentiate aspects of the environment, important questions about the effects and comparative effectiveness of interventions and policies to promote participation cannot be answered.

Not all barriers have an equivalent impact on health and participation. It remains unclear whether environmental barriers are summative or whether one barrier creates a "deal breaker" for participation. A theory-driven approach to EFs research and measurement can help address important but unanswered questions, such as the comparative impact of individual versus community-level interventions. For example, are people with disabilities' needs for access to information technologies best addressed through the individualized provision of assistive technologies or by changing information technologies to be more universally accessible? How do social attitudes toward people

List of abbreviations:

ADA	Americans with Disabilities Act
CAT	computer adaptive testing
EF	environmental factor
EMA	ecological momentary analysis
ESM	experience sampling method
GIS	geographic information system
ICF	<i>International Classification of Functioning, Disability and Health</i>
IRT	item response theory

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