A Systematic Review of Review Articles Addressing Factors Related to Physical Activity Participation Among Children and Adults with Physical Disabilities

Martin Ginis, K. A., Ma, J. K., Latimer-Cheung, A. E., & Rimmer J. H. (2016). A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. *Health Psychology Review, 5,* 1-31.

Abstract

Dozens of published papers cite factors related to leisure time physical activity (LTPA) participation among people with physical disabilities. Unfortunately, there has been little effort to synthesize this literature in a manner that is accessible and useful to the sectors (e.g., health care, recreation) responsible for LTPA promotion in disability populations. In this systematic review, over 200 factors were extracted from 22 review articles addressing barriers and facilitators to LTPA in children and adults with physical disabilities. Factors were grouped according to common themes, classified into five levels of a social ecological model, and coded according to whether they could be affected by the health care and/or recreation sectors. Findings are discussed with regard to key factors to target in LTPA-enhancing interventions, relevant theories and models in which to frame interventions, the levels at which the interventions can be implemented, and intervention priorities. The synthesis provides a blueprint and a catalyst for researchers and practitioners to shift focus from conducting studies that merely describe LTPA barriers and facilitators, to developing and delivering strategies to increase LTPA among persons with physical disabilities.

Keywords: sport, exercise, barriers, facilitators, disability

Introduction

Among people with physical disabilities, participation in sport, exercise, and other forms of leisure time physical activity (LTPA) has been shown to yield numerous health benefits (Carroll et al., 2014). Nevertheless, the vast majority of people living with a physical disability do not participate in sufficient LTPA to achieve health benefits (Carroll, et al., 2014). Of further concern, when people with disabilities do try to become physically active, their attempts are often thwarted, as evidenced by high dropout rates among those trying to initiate or maintain an active lifestyle (e.g., (Sweet, Martin Ginis, Latimer-Cheung, & The SHAPE-SCI Research Group, 2012). Taken together, the low LTPA participation rates and high dropout rates suggest that people with disabilities face tremendous barriers to becoming, and staying, physically active.

Dozens of descriptive studies and review articles have been published, identifying both barriers and facilitators to LTPA participation among persons with disabilities. Yet while these data are informative, if the ultimate goal is to increase LTPA, then scientists must do more than simply generate lists of factors related to participation. Rather, such information needs to be used as a basis for selecting, designing, testing and implementing LTPA-enhancing strategies. A significant challenge to using this information, however, is that there has been little effort to synthesize it in a manner that is accessible and useful to the various sectors that are responsible for LTPA promotion among people with physical disabilities (e.g., health care, recreation, policy sectors).

Some authors (Fekete & Rauch, 2012; Mulligan, Hale, Whitehead, & Baxter, 2012; Saebu, 2010) have tried to synthesize this literature within the World Health Organization's (2001) International Classification of Functioning, Disability and Health model (ICF). The ICF is a framework for describing and classifying information on health conditions that takes into account interactions between the condition/disorder/disease, components of functioning (*Body Functions*

and Structures, Activities, and *Participation*), and contextual factors (*Environmental Factors* and *Personal Factors*). In a review of factors related to sport and exercise among people with spinal cord injury, Fekete and Rauch (2012) concluded that most, but not all (e.g., depression, independence) factors, could be classified within the ICF, by applying published ICF linking procedures and rules (Cieza et al., 2005). The ICF's inability to incorporate all of the factors is an important limitation. Another limitation is that the ICF was designed as a descriptive, rather than a predictive model. It lacks temporal and causal ordering of constructs, providing little guidance for hypothesis testing, regarding the effects of specific factors and interventions on LTPA. It has also been noted that while the ICF can be useful for guiding the development of exercise rehabilitation programs (Rimmer, 2006), its complexity (e.g., need for linking procedures and rules) and abstract organization limit its value for non-health care professionals (Lenker & Paquet, 2003) working in sectors that would benefit from an understanding of factors related to LTPA participation (e.g., coaches, recreation programmers, policy makers).

Indeed, experts have argued that multi-sector approaches are needed to promote LTPA. That is, approaches that engage various sectors to change environments and policies (e.g., recreation, transportation, city planning), engage health professionals and behavioral scientists to educate and motivate individuals, and foster social environments conducive to LTPA (World Health Organization, 2004). Within the disability context in particular, a call has been made for greater collaboration between the medical/rehabilitation and community sectors, to facilitate and promote life-long LTPA participation (Rimmer & Lai, 2015).

Social Ecological Models as Organizing Theoretical Frameworks

Social ecological models could provide useful frameworks for formulating a response to this call, understanding how various sectors influence LTPA among persons with physical disabilities, and developing testable hypotheses and interventions to improve LTPA participation.

In general, social ecological models depict health behaviour as being facilitated and inhibited by multiple levels of influence, including factors related to the individual, the social, and the physical environments (McLeroy, Bibeau, Steckler, & Glanz, 1988). Within the health and LTPA literature, a number of models of social ecological variables have been proposed (e.g., (McLeroy, et al., 1988; Sallis, Myron, Rodriguez, & Saelens, 2012; Spence & Lee, 2003). However, all of these models share an underlying premise: the levels of influence are interdependent and can exert direct effects on one another. Thus, an intervention directed at one level of influence, can have knock-on effects on other levels of influence (Spence & Lee, 2003).

McLeroy and colleagues' (Sallis et al., 1985) social ecological model of health depicts five levels of influence: intrapersonal, interpersonal, institutional, community, and policy (see Supplementary Figure 1). Importantly, as with other social ecological models, the McLeroy model can accommodate additional models and theories. For instance, theories that incorporate psychosocial variables (e.g., Social Cognitive Theory, Health Action Process Approach) can be used to develop LTPA-enhancing interventions that are delivered at one level (e.g., institutional, community) to target factors at the intrapersonal and interpersonal levels (McLeroy, et al., 1988). By incorporating additional theories into the model, research hypotheses can be developed and tested.

Although other social ecological models have been proposed specifically for LTPA (e.g., (Sallis, et al., 2012; Spence & Lee, 2003), the McLeroy model is unique insofar as it delineates between institutional and community levels of influence. Within the physical disability realm, LTPA research and practice typically occur within these two levels/sectors (i.e., institution/ hospital-based exercise rehabilitation and community-based sport and exercise), yet there has been very little collaboration between these sectors (Rimmer, 2012; Rimmer & Lai, 2015). Thus, when applying a social ecological model to the study of LTPA in persons with disabilities, it may be

important to distinguish between institutional and community-level factors. For these reasons, the McLeroy model was chosen as the organizing framework for the present review.

In summary, the purpose of this project was to conduct a systematic review of previously published reviews of factors related to LTPA among persons with physical disabilities. Our objective was to systematically organize this information within the multiple levels of McLeroy et al's social ecological model in order to (a) render the information accessible to people working in various sectors (e.g., rehabilitation, recreation) and (b) identify factors that are relevant across sectors. Identification of areas of overlap might indicate high priority targets for intervention and could stimulate much-need cross-sector dialogue and collaboration (Rimmer & Lai, 2015).

Methods

A systematic, configurative review was undertaken. Whereas *aggregative* reviews--such as meta-analyses and cost-benefit analyses--are designed to compile (or 'aggregate') data to test hypotheses or inform decision-making, *configurative* reviews are designed to "interpret and understand the world" by interpreting and arranging (or 'configuring') information and developing concepts (Gough, Thomas & Oliver, 2012, p. 3). Although differing somewhat from aggregative review methods, configurative review methods are systematic insofar as they are transparent, replicable, and accountable. For instance, because aggregative reviews typically aim to answer a question about the magnitude and precision of a phenomenon, their search methods tend to be exhaustive and designed to capture a relatively homogeneous set of studies with strict inclusion/exclusion criteria. In contrast, configurative reviews aim to explore patterns and develop (not test) theory and hypotheses, so the search methods do not need to be exhaustive, but must produce a sufficient number and variety of studies to generate new conceptual understandings (Gough et al., 2012). Importantly, there is little consensus on methods for appraising the quality of evidence in configurative reviews (Gough et al., 2012). Some reviewers have adopted similar

appraisal strategies used in aggregative reviews (e.g., use of standardized, validated assessment tools). Others have rejected the appraisal of a study's method as the primary index of its quality, focusing instead on the study's relevance to the review, or its contribution to answering practical questions, or generating theory within the review (e.g., Williams, Smith, & Papathomas, 2014). Details of our methods to integrate these perspectives are described next.

Search Strategy and Selection Criteria

An author and a research assistant identified relevant reviews by searching electronic databases and hand searching reference lists of relevant articles. The initial search was undertaken in November 2014 and updated November 2015. AMED (1985-present), Embase (1974-present), ERIC (1966-present), Medline (1946-present), PsychINFO (1987-present), and PubMed (1950-present) databases were searched using the following keywords: "physical activity" or "exercise" or "sport" and "barriers" or "facilitators" and "disability" or "mobility impairment" or "spinal cord injury" or "multiple sclerosis" or "amputation" or "cerebral palsy" or "osteoarthritis" or "Parkinson's" or "stroke" or "fibromyalgia". Limits were set to include only review articles written in the English language. A sample database search strategy is presented in Supplementary Figure 2. The disabilities cited above were used as keywords given our experience with similar reviews indicating the need to include these terms to maximize coverage of the literature. Conditions that do not always result in physical disability (e.g., traumatic brain injury, rheumatic conditions) were not included. Thus, consistent with configurative review methods (Gough et al., 2012) the search was not necessarily exhaustive, but was designed to yield a representative set of reviews covering a wide variety of populations with physical disabilities.

Inclusion criteria were: (a) reviews of factors related to LTPA among adults or children with physical disabilities published in a peer-reviewed journal; (b) articles published in English. All types of reviews were included (e.g., systematic, meta-synthesis, scoping). LTPA was defined

as activities people choose to do in their leisure time, such as exercising, dancing, playing sports (recreational and competitive), and other types of active play. Exclusion criteria were: articles that (a) focused on social participation in general, but not LTPA participation in particular; (b) did not have a specific section dedicated to factors associated with LTPA (e.g., barriers, facilitators).

Screening of Articles

After removing duplicates, article titles were screened independently by author XX and a research assistant. The abstracts of remaining articles were then screened for inclusion/exclusion criteria by two independent reviewers (author [XX] and a research assistant). Two discrepancies were resolved through discussion. The screening process resulted in 22 articles to be included in the review. Supplementary Figure 3 is a PRISMA diagram of the article screening process.

Data Extraction

The following general information was extracted in duplicate from each review by XX and a research assistant, and then checked for accuracy by XX: country of the authorship team, types of disabilities addressed, whether the focus was on children/youth or adults, number of studies included, the purpose of the review, and the target audience. In addition, factors identified as being related to LTPA were extracted. Some authors conceptualized the factors as 'correlates' or 'determinants', whereas others labeled the factors as 'barriers' and/or 'facilitators.' In many cases, facilitators were simply the inverse of barriers (e.g., '*presence* of social support' is a facilitator whereas '*absence* of social support' is a barrier). For ease of presentation, we have used the label 'factors' to capture all of these conceptualizations.

Appraisal of the Evidence

The quality of systematic reviews was evaluated using the 11-item AMSTAR tool (*A Measurement Tool to Assess Systematic Reviews*; (Shea et al., 2009). AMSTAR has yielded evidence of rater agreement (kappa=0.70), validity and reliability (ICC=0.84) when used to

evaluate a sample of systematic reviews in the field of medicine (Shea, et al., 2009). Points for two AMSTAR items are only awarded to quantitative syntheses (e.g., meta-analyses). Thus, meta-analyses could achieve a maximum score of 11, while narrative reviews could only attain a maximum score of nine. For both review types, an AMSTAR score of 9-11 indicates high methodological quality, 5-8 indicates medium methodological quality, and 0-4 indicates low quality (Shea, et al., 2009). AMSTAR ratings were conducted independently and unblinded by author XX and a trained research assistant. There were no discrepancies between raters. Supplementary Table 1 shows the complete AMSTAR scoring for each study.

No valid, reliable protocol is available for appraising asystematic reviews (e.g., reviews that do not describe search methods, inclusion/exclusion criteria, data extraction methods). However, consistent with the configurative (rather than aggregative) approach guiding our synthesis, we felt it was important to include other types of reviews in order to capture perspectives of key stakeholders (e.g., recreation programmers, physiotherapists) who might not undertake or read academic, systematic reviews. These reviews could complement our understanding and interpretation of barriers and facilitators of LTPA and enrich the final synthesis. Given the diverse methods used in the asystematic reviews, they were appraised based on each article's (a) relevance to the present review, and (b) contributions to either a theoretical or practical understanding of factors related to LTPA (cf. Gough et al.,2012; Williams et al., 2014). For consistency, these criteria were also applied to the systematic reviews.

Coding of Factors within the Social Ecological Model

A combination of inductive and deductive methods (Sparkes & Smith, 2014) was used by two of the authors (XX and XX). First, using an inductive strategy, factors were organized and coded according to common themes. In many cases, the themes reflected categories that were identified in the original review articles (e.g., social support, transportation, facilities). When

themes aligned with categories included in the ICF model, they were labeled using ICF terminology. This was done in order to avoid introducing new terms and to apply recognized labels for constructs, when possible. Themes were modified until every extracted factor was captured. Second, the themes were deductively coded according to McLeroy et al.'s definitions of the five levels of factors within their social ecological framework: (1) *Intrapersonal factors*: characteristics of the individual; (2) *Interpersonal processes and primary groups*: formal and informal social networks and social support systems; (3) *Institutional/Organizational factors*: social institutions with organizational characteristics and rules and regulations of operation; (4) *Community factors*: relationships among organizations, institutions and informal networks within defined boundaries; also place of interaction between entities from different levels; and (5) *Public Policy*: local, state, and national laws and policies.

Finally, to address our objective of highlighting factors relevant to various sectors, the themes were categorized as potentially influenced by the health care sector, the recreation sector, or both. To categorize each theme, we looked at the target audience(s) of the papers in which the associated factors were cited. Because more reviews targeted health care providers than recreation providers (indicating a possible publication bias), we also based the categorization on our judgment of factors that could realistically be addressed by each sector.

Analyses were underpinned by assumptions of ontological relativism and epistemological constructionism. That is, we recognize that in interpreting the data, there is no singular, external, knowable truth about which factors are related to LTPA in people with disabilities, or how these factors fit together within the social ecological model. We also recognize that as researchers, our values and experiences mediate and shape how we understand and make sense of the factors.

Results

Twenty-two reviews met the inclusion criteria (see Table 1). Nine articles reported on

people with physical disabilities in general, two focused on spinal cord injury, three on osteoarthritis, three on stroke, two on neurological conditions, one on cerebral palsy, one on prosthetic limb users, and one review covered spinal cord injury, multiple sclerosis, osteoarthritis, and fibromyalgia. Half of the articles (n=11) focused on adults only, six focused on children/youth only, and the remainder (n=5) discussed factors related to participation in both children/youth and adults. The reviews were written by authors affiliated with institutions in Australia, Canada, Norway, The Netherlands, New Zealand, Sweden, Switzerland, United States, and the United Kingdom.

Ten articles were targeted primarily to an academic audience, five to health care professionals, one to recreation providers, and six to mixed audiences. Most articles (n=13) were systematic reviews; nine were of medium quality and four were rated as low quality. The other nine reviews were classified by their authors as 'best clinical guidelines practices' (n=1), 'expert opinion piece' (n=1), 'selected review' (n=1), 'discussion piece' (n=1) or were unspecified (n=5). All 22 reviews were deemed to be relevant, and to contribute useful information to the review. Consistent with configurative review methods (i.e., when the goal is to develop a comprehensive understanding and interpretation), findings from each review were considered of equal merit. As a final check, the resulting themes were reviewed by author XX to ensure no theme was generated solely from reviews that could be considered of dubious quality (J. Thomas & Harden, 2008).

We extracted a total of 208 factors that were identified as related to LTPA in children, youth or adults with physical disabilities. Table 2 presents the individual factors and their associated themes, organized within the levels of the social ecological model. The individual factors are also presented along with the studies in which they were cited in Supplementary Table 2. Figure 1 provides a schematic summary of the results. The figure is colour-coded to indicate themes that

could be affected by the health care and recreation sectors. The following paragraphs provide a summary of the key factors identified within each level of the social ecological model.

Key Factors Related to Physical Activity

At the *intrapersonal level*, the factors were categorized into the following themes: psychological factors; body functions and structures; and employment status. The most frequently cited factors were in the psychological subcategories of *affect and emotion*, *attitudes/ beliefs/perceived benefits* and *self-perceptions* as well as the body functions and structures theme. In particular, negative mood, depression, anxieties, fears, and embarrassment related to activity were frequently cited as affective/emotional barriers. Positive attitudes and beliefs about being active (e.g., provides opportunities to meet others, can improve function) and about oneself (e.g., self-efficacy, self-determination) were frequently cited as facilitators. In addition, under the subtheme of "*other*," several reviews cited evidence in support of the use of behavioural change strategies. Within the ICF-labeled theme of body functions and structures, health symptoms and conditions, pain, fatigue, energy and strength were frequently cited as important factors. Employment status was coded as a separate theme. Evidence was mixed, with employment being identified as both negatively and positively related to LTPA across the reviews.

At the *interpersonal level*, factors were grouped into three themes: social support, attitudes, and social processes. There was consistent evidence across the reviews regarding the importance of support from family, friends, peers, health care and other professionals for facilitating physical activity (all ICF labeled sub-themes). In contrast, other people's negative attitudes (also an ICF label) were often mentioned as an impediment to activity. Few reviews discussed social processes with the exception of role modeling (both being and having a role model) which was frequently cited as positively related to sport and exercise participation.

The following themes emerged at the *institutional level*: knowledge of people within institutions/organizations; rehabilitation processes; building design and construction (an ICF label); and program factors. The level of knowledge among healthcare professionals and other service providers was often cited as a factor that affected participation. At the sub-theme level, *disability-specific knowledge* about the benefits of physical activity and how to exercise was frequently identified as a specific area of importance. Within the theme of rehabilitation processes, numerous reviews cited the importance of physical activity information, counseling, and encouragement from rehabilitation professionals. The importance of building/facility accessibility and location were also underscored in the majority of reviews. In addition, 18 program-related factors were extracted from the reviews, with 'availability' and 'fun/enjoyable activities' being mentioned most often, and positively linked to physical activity participation.

At the *community level*, factors reflected the following themes: products and technology; climate; and relationships among groups and organizations. Of note, these themes reflect McLeroy et al.'s broad conceptualization of 'community' as encompassing the structures and groups to which people belong (e.g., neighbourhoods, teams, groups), the relationships among organizations and groups within a particular area, and groups defined by geographical and political terms. Within the general theme of 'products and technology', three ICF-labeled sub-themes emerged: *products and technology for culture, recreation and sport* (i.e., equipment), *land development*, and *education* (i.e., the availability of LTPA information). Equipment and information were cited in most reviews, as playing important roles. Climate also emerged as a theme that mitigated LTPA participation. Four factors reflecting 'relationships among groups and organizations' were extracted from the reviews but, overall, were not frequently cited.

Five themes emerged at the *policy level*. Two ICF-labeled themes reflected frequently cited factors within the potential purview of government policy-makers: health policies (specifically,

funding for programs); and transportation services, systems and policies. The latter was cited in the majority of reviews. Most reviews also cited the importance of the ICF-labeled theme of association and organizational policies, with two sub-themes--*financial costs to the individual* and the *need for training* of staff/professionals within the organizations--frequently identified as barriers to participation. The ICF-labeled theme of architecture and construction policies also emerged, but was cited in only one review (Nicholson et al., 2013).

Discussion

The overarching purpose of this review was to synthesize reviews of factors related to LTPA participation in people with physical disabilities, in a manner that would be accessible and useful to sectors with a vested interest in selecting, designing, testing, or implementing LTPA-enhancing strategies. Over 200 factors were extracted from 22 review articles. The factors were grouped according to common themes which were subsequently classified into the five levels of McLeroy et al.'s (1998) social ecological model. Themes were coded as potentially affected by the health care and/or recreation sectors. When themes aligned with concepts in the ICF model of disability (World Health Organization, 2001), ICF labels were applied. In the following sections, implications of our findings are discussed from theoretical, practical, and research perspectives.

Intrapersonal Level

Within the broad category of psychological factors, negative emotions, attitudes, self-perceptions, and behaviour change strategies were frequently cited as related to LTPA participation. When developing LTPA interventions that focus on the individual (e.g., informational or behavioural strategies), these factors should be prioritized as targets for change. There is strong theoretical support for the role of each of these variables within the context of behaviour change models and theories. For instance, Schwarzer's (Schwarzer, 2008) Health Action Process Approach (HAPA) model includes constructs that encompass worries about

potential risks of the behaviour (i.e., risk perceptions), attitudes toward physical activity (i.e., outcome expectations), self-perceptions (i.e., self-efficacy), and behaviour change strategies (i.e., action planning). Bandura's (1997) social cognitive theory (SCT) also captures these variables vis à vis the constructs of barriers and facilitators, outcome expectations, self-efficacy, and self-regulation. Thus, psychological factors consistently cited as relevant to LTPA participation are recognized as antecedents of behaviour and mechanisms underlying behaviour change within well-used social cognitive theories. This observation underscores the utility of integrating these theories into the social ecological model, to explain *why* psychological factors facilitate or impede LTPA.

Factors reflecting the ICF concept of 'body functions and structures' were also identified as relevant. Some of these factors may impede participation altogether, whereas others may impact the types of activities undertaken. For instance, secondary health problems and symptoms (e.g., infections, skin breakdown) could necessitate the complete avoidance of LTPA, while aerobic fitness, strength, functional limitations could constrain type or intensity of LTPA. Thus, the *extent* to which body function and structure factors impede participation is an important consideration.

Both the health care and recreation sectors can have an impact at the intrapersonal level. Rehabilitation and other health care professionals can provide information to address anxieties and negative attitudes/beliefs about sport and exercise participation. Given their relatively high patient contact time (Whiteneck et al., 2011), rehabilitation specialists may be particularly well-positioned to tackle patients' embarrassment, low self-efficacy, and fitness concerns by teaching basic exercises, sport skills, and behaviour change strategies (e.g., goal-setting, action planning). Information and skill-development can be provided in the recreation sector as well. This sector also has responsibility for ensuring that programs align with participants' physical and functional capabilities and are delivered in a manner conducive to health self-management. For instance,

providing programs later in the day for people with bowel and other morning self-care routines may help to alleviate barriers associated with disability-related secondary health conditions.

Interpersonal Level

Our review provided support for three categories of interpersonal factors: social support; others' attitudes toward people with disabilities and their participation in LTPA; and social processes (particularly, role modeling). These categories are reflected in constructs included in key theories used in the LTPA behaviour change literature. For instance, all three categories reflect a person's sense of relatedness to others, a central concept in Self-Determination Theory (Deci & Ryan, 2002). Similarly, the social support construct is a predictor of intentions, planning and behaviour in the HAPA model, and is posited to influence LTPA through its effects on self-efficacy in SCT (Bandura, 1997). SCT includes the social process of modeling as one of the four sources of self-efficacy (Bandura, 1997). Together, these observations attest to the theoretical relevance of the interpersonal level factors and their linkages with intrapersonal level factors.

The interpersonal factors can also be conceptualized within some social models of disability. The ICF model, for instance, conceptualizes other people's attitudes, social support, and relationships as environmental factors that influence disability. Similarly, Thomas's (C. Thomas, 2007) social relational model conceptualizes disability as a manifestation of relationships with structures and other people. Structural barriers can impede the participation of people with impairments (i.e., *structural disablism*), but society can hurt them on a personal level through expression of negative attitudes, insensitive comments, and unsupportive behaviours. This type of hurt, referred to as '*psycho-emotional disablism,*' is damaging at the intrapersonal level. It affects one's sense of self, limiting what people with disabilities believe they can accomplish (e.g., participating in sport) and what they believe they can become (e.g., successful, competitive athletes; (Smith & Bundon, 2015).

Given its profound negative impact, the alleviation of psycho-emotional disablism from LTPA contexts must be prioritized. By approaching LTPA promotion from the perspective of social models of disability, the health care and recreation sectors can leverage intrapersonal factors and mitigate disablism. For instance, both sectors can contribute to 'normalizing' LTPA for people with disabilities by ensuring that persons of all abilities are encouraged to be active and are prominent in LTPA promotional resources and campaigns (Rimmer, 2005). Such activities reinforce the message that 'physical activity is for everyone,' thus combatting negative societal stereotypes and attitudes toward people with disabilities. Health care professionals can encourage patients to build and utilize social support networks. Rehabilitation therapists can facilitate family support networks by developing care and support plans that involve the patient's family, and identifying programs and activities that the family can do together. In the recreation sector, programming can be designed to facilitate peer support, peer mentoring, and the use of role models. Disablism can be further addressed by delivering integrated programs so that persons with disabilities reap the social benefits of participating alongside able-bodied friends and family.

Institutional Level

At the institutional level, four themes of factors emerged: knowledge of people within institutions/organizations; rehabilitation processes; design and construction of public buildings; and program factors. Staff knowledge, in particular, was a frequently cited factor of relevance to both the health care and recreation sectors. Presumably, the more information that organizational staff have about LTPA and disability, the more likely they will intervene at the various levels of the social ecological model (e.g., providing social support, adapting activities). Unfortunately, most health care professionals receive minimal training on LTPA and disability (Staley & Worsowicz, 2005), and few discuss LTPA with patients with physical disabilities (Tomasone, Martin Ginis, Estabrooks, & Domenicucci, 2014). Given that provision of LTPA information and

counseling during rehabilitation was frequently cited as an important facilitator (categorized as '*rehabilitation processes'*), there is a need for programs to improve health care professionals' skills, knowledge and resources for promoting LTPA to patients with disabilities.

Similarly, recreation sector staff are often criticized for a lack of skills and knowledge on how to adapt activities, create inclusive environments and provide exercise instruction and guidance (Jones, 2002; Rolfe, Yoshida, Renwick, & Bailey, 2012). Such knowledge gaps limit programming options for people with disabilities and further contribute to disablism. Indeed, within the 'program factors' theme, several factors could be impacted by staff knowledge and training, such as variety, inclusiveness, and the extent to which activities are enjoyable and fun. Training in disability awareness, recognizing and understanding different types of disabilities, and how to adapt activities and equipment must be a high priority for the recreation sector.

Another priority is to ensure that LTPA facilities are truly accessible. For instance, when researchers conducted accessibility audits (Rimmer, Riley, Wang, & Rauworth, 2004) in 44 fitness and recreation facilities that identified as "accessible," none were completely accessible to people with mobility impairments (Arbour-Nicitopoulos & Martin Ginis, 2011). Furthermore, virtually all bathrooms, locker rooms, and swimming pools received accessibility scores less than 50%. Thus, the design and construction of public buildings remain a vital concern, and an ongoing contributor to structural disablism, at the institutional level (Dolbow & Figoni, 2015).

Community Level

At the community level, our review yielded evidence of the importance of factors encompassed by the ICF labeled-themes of "products and technology" (particularly the availability of LTPA information and equipment) as well as "climate." There was also some mention of the importance of managing relationships across groups and organizations. Managing relationships and the flow of information are factors that the health and recreation sectors can help to address. In

particular, priority should be given to creating stronger relationships between rehabilitation facilities and community-based sport and exercise programs. Rehabilitation professionals could share expertise on the needs of people with particular disabilities, and the recreation sector could share information on locally available programming. Building stronger liaisons between sectors would also help patients with newly acquired disabilities experience a smoother transition from hospital-based to community-based physical activity (Rimmer & Lai, 2015), as rehabilitation specialists could prepare clients, and refer them to community programs, prior to discharge.

Recreation facilities could also benefit from partnering with community disability organizations to facilitate the spread of information and awareness of local program and equipment availability. Equipment barriers could be reduced, for instance, by pooling resources across community organizations and establishing equipment loan programs. Furthermore, by strengthening relationships across community organizations and groups, people who require sports or fitness equipment could be more readily connected with programs to facilitate its acquisition.

Two categories of community level LTPA factors are generally beyond the impact of the health and recreation sectors: *climate* and *land development*. Yet, while it is impossible to change the weather, it is possible to provide people with information on alternatives to being active outdoors when the weather is poor, and how and where to be active in different climates (e.g., adapted skiing in winter; hand-cycling in warmer climates). People with disabilities can also be coached how to anticipate and manage bad weather so that it does not disrupt their LTPA routines (Arbour-Nicitopoulos, Martin Ginis, & Latimer, 2009). Land development in the community (e.g., building curb cuts, sidewalks) may often be beyond the reach of the health and recreation sectors. Nevertheless, these sectors can advocate and raise awareness of the need for communities to be built in a way that facilitates LTPA (Rosenberg, Huang, Simonovich, & Belza, 2012).

Policy Level

Funding for programs, training, architecture and construction, transportation, and costs were factors identified at the policy level. Transportation and the costs of participating (e.g., for programs, equipment) were highly cited across the reviews. This is not surprising given that people with disabilities are typically at the lower end of the socioeconomic spectrum and often cannot afford private transportation, equipment or fitness memberships (Rimmer, Riley, Wang, Rauworth & Jurkowski, 2004). These barriers represent a significant cause of disablism.

Training was also identified as an important policy issue. Numerous training programs and resources are available. For instance, the National Center on Health, Physical Activity and Disability (NCHPAD; www.nchpad.org) provides a wealth of video- and print-based resources aimed at providing fitness professionals with information to support people with disabilities (National Center on Health Physical Activity and Disability, 2015). The onus is on organizations, however, to create and enforce policies that prioritize staff engagement with these training programs and resources.

Together, the recreation and health care sectors can play an important advocacy role to address policy barriers in ways that are relevant to their local contexts. For instance, they can leverage their influence to shape public policy to alleviate transportation and building accessibility barriers. They can lobby to ensure adequate resources are allocated to informational and recreation programs at the community and institutional levels (Shikako-Thomas, Majnemer, Law, & Lach, 2008). When recreation providers have greater overall financial support, they may be in a better position to have policies that alleviate financial barriers to persons with disabilities. For instance, programs may be more likely to waive fees for attendants or caregivers, and fitness centres may be more likely to waive monthly membership fees when a disabled person is required to take a medical break from sport or exercise (Rimmer, 2012). Existing federal laws such as the Americans

with Disabilities Act can be enforced to a greater degree by educating organizational managers and staff on elements of their facilities/programs that must be accessible as required by law.

Research Implications

From this review of 22 papers, we identified factors associated with LTPA participation in children and adults with physical disabilities. Given the extent of knowledge on this topic and the relative consistency in the types of factors being cited in reviews (see Supplementary Table 2), we urge researchers to move beyond conducting simple descriptive studies. If the ultimate goal is to increase LTPA participation, then it is time to focus on selecting, developing, testing and implementing interventions, rather than simply generating lists of barriers and facilitators. For this to occur, researchers must be able to address a variety of barriers/facilitators that cut across multilevel, multisector structures.

We encourage researchers to use the model and results depicted in Figure 1 to guide the selection of interventions to be developed and tested. The factors shown within each level of the model should be prioritized as variables to target in intervention studies. The model also provides a framework to direct thinking about the types of interventions needed to impact different types of factors (e.g., policy-level interventions to address cost and transportation barriers; individual-level interventions to address psychological factors) and how an intervention directed at one level can have knock-on effects at another level. For instance, a hospital policy-level intervention requiring staff to be trained on exercise prescription would have knock-on effects at the community level, vis à vis *knowledge of individuals in institutions/organizations*. With increased knowledge, staff may be more likely to provide informational support to patients (an inter-individual level factor) which could, in turn, enhance patients' attitudes and self-perceptions with regard to being active (intra-individual factors). Thinking about the multi-level effects of an intervention may help researchers prioritize their intervention efforts in order to maximize impact.

In addition, our findings contribute to the formulation of a broader LTPA and disability research agenda. Nearly twenty years ago, a call to action was issued for scientists to undertake research aimed at understanding the LTPA patterns and physiological responses of people with disabilities (Rimmer, Braddock, & Pitetti, 1996). While knowledge has increased in these two areas, research is still lacking regarding how best to intervene to facilitate the initiation and maintenance of LTPA participation among persons with disabilities. There has also been a lack of interdisciplinary research. Given that many barriers are not resolvable from disciplinary silos, there could be tremendous benefit if scientists from different disciplines collaborated to address research questions aimed at solving the problem of low LTPA participation and adherence rates.

The information provided in Figure 1 can be used to identify areas where researchers can provide support to the recreation and health care sectors. Given that both sectors have a profound need for information on LTPA and disability, researchers should prioritize addressing these needs by (a) conducting intervention studies to bridge knowledge gaps that are currently hindering the efficacious delivery of LTPA in rehabilitation and community settings, and (b) ensuring that research findings are translated into informational resources (e.g., guidelines, toolkits) that are delivered to, and implemented by, individuals working in institutions and organizations. When scientists work collaboratively with other sectors, we can have a greater reach and impact on the disability community than when we work alone (Sweet, Martin Ginis, Estabrooks, & Latimer-Cheung, 2014). Through these collaborations, scientists might help bridge the gap between the rehabilitation and recreation sectors.

Strengths and Limitations of the Review

Our review has numerous strengths including: the application of rigorous, systematic methods for searching, appraising, and synthesizing the literature; the integration of various theoretical perspectives on physical activity and disability; and the translation of the results into

evidence-informed recommendations for the health care and recreation sectors. From a theoretical standpoint, this review is the first to demonstrate that a social ecological model can be readily used to organize and conceptualize factors related to LTPA in persons with disability. We have also shown how the model can incorporate other behaviour change theories and disability models to develop testable hypotheses and interventions targeting key LTPA barriers and facilitators. From a practical standpoint, we have demonstrated that categorizing LTPA factors according to five levels of a social ecological model can identify priority areas where sectors can realistically intervene to make change, and opportunities for collaboration to address common barriers and facilitators. And finally, we have discussed how interventions at one level can have knock-on effects on factors at another level, thus attesting to the utility of multi-level approaches to eliminating barriers and fostering facilitators to LTPA in people with disabilities.

A few limitations of our review must also be acknowledged. First, although our review is predicated on the assumption that LTPA is good, for some people in some circumstances, LTPA may have physical or psychological costs or harms (see Williams et al., 2014 for a discussion). Second, although we developed and followed a rigorous, systematic protocol, given the ontological and epistemological assumptions inherent to configurative reviews (Gough, Thomas, & Oliver, 2012), other reviewers could come to different conclusions regarding the categorization of the factors and where they situate within the SEM. Third, information was synthesized across studies of people with different types of disabilities. Although there was consistency in relevant factors across populations, it is important to acknowledge that some disability groups were more strongly represented in our synthesis than were others (e.g. five reviews involving persons with spinal cord injury versus one review involving prosthetic users). Furthermore, while many common physical disabilities were covered by our search strategy, we did not conduct an exhaustive review of reviews of all possible disabilities. Moreover, given that few reviews focused

on children/youth and these reviews included a relatively small, or unspecified number of studies, it was not possible to make reliable comparisons of relevant factors for adults versus children/youth.

Fourth, some factors and categories of factors were infrequently cited in the review articles. In some cases, this was a reflection of the lack of research on a particular factor rather than a lack of support for a factor's relevance. As such, we have avoided drawing conclusions about the relative importance of factors and we included all emergent themes in Figure 1 regardless of the extent to which they were mentioned. Furthermore, because our review is based on a body of literature that is almost entirely descriptive (as opposed to experimental), and different reviews utilized different methods, it was impossible to discriminate between factors based on the quality of supporting evidence. Finally, our conclusions are based on the extant data. There may be other factors and other sectors (e.g., education, Menear & Shapiro, 2004) relevant to LTPA participation in persons with disabilities that were not captured because of limited, or no data, on their role.

Summary and Conclusions

Researchers have invested considerable effort in compiling lists of factors related to LTPA among persons with physical disabilities. We organized and conceptualized these factors within a social ecological framework. Based on our synthesis, the following recommendations/priorities emerged:

1. Scientists and practitioners in the health care and recreation sectors must establish inter-professional communication channels and work collaboratively to address barriers impeding LTPA participation among people with a disability.
2. Scientists must shift their focus from describing LTPA barriers and facilitators, to working collaboratively with practitioners to develop, test, and deliver strategies to increase LTPA participation among persons with physical disabilities.

3. Strategies should not focus only on people with disabilities (i.e., at the intrapersonal level) but should target each level in the social ecological model and the key stakeholders operating within those levels (e.g., peers, coaches, rehabilitation specialists, program administrators).

   3a. At the intrapersonal level, intervention development should focus on improving negative emotions, attitudes, and self-perceptions, and teaching behaviour-change strategies.

   3b. At the interpersonal, institutional, and community levels, intervention development must focus on improving societal attitudes toward LTPA for people with disabilities, enhancing practitioner knowledge, and building social networks to provide the informational and other LTPA supports required by people with disabilities.

   3c. At the institutional, community, and policy levels, interventions and organizational and public policies are needed to circumvent and alleviate transportation and financial cost barriers.

We urge scientists and practitioners in the recreation and health care sectors to use our synthesis and recommendations as a blueprint and a catalyst for positive change in LTPA promotion efforts for persons with physical disabilities.

Disclosure Statement

The authors have no financial or competing interests to disclose.

References

Arbour-Nicitopoulos, K. P., & Martin Ginis, K. A. (2011). Universal accessibility of "accessible" fitness and recreational facilities for persons with mobility disabilities. *Adapted Physical Activity Quarterly, 28*(1), 1-15.

Arbour-Nicitopoulos, K. P., Martin Ginis, K. A., & Latimer, A. E. (2009). Planning, leisure-time physical activity, and coping self-efficacy in persons with spinal cord injury: A randomized controlled trial. *Archives of Physical Medicine and Rehabilitation, 90*(12), 2003-2011.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman.

Carroll, D., Courtney-Long, E. A., Stevens, A. C., Sloan, M. L., Lullo, C., Visser, S. N., . . . Centers for Disease Control and Prevention. (2014). Vital signs: disability and physical activity – United States, 2009-2012. *Morbidity and Mortality Weekly Report (MMWR), 63*(11), 407-413.

Cieza, A., Geyh, S., Chatterji, S., Kostanjsek, N., B., U., & Stucki, G. (2005). ICF linking rules: an update based on lessons learned. *Journal of Rehabilitation Medicine, 37*(4), 212-218.

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY.

Dolbow, D. R., & Figoni, S. F. (2015). Accommodation of wheelchair-reliant individuals by community fitness facilities. *Spinal Cord, 53*(7), 515-519.

Fekete, C., & Rauch, A. (2012). Correlates and determinants of physical activity in persons with spinal cord injury: A review using the International Classification of Functioning, Disability and Health as reference framework. *Disability and Health Journal, 5*, 140-150.

Gough, D., Thomas, J., & Oliver, S. (2012). Clarifying differences between review designs and methods. *Systematic Reviews, 1*(28), 1-9.

Lenker, J., & Paquet, V. L. (2003). A review of conceptual models for assistive technology outcomes research and practice. *Assistive Technology, 15*, 1-15. doi: DOI: 10.1080/10400435.2003.10131885

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*, 351-377.

Menear, K. S., & Shapiro, D. R. (2004). Let's get moving! Physical activity and students with physical disabilities. . *Physical Disabilities: Education and Related Services, 23*, 9-18.

Mulligan, H. F., Hale, L. A., Whitehead, L., & Baxter, G. D. (2012). Barriers to physical activity for people with long-term neurological conditions: a review study. *Adapted Physical Activity Quarterly, 29*, 243-265.

National Center on Health Physical Activity and Disability. (2015). Autism and Exercise: Launch of new video series, from http://www.nchpad.org/1399/6252/Autism~and~Exercise

Rimmer, J. (2005). The conspicuous absence of people with disabilities in public fitness and recreation facilities: Lack of interest or lack of access? *American Journal of Health Promotion, 19*(5), 327-329.

Rimmer, J. (2006). Use of the ICF in identifying factors that impact participation in physical activity/rehabilitation among people with disabilities. *Disability and Rehabilitation, 28*(17), 1087-1095.

Rimmer, J. (2012). Getting beyond the plateau: Bridging the gap between rehabilitation and community-based exercise. *Physical Medicine and Rehabilitation, 4*, 857-861.

Rimmer, J., Braddock, D., & Pitetti, K. H. (1996). Research on physical activity and disability: An emerging national priority. *Medicine and Science in Sports and Exercise, 28* (8), 1366-1372.

Rimmer, J., & Lai, B. (2015). Framing new pathways in transformative exercise for individuals with existing and newly acquired disability. *Disability and Rehabilitation, 21*, 1-8.

Rimmer, J., Riley, B., Wang, E., & Rauworth, A. (2004). Development and validation of AIMFREE: Accessibility Instruments Measuring Fitness and Recreation Environments. *Disability and Rehabilitation, 26*(18), 1087-1095.

Rosenberg, D. E., Huang, D. L., Simonovich, S. D., & Belza, B. (2012). Outdoor built environment barriers and facilitators to activity among midlife and older adults with mobility disabilities. *The Gerontologist, 53*(2), 268-279.

Saebu, M. (2010). Physical disability and physical activity: a review of the literature on correlates and associations. *European Journal of Adapted Physical Activity, 3*, 37-55.

Sallis, J. F., Haskell, W. L., Wood, P. D., Fortmann, S. P., Rogers, T., Blair, S. N., & Paffenbarger, R. S., Jr. (1985). Physical activity assessment methodology in the Five-City Project. *American Journal of Epidemiology, 121*(1), 91-106.

Sallis, J. F., Myron, F. F., Rodriguez, D. A., & Saelens, B. E. (2012). The role of built environmnets in physical activity, obesity, and CVD. *Circulation, 125*(5), 729-737.

Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology-An International Review-Psychologie Appliquee-Revue Internationale, 57*(1), 1-29.

Shea, B. J., Hamel, C., Wells, G. A., Bouter, L. M., Kristjansson, E., Grimshaw, J., . . . Boers, M. (2009). AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *Journal of Clinical Epidemiology, 62*(10), 1013-1020.

Shikako-Thomas, K., Majnemer, A., Law, M., & Lach, L. (2008). Determinants of participation in leisure activities in children and youth with cerebral palsy: Systematic review. *Physical and Occupational Therapy in Pediatrics, 28*(155-169).

Smith, B., & Bundon, A. (2015). Disability models: Explaining and understanding disability sport. In I. Brittain (Ed.), *Palgrave handbook of Paralympic studies*. Basingstoke: Palgrave.

Sparkes, A. C., & Smith, B. (2014). *Qualitative research methods in sport, exercise and health: From process to product*. London: Routledge.

Spence, J. C., & Lee, R. E. (2003). Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise, 4*, 7-24.

Staley, J., & Worsowicz, G. (2005). Survey of physical medicine and rehabilitation resident's awareness of sport and leisure activities for the disabled. *Archives of Physical Medicine and Rehabilitation, 86*(9), e28-e28.

Sweet, S., Martin Ginis, K. A., Estabrooks, P. A., & Latimer-Cheung, A. E. (2014). Operationalizing the RE-AIM framework to evaluate the impact of multi-sector partnerships. *Implementation Science, 9*, 74. doi: 10.1186/1748-5908-9-74

Sweet, S., Martin Ginis, K. A., Latimer-Cheung, A. E., & The SHAPE-SCI Research Group. (2012). Examining physical activity trajectories for people with spinal cord injury. *Health Psychology, 31*, 728-732. doi: 10.1037/a0027795

Thomas, C. (2007). *Sociologies of disability and illness: Contested ideas in disability studies and medical sociology*. Basingstoke: Palgrave Macmillan.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology, 8*, 45. doi: 10.1186/1471-2288-8-45

Tomasone, J. R., Martin Ginis, K. A., Estabrooks, P. A., & Domenicucci, L. (2014). 'Changing Minds': Determining the effectiveness and key ingredients of an educational intervention to enhance health care professionals' intentions to prescribe physical activity to patients with physical disabilities. *Implementation Science, 9*, 30.

Whiteneck, G., Gassaway, J., Dijkers, M., Backus, D., Charlifue, S., Chen, D., . . . Smout, R. (2011). The SCIRehab project: Treatment time spent in SCI rehabilitation: Inpatient treatment time across disciplines in spinal cord injury rehabilitation. *Journal of Spinal Cord Medicine, 34*(2), 133-148.

Williams, T. L., Smith, B., & Papathomas, A. (2014). The barriers, benefits and facilitators of leisure time physical activity among people with spinal cord injury: a meta-synthesis of qualitative findings. *Health Psychology Review, 8*(4), 404-4025. doi: 10.1080/17437199.2014.898406

World Health Organization. (2001). International classification of functioning, disability, and health (ICF). In World Health Organization (Ed.). Geneva.

World Health Organization. (2004). Global strategy on diet, physical activity and health. In World Health Organization (Ed.). Geneva.

Table 1.

Characteristics of Review Articles Included in the Systematic Review

Reference	Populations Addressed: Disability Type	Populations Addressed: Children/ Youth Adults	Review Type	Number of studies included	Quality	Purpose of the Review	Audience*
Bennell et al., 2014	OA	A	Best Clinical Practice	Unspecified		Identify barriers and facilitators to exercise and strategies to maximize adherence.	HCP
Block et al., 2013	General Disability	C/Y	Opinion Piece	Unspecified		The need to remove barriers to participation and increase levels of support.	REC
Deans et al., 2012	Prosthetic Users	C/Y A	Systematic Review	12	5	Describe PA post-amputation and identify barriers and facilitators to participation.	HCP
Fekete & Rauch, 2012	SCI	A	Systematic Review	25	7	Summarize PA correlates and determinants within the ICF framework.	ACA
Jaarsma et al., 2014	General Disability	C/Y A	Systematic Review	52	5	Provide overview of barriers and facilitators of sports participation.	ACA
King et al., 2003	General Disability	C/Y	Unspecified	Unspecified		Create a conceptual model of factors that influence children's participation in recreation and leisure.	ACA HCP REC
Marks & Allegrante, 2005	OA	A	Systematic Review	7	4	Summarize factors related to exercise adherence.	ACA HCP
Martin, 2013	General Disability	C/Y A	Selected Review	Unspecified		Provide overview of selected research within framework of a social relational model.	ACA HCP

Martin Ginis & Hicks, 2007	SCI, MS, OA, Fibro-myalgia	A	Unspecified	Unspecified		Summarize epidemiological data, PA benefits and unique barriers for people with disabilities.	ACA
Menear & Shapiro, 2004	General Disability	C/Y	Unspecified	Unspecified		Provide overview of barriers, determinants, and outcomes of PA, activity patterns.	EDU HCP FAM
Morris et al., 2012	Stroke	A	Systematic Review	19	8	Review psychological and social factors influencing PA; identify health behaviour models used in the literature.	ACA
Morris & Williams, 2009	Stroke	A	Discussion piece	Unspecified		Present a case for role of physiotherapists to support PA participation.	HCP
Mulligan et al., 2012	Neurologic Conditions	A	Systematic Review	28	7	Summarize environmental and personal barriers to PA within the ICF framework.	ACA
Nicholson et al., 2013	Stroke	A	Systematic Review	6	5	Review perceived barriers and motivators to PA.	ACA HCP
Rimmer & Rowland, 2008	General Disability	C/Y A	Unspecified	Unspecified		Provide overview of disparities in PA, review intervention studies, discuss barriers and describe conceptual model for PA promotion.	ACA
Saebu, 2010	General Disability	A	Systematic Review	57	5	Review literature on factors associated with PA within the ICF framework.	ACA
Sahlin & Lexell, 2015	Neurologic Disorders	C/Y A	Systematic Review	10	3	Summarize literature on impact, barriers, and facilitators of sport participation.	ACA
Sharp et al., 2012	General Disability	C/Y	Systematic Review	Unspecified	4	Summarize PA barriers; explore occupational therapist's role in enabling participation.	HCP

Shields et al., 2012	General Disability	C/Y	Systematic Review	14	7	Investigate PA barriers/ facilitators in children.	ACA
Shikako-Thomas et al., 2008	CP	C/Y	Systematic Review	10	3	Describe participation in leisure activities (including PA) and personal and environmental factors that affect participation.	ACA HCP
Stevenson & Roach, 2012	Knee OA	A	Unspecified	Unspecified		Review evidence for PA, lifestyle changes, motivational techniques, and barriers to increasing HCP's patients' PA.	HCP
Williams et al., 2014	SCI	A	Meta-Synthesis	18	6	Synthesize qualitative research on barriers, benefits, and facilitators to PA.	ACA

Note: *Coding for audience reflects whether the article was written for a particular sector or if recommendations were written for a particular sector. HCP= health care providers (primarily physiotherapists and occupational therapists); REC=recreation providers; ACA= academics; EDU = educational sector; FAM=families.

PA= physical activity

CP= cerebral palsy

OA=osteoarthritis

MS=multiple sclerosis

SCI= spinal cord injury

Table 2.

Summary of Themes and Sub-Themes (italicized) of Factors Associated with Physical Activity Among People with Physical Disabilities

INTRAPERSONAL LEVEL
Psychological Factors
Negative Affect and Emotion
Attitudes/Beliefs/Perceived Benefits
Self-Perceptions
Other (e.g., use of behaviour change strategies, travel, personality)
Body Functions and Structures*
Employment Status
INTERPERSONAL LEVEL
Social Support*
*Family Support**
*Friend Support**
*Acquaintances, Peers, Colleagues, Neighbours and Community Members Support**
Attitudes*
*Societal Attitudes**
Social Processes
INSTITUTIONAL LEVEL
Knowledge of Individuals within Institutions/Organizations
Disability-Specific Knowledge Areas
Rehabilitation Processes
Design, Construction and Building Products and Technology of Buildings for Public Use*
Program Factors
COMMUNITY LEVEL
Products and Technology*
*Products and Technology of Land Development**
Products and Technology for Education (Information)*
Products and Technology for Culture, Recreation and Sport (Equipment)*
Climate*
Relationships Among Groups and Organizations
POLICY LEVEL
Health Policies*
Transportation Services, Systems, and Policies*
Architecture and construction policies*
Association and Organizational Policies*
Costs
Need for Training
Other (Restrictive policies and bureaucracy)

Note. *Denotes language and labels borrowed from the ICF

List of Figure Captions

Figure 1. Summary of Results of the Systematic Review, Situated Within a Social Ecological Model