TITLE: Enabling inclusive sport participation: Effects of disability and support needs on constraints to sport participation

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Abstract

Framed by a social approach to disability and leisure constraints theory, this paper presents the results of a national study examining the constraints to sport participation for people with disability. Responses were obtained from a multi-platform questionnaire survey capturing data on constraints to participation, dimensions of disability, and level of support needs. The Exploratory Factor Analysis identified five structural together with intrapersonal and interpersonal constraint factors. While intrapersonal and interpersonal considerations were found to constrain sport participation and nonparticipation, the five structural factors had the most significant constraining impact on sport participation. The findings showed that disability type and level of support needs explain significant variations in constraints to participation and nonparticipation. When the 2-Way MANOVA included type of disability and level of support needs as contingent independent variables, the level of support needs was the most significant indicator of the likelihood of having constraints to participation or nonparticipation.

Enabling Inclusive Sport Participation: Effects of Disability and Support Needs on Constraints to Sport Participation

Article 30 of the United Nations' (2006) *Convention on the Rights of Persons with Disabilities* (CRPWD) states that its signatories "…recognize the right of persons with disabilities to take part on an equal basis with others in cultural life" (defined as participation in recreation, leisure, the arts, sport and tourism). The CRPWD is based on social model conceptualisations of disability now used by more than 160 nations. The CRPWD reinforces disability discrimination policies and legislation that many countries have in place to enshrine the right of citizens to a cultural life. These include, for example, the US's *Americans with Disability Act 1990*, Australia's *Disability Discrimination Act 1992*, and the UK's *Equality Act 2010*.

Despite these enabling policy initiatives, people with disability (PwD) experience significant discrimination, exceptionally lower levels of employment and significantly higher levels of poverty than the general population (World Health Organization & World Bank, 2011). In relation to sport, studies in the U.S., Australia and the UK (e.g., Verdonschot, De Witte, Reichrath, Buntinx, & Curfs, 2009) have found that PwD participate at lower rates than the general population in all forms of cultural life. The low participation rates of PwD are particularly notable in sport activities (e.g., Jong, Vanreusel, & Driel, 2011). When access to sport is constrained, inhibited or denied, PwD are not able to realise the benefits of participation available to other population groups (Driver & Bruns, 1999). PwD's levels of participation in sport are reflective of many considerations, including historical contexts, discrimination issues and legal approaches (DePauw & Gavron, 2005). To create more inclusive practices and counter historical influences, a reformed sporting agenda that moves from focusing on the deficits of individuals towards understanding the complexity of sporting practices through a social model approach to disability has been suggested (Misener & Darcy, 2014).

Understanding how PwD's experiences constrain sport participation is critical in managing support for participation and enabling sport experiences (Sotiriadou & Wicker, 2014).

The literature on disability and sport primarily focuses on human performance (e.g., Burkett, 2010), body technology (e.g., Lutgendorf, Mason, van der Woude, & Goosey-Tolfrey, 2009), psychological motives (e.g., Lundberg, Groff, & Zabriskie, 2010), rehabilitation (e.g., van Langeveld et al., 2011), quality of life/well-being (e.g., Vanner, Block, Christodoulou, Horowitz, & Krupp, 2008), and more recently has included performance technology in sport (e.g., Burkett, 2010). The focus of this paper is to understand conceptually how constraints affect PwD in sport, as this is still an emerging area of research (Sotiriadou & Wicker, 2014). Studies adopting social model approaches to disability and sport have provided evidence of the disabling barriers that affect participation across different disability types (e.g., Devas, 2003; Tregaskis, 2003). A critical outcome of these studies informs us that we must focus on addressing an individual's specific access needs. In this vein, a greater understanding of the constraints experienced by PwD could inform policy and practice to support participation in sport.

The World Health Organization's (WHO, 2001) International Classification of Functioning (ICF), records categories for disability type, level of disability and activity limitations. Disability is measured by body function and structure (e.g., loss of limb), and the level of limitation is termed as none, mild, moderate, severe or profound. Many national-level surveys (e.g., ABS, 2012) include this measure as an important variable for understanding sport participation. In both medical and social model conceptualisations, activity limitations have been classified by the level of support a person requires to participate from independent, low, medium, high and very high (e.g., Robertson & Emerson, 2010). The ABS (2010; 2012) identifies that PwD participate at lower levels in sport and participation rates vary by disability type and level of support needs.

Purpose of Study and Research Questions

Building on prior research, we investigate the influence of disability type and level of support needs on the constraints faced by PwD in Australia. There is very little discussion in the literature explicating how PwD's involvement in sport is affected by varying types of disability and/or support needs. Drawing on leisure constraints theory and the social model of disability we explored two research questions concerning the constraints experienced by PwD in sport:

RQ1. Are there differences in the magnitude and category of constraints encountered based on disability type?

RQ2. Are there differences in the magnitude and category of constraints encountered based on level of support needs (none, low, medium, high and very high)?

To locate the study within a wider societal milieu, we now discuss conceptualisations of disability and research on leisure and sport constraints in the context of disability.

Changing Approaches to Conceptualising Disability

Frameworks developed to better understand human experience from a social model perspective have relocated disability from biomedical dysfunction (personal tragedy) to a social relationship shaped by the privileging of normalcy and processes of exclusion across social, political and cultural relationships (Oliver, 1990; Barnes et al., 2010). However, it has been argued that there is a distinct lack of engagement with social model understandings of disability in leisure studies (Aitchison, 2003; 2009) or in sport management research (Misener & Darcy 2014). In focusing on disabling environments, social model theorists argue that the barriers PwD encounter in their day-to-day lives affect their social participation.

Central to social model approaches are notions that disabling environments and social attitudes are socially imposed in addition to an individual's impairment (Oliver, 1990; Barnes

Mercer & Shakespeare, 2010). Social model approaches to disability emphasise the ways in which organisations, structures, processes and practices might provide the access and support required to enable participation by PwD in social, political and cultural life. In the same way the feminist movement focused on the 'glass ceiling', social approaches to disability centre on the lived experience of PwD, the constraints they encounter and ways to transform PwD's experiences of exclusion by creating enabling environments, attitudes and practices (Oliver, 1990). More recent contributions recognise that removing constraints to inclusion does not automatically create a level playing field. Led by feminist disability theorists, there has been discussion regarding the importance of considering each PwD's individual experience and 'impairment effects' (Thomas, 2004). For example, people with similar disabilities (e.g., multiple sclerosis) may have very different individual impairments effects that result in different levels of abilities, fatigue, temperature control and vision; all of which require different levels and types of support. The social model of disability provides a conceptually relevant approach through which to explore leisure constraints to sport participation for PwD.

Leisure, Sport and Constraints

In an extensive body of research spanning 40 years, leisure constraints theorising has investigated the nature of constraints to participation and reasons for nonparticipation. Leisure constraints can be defined as "factors that limit the formation of leisure preferences or inhibit participation" (Jackson, 1991, p. 279). In their seminal work, Crawford and Godbey (1987) identified three categories of leisure constraints: intrapersonal, interpersonal and structural. Approaches to studying leisure constraints have evolved through consideration of the hierarchical nature and the negotiation of constraints (e.g., Crawford, Jackson, & Godbey, 1991; Jackson, Godbey, & Crawford, 1993). Leisure constraints theory has been used to examine participation in: sport generally (e.g., Alexandris & Carroll, 1997; 1999); specific

sport activities (e.g., Alexandris, Kouthouris, Funk, & Chatzigianni, 2008; Lamont, Kennelly, & Wilson, 2012); sport consumption (e.g., Kim & Trail, 2010;); specific population groups (e.g., Casper, Bocarro, Kanters, & Floyd, 2011; Stodolska & Shinew, 2010); and strength-based approaches to developing inclusive approaches and enabling outcomes (Damali & McGuire, 2013). In an early study of constraints to sport participation, Alexandris and Carroll (1997) developed a Leisure Constraints Questionnaire based on Crawford et al.'s (1991) hierarchical model of leisure constraints. They reported seven constraint factors: time; facilities/services; accessibility/financial; lack of partners; lack of knowledge; individual psychological; and lack of interest (Alexandris & Carroll, 1997a). In examining sport participation and constraints, it is evident that the identification of constraints has occurred for different leisure and sport activities (e.g., Alexandris et al., 2008; Andronikidis, Vassiliadis, Priporas, & Kamenidou, 2007; Lamont et al., 2012), geographic contexts (Greece, USA, Canada, Germany and Australia), and constraint negotiation (e.g., Lyu, Oh, & Lee, 2013).

Constraints research and disability

The literature on leisure constraints is extensive and this section limits its review to leisure constraints related to sport, disability and support needs. Research exploring the leisure and sport experiences of PwD has examined: gendered constraints in leisure (Henderson, Bedini, Hecht, & Schuler, 1995); negotiation of constraints amongst people with physical disabilities in rehabilitation (Lyu, Oh, & Lee, 2013); natural area visitation and perceived constraints to outdoor recreation (Burns & Graefe, 2007); perceived constraints and benefits of fishing (Freudenberg & Arlinghaus, 2010); constraints facing elite athletes with disabilities (Crawford & Stodolska, 2008); differences in constraints between low and high serious leisure categorisations in adapted sport (Heo, Lee, Lundberg, McCormick, & Chun, 2008); and sport

participation of older Australians identifying as having a disability (Sotiriadou & Wicker, 2014). Table 1 presents a summary of the literature, which we discuss briefly below, with respect to disability related constraints studies and their relative contribution to the area.

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Insert Table 1

Henderson et al., (1995) used an interpretive paradigm to explore constraints to leisure participation encountered by women with physical and sensory disabilities. The study found that women with disability faced a 'magnification' of constraints within the gender/disability intersection, which was subsequently described as the 'double whammy' in a follow-up study (Henderson & Bedini, 1997). Women noted that their major constraints to participation were energy deficiency, time shrinkage, lack of opportunity and choices, dependency, and issues of physical and psychological safety. Henderson and Bedini concluded that leisure choices were modified by disability that constrained and influenced their choices.

Crawford and Stodolska (2008) interviewed Kenyan Paralympic Team athletes with disability and sport administrators about participation constraints. Seven major constraint themes emerged: lack of financial resources; negative attitudes toward PwD; coaching; equipment; facilities; transportation; and perception of ethnic favouritism during selection. The authors concluded that in addition to factors captured in the hierarchical model of constraints, Kenya's social context for PwD was a major constraining factor for Paralympic sport participation. In a study of a broader group of PwD, Heo et al. (2008) examined leisure constraints as one set of influencing factors that determined high and low serious leisure participation in adapted sport. The findings suggested that self-determination and the impact of structural constraints were the major reasons for low participation levels, as opposed to high levels, of serious leisure engagement.

Burns and Graefe (2007) conducted a secondary analysis of data from the general

population using a disability variable and phase two general population surveys with a disability module. They found that despite PwD sharing the same interest in visiting natural areas they did so 50% less frequently than people without disabilities. Freudenberg and Arlinghaus (2010) also use comparative samples of people with and without disability in a study examining angling clubs in Germany. They identified four constraint domains: intrapersonal; access; fish catch; and interpersonal factors. Both of these studies found that participants with disabilities had higher constraint scores on all domains than the general population.

Lyu, Oh and Lee (2013) focused on constraint negotiation and extraversion. They found a negative association between the level of constraints experienced and the constraint negotiation process where PwD made use of different constraints negotiation processes to participate in leisure. The results did not report on between group differences of those with mobility, visual or auditory disabilities. Finally, Sotiriadou and Wicker (2014) tested sport participation and socio-demographic variables as proxy measures of constraint factors. While disability was a significant constraint in some models, the degree to which a person was restricted had a negative effect on sport participation in all models. They acknowledged that their secondary dataset limitations meant that how the sport participation of PwD is affected by constraints was not fully explained.

As Table 1 presents, the proposed research undertook an inclusive approach to disability types within a single study using a leisure constraints framework viewed through the lens of the social model of disability within the research design (Barnes & Mercer, 1997; Barnes, 2008). Our study was designed to gather empirical evidence to determine the range of factors that are antecedent to nonparticipation for PwD for a better understanding of the effects of disability types and levels of support needs. This is important to address issues of inclusion and participation in sport from the social model perspective (Misener & Darcy, 2014). To this

end, the social model conceptualisation of disability and leisure constraints provides an appropriate framework for developing an understanding of the constraints faced by PwD in sporting contexts.

Method

Participants and Procedure

An electronic snowballing technique was used to contact potential participants (Veal & Darcy, 2014), a technique successfully used in previous studies of PwD (Darcy, 2010; Darcy & Ely, 2014). Using a database of over 100 disability organisations PwD from across Australia were contacted from June 2009 through to June 2010. A research information notice was circulated electronically with a link to the online questionnaire, which offered appropriate accessibility features used in previous studies (Darcy, 2010). The organisations then communicated the notice to members by direct e-mail, electronic or hard-copy newsletters, or via a website notice.

Table 2 provides an extensive summary of the socio-demographic profile of our sample. A total of 1046 questionnaires were returned; 53% were completed by PwD, and attendants or family/friends filled out the remainder on behalf of a PwD. The option of having a third party complete the questionnaire was recommended by the piloting group and disability organisations with which we consulted. Due to the use of a snowball sampling method we are not able to provide a response rate. A series of *t*-tests were conducted to test for differences between the responses of PwD (group one), and carers, attendants, family/friends (group two). We found significant differences in responses between PwD and carers/attendants on half of the constraint factors. However, while this could be regarded as a limitation of this study, the data indicated that carers/attendants responded predominantly (66%) for people with an intellectual disability with high (70%) or very high (74%) support

needs, this is a sub-population of PwD that could not self-complete.

The responses indicated that PwD engaged in 125 different sporting activities, with 50% participating in organised sport, 32% in unorganised and 18% in partially organised sport. The organised activities were accessed through community sport organisations and disability sport organisations, as well as through disability service providers (e.g., ParaQuad; Cerebral Palsy Alliance; Vision Australia), which acted as a supplier or broker for sport activities. Activities included segregated disability-specific sport (e.g., wheelchair basketball); integrated sport activity (e.g., tenpin bowling); and mainstream sport, where PwD participate with nondisabled persons (e.g., sailing).

Insert Table 2

Instrument

The leisure constraints framework and social model theory guided the survey instrument design. The instrument was developed using items from previous research on participation in sport, constraints and/or disability. Additionally, item design was informed by the disability sport expertise of the research team and the partner organisation. The questionnaire comprised three sections: constraints to participation; disability and level of support needs; and demographic/psychographic profile.

Constraints. We developed the constraint items by examining previous studies investigating leisure constraints and PwD (see Table 1). The constraint conceptualisations were grounded in PwD's lived experiences in line with social model considerations. The development of items was also informed by a study that included gender and cultural items and adopted a six-point scale used for that study of 1 (*never*) to 6 (*always*) (Arab-Moghaddam, Henderson, & Sheikholeslami, 2007). Using the aforementioned studies as the starting point, the research team collaborated with the partner organisation to develop a

comprehensive exploratory scale measuring constraints experienced by PwD in sport. The initial battery of questions contained 49-items. The constraint items were introduced using the question, “How frequently do the constraints in the following list affect your participation?” The 49-items included in the total scale sought to measure: 1. Community/organisational support (structural); 2. Time (structural); 3. Equipment (structural); 4. Economic (structural); 5. Intrapersonal; 6. Interpersonal; and 7. Transport/location (structural). While Time and Economic factors are similar to previous constraint studies and do not require further explanation, we defined the factors interpreted through a social model of disability lens, next.

The *Community/organisational support* factor included items measuring structural constraints to participation. This included macro policy such as support from government programs, meso-level program inclusion and availability, and direct need for attendants to support participation and programs to train staff at sport organisations.

Equipment (structural) was measured by items examining the accessibility to and availability of adaptive equipment, and the need for this equipment by PwD. For example, the equipment may be integrated into existing fitness centre and training facilities (e.g., weight machines for wheelchair users) or be specialist equipment required for participation in disability-specific sport (e.g., tandem cycles for vision-impaired athletes).

The *Intrapersonal* factor was captured by items related to an intrinsic interest in sport. The other items identified in this factor are shaped by PwD’s perceptions of the environment and disability considerations. For example, for some types of disability (e.g., autistic spectrum) 'overcrowding' is a sensory overload, which is an intrapersonal constraint. Similarly, some PwD's life experience of isolation leads to intrapersonal constraints to public participation due to perceptions of fear, lack of safety and violence (see Clement, Brohan, Sayce, Pool, & Thornicroft, 2011).

Interpersonal factor items such as 'lack of companions' are significant constraints for some PwD, who find the social nature of sporting activities problematic, as they do not have others with whom they can share their experiences (Robertson & Emerson, 2010). From a social model perspective, this factor overlaps with the community/organisation factor, as some PwD require assistance to participate in solitary sport activities. For example, for some quadriplegics even something as simple as using an exercise hand cycle may require an attendant to attach their hands to the handles via Velcro (as they have no grip).

The *Transport*/*location* (structural) factor contains items involving general and disability-specific access-transport requirements and geographic location to activities or facilities. The combination of items in this component measures the effect of geographic proximity to facilities, private vehicle access, and public transport as constraints to disability sport opportunities.

Dimension of disability and level of support needs. Disability type and level of support needs items were used as measures of individual difference to assess the complexity and heterogeneity of disability. The disability question read, "What do you regard as your main disability or dimension of access?", and the categories used built upon previous work (Darcy, 2010) that identified nine disability types involving mobility (5), vision, hearing, cognitive and mental health. We asked participants to indicate their main disability in the first instance. Then, for participants identifying as having multiple disabilities, we included a multi-response checklist to capture all dimensions of access. A PwD's social participation is also affected by core activity limitations and/or the level of support the PwD requires (WHO, 2001). This premise has been operationalised by the ABS (2009) and recognised as a part of social model conceptualisations through the CRPWD. To assess this aspect, participants were asked: "How would you describe your level of support needs in everyday living?" This was measured on a continuum from: *no support; low; medium; high; to very high support needs.*

Participation and demographics. Sport participation items were drawn from the Australian Exercise, Recreation and Sport Survey (ASC and State and Territory Department of Sport and Recreation, 2001–2011), a nationally administered instrument validated by over a decade of implementation. Participation was measured by questions about the PwD's participation in any sport over the preceding 12 months, the activities in which they participated (up to five activities), whether the activity was organised/informal, the frequency of participation, and the duration of participation. The socio-demographic items included: age, gender, education qualification, employment status, geographic location, Australian or overseas born, Indigeniety, and languages spoken at home.

Pilot. The research team liaised with disability sport organisations, disability service organisations and national sport organisations to pilot the initial questionnaire with a sample of PwD (N = 40). The purpose of the pilot was to test the questionnaire for layout, accessibility on different computer platforms, wording and completion time. Feedback from the participants led to some changes to the instrument, including redesign of the online questionnaire (i.e., creation of more pages to reduce the amount of scrolling required), and additional options added to some closed-ended questions. After piloting, the questionnaire was structured in nine different formats to reach the broadest possible cross-section of the disability community:

1. Online questionnaire compliant with W3C accessibility
2. Hard copy (those without internet access);
3. Large print (those with a visual impairment);
4. Easy text (people who are blind/vision who use screen readers);
5. Braille (for blind participants);
6. Easy English (people with intellectual disability and attendant assisted completion);
7. Online questionnaire with embedded Auslan video clips (for deaf/hearing impaired);
8. Phone-assisted completion (those with issues completing the survey online); and
9. Online questionnaire designed for participants with mental-health considerations.

Results

Exploratory Factor Analysis

The analysis was carried out using the Statistical Package for the Social Sciences (SPSS) version 21. First, we conducted an Exploratory Factor Analysis (EFA) to assess the structure of the 49-item scale. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .95) exceeded the recommended value of .60 (Kaiser 1970, 1974) and Bartlett's Test of Sphericity was statistically significant ($p < .01$; Bartlett 1954), which supported the factorability of the items shown in Table 3. We examined the structure of the constraints scale using an EFA with Maximum Likelihood Estimation and orthogonal rotation (Direct Oblimin). An orthogonal rotation was selected as the constraint factors are theoretically related (Field, 2009). We adopted an exploratory factoring procedure, as the items tested in this research were derived from established instruments that had not been tested together or in relation to PwD. The initial model containing 49-items displayed a series of issues due to items loading on multiple factors; items on loading on factors to which they did not theoretically relate; or items not loading onto any factor at all. We examined the item structure through interpretation of item communalities and the pattern matrix to assure that each indicator loaded onto one factor only (simple structure). In addition, following Tabachnick and Fidell (2012), only items with factor loadings exceeding .32 were retained. We deleted items individually to ascertain the effect removing each had on the overall model.

The final configuration of items initially loaded onto six constraint factors (with the default SPSS setting configured to display factors with Eigenvalues > 1). However, the scree plot indicated a seventh factor, which had an Eigenvalue less than one. Therefore, we made a theoretical decision to retain the seventh factor, which provided simple structure for all items (i.e., no split loadings > .30). In total, we removed 14 items from the exploratory scale, based on the criteria outlined above. The final model included 35 items, which measured seven

factors: Community/organisational support (10-items); 2. Time (5-items); 3. Equipment (3-items); 4. Economic (3-items); 5. Intrapersonal (7-items); 6. Interpersonal (3-items); and 7. Transport/location (4-items). The items measuring gender and family were removed from the model due to problematic split-loadings, and weak communalities to the overall constraint scale. Table 3 presents descriptive statistics and factor loadings for the final list of items. Table 4 displays the factor reliability coefficients and the factor correlation matrix.

Insert Table 3

Insert Table 4

MANOVA

Second, we created composite mean scores for each constraint dimension, which were included as dependent test variables in a 2-way factorial Multiple Analysis of Variance (MANOVA). We conducted an omnibus test with two contingent independent variables to determine the influence of disability type, level of support needs, and the interaction of disability type and level of support needs on the seven dependent constraint dimensions (Hair, Black, Babin, & Anderson, 2010). The multivariate tests in the two-way factorial MANOVA were interpreted using Pillai's Trace, as it provides the most rigorous method to test for main effects when group sizes are unequal, thus reducing the chances of making a Type I error (Tabachnik & Fiddell, 2007).

Prior to conducting the MANOVA, we assessed the homogeneity of variance-covariance matrices using Box's *M* test. Box's $M = 1497.36$, $F_{(840, 33871)}$, $p < .001$, violated the homogeneity of variance-covariance assumption. Tabachnik & Fidell (2012) note the sensitivity of Box's *M* test, especially in cases involving independent variables with multiple levels (i.e., Disability type = 9, & Level of support needs = 5). To caution against making a Type I error following the violation of Box's *M* test, we adopted a conservative Alpha (α)

level of .01 for main effects and post-hoc tests. In addition, we report Levene's Test for the Equality of Error Variances to underpin our use of a Scheffe (equal variances assumed) or Tamhane post-hoc adjustment (equal variances not assumed). We selected the Scheffe and Tamhane as very conservative post-hoc tests of between-group differences with equal or unequal error variances (Hair et al., 2010).

Initially, we examined the interaction effect for disability type and level of support on the seven constraint dimensions. The interaction between the two independent variables was insignificant (Pillai's V = .243, $F_{(217, 6804)}$ = 1.09, p = .161, η_p^2 = .035), confirming that the interpretation of the main effects for disability type and level of support needs was appropriate (Hair et al., 2010). It also confirmed that the interaction of disability type and level of support needs did not contingently explain significant variation in the constraint dimensions tested. There was a significant main effect for disability type: Pillai's V = .461, $F_{(56, 6804)}$ = 8.561, p < .001, η_p^2 = .066; and level of support needs: Pillai's V = .188, $F_{(28, 3876)}$ = 6.830, p < .001, η_p^2 = .047. Tables 5 and 6 display mean comparisons for each level of the independent variables and the seven constraint dimensions.

Insert Table 5

Insert Table 6

Community/organisational support. There was no effect for disability type and community/organisational support $F_{(8, 972)}$, p = .097, η_p^2 = .014. However, there was a strong effect for level of support needs on the community/organisational support ($F_{(4, 972)}$ = 49.709, p < .001, η_p^2 = .131). Levene's Test showed equality of error variances for level of support needs groups $F_{(43, 972)}$ = 1.129, p = .265. The Scheffe post-hoc test revealed that very high and high levels of support needs group reported higher scores for the community/organisational

support than all other groups.

Time. There were significant effects for disability type ($F_{(8, 972)} = 2.291$, $p < .001$, $\eta_p^2 = .052$), but not level of support needs for the time constraint dimension ($F_{(4, 972)} = 0.756$, $p = .548$, $\eta_p^2 = 0.03$). Error variances for the time dimension were unequal $F_{(43, 972)} = 1.831$, $p = .001$. The Tamhane post-hoc test revealed that people with hearing impairments reported the highest levels of time constraint. However, overall, no group reported a mean score for the time constraint, which exceeded the mid-point of the scale, illustrating that time was not a major constraint to the majority of participants.

Equipment. There were significant effects for disability type, $F_{(8, 972)} = 22.893$, $p < .001$, $\eta_p^2 = .159$) and level of support needs ($F_{(4, 972)} = 26.395$, $p < .001$, $\eta_p^2 = .098$) for the equipment constraint dimension. As error variances were unequal, $F_{(43, 972)} = 2.160$, $p < .001$, we interpreted the Tamhane post-hoc test. Power and manual wheelchair users reported significantly higher scores for the equipment dimension than all other disability groups, with the exception of the other mobility aids group. There were no differences between power and manual wheelchair users. Participants with very high and high support needs reported higher mean scores for the equipment constraint dimension than all other groups.

Economic. Disability type did not display a significant effect on the economic constraint dimension, $F_{(4, 972)} = 1.919$, $p = .054$, $\eta_p^2 = .016$. Level of support needs, however, did display a significant effect on the economic constraint dimension $F_{(4, 972)} = 10.616$, $p < .001$, $\eta_p^2 = .042$. Error variances were unequal, $F_{(43, 972)} = 1.518$, $p = .019$, so we interpreted the Tamhane post-hoc test. The very high and high levels of support needs groups reported significantly higher levels of economic constraints than the low and very low groups. Overall, participants with higher level support needs reported that economic constraints were more salient.

Intrapersonal. Disability type did not significantly influence the intrapersonal

constraint dimension $F_{(4, 972)} = 2.321$, $p = 0.18$, $\eta_p^2 = .019$. Level of support needs, on the other hand, did display a significant effect, $F_{(4, 972)} = 16.766$, $p < .001$, $\eta_p^2 = .065$. Levene's test indicated unequal error variances for the intrapersonal dimension ($F_{(43, 972)} = 1.851$, $p = .001$). The Tamhane post-hoc test showed that the very high and high support needs groups reported significantly higher intrapersonal constraints than the medium, low and no support needs groups. However, none of the disability type or support needs group categories reported agreement with the intrapersonal constraint dimension (i.e., the mean score for all groups was < 3).

Interpersonal. There was no effect for disability type and the interpersonal constraint dimension, $F_{(4, 972)} = 2.464$, $p = .020$, $\eta_p^2 = .020$. There was a significant effect for level of support needs, however, $F_{(4, 972)} = 11.143$, $p < .001$, $\eta_p^2 = .044$. Levene's test indicated equality of error variances for the interpersonal constraint dimension, $F_{(43, 972)} = 1.130$, $p = .264$). The Scheffe post-hoc test revealed that interpersonal constraints increased as level of support needs went up. The very high, high and medium support needs groups did not differ significantly from one another, but reported significantly higher scores for the interpersonal constraint dimension than the low and no support needs groups.

Transport/location. There were significant effects for disability type, $F_{(8, 972)} = 7.917$, $p < .001$, $\eta_p^2 = .061$) and level of support needs for transport constraints, $F_{(4, 972)} = 22.960$, $p < .001$, $\eta_p^2 = .086$). Levene's test indicated equality of error variances ($F_{(8, 1007)} = 1.858$, $p = .063$). The Scheffe post-hoc analysis revealed that power wheelchair users, and participants with a visual impairment reported the highest mean scores for transport constraints. Power wheelchair users reported significantly higher levels of transport constraints than the physical – not affecting mobility, hearing impairment and intellectual disability groups. The visual impairment group reported significantly higher transport constraints than the physical – not affecting mobility and hearing impairment groups. The post-hoc tests for level of support

needs indicated that participants with higher levels of support needs experienced greater transport constraints. Scores for the very high support needs group were significantly higher than the medium, low and no support needs. Transport and location constraints became a significant barrier to participation for PwD as level of support needs increased.

Discussion

This study has extended previous knowledge of PwD and sport through an application of leisure constraints and social model conceptualisations of disability to enhance understanding of factors that constrain participation. There are four areas in which the present study contributes to existing literature. First, we have provided a national dataset on the constraints faced by PwD in sport across nine disability types and five levels of support needs. Second, we have presented evidence of five structural, together with intrapersonal and interpersonal constraints factors faced by PwD. Third, we have examined the influence of disability type and level of support needs on different constraint components. Fourth, we have offered an interpretation of constraints to sport participation through applying an understanding of the social model of disability to bring together the two bodies of knowledge to create a more thorough understanding of the sports constraints facing PwD. We discuss each of these contributions in relation to the literature previously presented.

This research extends the work of Sotiriadou and Wicker's (2014) in three ways. First, we specifically targeted people who identified as having a disability, which led to the recruitment of a younger group of PwD than studied in previous work. Second, while Sotiriadou and Wicker used demographic variables as proxy measures of constraints, we developed existing scales to elicit seven dimensions of constraints experienced by PwD. This allowed us to capture a more diverse array of constraints that affect PwD participation in sport. Third, complementing Sotiriadou and Wicker, we provided insight into how PwD's

levels of support need influences participation in sport. Our use of a social model conceptualisation (Oliver, 1990; Barnes et al., 2010) led us to focus on required support, instead of participant's 'restrictions' (Sotiriadou & Wicker, 2014).

The type and extent of structural constraints is far more diverse for PwD than presented in previous research on sport constraints or disability-specific leisure/sport constraint studies (Burns & Graefe, 2007; Freudenberg & Arlinghaus, 2010; Henderson & Bedini, 1997; Henderson et al., 1995; Heo et al., 2008; Sotiriadou & Wicker, 2014). Seven constraint factors influenced PwD's participation in sport, based on a person's disability type and/or level of support needs (community/organisational support; time; equipment; economic; intrapersonal; interpersonal; and transport). This extends Alexandris and Carroll's (1997) work, which found three significant structural constraints (facilities, accessibility/financial and time). Additionally, our results complement Crawford and Stodolska's (2008) qualitative study of elite Paralympic athletes, which found three of the seven emerging themes to be structural: lack of funding, problems with facilities and transportation (regarded as one theme), and lack of equipment.

As the mean scores for all groups were below the midpoint of our scale ($M < 3.00$), we do not discuss time or intrapersonal constraints further. Henderson et al. (1995) discussed the effect of time shrinkage in prior work; however, across all groups, time did not act as a salient constraint based on disability type or level of support needs. Furthermore, in previous studies intrapersonal constraints were a key inhibiting factor (e.g., Freudenberg & Arlinghaus, 2010; Heo et al., 2008), while other studies have suggested that a person's disability itself is an intrapersonal constraint (Freudenberg and Arlinghaus, 2010; Sotiriadou & Wicker, 2014). In our study the item 'poor health' was not identified by PwD and did not load on any of the components. Our findings did not support this previous work, which warrants additional testing in future work.

We did find theoretical support for social model conceptualisations of the separation of a person's impairment and their socially constructed disability (Barnes et al., 2010). This finding is also confirming of feminist disability theorists regarding the importance of 'impairment effects' (Thomas, 2004) where individuals may have characteristics that need to be considered by service providers (e.g., impairment related fatigue in Loucks-Atkinson & Mannell, 2007). We will now concentrate on discussing group differences based on disability type and level of support needs for community/organisational support, equipment, economic, interpersonal, and transport constraints, for which we found the strongest evidence.

Community/organisational support constraints increased commensurately with a person's level of support needs. Furthermore, this constraint component displayed the strongest effect size based on a person's level of support requirements in everyday life. From a social model perspective, this suggests that a multitude of inclusive practices benefit PwD's participation in sport. The items measuring community/organisational support were wide ranging; from inclusive activity programming considerations, the need for wider government support, information provision, operational issues of assessing PWD's needs, the need for support to participate, and the lack of trained staff to support participation. By measuring specific structural constraints, we were able to extend Sotiriadou and Wicker's (2014) study, which only included education and working hours as proxy measures of structural constraints.

The social model perspective suggests the community/organisational component needs to be considered in conjunction with the interpersonal factor as both overlap. For instance, PwD without social networks would be still able to participate in sport if they have access to attendants or if the sport organisation employs inclusive practices by training staff to support PwD in mainstream or disability specific sports. This interrelationship is theoretically consistent with enabling social participation in activities that has traditionally

been regarded as an interpersonal constraint rather than structural.

Consistent with mainstream sport constraints research (Alexandris & Carroll, 1997) interpersonal constraints influenced the participation of PwD. This included a lack of companions or friends to participate with, not wanting to participate alone, and fear of public participation (e.g., Henderson et. al, 1995; Burns and Graefe, 2007; Crawford & Stodolska, 2008; Freudenberg & Arlinghaus, 2010). We found that interpersonal constraints increased alongside PwD's level of support needs for medium, high and very high PwD whereas Sotiriadou and Wicker (2014) noted a negative effect of restrictions on their models. Our more contextually specific interpersonal component extends Sotiriadou and Wicker's (2014) study that included relationship status and children living at home as the two item proxy construct. In our study, the effect sizes for interpersonal constraints in relation to the level of support needs were relatively weak. As such, further research is required to test the accuracy of our finding.

This research has added to the literature by establishing quantitatively that disability type has an effect on the constraints of equipment, economic and transport constraints. Other disability studies had noted that PwD experienced problems with limited availability of equipment and transport (Crawford & Stodolska, 2008; Freudenberg & Arlinghaus, 2010). Our findings extend this work in two ways. First, PwD using power or manual wheelchairs experienced higher levels of equipment constraints than all other disability groups. Possessing suitable equipment such as sport chair/aids for participation in activities was crucial. Second, transport constraints presented a more significant challenge to power wheelchair users and people with vision impairment when travelling to participate in sport and physical activity. This suggests that further research regarding the effects of these constraints is required.

Like previous sport studies (e.g., Alexandris & Carroll, 1997; 1999) economic constraints were identified as an inhibiting factor because PwD cannot afford to participate in sport. In these studies the economic item was linked to access from a geographic perspective. With regards to disability constraint studies, while not analysing their items from a component perspective Burns and Graefe (2007) noted that PwD had a higher constraint score than the general population for affordability to visit parks for outdoor recreation, and Freudenberg and Arlinghaus (2010) noted that PwD could not afford to fish more as part of their access component. Crawford and Stodolska (2008) found that limited financial resources, together with availability of equipment and facilities were inhibiting factors to participating as Paralympic athletes. Our study extends the previous work by identifying that a lack of money generally, and income and pricing of sporting opportunities are also constraints to an individual's participation. This was particularly so for people with higher support needs. We suggest that the economic component is compounded by those affected by the equipment component discussed previously. For those PwD in sports requiring adaptive equipment this is a significant issue. The economic component also pervades other areas of PwD's life with respect to cost of transport and cost of community support mechanisms.

A person's level of support needs explained the variability in a broader range of constraints than disability type. It appears that as support needs increase, the nature and scope of the constraints PwD encounter diversify and compound, making participation more challenging. However, PwD do not inherently regard their impairment as an intrapersonal constraint. Instead, they seek enabling policy, sport or attendant support in a sporting environment to participate. This challenges the findings of previous studies that identified a person's disability as a constraint (e.g., Sotiriadou & Wicker, 2014). Such work does not include an understanding of social model conceptualisations (Oliver, 1990; Barnes et al., 2010) or 'impairment effects' as a separate mitigating factor (Thomas, 2004; Aitchison, 2004;

2009). It also, ignores that one disability type might involve completely different levels of support needs between individuals (e.g., low to very high Cerebral Palsy).

‘Impairment effects' are not uniform across disability types or level of support needs for any of the constraint factors. From a sport perspective, this suggests that to enable participation for PwD, each individual’s disability type and support needs require unique consideration. It is necessary to go beyond classifying people's disability and support needs to effectively manage sport participation. For example, power wheelchair users with high support needs include people with different impairments (e.g., quadriplegia, cerebral palsy and multiple sclerosis). Each case has different structural constraint considerations (e.g., transport and specialist equipment). Hence, actions need to be contextualised for the individual's combination of 'impairment effects' so they can be better accommodated within the sport environment and supports previous feminist qualitative inquiry (Henderson & Bedini, 1997; Henderson et al., 1995).

If sport providers acknowledge and address constraining structural and interpersonal practices, they may be able to develop more meaningful inclusive practices for PwD (Darcy et al., 2011). Sport practices may be constructed in a way that considers the constraint factors for participants, the sport organisation and the wider macro social policy to support PwD. A better understanding of how these constraint factors socially construct the sport environment for PwD may then lead to transformative solutions that improve participation at the community level to enhance sport development pathways in mainstream and disability sport (Misener & Darcy, 2014).

Limitations

We acknowledge five main limitations. First, the convenience-sample established through electronic snowballing method provided an efficient means of contacting PwD; however,

there were associated limitations. The sample comprised participants that had access to the internet, and/or were members of disability-related organisations who regularly accessed the organisational website or its electronic or hard-copy publications. The limitation is a difficult one to overcome as there is no census list of PwD and locating individuals outside of formal organisations or social media channels is ad hoc at best.

Second, some aspects of the structure of the scale tested also represent a limitation of the study. The final model required the deletion of multiple items, which split-loaded onto multiple factors. Retaining split-loading items represented significant challenges conceptually given the between-subjects analysis, which we conducted during the MANOVA testing. As such, split-loading items were removed. This limited the study because removing these items reduced the diversity of constraints that were covered. Future research may develop a scale that accurately measures a broader range of the constraints faced by PwD. While in this study the item 'poor health' did not load on any of the components to a high enough level, future work could investigate impairment specific constraints scales incorporating medicalised effects (e.g., Loucks-Atkinson and Mannell, 2006).

Third, we captured a generic measure of level of support needs but we did not gather more detailed information on whether PwD required physical, emotional or other support for their day-to-day lives. The latter is a limitation of this study and should be considered in future attempts to model the constraints faced by PwD. Fourth, we could have examined the effects, if any, of a person identifying as having multiple disabilities, whether the disability was congenital or traumatically acquired alongside other socio-demographic variables.

Fifth, constraint scale can be further refined, particularly around gender, culture and family. These sociocultural considerations were originally included in a relatively weakly loading component but were considered theoretically important. While these considerations may theoretically explain constraints facing PwD and those from different cultural

backgrounds (Arab-Moghaddam, Henderson, & Sheikholeslami, 2007); in multicultural countries like Australia, the relative poor loading of these items suggests that the items are not fully capturing this constraint factor and that further scale development is warranted.

Future Research and Implications

The limitations discussed above provide ample considerations for future research design. More specifically, this research provides a basis to develop a better understanding of the constraints to sport participation for PwD and presents findings that could be used to improve inclusive organisational practices. The results highlight the need for a more considered conceptualisation of the intrapersonal component across their interpersonal relationships and structural constraints present in sport organisations, sport policy provisions and macro-level policy considerations. The leisure constraints framework of intrapersonal, interpersonal and structural constraints was a useful theoretical framework to approach the examination of perceived individual constraints to sport participation. The underpinning social model conceptualisation provides direction for a more enabling constraints framework (Damali & McGuire, 2013). The individuals responding to this study did not have “poor health”, they wanted to participate in sport but were constrained by mainly structural factors that can be addressed by sport organisations and social policy to facilitate participation.

This study has reinforced previous empirical research, which found that lower participation levels of PwD in sport can be attributed to a series of constraints. There is no simple formula for assessing the 'impairment effect’ of disability type and support needs on constraint components. Managers need to consider the implications of a matrix of disability type and support needs across their operations. While this prospect may seem daunting, enabling environments for access needs are well documented and could start by addressing the set of core inclusions for mobility, vision, hearing and intellectual disabilities that are

entrenched within built environment legislation (see Australian Sports Commission and Sport England). Where these basic infrastructure provisions are present, sports organisations need to understand what the individual's support needs are from a member or customer-service perspective. This requires an organisational commitment, training, and marketing strategies to engage and attract PwD, as has been undertaken with other marginalised groups (Stodolska & Shinew, 2010). This study has also led to a major government publication by (Darcy et al., 2011), together with Internet-based resources developed by the agency that outlines the practical implications for inclusive practice in public policy and for sports organisations. Finally, this study employed an inclusive methodology of nine accessible formats for the survey, which was able to reach multiple disability types in the one study. While this required significant commitment to the costs associated with developing and implementing the survey instrument the added value was significant and we would encourage other researchers working in this area to likewise make this worthwhile investment.

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Table 1: Major studies on disability constraints related to leisure/sport

Author	Year	Method Sample	Population	Constraints	Major findings related to this paper
Henderson, Bedini, Hecht, & Schuler,	1995	Interviews * 2 30 WomenWD	• Physical • Sensory	Thematic constraints identified • Energy • Time shrinkage • lack of opportunity • dependency • physical safety • psychological safety	• Focus was on overall themes • women as women first • disability as a modifying element to a varying degree with each individual
Crawford and Stodolska (2008)	2008	Interviews 5 AthletesWD 5 officials	• Physical (amputee & polio)	Constraints mostly structural with interpersonal • negative attitudes • Coaching issues • limited availability of equipment • problems with facilities • problems with transportation • ethnic favouritism • lack of financial resources	• Focus was on overall themes not disability specific and the sample group were relatively homo-genius with physical involving amputees and people with polio
Heo et al.	2008	Hardcopy survey 76 PwD	• Spinal cord injury • developmental disability • orthopaedic related impairment	• Serious leisure • Self-determination • 21 item leisure constraint scale (Ray Moore, Godbey, Crawford & van Eye, 1993) covering intrapersonal, interpersonal and structural	• Study reported negative correlation between serious leisure and the intrapersonal and structural constraint dimensions • structural constraints were dominant in discrimination
Burns and Graefe	2007	2 Household survey 1989 Gen POP (336 PWD) 710 Gen POP (130) PWD	• whether a person had a disability	• 17 item leisure constraint scale • study did not report intrapersonal, interpersonal and structural dimensions	• PWD had same interest in visiting natural areas that did so 50% less frequently than those without disability • PWD had higher constraint scores on all items
Freudenberg and Arlinghaus	2010	Member survey 775 members with 347 PwD	• Whether a member had a disability	• 28 item leisure constraint scale • Intrapersonal • Access (structural) • Fish catch (structural) • Interpersonal	• People with disability exhibited higher mean constraints on 14 of the 28 items • anglers with disability affected by Fish catch (structural) and access (structural), followed by a interpersonal and intrapersonal. • disability type and constraints were not presented as part of the findings
Lyu, Oh and Lee	2013	Survey rehab centres 341 PwD	• Mobility • Vision • Auditory	• 14 item leisure constraint scale • Focus on constraint negotiation processes • Extraversion as a mediating influence on constraint negotiation	• negative association between constraints and negotiation to where the level of the of negotiation efforts exerted by Pwd decreases as the degree to which they perceive constraints increases • findings did not report on between group differences

Sotiriadou and Wicker	2014	cross-sectional population secondary data 4342 PwD	Older Australians • Mobility • vision • hearing • other + Restrictions • 3 Levels	• 9 socio demographic variables from secondary data • Intrapersonal (disability type, restriction, age, gender and Indigeneity) • interpersonal (relationship status, children living at home) • structural (education, working hours)	• socio demographic variables used as indicators of constraint categories • intrapersonal • structural • regression models suggested that disability was a constraint in some models • regression models suggested "restriction" was a constraint in all models
Our study	2011	1043	Disability 9 Types • Mobility - Power wheelchair • Mobility - Manual wheelchair • Mobility - Other mobility aids • Mobility - No aid required • Physical - not affecting mobility • Blind or vision • Deaf or hearing • Intellectual/ cognitive/ learning • Mental health • Other + Support needs - 5 levels • none/independent • low • moderate • high • very high	• 49 item constraint scale with 35 items loaded on seven components • 7 constraint components	• MANOVA undertaken for disability type (nine) and level of support needs (five)

Table 2
Socio-demographic characteristics by a mean of constraints

Category	*M (SD)*	*n*	*%*
Participate in Sport and Active Recreation			
No	2.85 (0.96)	139	13.7
Yes	2.29 (0.81)	877	86.3
Gender			
Male	2.37 (0.84)	588	57.9
Female	2.36 (0.87)	428	42.1
Age			
0-19 years	2.34 (0.83)	323	31.8
20-29 years	2.33 (0.89)	224	20.0
30-39 years	2.46 (0.77)	150	14.8
40-49 years	2.42 (0.87)	169	16.7
50-59 years	2.46 (0.94)	105	10.3
60+ years	2.15 (0.82)	26	5.5
Australian/overseas born			
Overseas	2.38 (0.81)	124	11.5
Australia	2.37 (0.86)	947	88.5
Aboriginal or Torres Strait Islander			
No	2.36 (0.82)	979	96.4
Yes	2.70 (0.83)	37	3.6
Main disability			
Mobility - Power wheelchair	2.78 (0.91)	70	6.9
Mobility - Manual wheelchair	2.48 (0.85)	157	15.5
Mobility - Other mobility aids	2.33 (0.81)	62	6.1
Mobility - No aid required	2.41 (0.77)	79	7.8
Physical - not affecting mobility	2.00 (0.81)	72	7.1
Blind or vision	2.34 (0.69)	88	8.7
Deaf or hearing	2.13 (0.92)	104	10.2
Intellectual/ cognitive/ learning	2.40 (0.86)	360	35.4
Mental health	2.26 (0.57)	24	2.4
Multiple disability			
No	2.20 (0.79)	674	66.3
Yes	2.70 (0.87)	342	33.7
Congenital or traumatically acquired			
Congenital	2.35 (0.84)	677	66.6
Acquired condition	2.40 (0.87)	339	33.4
Support needs			
None	2.06 (0.81)	237	23.3
Low	2.19 (0.75)	294	28.9
Medium	2.47 (0.78)	277	27.3
High	2.75 (0.88)	147	14.5
Very high	3.03 (0.95)	61	6.0

Note - Education and Lifestyle Status not reported due to space limitations

Table 3
Factor Loadings and Descriptive statistics for Constraints to Participation

Dimension	Item	*M*	*SD*	Skewness	Kurtosis	λ
Community/	Lack of trained staff to support my participation	3.03	1.72	0.32	-1.18	0.77
Organisation	No assessment of pwd's needs	2.87	1.69	0.40	-1.14	0.69
	Sport and recreation staff don't include pwd	2.75	1.64	0.52	-0.93	0.68
	No integrated sport and recreation programs available	3.00	1.72	0.34	-1.20	0.65
	No support to participate	2.83	1.68	0.47	-1.04	0.56
	Only segregated sport and recreation programs available	2.69	1.70	0.59	-0.96	0.49
	Lack of awareness of the benefits of sport and recreation for pwd	2.75	1.71	0.52	-1.05	0.48
	Lack of government support	3.35	1.77	0.11	-1.30	0.45
	Restrictions for pwd in public	2.33	1.48	0.95	-0.07	0.38
	Lack of information	2.70	1.51	0.58	-0.64	0.38
Time	Too many responsibilities	1.95	1.25	1.36	1.18	0.81
	Too many domestic duties to do	2.07	1.31	1.15	0.52	0.78
	Lack of time	2.41	1.30	0.75	-0.09	0.75
	Work commitments	2.07	1.31	1.09	0.30	0.69
	Family responsibilities	2.28	1.41	0.91	-0.07	0.53
Equipment	Scarce access to adaptable equipment	2.42	1.60	0.81	-0.63	-0.85
	No adaptable equipment to use	2.32	1.55	0.89	-0.45	-0.8
	Adaptable equipment is too expensive	2.71	1.83	0.60	-1.12	-0.78
Economic	Lack of money	2.97	1.66	0.41	-1.01	-0.88
	Lack of personal income	2.87	1.71	0.48	-1.06	-0.81
	Pricing	3.04	1.59	0.31	-0.96	-0.61
Intrapersonal	Not accustomed to sport and recreation	1.85	1.26	1.54	1.70	-0.67
	Lack of interest in group activities	2.02	1.32	1.26	0.77	-0.62
	Fear of public participation	1.91	1.32	1.42	1.13	-0.56

	Sport and recreation not important to me	1.62	1.12	2.04	3.89	-0.54
	Overcrowding	2.10	1.29	1.06	0.39	-0.45
	Lack of safety	1.90	1.20	1.40	1.40	-0.38
	Fear of violence	1.63	1.14	2.08	3.97	-0.36
Transport	Opportunities too far from home	2.69	1.50	0.49	-0.82	-0.66
	No access to facilities close to home/ work	2.74	1.59	0.48	-0.95	-0.63
	Lack of accessible public transport	2.49	1.72	0.74	-0.87	-0.54
	Lack of private transportation	2.30	1.62	0.97	-0.40	-0.51
Interpersonal	Lack of companions	2.64	1.54	0.64	-0.66	-0.93
	No friends to participate with	2.91	1.64	0.42	-1.03	-0.7
	Not wishing to participate alone	2.39	1.47	0.87	-0.22	-0.64

Table 4
Factor Correlation Matrix

Factor	Community	Time	Equipment	Economic	Intrapersonal	Transport	Interpersonal	*M*	SD	α
Community	1.00							2.83	1.27	0.92
Time	0.07	1.00						2.16	1.02	0.84
Equipment	-0.54	-0.18	1.00					2.49	1.51	0.87
Economic	-0.34	-0.27	0.39	1.00				2.96	1.51	0.90
Intrapersonal	-0.34	-0.23	0.32	0.25	1.00			1.86	0.84	0.81
Transport	-0.43	-0.21	0.51	0.41	0.27	1.00		2.64	1.31	0.80
Interpersonal	-0.56	-0.21	0.39	0.38	0.55	0.47	1.00	2.65	1.36	0.84

Table 5
Main effects for Main disability (IV) and constraint dimension (DV)

	PW	MW	OMA	MNAR	Physical	Vision	Hearing	Intellectual	MH		
Constraint	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*p*	η_p^2
Community/ Organisation	3.29 (1.25)	2.82 (1.25)	2.57 (1.17)	2.78 (1.22)	2.33 (1.24)	2.58 (1.15)	2.60 (1.32)	3.08 (1.28)	2.08 (0.87)	.097	.014
Time	2.21 (0.97)	2.35 (1.00)	2.16 (1.04)	2.41 (1.08)	2.00 (0.95)	2.12 (0.91)	2.61 (1.23)	1.88 (0.89)	2.54 (1.30)	<.001	.052
Equipment	3.64 (1.60)	3.38 (1.55)	2.70 (1.48)	2.51 (1.47)	1.81 (1.18)	2.45 (1.28)	1.83 (1.27)	2.23 (1.40)	1.43 (0.79)	<.001	.159
Economic	3.45 (1.64)	2.95 (1.45)	2.97 (1.48)	3.24 (1.41)	2.80 (1.63)	2.80 (1.35)	2.64 (1.56)	2.95 (1.52)	3.32 (1.62)	.054	.016
Intrapersonal	2.03 (0.81)	1.73 (0.83)	1.73 (0.76)	1.87 (0.83)	1.58 (0.68)	1.66 (0.67)	1.67 (0.80)	2.04 (0.89)	2.27 (0.88)	.018	.019
Interpersonal	2.80 (1.41)	2.46 (1.38)	2.27 (1.22)	2.66 (1.34)	2.18 (1.18)	2.67 (1.27)	2.26 (1.24)	2.94 (1.38)	3.07 (1.41)	.012	.020
Transport	3.35 (1.40)	2.71 (1.26)	2.88 (1.32)	2.37 (1.10)	2.11 (1.34)	3.17 (1.32)	2.08 (1.26)	2.65 (1.26)	2.11 (0.90)	< .001	.061
	(*n* = 82)	(*n* = 164)	(*n* = 63)	(*n* = 83)	(*n* = 79)	(*n* = 95)	(*n* = 118)	(*n* = 404)	(*n* = 34)		

PW = Power Wheelchair, MW = Manual Wheelchair, OMA = Other mobility aid, MNAR = Mobility, No aid required, Physical = Physical - not affecting mobility, Vision = Blind, or vision impaired, Hearing = Deaf, or hearing impaired, Intellectual = Intellectual/ cognitive/ learning, MH = Mental Health

Table 6

Descriptive statistics for constraint dimensions by level of support needs

	Level of support needs						
	None	Low	Medium	High	Very high		
Constraint dimension	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	*p*	η_p^2
Community/organisation	2.17 (1.09)	2.60 (1.16)	3.06 (1.19)	3.48 (1.22)	3.89 (1.23)	<.001	.131
Time	2.37 (1.08)	2.14 (1.13)	2.08 (0.98)	2.04 (0.94)	2.00 (1.03)	.548	.003
Equipment	2.07 (1.40)	2.24 (1.34)	2.50 (1.45)	3.08 (1.64)	3.77 (1.62)	<.001	.098
Economic	2.66 (1.49)	2.73 (1.36)	3.07 (1.52)	3.37 (1.56)	3.72 (1.65)	<.001	.042
Intrapersonal	1.59 (0.76)	1.71 (0.75)	1.94 (0.79)	2.25 (0.90)	2.39 (0.99)	<.001	.065
Interpersonal	2.26 (1.32)	2.41 (1.24)	2.83 (1.29)	3.14 (1.43)	3.31 (1.45)	<.001	.044
Transport	2.08 (1.19)	2.50 (1.20)	2.81 (1.31)	3.11 (1.29)	3.56 (1.30)	<.001	.086