Examining the participation patterns of an ageing population with disabilities in Australia

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Authors' Notes

All ERASS data is the intellectual property of the Australian Sport's Commission (ASC) and the State/Territory Departments of Sport and Recreation.

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Abstract

Social policies facilitate equity of access for participation in physical activity by all groups of people in society. While the sport participation of able-bodied people has been widely examined, much less attention has been given to the participation of people with disabilities. The purpose of this study is to investigate the patterns of participation in physical activity of people with disabilities. Based on the leisure constraint theory, a theoretical framework is developed that describes participation as a function of intrapersonal, interpersonal, and structural constraints. The framework is tested using a comprehensive sample of people in Australia from 2009 and 2010. From the dataset a sub-sample of people with disabilities was identified ($n=4,342$). As 78.1% of participants were aged 45 years and older, the sample represents an ageing population and a selected segment of the population of people with disabilities. Therefore, generalisations to disability sport need to be made with caution. The results show that 57% of the respondents participate in physical activity for an average of four hours per week. The regression results indicate that the type of disability, the extent to which the person is restricted by the disability, age, gender, and education have a significant effect on participation. People with high workloads who are in a relationship participate less frequently. The cluster analysis resulted in two non-participant clusters and three participant clusters. The results inform policy makers and sport managers on ways to better support the participation of people with disabilities and specifically target their needs.

Keywords: Sport participation; disability; market segmentation; social policy; leisure constraint theory

1. Introduction

The term ‘social policy’ refers to the actions adopted by governments, non-governmental organisations, and businesses to remedy or avert social problems and make society better (Hall & Midgley, 2004). Such policies affect leisure and sport participation behaviours globally (Dawson, 2010; Richmond, 2004). In light of their significance, the World Leisure Organization (2008) calls for governments throughout the world to implement social policies in order to optimise leisure opportunities for their citizens. Typically, people with disabilities have been excluded from mainstream sport practices (Abells, Burbidge, & Minners, 2008). The introduction of specific policy initiatives has helped the legitimate integration and inclusion of people with disabilities into sport wherever this can be accommodated (DePauw & Doll-Tepper, 2000; Harada & Siperstein, 2009).

In Australia, it was not until the 1980s that such policy changes occurred and legislation (Australian Government, 2011a, 2011b) resulted in the promotion of the inclusion of people with disabilities in all forms of social life, including sport. More recently, an inquiry into Australia’s sport policy (the Crawford report) questioned the adequacy of sport development opportunities for people with disabilities and created a climate which was conducive to the funding and facilitation of sport development practices for them (Crawford, 2009). In response to the Crawford report, the Australian Government’s outline of its new sport policy direction, *Australian Sport: The Pathway to Success*, calls for an increase in the number of all Australians participating in sport and active recreation regardless of age, gender, and ability through an integrated, whole-of-sport approach (Commonwealth of Australia, 2010). The Australian Sports Commission (ASC), the federal government agency responsible for sport in Australia, argued that in building better communities, it is critical that Australia increases “community participation and social inclusion by minimising the disadvantages and constraints that have an impact on the participation of many marginalised

groups, such as people with disability” (Commonwealth of Australia, 2010, p. viii). These aspirations are further outlined in the government’s National Disability Strategy 2010–2020 (Commonwealth of Australia, 2011).

Research on marginalised groups, including those living with a disability, continues to exclude people with a disability from decision-making in the research endeavour (Dupuis et al., 2012). If social policies aim to improve living conditions, enhance society and prevent social injustice, a commitment to providing inclusive sport participation policies for people with disabilities is an obvious corollary. Therefore, it is important to guide future policy initiatives and to know more about the participation patterns of people with disabilities. Yet, previous research has mainly looked at the participation patterns of able-bodied people (for an overview see Downward & Rasciute, 2010) and at barriers to the participation of people with disabilities (for an overview see Smith, Austin, Kennedy, Lee, & Hutchison, 2005), but not at their actual participation patterns.

The purpose of this study is to fill this gap in the literature and examine the participation patterns of people with disabilities. This study advances the following three research questions: 1) what are the participation patterns of people with disabilities? 2) What factors constrain participation in physical activity by people with disabilities? And 3) what groups can participants and non-participants with disabilities be classified into? The research context for this study is Australia where 18.5% of the population (four million people) have a disability (Queensland Government, 2012) and where “the participation rates of people with disability are significantly lower than that of the general population” (ASC, 2011, p. 4). The leisure constraint theory is used to explain and classify constraints on the participation of people with disabilities. The research questions are analysed using a sub-sample of people with disabilities stemming from a comprehensive survey dataset ($n=4,342$). The findings should be used by policy makers and sport managers to better support participation of people

with disabilities. This study contributes to the body of research on sport participation by examining one specific population group, people with disabilities, which has been largely neglected in previous research.

2. Literature review

Constraints on sport participation are important and on-going considerations for sport organisations and other providers of sport and leisure related opportunities (Hinch & Jackson, 2000). Constraints which restrict or inhibit the formation of sport participation activities or preferences affect people's choices and decisions (Jackson, 1991). A constraint has been defined as a "subset of reasons for not engaging in a particular behaviour" (Jackson, 1988, p. 69). Such reasons may affect some groups of people more than others, and may be overcome (Kennedy, Smith, & Austin, 1991). Some, but not all, constraints are permanent (Crawford, Jackson, & Godbey, 1991). This study uses the word *constraint* since not all constraints under investigation are permanent conditions. Previous research can be summarised into studies looking at (1) the constraints on the participation of the general population, (2) the constraints of people with disabilities, and (3) specific constraints of people with disabilities in an Australian context.

First, prior studies have examined constraints on the participation of the general population and identified issues such as lack of time, disposable income, ability, gender, awareness and opportunity, access, and programming (e.g., Shaw, Bonen, & McCabe, 1991). Constraints have also been examined in view of the needs of specific groups of people. It was shown that different groups face different constraints. For example women are constrained by negative experiences at school and the dominance of males; youth are often averse to highly structured or competitive activities; and older people are constrained by unclear guidance and a shortage of role models (Allender, Cowburn, & Foster, 2006). Finally, previous research has demonstrated that a person's health status has a positive influence on their sport

participation in general (Downward, 2007; Downward & Rasciute, 2010) and frequency of participation (Downward & Riordan, 2007). If one assumes that people with disabilities rate their health status lower than able-bodied people, these findings suggest that their participation rates will also tend to be lower.

Second, previous research indicated that the difficulties faced by marginalised groups such as women and ethnic minorities are similar to those that people with disabilities encounter (DePauw & Gavron, 1995). Previous research has shown that on average people with a disability participate 15% less than the general population (Australian Bureau of Statistics [ABS], 2009). Similar patterns of restricted access and opportunity are evident among people with disabilities, but in a magnified form. Henderson, Bedini, Hecht, and Schuler (1995), for instance, focused on participation constraints of women with disabilities. Apart from their disability, women faced constraints relating to parenthood, work, or unemployment. A survey of young people with a disability for Sport England found that the respondents were far less likely to take part in extracurricular or out-of-school sport activities (Finch, 2001). A follow-up survey showed that females with a disability participated substantially less than males with a disability (Gatward & Burrell, 2002). Moreover, sport participation rates were found to decrease with increasing age. It was also reported that people with a disability faced a number of additional barriers to participation in sport because they are more dependent on others (Gatward & Burrell, 2002).

Third, international studies on participation constraints for people with disabilities are highly relevant in the Australian context. An inquiry into the factors that influence the participation and non-participation of people with a disability in Australia identified the constraints that people with a disability encounter (ASC, 2011). Based on a sample of 1,050 completed responses by participants across all Australian states and territories the findings demonstrated that education qualification, type of disability, and employment status were

strong indicators of participation levels. The three most common activities included recreational swimming, gymnasium workouts, and walking (ASC, 2011). More recently, Darcy and Dowse (2013) examined the experiences of people with an intellectual disability in a sporting context. In a comprehensive list of constraints, age, affordability, ability levels, having young children living at home, and relationships or friendships were identified as key constraints of sport participation.

The review of the literature reveals that several studies have looked at the participation in sport and physical activity of people with disabilities. However, some shortcomings can be observed in previous research. First, many studies were largely atheoretical (i.e., the choice of explanatory factors or possible constraints was not based on theory). Therefore, the contribution to the body of research is limited. Second, it stands out that most studies used only descriptive statistics in the presentation of results, which is probably due to the fact that they are conducted for sport organisations like Sport England (e.g., Finch, 2001) or governments (e.g., ASC, 2011). While percentages and mean values may be informative, they do not allow for the generalisation of findings. Also, overlapping effects cannot be identified (e.g., age may not be so important anymore when controlling for education). Third, previous research has looked at the participation of specific groups of people (e.g., young people and adults, males and females), but no previous study has grouped several characteristics together to identify groups of participants that share similar characteristics. This study addresses these shortcomings.

3. Theoretical framework

3.1 Leisure constraints theory

People should have the freedom to participate in sport and leisure activities, but there may be factors that impinge upon their desire to participate (Raymore, 2002). The existence of constraints to participation in sport for people with disabilities means that a leisure

constraints theory approach is appropriate in this study (Crawford & Godbey, 1987). This theory has received widespread theoretical and empirical attention over the past 30 years. It has been applied to a range of leisure, sport, or recreational contexts such as travel and tourism (Wilson & Little, 2005), event travel career (Lamont, Kennelly, & Wilson, 2012), sport tourism (Hinch, Jackson, Hudson, & Walker, 2005), and recreational sport participation (Alexandris & Stodolska, 2004). Also, studies have illustrated the impact that constraints may have on subgroups, such as on adult women (e.g., Little, 2002) or on young women (e.g., Carr, 2000). While advances have been made in leisure constraints research and despite the potential usefulness of applying leisure constraints theory to examine people with disabilities, such studies are limited (i.e., Darcy & Dowse, 2013; Freudenberg & Arlinghaus, 2010). This study applies and further advances the use of the leisure constraint theory in the context of the participation of people with disabilities.

The main idea of this theory is that different types of constraints interact in a quasi-hierarchical manner to influence participation in leisure activities (Crawford et al., 1991; Hinch et al., 2005). According to this theory, constraints can be categorised into three areas: intrapersonal, interpersonal, and structural. Crawford et al. (1991) suggest that intrapersonal constraints are encountered first and foremost. Therefore, if intrapersonal constraints are successfully overcome, interpersonal and then structural constraints follow and only when all three clusters of constraints are dealt with is participation ensured. In this study, it is assumed that participation in physical activity by people with disabilities is influenced by intrapersonal constraints (type of disability, extent of restriction, age, gender, origin), interpersonal constraints (relationship, children), and structural constraints (education, work hours).

3.2 Intrapersonal constraints

Intrapersonal constraints (personal/psychological) are defined as individual psychological states and attributes which interact with leisure preferences (Crawford &

Godbey, 1987; Crawford et al., 1991). Intrapersonal constraints exist when individuals fail to develop leisure preferences due to their abilities, personal needs, prior socialisation, and perceived reference group attitudes. Intrapersonal constraints predispose people to define sport activities or services as appropriate or inappropriate, interesting or uninteresting, or available or not available to them (Scott, 1991). These definitions also suggest that intrapersonal constraints are highly resistant to change because they are inherent in a person. In this study, it is suggested that the type of disability, the extent to which the person is restricted by the disability, as well as their age, gender, and origin represent intrapersonal constraints to participation in physical activity.

The first intrapersonal constraint is the type of disability. Since a person's leisure preferences and activities are determined in part by their abilities (Scott, 1991), having a disability, and the type of disability, can be assumed to have an influence on a person's participation in physical activity. This assumption is supported by previous research indicating that people with a disability have lower participation rates than the general population in all forms of cultural life, especially sport (Cozzillio & Hayman, 2005). Participation rates were found to vary depending on the type of disability (ABS, 2009; ASC, 2011). For example, it was shown that people with an intellectual disability have a significantly lower participation rate than people with psychological, physical or sight-hearing-speech related disabilities. More specifically, the participation rate of people with an intellectual disability was 40% lower (ABS, 2009) and people with an intellectual disability were also found to take part less frequently than people with other disabilities (Darcy & Dowse, 2013). Therefore, it is suggested that the type of disability influences participation in physical activities.

The second intrapersonal constraint is the extent to which a person's disability has an impact on their capacity to participate in physical activity. For example, Thomas (2004)

argues that the experiences of a person with vision impairment are qualitatively different from those of someone with autism. Also, different types of disability have different effects, because the extent to which people are restricted by their disability can depend on physical and psychological factors. This means that some people with a disability experience physical constraints due to their impairments, while others may also experience psychological constraints because they need assistance (Smith et al., 2005).

The third intrapersonal constraint is age. Similar to able-bodied people, the physical capacities of people with a disability decrease as they age. Consequently, it has been found that sport participation rates for the general population decrease from a certain age onwards (Wicker, Hallmann, & Breuer, 2013). Similarly, sport participation rates among adults with a disability decrease with increasing age (Gatward & Burell, 2002). However, sport-specific differences can be observed since the declines in participation rates vary for different sports. For example, participation by people with disabilities in cue sports fell from 26% for 16–19 year olds to 5% for 45–59 year olds, whereas participation in swimming only decreased from 21% among the youngest group to 10% for the oldest age group (45–59 years; Gatward & Burell, 2002). Therefore, it is suggested in this study that age has a negative effect on participation in physical activity.

Gender represents the fourth intrapersonal constraint. Previous research has documented that – similar to able-bodied people (Wicker, Breuer, & Pawlowski, 2009) – females with a disability are less likely to participate in physical activity (e.g., ABS, 2009; ASC, 2011). In Australia, participation rates of females with disabilities were found to be lower than for their male counterparts (51% vs. 55%; ABS, 2009). In the UK, the difference in participation rates was greater with 56% of males and 47% of females participating in at least one activity in the four weeks before the interview (Gatward & Burrell, 2002).

Therefore, it is assumed in this study that males are more likely to participate in physical activity.

The last intrapersonal constraint is a person's origin which gives an indication of the culture people grew up with and the associated social values. The value of sport and the appreciation and importance of being physically active may vary between cultures and people of different origins (Amara & Henry, 2010; Maxwell & Taylor, 2010). Previous research on able-bodied people documented lower participation rates for people with a migration background (e.g., Wicker et al., 2013). Similarly, adults with disabilities who described themselves as white were more likely to have participated in sport than those in any other ethnic group. Nearly 40% of white adults with disabilities had participated in at least one sport in the four weeks before the interview compared with 32% of black adults. The participation rate was lowest for adults who described themselves as Indian (23%) or Pakistani and Bangladeshi (22%; Gatward & Burrell, 2002). Thus, it is suggested that participation patterns vary depending on a person's origin.

3.3 Interpersonal constraints

Interpersonal constraints (social/relating to others) are those that arise out of social interaction with friends, family, staff and others. For instance, a lack of social interaction skills is an interpersonal constraint. In a family context, interpersonal constraints may occur when spouses differ in terms of their leisure preferences (Hinch et al., 2005). These differences may impact both spouses' leisure preferences and sport participation (Crawford & Godbey, 1987). This study looks at two interpersonal constraints. These are being in a relationship and having children at home.

Having a partner may influence people's participation in physical activity. Yet, the nature of the effect is not clear. If the partner supports a person's participation in physical activity, or if the two work out together, this factor would be a facilitator rather than a

constraint. Yet, previous research shows that having a partner may be a constraint for people with disabilities. When asked for constraints to participation, adults with disabilities have stated that some of them would have nobody to participate with them, that they had family responsibilities which distracted them from participation, or that their family would not be keen for them participate in a sport (Gatward & Burrell, 2002). Therefore, it is assumed that being in a relationship represents a constraint to participation in this study.

The second interpersonal constraint is having children, which typically affects women to a greater extent than men. Research on able-bodied people indicates that people who spent a lot of time looking after children were less likely to participate in sport (Ruseski, Humphreys, Hallmann, & Breuer, 2011; Wicker et al., 2012). This effect is likely to be more pronounced when the children still live at home. Also, an inequitable division of parental responsibilities could strain spousal relationships, particularly when one parent is left to care for children (Lamont et al., 2012). Similar findings have been reported for people with disabilities. Henderson et al. (1995) found that most women with physical disabilities who were wives and mothers saw their family obligations as having the highest priority. When they had extra energy they wanted to spend it with their children (Henderson et al., 1995). Thus, it is suggested that having children at home has a negative impact on participation.

3.4 Structural constraints

Structural constraints (societal/institutional) are those that intervene between preferences and participation, but they also affect preferences in several significant ways (Hinch et al., 2005). Structural constraints between individual preferences and participation can include lack of time, the costs associated with participating, inadequate facilities or programmes, limited ability, and lack of transportation (Crawford & Godbey, 1987).

Structural constraints are circumstances that can be changed through external intervention.

This study focuses on the structural constraints of education and working time.

A person's educational level can represent a structural constraint. Previous research has shown that people with higher education are more likely to participate in sport (e.g., Wicker et al., 2009), probably because they have learned more sports and consumption skills during a longer education period or they are more aware of the positive health effects of physical activity (Downward & Rasciute, 2010; Wicker et al., 2013). Similarly, professionals with a disability were almost twice as likely as unskilled manual and skilled manual workers to participate in sport (Gatward & Burrell, 2002). These findings suggest education has a positive effect on participation in physical activity among people with a disability.

The second structural constraint is an individual's working time. The underlying assumption is that people who work many hours per week have less time for sport. This assumption is supported by research showing that time is the most frequently stated constraint to participation (Alexandris & Carroll, 1997). However, analytical studies fail to provide evidence of a significant negative time effect. A study on able-bodied people found that working hours negatively influence sport participation, although the effect was not significant (Ruseski et al., 2011). Other studies have found a positive effect for sport participation in general and a negative effect for club participation, suggesting that time constraints are associated with the type of sport organisation (Wicker et al., 2009; Wicker et al., 2013). Previous research on people with disabilities has not considered this constraint and therefore assumptions are difficult to make, particularly given the inconsistent findings in the above studies.

4. Method

4.1 Data source

The participation patterns of people with disabilities in Australia are examined using data from the Exercise, Recreation and Sport Survey (ERASS). The ERASS is a joint initiative of the ASC and the state and territory government agencies responsible for sport and recreation. Within this set of surveys, a sample of Australians is asked about their participation in physical activity every year. This data has been collected since 2001 to give information about participation patterns and trends in Australia (Committee of Australian Sport and Recreation Officials [CASRO], 2001). However, the yearly surveys do not have a panel character and therefore, no intra-individual developments can be analysed (like in longitudinal/panel data). The ERASS data have some limitations because the wording of the question about sport participation in the survey has changed over the years which can lead to biased estimates for participation trends. Nevertheless, the ERASS data has been used in previous research to examine sport participation in the context of major sport events (Veal, Toohey, & Frawley, 2012). Nevertheless the data consists of comprehensive yearly samples that contain useful information.

In 2009 and 2010, specific questions about disability were asked. Since the wording of the sport participation question was identical in these two years, the present study uses a sub-sample of the ERASS data for 2009 and 2010. The overall samples are random samples that are stratified by state and territory and people are interviewed using Newspoll's Computer-Assisted Telephone Interviewing (CATI) system (last birthday method). In 2009, $n=21,031$ persons aged 15 years and older were interviewed (response rate: 25.2%); in 2010, the final sample was $n=21,603$ (response rate: 23.1%).

In 2009 and 2010, people were asked whether they have a disability or a physical condition that restricts life. If so, respondents had to state whether the condition lasted for six

months or more (CASRO, 2009, 2010). If it did, then it was classified as a chronic disease or disability, a definition that has already been used in previous research (e.g., Breuer & Wicker, 2011; Finch, 2001). Also, it was shown that chronic disease or illness is correlated with disability. In a UK study, 94% of people with a limited longstanding illness reported having a disability (Gatward & Burrell, 2002). Thus, it is difficult to disentangle disability and impairments such as long-term diseases. Importantly, the term *impairment* is part of a definition of disability provided by Thomas (2003, p. 106) who states that a disability is “an impairment owned by an individual, resulting in a loss or limitation of function”. While this is one possible definition, it must be stressed that the definition of disability always depends on the time and culture in which the term is used and that it is therefore difficult to achieve consistency. Accordingly, *disability sport* comprises several facets reaching from the grassroots level to elite sport with tendencies of moving away from specific organisations to mainstream (Thomas, 2003).

Altogether in the 2009 and 2010 ERASS, $n=4,342$ respondents reported a physical disability and this was the sub-sample for this analysis. Before analysing the data, the representativeness of the sample was ensured. Since some population groups are under- or overrepresented in the sample, the data are weighted by state, region, age, and gender. The weights were calculated based on population projections by the ABS based on the 2006 Census for persons in occupied private dwellings (CASRO, 2009, 2010). Weighting the data made the sample representative and thus improved the external validity of the findings.

4.2 Questionnaire and variables

An overview of the variables used in this study is provided in Table 1. In the ERASS and in the current study, any physical activity is defined as:

...physical activity for exercise, recreation or sport. It includes those activities that were organised by a club, association or other type of organisation, and those activities that were non-organised. It excludes those activities that were part of household or garden duties, or were part of work (CASRO, 2010, p. 1).

This study does not include activities such as playing computer games, going out for a meal, playing musical instruments, or watching TV, that have been the focus in previous leisure and recreation (rather than sport related) studies (e.g., Aitchison, 2003). In the survey, people were asked whether they had participated in any physical activities for exercise, recreation or sport during the last 12 months. If so, they were asked about the type of activities, the organisation where the activity took place, the type activity, and the number and duration of sessions. Based on these questions several participation measures were calculated. Weekly participation (i.e., at least once per week) can be considered the most common measure in previous research (e.g., Wicker et al., 2009; Wicker et al., 2013) and is therefore also applied in this study (variable: participation). If people participated at least once per week in physical activity, the frequency and duration of participation per week was also measured. Since the respondents were asked about the type of activity, the top five activities for participants could be calculated. These are walking, swimming, gymnasium workouts, aerobics/callisthenics/exercising/physiotherapy, and cycling.

With regard to intrapersonal constraints, respondents were asked whether they had a disability or physical condition that restricted their life. If they did, they were asked whether their condition was related to sight, hearing, or mobility. All other disabilities (e.g., upper limb amputees, learning or cognitive disabilities, emotional or behavioural disabilities, brain disability) were captured in the category *other disability*. Thus, disability in the context of this study may occur in various ways, including but not restricted to injury, ageing, or heredity. Unlike previous research, this study did not *target* a particular sub-group of people with disabilities (e.g., intellectual disability, vision impairment, transplant-related disability). Central to differentiating between people with disabilities is the notion that people with an early-onset disability *age with disability*, whereas those with mid- or late-life onsets have

disability with ageing (Verbrugge & Yang, 2002). Moreover, the extent to which the respondent is restricted by the condition was assessed. The respondent was asked for his/her age, gender, and origin in the survey. The age variable was recoded into six age groups that allowed a more detailed examination of age effects since relationships may be more complex than linear (age) or quadratic (age squared).

Two interpersonal constraints were assessed. The variable *relationship* was calculated based on the marital status reported by the respondents. The categories *married* and *de facto* were recoded into 1 (yes) and the categories *separated*, *divorced*, *widowed*, and *never married* into 0 (no). Respondents were asked a yes/no question about whether they had children at home. Regarding structural constraints, people were also asked to state their highest level of education. The categories *certificate/trade qualification* and *undergraduate diploma* were combined into one category because they both represent qualifications that can be attained outside of the *normal* education stream (high school and university). The information on the number of weekly work hours was asked using an open question (Table 1). For all variables, answers in the categories *refused* or *do not know* were set to missing values.

It must be noted that income is usually a predictor of participation and thus can also be a constraint to participation (e.g., Downward, 2007; Wicker et al., 2009); however, an income variable was not included in the dataset for these two years. Although a socio-economic index is available in the overall dataset, all values were missing for the 2009 and 2010 surveys. Since previous research shows that income is positively correlated with education and had to be excluded from statistical models due to multicollinearity issues (e.g., Wicker et al., 2013), the unavailability of this variable should not be an issue.

Table 1

Overview of variables

Variable	Description	Scale
Participation in physical activity		
Participation	Participation in any physical activity at least once per week (<i>1=yes</i>)	Dummy
Frequency	Number of times people participate per week	Metric
Duration	Number of minutes per week	Metric
Top five activities		
Walking	Walking (<i>1=yes</i>)	Dummy
Swimming	Swimming (<i>1=yes</i>)	Dummy
Gym	Gymnasium workouts (<i>1=yes</i>)	Dummy
Cycling	Cycling (<i>1=yes</i>)	Dummy
Aerobics	Aerobics/callisthenics/exercising/physiotherapy (<i>1=yes</i>)	Dummy
Intrapersonal constraints		
Type of disability	Type of condition (sight, hearing, mobility, or other)	Nominal
Restriction	Extent the person is restricted by the condition (<i>1=to a small extent, 2=to a medium extent, 3=to a large extent</i>)	Ordinal
Age	Age of the person (in years)	Metric
Age group	Six age groups with same interval size	Ordinal (6 dummies)
Gender	Gender of the person (<i>1=male</i>)	Dummy
Origin	Person is of Aboriginal or Torres Strait Islander origin (<i>1=yes</i>)	Dummy
Interpersonal constraints		
Relationship	Person is in a relationship (<i>1=yes</i>)	Dummy
Children	Children are still living at home (<i>1=yes</i>)	Dummy
Structural constraints		
Education	Highest level of education (still at school, no secondary education, high school, certificate/trade qualification or undergraduate diploma, university degree)	Nominal (5 dummies)
Work hours	Weekly hours of work	Metric
Controls		
State	State in Australia	Nominal
Year	Year the respondent was surveyed (<i>0=2009, 1=2010</i>)	Dummy

4.3 Data analysis

The data analysis consists of three main steps. First, descriptive statistics are provided to give an overview of the sample structure and the participation patterns of people with disabilities (and to answer the first research question: What are the participation patterns of people with disabilities?). Second, regression analyses are estimated to identify the significant constraints to participation (and to answer the second research question: What factors constrain the participation of people with disabilities in physical activity?). A total of eight regression models are estimated. Model 1 is a logistic regression with weekly participation as the dependent variable. Models 2 and 3 are linear regressions with frequency as the dependent variable in Model 2 and duration as the dependent variable in Model 3. Each of the top five activities in turn (walking, swimming, gym, aerobics, and cycling) serves as a dependent variable in Models 4 to 8 respectively which are logistic regression analyses.

In all regression models, the intrapersonal, interpersonal, and structural constraints are entered as independent variables. Since the variables *type of disability* and *education* are nominal variables with more than two categories, they had to be recoded into dummy variables. All dummies were entered into the regressions except for one which is excluded and serves as the reference category. This means that all effects have to be interpreted with regards to this reference category. The same procedure is applied to the age variable to allow a more detailed modelling of age. The reference categories are *other disability* (disability), *up to 34 years* (age), and *no secondary education* (education). The regression models also control for the state and the year of the survey. The independent variables were checked for multicollinearity. Since all correlation coefficients are below .9 (Tabachnick & Fidell, 2007) and all variance inflation factors below 10 (Hair, Black, & Babin, 2006), there are no indications for multicollinearity.

In a third step, a cluster analysis was run to answer the third research question (What groups can participants and non-participants with disabilities be classified into?). Classifying participants and non-participants into groups can be useful for marketing purposes and for targeting non-participants. Given the mix of continuous and categorical variables, a two-step cluster analysis was chosen. For participants, the cluster analysis results in three clusters that cover 77.2% of the cases. The remaining cases were too heterogeneous to be assigned to one of the three clusters or to form a new cluster. An α -level of .1 was used for all statistical tests.

5. Results

5.1 Sample structure and participation patterns

The descriptive statistics are summarised in Table 2. For nominal and dummy variables the percentages of respondents are displayed, while mean values and standard deviations (SD) are presented for metric and ordinal variables. It can be seen that 48.2% of the respondents are male. The average age is 57.06 years with 24.1% of the respondents being between 55 and 64 years. With regard to education, the largest category was persons with no secondary education (39.0%), followed by a certificate/trade qualification or undergraduate diploma (21.8%), high school (19.4%), and a university degree (19.0%). The average weekly workload was 12.11 hours. Some persons (14.7%) still had children at home and half of the respondents (50.5%) were in a relationship. A small percentage of respondents (1.4%) were of Aboriginal or Torres Strait Islander origin.

Concerning the type of disability, approximately two-thirds of the persons (63.5%) had a mobility condition, followed by other disabilities (34.0%), a sight condition (7.9%), and a hearing condition (6.2%). On average, respondents stated that they were restricted to a medium extent ($M=2.10$) by their condition. With regard to participation, 57.2% of the persons with disabilities participated in any physical activity at least once per week. A detailed analysis shows that 39.1% of the respondents participated three times or more per

week in any physical activity. Those persons who participated at least once per week, had on average 4.08 sessions per week (frequency) which took on average 247.87 minutes altogether (duration). This means that they took approximately one hour per session. The top five activities were walking (35.8%), followed by swimming (10.7%), gymnasium workouts (8.2%), cycling (5.7%), and aerobics/callisthenics/exercising/physiotherapy (5.5%; Table 2).

Table 2

Descriptive statistics (weighted)

Variable	Percentage of respondents	Mean (SD)
Participation	57.2%	
Frequency		4.08 (3.42)
Duration		247.87 (288.27)
<i>Top five activities</i>		
Walking	35.8%	
Swimming	10.7%	
Gym	8.2%	
Cycling	5.7%	
Aerobics	5.5%	
<i>Type of disability</i>		
Sight	7.9%	
Hearing	6.2%	
Mobility	63.5%	
Other	34.0%	
Restriction		2.10 (0.78)
Age		57.06 (17.24)
<i>Age group</i>		
Up to 34	12.4%	
35-44	9.5%	
45-54	18.7%	
55-64	24.1%	
65-74	18.8%	
75 and older	16.5%	
Gender	48.2%	
Origin	1.4%	
Relationship	50.5%	
Children	14.7%	
<i>Education</i>		
No secondary education	39.0%,	
Still at school	1.3%	
High school	19.4%	
Trade/diploma	21.8%	
University	19.0%	
Work hours		12.11 (18.98)
<i>State</i>		
New South Wales	30.5%	
Victoria	31.9%	
Queensland	16.2%	
South Australia	7.4%	
Western Australia	9.4%	
Tasmania	2.5%	
Northern Territory	0.5%	
Australian Capital Territory	1.3%	
Year (2010)	89.3%	

5.2 Constraints of participation

The regression results for participation in physical activity are presented in Table 3. In Model 1 for weekly participation in physical activity, extent of restriction, age, gender, and education have a significant impact on the dependent variable. Females with any completed education who were restricted by their condition to a lesser extent were more likely to participate in physical activity on a weekly basis, while persons aged 75 years and older were less likely to participate compared with the reference group of people aged up to 34 years. Models 2 and 3 were calculated only for participants. Model 2 shows that people with a sight condition were more frequently active and people with a mobility condition were less frequently active than people with other disabilities. The variables *restriction* and *work hours* had a negative impact on frequency of participation, while education had a positive impact. People in the age groups 55–64 and 65–74 participated more frequently than people in the youngest age group (up to 34 years). Interestingly, people without a partner participated more frequently in physical activity.

In Model 3 it can be seen that people with a hearing condition participated significantly longer in physical activity compared with people with other disabilities. The non-standardised coefficient reveals that they participated 96 minutes longer per week. Moreover, people who were restricted to a lesser extent by their condition and males participated for significantly longer periods, while people aged 75 years and older participated for significantly shorter periods than people in the youngest age group. Persons who were still at school had a longer weekly duration than people without secondary education, while people in a relationship practised for significantly shorter periods. The coefficients indicate that males practised one hour longer than females and people in a relationship participated 35 minutes less than people not in a relationship. The R^2 s show that

the regression models explain between 4.2% (Model 2) and 13.5% (Model 1) of the variation in the dependent variable (Table 3).

Table 3

Summary of regression results for participation in physical activity

Variable	Model 1: Participation	Model 2: Frequency	Model 3: Duration
Constant	1.680***	5.118***	296.032***
Sight	.279	.791**	9.826
Hearing	-.228	-.138	96.854***
Mobility	-.122	-.291*	6.059
Other	REF	REF	REF
Restriction	-.569***	-.265**	-16.944*
<i>Age group</i>			
Up to 34	REF	REF	REF
35-44	.131	.226	22.407
45-54	-.073	.382	-3.041
55-64	-.129	.492*	13.374
65-74	-.176	.542*	29.682
75 and older	-.587***	-.190	-77.248**
Gender	-.194**	.007	59.926***
Origin	-.318	-.221	40.651
Relationship	.019	-.410**	-35.063**
Children	-.202	-.383	-28.273
<i>Education</i>			
No secondary education	REF	REF	REF
Still at school	1.364***	1.198*	209.720***
High school	.444***	.385*	8.813
Trade/diploma	.665***	.239	11.684
University	.928***	.570**	-23.677
Work hours	.000	-.015***	-.421
State dummies	included	included	included
Year	included	included	included
R^2	.135	.042	.056

Note: *** $p < .01$; ** $p < .05$; * $p < .1$; displayed are the non-standardised coefficients.

The regression results for participation in the top five activities for people with disabilities are summarised in Table 4. Model 4 shows that people with a sight condition were

significantly more likely and people with a mobility or hearing condition were less likely to do walking and cycling than people with other disabilities. People with a sight condition were more likely to participate in aerobics, while people with a mobility condition were less likely to do so compared to people with other disabilities. The extent to which a person was restricted by the condition had a negative impact on participation in all five activities. People aged 35–74 were more likely to participate in walking compared with the youngest age group, while people aged 55 years and older were less likely to do swimming, gymnasium workouts, and cycling. Particularly people aged 75 years and older participated in aerobics/callisthenics/exercising/physiotherapy. Walking, swimming, gymnasium workouts and all sorts of aerobics were preferred by females, while males and people of Aboriginal or Torres Strait Islander origin preferred cycling. High weekly workloads had a positive effect on doing gymnasium workouts, while having children living at home had a positive impact on cycling participation. Having completed any form of post-school education had a positive effect on participation in all five activities. The regression models explain between 9.7% (Model 7) and 21.7% (Model 8) of the variation in the dependent variables (Table 4).

Table 4

Summary of regression results for participation in the top five activities

Variable	Model 4: Walking	Model 5: Swimming	Model 6: Gym	Model 7: Cycling	Model 8: Aerobics
Constant	.257	-1.987***	-1.057**	-2.127***	-3.472***
Sight	.283*	-.433	-.023	.511*	.741**
Hearing	-.456**	.002	.078	-.470	-.490
Mobility	-.212**	-.191	.112	-.606***	.555***
Other	REF	REF	REF	REF	REF
Restriction	-.401***	-.180**	-.320***	-.449***	-.212*
<i>Age group</i>					
Up to 34	REF	REF	REF	REF	REF
35-44	.459**	-.040	.177	-.194	.152
45-54	.637***	-.032	-.325	-.010	-.079
55-64	.703***	-.514**	-.725***	-.709**	.037
65-74	.600***	-.632***	-.683***	-.880**	.321
75 and older	.251	-1.457***	-2.122***	-1.685***	.898**
Gender	-.624***	-.414***	-.317**	1.257***	-.740***
Origin	.037	-.787	-.735	1.390***	-.391
Relationship	.015	-.007	-.079	.230	.015
Children	-.172	.000	-.086	.515**	.163
<i>Education</i>					
No secondary education	REF	REF	REF	REF	REF
Still at school	-3.175**	-.381	-18.720	1.847***	-.811
High school	.163	.831***	.491**	1.206***	-.131
Trade/ diploma	.380***	.791***	.525**	1.058***	.730***
University	.628***	1.390***	.944***	1.242***	.950***
Work hours	-.004	-.001	.010***	-.006	-.010
State dummies	included	Included	included	included	included
Year	included	Included	included	included	included
<i>R</i> ²	.108	.109	.127	.097	.217

Note: *** $p < .01$; ** $p < .05$; * $p < .1$; displayed are the non-standardised coefficients.

5.3 Clusters of participants and non-participants

The results of the cluster analyses are presented in Table 5. The participant clusters are similar for the variables *restriction*, *children*, *education*, and *origin*. The largest group in all three clusters comprised people who most people had a condition that restricted them to a

medium extent, were not of Aboriginal or Torres Strait Islander origin, had no children at home, and had not completed secondary education. Nevertheless, the clusters differed from each other regarding the type of disability, age, gender, work hours, and relationship status. The first cluster was labelled *single females* because the cluster comprised females with no partners. All of them had a mobility condition. They were on average 63.6 years old and worked an average of 8.3 hours per week. The second cluster was named *single males*. This cluster is the youngest cluster with an average age of 57.6 years. This cluster comprised males with other disabilities who had no partner. The third cluster was labelled *educated with a partner* because people in this cluster had a university degree and a partner. This cluster mainly comprised males with a sight condition who worked on average 12.6 hours per week.

The non-participant clusters look similar with regard to most characteristics. People in these two clusters were restricted by their condition to a large extent, were mainly female, were not of Aboriginal or Torres Strait Islander origin, were not in a relationship, had no children at home, had not completed secondary education, and worked on average 9 hours per week. The clusters only differed in terms of type of disability and age. Since there was only a small difference in age and it was considered inappropriate to give any names to these clusters based on the type of disability, it was decided to use the labels Cluster 4 and Cluster 5 when referring to these two clusters. Non-participants in Cluster 4 mainly had a mobility issue, while people in Cluster 5 had other disabilities. People in Cluster 4 were on average 62.7 years old and were thus slightly younger than people in Cluster 5 where the average age was 69.5 years (Table 5).

Table 5

Results of the cluster analysis for participants and non-participants

	Participants			Non-participants	
	Cluster 1: Single females	Cluster 2: Single males	Cluster 3: Educated with a partner	Cluster 4	Cluster 5
n	740	543	429	1190	484
% of respondents	33.1%	24.3%	19.8%	71.1%	28.9%
Type of disability	Mobility (100%)	Other disability (100%)	Sight (73.1%)	Mobility (92.3%)	Other disability (100%)
Restriction	Medium extent (44.9%)	Medium extent (37.0%)	Medium extent (41.2%)	Large extent (47.9%)	Large extent (47.5%)
Age	63.6	57.6	60.4	62.7	59.5
Gender	Female (100%)	Male (51.0%)	Male (52.1%)	Female (57.4%)	Female (50.8%)
Origin	No (99.1%)	No (98.5%)	No (99.6%)	No (98.1%)	No (98.1%)
Relationship	No (54.6%)	No (56.4%)	Yes (53.4%)	No (50.4%)	No (52.3%)
Children	No (100%)	No (100%)	No (89.1%)	No (89.6%)	No (89.3%)
Education	No secondary education (37.3%)	No secondary education (34.8%)	University degree (33.2%)	No secondary education (49.8%)	No secondary education (50.0%)
Work hours	8.3	11.1	12.6	8.9	9.0

6. Discussion

This study looked at the participation patterns, the constraints of participation, and participant and non-participant clusters of people with disabilities in Australia. With regard to participation patterns, it was found that more than half (57.2%) of the people with disabilities participate in physical activity at least once per week. This relatively high rate may be a result of the broad definition of physical activity that was used in the survey. Recall that the definition used in this study included physical activity for exercise, recreation, or sport. Thus, activities are not limited to sport. Activities of lower intensity are also included potentially leading to higher participation rates. Also, it could be that the sampling frame had an influence on the participation rate since the current sample was drawn from a general population survey. Yet, previous research on people with disabilities in Australia detected even higher participation rates which could also be a result of the use of broad definitions of sport and active recreation (ASC, 2011). Slightly lower participation rates were found in a prior study in the UK (Gatward & Burrell, 2002), but in that study a different definition and time frame were used for the assessment of physical activity and this makes the results difficult to compare.

While the participation rate observed in this study may still seem high, it is lower than the rate for the Australian population as a whole which is 69.4% (CASRO, 2010). One explanation for this finding could be that having a disability is a constraint to participation in physical activity. Naturally, the health effects associated with having a disability constrain participation (ASC, 2011). Another explanation could be the relatively high age of this sub-sample which can also represent a constraint to participation. Typically, disability is associated with old age (Le Clair, 2011), a relationship that also explains the high average age of this sub-sample. The fact that most participants were over the age of 40 may be the result of Australia's ageing population and demographic shift (Anderson & Hussey, 2000).

Verbrugge and Yang (2002) argue that although ageing and disability overlap throughout the course of people's lives, researchers have concentrated on disability in particular age groups. Their study showed empirically that disability and ageing are processes that interact across the whole course of life. Their results also indicate that most persons with a disability are older.

Although the participation rate of people with disabilities is lower than for able-bodied people, it must be stressed that more than half of the persons with disabilities participate at least once per week in physical activity for exercise, recreation or sport, which by definition excludes household and garden activities. Once people made the decision to participate in physical activity, they participate quite frequently. The top five activities that were identified in the survey (i.e., walking, swimming, gymnasium workouts, cycling, and aerobics) are all health and fitness related. These are typical activities that are preferred by older people and females (Breuer, Hallmann, & Wicker, 2011; Downward & Riordan, 2007). These activities are similar to those of previous studies on people with disabilities (ASC, 2011). Also, they are among the top ten activities of the general population (CASRO, 2010). Thus, the findings suggest that having a disability does not affect sport-specific preferences to a great extent.

With regard to constraints, it became evident that intrapersonal and structural constraints were the dominant ones. While the type of disability was a significant constraint in some regression models, the extent to which the person was restricted by the condition had a significant negative effect in all models. One explanation could be that the need for support increases with the level of restriction and consequently, the participation rate and frequency of people with higher support needs decreases (ASC, 2011). Also, organisations like sport clubs do not usually have the capacity to cater for people with high support needs, an assumption which is supported by relatively low club participation rates of people with

disabilities (Gatward & Burrell, 2002). Thus, people with disabilities who are restricted to a great extent may have difficulties in finding organisations that provide programmes for them. Females seemed to be less likely to participate in physical activity, and this supports the assumption that being female is a constraint to participation. On the other hand, old age or being of Aboriginal or Torres Strait Islander origin did not appear to involve severe constraints to participation. That the types of disabilities identified may be more aligned with (but not restricted to) ageing adults (e.g., sight, hearing, mobility) and less about the other types of disabilities (e.g., amputation) could also be a reflection of an ageing population.

Concerning interpersonal constraints, having children at home was not identified as a significant constraint to participation in most cases. One explanation could be that only a small percentage of people have children living at home, also probably because most respondents were aged 55 years and older. While having a relationship was not identified as a significant constraint to participation in physical activity in general, it influenced the frequency and duration of participation significantly. Interestingly, people without a partner practised more frequently and for longer hours once they made the decision to participate in physical activity. One explanation could be that they practise more often because they have the time and will to use participation as an alternative outlet to a relationship, or because they have the intention to get to know new people through their engagement with sport. This assumption is supported by previous research indicating that people with disabilities see participation in physical activity as an opportunity to socialise with others and be with other people enjoying themselves (ASC, 2011).

Regarding structural constraints, high weekly workloads did not constrain participation per se, only frequency of participation. Moreover, people who worked many hours per week were found to favour gymnasium workouts, probably because of the more flexible and thus more convenient opening hours of commercial sport providers. It is apparent

that education level is a huge predictor of participation in physical activity. The first indication that people with disabilities tend to have lower educational levels can be seen in the percentage distribution. Altogether, 39% of respondents stated that they had no secondary education, a percentage that is quite high, both compared with the general population (CASRO, 2010) and compared with other studies on people with disabilities (ASC, 2011). In the latter study, the respondents were well educated with 39% having completed tertiary education. One explanation for this difference could be the relatively high average age of this sub-sample, again supporting the finding that old age is correlated with disability (Le Clair, 2011). Also, the ERASS did not specifically target people with disabilities and therefore no attention was paid to ensuring an equal age distribution within this sub-group. Looking at the regression models, higher education was usually associated with higher participation. People with any type of education or degree were more likely to participate in physical activity.

The implications of the study's findings on the identified intrapersonal, interpersonal, and structural constraints are deeply entrenched within sport development processes. Successful sport development in attracting, retaining, and nurturing participants of all ages and ability levels depends on: (a) stakeholder input such as policy and funding, (b) throughputs such as facilities and programmes tailored to the needs of participants, and (c) outputs such as pathways that take participants from one level of participation to another (Sotiriadou, Shilbury, & Quick, 2008).

From the perspective of stakeholder *input*, policy makers can have a strong influence on the education of people with disabilities about the benefits of participation in sport. This recommendation is similar to the situation for able-bodied people (Wicker et al., 2009); however, education investments for people with disabilities may be more complex because other issues (e.g., the accessibility of the facilities used) have to be considered. Furthermore, stakeholders involved with the promotion of sport benefits or sport programmes designed for

people with disabilities should be cognisant of the intrapersonal, interpersonal, and structural constraints identified in this study. As previous studies show, sport development stakeholders, such as sport development officers and coaches, can be unaware of these constraints (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). That in turn can be deleterious to attracting participants and nurturing their interest in participation. A second implication is related to the integration of disability programmes and ageing programmes. Such programmes have been distinct for many years (Ansello & Eustis, 1992). However, Verbrugge and Yang (2002) maintain that service providers should expect to find many commonalities among persons with disabilities of all ages. Given that people with disabilities often need both types of services, and given that separating the two is inefficient, policy makers should consider blending disability and ageing policies and programmes, and shift their thinking towards *common ground*.

In relation to sport development *throughputs*, there are several implications for sport managers and in particular the types of sport programmes needed for the different groups of people with disabilities. The findings concerning the type of disability show that programmes for people with mobility issues, and programmes that cater for people with other disabilities are needed. Furthermore, given that people with mobility conditions are less likely to participate and they represent two thirds of the population of people with disabilities, sport managers should consider the types of mobility restriction and offer a modified version of sports other than walking, cycling, or aerobics that are not so popular within this group. This will promote an increase in participation rates. Also, as people between the ages of 55 and 74 participate more than people up to 34 years old, there is a need to further investigate this younger cohort and the ways sport programmes can be made attractive to them (Sotiriadou et al., 2008). As people 75 years and older are less likely to participate in swimming, gym

workouts or cycling, sport managers should consider programmes that are short in duration and of low impact.

Last, the identified constraints of the ageing population in Australia need to be considered in ways that would allow pathways (i.e., sport development *outputs*) for people with disabilities, both participants and non-participants, to progress from one level of sport development to another. For instance, the attraction of non-participants deserves a focus. Given that most of the non-participants are female, it is recommended that a focus should be given on activities that females prefer like walking, swimming, gymnasium workouts, and aerobics (Table 4). Overall, the implications for programmes and policy considerations present the potential for the creation of pathways for people with disabilities that should be cost effective, suitable to people's constraints, and sustainable over long periods of time. These pathways may vary from sport to sport (e.g., individual versus team sports, high to low physically demanding sports). Similarly to marketing campaigns, a different blend of policies and programmes would be required to attract non-participants than to retain or nurture existing ones. This approach to managing barriers to participation is consistent with other research on understanding an individual's connection to sport (e.g., psychological connections; Funk & James, 2001) and Green's (2005) normative theory for sport development.

This study used the leisure constraints theory and applied it to people with disabilities. The theory was useful for categorising the different types of variables affecting the participation of people with disabilities in physical activity into three groups of constraints. While some factors had a significant negative effect on participation and could thus be considered constraints, other factors were not significant or even had a positive influence on participation. For example, the type of disability and a person's origin had no significant effect in many cases. Increased age had a positive effect on frequency and duration of

participation (except for the oldest age group) and on participation in walking. These findings suggest that people with disabilities manage to participate, although they may be constrained by several factors. This idea is supported by previous research suggesting that participation can occur despite the presence of constraints (Jackson, Crawford, & Godbey, 1993; Kay & Jackson, 1991). Other studies support this by arguing that people can shape patterns of behaviour that allow them to organise their lives in a way that enables constraints to be overcome (Samdahl & Jekubovich, 1997). Consequently, it is important in contemporary constraints research to look beyond simple groupings of constraints (Lamont et al., 2012). This study achieved this by examining the patterns of behaviour for people with disabilities and therefore the interactive relationships between constraints and participation.

7. Conclusion

This study examined the participation patterns of people with disabilities in Australia. Constraints to participation were categorised based on the leisure constraints theory and analysed using a sub-sample of people with disabilities from a nationwide population survey. This study is among the first to advance various constraints theoretically and identify significant constraints empirically. Although it yielded interesting findings, it has some limitations that represent avenues for future research. First, the study participants were drawn from the general population. As most of them were aged 45 years and older, the study sample denotes an ageing population and represents a selected segment of the population of people with disabilities. Given that the sample was drawn from the general population and that the study did not examine the ways the levels of disability affect individuals, generalisations from the present findings to the specifics of disability sport need to be made with caution.

Second, the ERASS dataset used in this study does not further differentiate within the category *other disabilities*. It would be interesting in future research to build on the current findings and examine in more detail the relationships between participation patterns and the

type of disability. Third, the regression models only explain a small share of the variation in the dependent variables. However, this is quite common in sport participation studies that are based on cross-sectional survey data (e.g., Wicker et al., 2009). Nevertheless, there may be more constraints that explain participation in physical activity by people with disabilities, like the location and accessibility of sport facilities and the costs of participation. These constraints may be considered in future research. Yet, the current analysis is limited to the variables that are available in the ERASS datasets. Last, this study is only cross-sectional. It would be fruitful to track participation patterns of people with disabilities over time, and preferably before and after policy interventions.

8. References

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