

## Promoting physical activity for disabled people who are ready to become physically active:

Jaarsma, Eva; Smith, Brett

DOI:

[10.1016/j.psychsport.2017.08.010](https://doi.org/10.1016/j.psychsport.2017.08.010)

License:

Creative Commons: Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)

*Document Version*

Peer reviewed version

*Citation for published version (Harvard):*

Jaarsma, E & Smith, B 2017, 'Promoting physical activity for disabled people who are ready to become physically active: a systematic review', *Psychology of Sport and Exercise*.  
<https://doi.org/10.1016/j.psychsport.2017.08.010>

[Link to publication on Research at Birmingham portal](#)

### General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

### Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.

# Promoting physical activity for disabled people who are ready to become physically active: a systematic review

## Abstract

*Objective:* To provide an overview of which psychosocial factors are related to physical activity participation for disabled people who intend to be active, to determine which interventions effectively improved physical activity and to identify how participants were described as intenders.

*Design:* A systematic review was conducted using PRISMA guidelines.

*Method:* Six databases were searched using Mesh terms and free texts. Inclusion criteria were studies focusing on disabled people, physical activity and intention. Exclusion criteria were studies not including disabled people, focusing on children or on biomechanical or neurological aspects of physical activity. Included studies were appraised using the quality tool by Sirriyeh et al, 2012 and were coded using the behaviour change technique (BCT) taxonomy by Michie et al (2011). BCTs were considered effective if they were present in at least 50% of the effective studies included in this review and only present in one of the non-effective studies, as described in Hynynen et al (2016).

*Results:* Twenty studies were included in this review. Self-efficacy, intention and weighing pros and cons were positively associated with physical activity, whereas experiencing barriers and severity of the impairment were negatively associated. Intervention studies reported BCTs such as self-monitoring of behaviour, barrier identification/problem solving and action planning as effective elements of interventions.

*Conclusions:* Future research should consider including the above mentioned techniques as well as additional BCTs to provide better insight in effective elements promoting physical activity of disabled intenders. We close with a series of recommendations for future research.

**Keywords:** Systematic review, disabled people, physical activity, Health Action Process Approach

Physical activity can provide physical and psychological benefits for disabled people (Kinne, Patrick, & Doyle, 2004; Martin Ginis, Ma, Latimer-Cheung, & Rimmer, 2016; Williams, Smith, & Papathomas, 2014). Engaging in regular physical activity can improve physical fitness, as well as reducing secondary conditions such as vascular diseases, diabetes Type II and obesity (Carroll et al., 2014; Durstine et al., 2000; Heath & Fentem, 1997; Kinne et al., 2004). Participation in physical activity can also help increase self-confidence and overall quality of life (Hicks et al., 2003). Physical activity is known to help reduce anxiety, depression and loneliness (Hicks et al., 2003; Kinne et al., 2004). Even though the benefits of physical activity are frequently documented, disabled people are not as physically active as their able-bodied peers (Carroll et al., 2014; Healthy people 2020, 2010).

Besides benefits of being active previous studies have also provided extensive insight in barriers and facilitators of physical activity experienced by disabled people. For example, disabled people have reported barriers such as lack of physical activity opportunities, lack of adjusted facilities and lack of transport as reasons that prevent them from being physically active (Buffart, Westendorp, van den Berg-Emons, Stam, & Roebroek, 2009; Jaarsma, Dijkstra, Geertzen, & Dekker, 2014; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). Alternatively fun, social contacts and improving health were main facilitators for becoming and staying physically active (Jaarsma et al., 2014; Rimmer et al., 2004). In order to try to increase physical activity participation we need to reduce barriers and improve the facilitators to get disabled people motivated to become physically active. In other words, it is important that we understand how to motivate disabled people to become physically active regularly.

Of course, motivating people is not straightforward. To better determine how to motivate people rather than merely describing motivation, the application of theoretical models is a useful strategy. Theoretical models can help as a guide to understand the necessary conditions needed in order to change behaviour. Models such as the theory of planned behaviour (TPB) and the transtheoretical model (TTM) have been frequently used in the past to predict and describe behaviour changes in physical activity in both people without (Hagger, Chatzisarantis, & Biddle, 2002; Marshall & Biddle, 2001) and with disabilities (Cardinal, Kosma, & McCubbin, 2004; Jaarsma, Geertzen, de Jong, Dijkstra, & Dekker, 2014; Kooijmans et al., 2013; Korologou, Barkoukis, Lazuras, & Tsorbatzoudis, 2015; Latimer, Martin Ginis, & Craven, 2004). TPB assumes that intention is the most important element of influencing behaviour and that attitude, subjective norm and perceived behaviour control affect behaviour by promoting the decision of a person to act (Ajzen, 1991). TTM describes five stages of progress to achieve a behaviour goal (Prochaska & Velicer, 1997). In the first two stages people are considered to be either not thinking about changing their behaviour (precontemplation) or deliberating changing behaviour (contemplation). In the third stage,

preparation, a person is preparing themselves to change their behaviour. In the fourth and fifth stage, people are initiating (action) and maintaining (maintenance) the changes in their behaviour. Even though the TTM does not explicitly include intention in the model, several studies have shown that there is a linear increase in intention across the first three stages of the model (Webb & Sheeran, 2006). Both popular behaviour change models thus acknowledge that intention is a key element of behaviour and behaviour change (Sheeran, 2002; Webb & Sheeran, 2006). However when a person strongly intends to change their behaviour, such as their physical activity, this does not automatically translate into action in that the person will actually start the physical activity. This is usually referred to as the 'intention-behaviour' gap (Sheeran, 2002). Given this, it can be argued that traditional models such as TPB and TTM need to be expanded to include a volitional phase where intentions are implemented. In making this case a distinction is created between a motivational phase where people become motivated to change their behaviour and a volitional phase where people initiate, plan and maintain their new behaviour as well as restart when they have experienced setbacks (Sniehotta, Scholz, & Schwarzer, 2005).

The health action process approach (HAPA) model (Fig. 1) is an example of a behaviour change model that includes a motivational and volitional phase. It has too been previously used in disabled people (Martin Ginis et al., 2013; Perrier, Sweet, Strachan, & Latimer-Cheung, 2012; Perrier, Shirazipour, & Latimer-Cheung, 2015). The HAPA model categorises people as pre-intenders, intenders or actors (Schwarzer, Lippke, & Luszczynska, 2011). In terms of this model, *pre-intenders* need to develop intention to change behaviour by acknowledging the risks their current behaviour implies (*risk perception*). Similarly this group has to consider the pros and cons (*outcome expectancies*) of the behaviour change. Finally they need to believe in their capacity to be able to perform this change in their behaviour (*task self-efficacy*) (Schwarzer et al., 2011). *Intenders* are persons who are motivated to change but have not acted on this change. Their intention needs to transform into the actual behavioural change. This may be achieved by using self-regulatory skills and strategies, such as planning the when, where and how of the behaviour change (*action and coping planning*), as well as having the confidence that they are able to maintain the behaviour change on a regular basis despite facing possible barriers (*maintenance self-efficacy*) (Schwarzer et al., 2011). Once people have transformed their intention into action they are considered *actors*. In order to maintain their new behaviour it is important that people remain confident of sustaining the behaviour change and also overcoming any relapses that might jeopardize their behaviour (*maintenance and recovery self-efficacy*). Monitoring the prescribed behaviour plan and meeting its requirements (*action control*) are also important to maintain for actors (Schwarzer et al., 2011).

The specific focus of this systematic review is on disabled people who are intenders of physical activity. The focus on intenders is important and novel for several reasons. According to Smith, Perrier and Martin (2016), to successfully increase physical activity participation in disabled people it is crucial that people have the intention to start becoming physically active. As such, they recommend that more attention is given to identifying intenders and determining possibilities to promote physical activity among those intending to be active (Smith, Perrier, & Martin, 2016). Latimer-Cheung et al (2013) also emphasised that intenders are the ideal target for physical activity interventions as intenders are more ready for change than people who have no intention to change their behaviour. This does not imply that research on pre-intenders or actors is less relevant, but rather that researchers should specifically focus on intenders when trying to successfully increase physical activity participation. That focus also implies the importance of identifying people based on their specific behaviour change stage (e.g. intender) in order to tailor physical activity interventions. In other words, targeting people who intend or are ready to change current behaviour is a practical strategy for seeking to engage more people to become physically active as this group are 'ready for change'.

Besides focusing on intenders we also included people from different disability groups. One reason to include multiple disability groups is that previous research has mainly focused on one specific disability group (e.g. spinal cord injury). Disabled people show large differences in level of injury, which indicates that there are differences *between* disability groups as well as *within* disability groups. Results from studies with people from one specific disability group might therefore not be applicable for other disability groups. The recent move in health research to work *with* rather than *on* this heterogeneous group of people also indicates that disability organisations would like physical activity research to include several disability groups. Such a move to working with people and being guided by their needs is also consistent with community based participatory research (Schinke, Smith & McGannon, 2013). The rationale for this lies in recent calls for more research to be community driven and the benefits this can bring. For example, as Martin Ginis et al (2016) noted, "Within the disability context in particular, a call has been made for greater collaboration between the medical/rehabilitation and community sectors to facilitate and promote life-long LTPA (Leisure Time Physical Activity) participation" (p. 479). As suggested, community based participatory research considers that the community themselves are the experts of their needs and should therefore direct what research is done by, for example, identifying what needs studying (Schinke, Smith, & McGannon, 2013). Driven by such tenets of community based work, members of the disabled community and user led disability organisations (e.g. The English Federation of Disabled Sport) suggested that rather than focusing on one disability multiple impairment groups needed to be

incorporated if research within the context of the UK was to be best translated to provide meaningful outcomes and be of use. Members of the community also identified the need to focus at this stage exclusively on intenders. In terms of this work, the population of this systematic review was not simply driven by theory and past empirical work but was also suggested by user led disability organisation such as the English Federation of Disability Sport (EFDS) and the National Disability Sports Organisations (NDSOs). These community based suggestions confirm the call for more physical activity research on different disability groups such as spinal cord injury (SCI), visual impairment, hearing impairment, amputation, cerebral palsy, restricted growth and learning disability. Therefore, without overlooking the importance of research focusing on one specific disability group, there is a need to also consider research that includes various disability groups. This is especially so as it is unknown whether variables such as outcome expectancies, action and coping planning and self-efficacy that positively influence physical activity participation (Arbour-Nicitopoulos, Martin Ginis, & Latimer, 2009; Martin Ginis et al., 2013) are also applicable for people from different disability groups but who all are intenders.

To date, no overview has been provided focusing on promoting physical activity in people with different disabilities who are ready to become physically active. Researchers may use different types of reviews such as a systematic review, meta-synthesis or meta-ethnography to provide a literature overview. A systematic review would typically involve a detailed plan and search strategy based on one or more research questions, after which quantitative studies will systematically be identified, appraised, and synthesised (Petticrew & Roberts, 2006). A systematic review might also include a statistical component, a meta-analysis, to synthesize all included studies into one estimate or effect size (Petticrew & Roberts, 2006). A meta-synthesis is an analytical technique that uses data from qualitative studies to provide a more comprehensive understanding of a particular phenomenon (Walsh & Downe, 2005). Finally in a meta-ethnography interpretations and explanations in the original studies are regarded as data and are translated to produce a synthesis (Britten et al., 2002).

Against the aforementioned gap in disability research, and reasons why it is important to focus specifically on intenders, the main purpose of this systematic review was to provide an overview of what psychosocial factors are related to physical activity participation for disabled people who are intenders. A second purpose was to determine which physical activity programs or BCTs of physical activity programs significantly improved regular physical activity of disabled people. To enable clarity about BCTs in this review Michie et al. (2011) standardised definitions of techniques used in studies focusing on behaviour change and coding taxonomy are harnessed. A final purpose was to identify how participants were described as intenders.

## 1. Method

The protocol used for this systematic review was the Preferred Reporting Items for Systematic Reviews and Meta Analyses guidelines (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009).

### 1.1. Search strategy

A search strategy was performed in Medline, PsychINFO, Cinahl, Scopus, SportDiscus and Web of Science using a combination of MesH terms and free text. Main keywords used in the search were "Visual Impairment" or "Hearing Impairment" or "Cerebral Palsy" or "Spinal Cord Injury" or "Amputation" or "Learning Disability" or "Dwarfism" AND "Sport" or "Physical activity" or "Exercise" or "Disabled sport", AND "Motivation(al strategies)" or "Intender" or "HAPA model" or "behaviour change". The complete search strategy used in this study can be found in Appendix 1. The search was performed up to April 1<sup>st</sup> 2016.

### 1.2. Procedure quantitative studies

We determined the following inclusion and exclusion criteria that were used throughout the different review stages.

Included studies:

- 1) focused on people with visual impairments, hearing impairments, cerebral palsy, SCI, amputation, restricted growth or learning disability, or a combination of any of the disabilities. Disabled people at all stages and severities of impairment were included in the review.
- 2) solely focused on sport, sports participation, physical activity, exercise, disabled sport or any equivalent.
- 3) clearly stated that the aim or intervention focused on promoting physical activity for inactive people intending to become physically active. If the term intenders was not used, the following intender definitions were also included:
  - Participants who were in the contemplation or preparation stage (when studies used the stages of change or transtheoretical model).
  - Participants who were defined as 'ready to change', 'internally motivated to become active' or use any similar description that explained the participants' intention to become physically active.
- 4) were published in peer-reviewed journals that were written in English were included in this study.
- 5) could include all types of intervention delivery modes (e.g. internet-based, face-to-face,

written materials).

6) could include a qualitative, quantitative or mixed method design.

Studies were excluded if:

- 1) participants were under the age of 18, even if they could be included in any of the above mentioned disability groups.
- 2) they only focused on the biomechanical, physiological or neurological aspects of physical activity, on surgical procedures, treatment modalities, orthopaedic examinations, diagnostic methods or studies focusing on the validity or reliability of an instrument.
- 3) they included a nutrition element in their research.
- 4) these were reviews, books, book chapters, comments, reports, case studies, posters or letters.

Data was extracted by the first author (EJ). The second author (BS) independently assessed a random selection of 10 titles, 10 abstracts and 5 full texts using the abovementioned inclusion and exclusion criteria, to ensure the accuracy of the study selection procedure. As part of this process the two authors (EJ and BS) discussed and agreed on including or excluding the randomly selected studies in a meeting acting as 'critical friends' (Smith & Sparkes, 2012; Smith, Bundon, & Best, 2016).

### **1.3. Synthesising qualitative studies**

We also included qualitative studies in this systematic review. Although the original intention was to synthesise qualitative studies by using the process described by Williams et al., 2014 this step was abandoned due to lack of qualitative studies that were included in this systematic review.

### **1.4. Data extraction**

After all relevant studies were selected the following data were extracted: number of participants, sample characteristics, study design, intervention type and duration, assessment method, theoretical framework, outcome measures and significant results. Relevant quotes or themes were extracted from included qualitative studies. The mean age of the research sample within a study was pooled if possible and necessary. The weighted mean age of all included studies was calculated by first multiplying the mean age by the number of participants for each study. Then, these values were added and divided by the total number of participants of all included studies.



### **1.5. Assessing quality of methodology**

We included both qualitative and quantitative studies in this systematic review, which shows diversity in study design, data collection methods, outcome measures and analytical methods that were used. This diversity complicates comparison of methodological quality across included studies. Moreover, most quality assessment tools focus on specific types of research (i.e. either qualitative or quantitative) or are restricted to certain study designs such as randomized controlled trials. However, Sirriyeh et al (2012) developed a tool that can help guide quality assessment of both qualitative and quantitative studies. The tool consists of 16 criteria which need to be scored according to a four point scale (i.e. 0 to 3, with 3 being the highest score). In addition to the criteria highlighted by Williams et al. (2014), and with the exception of criteria 14 (the reliability of analytical process (qualitative only) because this check is flawed and now known to be ineffective for reliability purposes in terms of qualitative research (Smith & McGannon, 2017), all included studies were assessed for quality based on the tool as described by Sirriyeh et al (2012). All included studies were scored, divided by the maximum possible score and reported as percentages (see Table 3). Initial scoring was done by the first author and later by the second author as part of the critical friends judgment process as detailed in Smith and McGannon (2017).

### **1.6. Coding the behaviour change techniques**

The coding of the BCTs was conducted by two researchers (XX and XX) using behaviour change technique taxonomy by Michie et al (2011). Prior to coding, both researchers familiarised themselves with the BCT coding method and definitions developed by Michie et al (2011). The first author then screened the included intervention studies for elements meeting these BCT definitions. After the initial screening the first author coded all BCTs that were reported in the included intervention studies. Similar to judging the quality of the research, both researchers finally operated as critical friends to explore, compare and enrich interpretations of the coding and arrive at final BCT coding for each intervention study (Smith & McGannon, 2017).

### **1.7. Assessing intervention and BCT effectiveness**

The effect sizes of the included studies (e.g. Cohen's d) for the statistically significant outcome measures are presented in Table 1. When the study did not report any effect sizes, these were sought by contacting the named authors for additional numerical data needed. However, they unfortunately did not provide the requested data. We therefore could not calculate the effect sizes of this study (Thomas et al, 2011). Effective studies were defined as studies including an intervention that reported a significant difference ( $p < 0.05$ ) between the intervention and the control group. We

identified the BCTs that were present in the effective and non-effective intervention studies. We then analysed the BCT effectiveness using the method as described in Hynynen et al (2016). In this study BCTs are effective if they were present in at least 50% of the effective studies but not present or only present in one of the non-effective trials. Please also see Table 2 for included BCTs in effective and non-effective studies.

## **2. Results**

### ***2.1. Study selection***

A total of 1808 studies were identified in the search with 374 duplicates. After the evaluation of the titles, 278 studies were included to the abstract stage. From the 278 abstracts, 45 studies were included for the full text stage. Two articles were excluded from the full text stage because the full text of the studies was unavailable, despite attempts to retrieve the studies from other libraries or by contacting the authors. Another 26 articles were excluded because these did not meet the inclusion criteria. After evaluating the full text and searching the references of the included studies 20 studies were included in this study (Fig. 2). Nineteen of these studies were quantitative studies and one study (Kennedy, Taylor, & Hindson, 2006) included both quantitative as qualitative data.

### ***2.2. Summary of Results from the Reviewed Articles***

The results from the included studies from this systematic review are described below (see also Table 1).

#### ***2.2.1. Characteristics of the included studies***

The 20 included studies were published between 2004 and 2015. The study sample of the included studies had the following characteristics: the weighted mean age of the study sample included in this study is 43.9 years, with age ranging from 18-82. In total 1908 males (57%) and 1444 females (43%) participated in the included studies. The minimum and maximum sample sizes were 16 and 648 participants respectively. The majority of studies (19, 95%) included people with SCI in their study sample, with six studies including more than one disability group. All studies used questionnaires as their assessment tool, with one study also including interviews. Intervention delivery modes were telephone counselling (n=5), written materials (n=4), a course (n=1) and face-to-face counselling (n=1), with three studies used a combination of these modes. Most frequently used study design was a cross-sectional design (n=11). Other designs included cohort studies (n=5), RCTs (n=3), and an observational study (n=1). Duration of interventions ranged from 2 weeks to 18 months.

### *2.2.2. Theories, models and frameworks*

The majority of the included studies based their research on theories or models (n=16, 80%). The most frequently chosen theory was the theory of planned behaviour (n=6), which was also used in combination with frameworks or models such as the international classification of functioning, disability and health, the transtheoretical model or the health action process approach. Other models or frameworks included the health action process approach (n=4), the transtheoretical model (n=3) and the international classification of functioning, disability and health (n=3).

### **2.3. Psychosocial factors related to physical activity participation**

The primary purpose of this study was to provide an overview of what psychosocial factors are related to physical activity participation for disabled people who are intenders. The significant results of the included studies suggest positive association of self-efficacy (Arbour-Nicitopoulos et al., 2009; Cardinal et al., 2004; Keegan, Chan, Ditchman, & Chiu, 2012; Kennedy et al., 2006; Kosma, Cardinal, & McCubbin, 2004; Martin Ginis et al., 2013; Molton, Jensen, Nielson, Cardenas, & Ehde, 2008; Perrier et al., 2012; Perrier et al., 2015; Warm, Belza, Whitney, Mitchell, & Stiens, 2004), intention (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos, Tomasone, Latimer-Cheung, & Martin Ginis, 2014; Latimer, Martin Ginis, & Arbour, 2006; Martin Ginis et al., 2013; Molton et al., 2008; Perrier et al., 2015) and outcome expectancies (Cardinal et al., 2004; Keegan et al., 2012; Kosma et al., 2004; Martin Ginis et al., 2013; Perrier et al., 2012; Perrier et al., 2015) on physical activity. Twelve studies reported an increase in self-efficacy in intenders engaging in regular physical activity. This included task self-efficacy, barrier self-efficacy, maintenance self-efficacy, exercise self-efficacy, self-esteem as well as general self-efficacy. Seven studies reported intention and five studies the weighing-up of pros and cons or outcome expectancies as predictors for physical activity participation.

Negative associations with physical activity might be experiencing barriers to physical activity (Cardinal et al., 2004; Jaarsma et al., 2014; Jaarsma, Dekker, Koopmans, Dijkstra, & Geertzen, 2014; Warm et al., 2004) and the severity of disability (Jaarsma et al., 2014; Keegan et al., 2012). Four studies reported experienced barriers to physical activity and two studies reported that the severity of the disability was negatively associated with physical activity.

### **2.4. Effective studies and their BCTs**

The second purpose of this study was to determine which physical activity programs or BCTs significantly improved regular physical activity of disabled people. Seven intervention studies were identified, of which 6 showed effective interventions (i.e. significant differences between

experimental and control group). At least 50% of these effective interventions used the following BCTs to promote physical activity for intenders with a disability:

1. Prompt self-monitoring of behaviour (e.g. filling out a questionnaire) (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Kennedy et al., 2006; Latimer et al., 2006; Pelletier, Latimer-Cheung, Warburton, & Hicks, 2014; Thomas et al., 2011; Warm's et al., 2004).
2. Providing information on the consequences of behaviour to the individual (e.g. costs and benefits) (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Pelletier et al., 2014; Warm's et al., 2004)..
3. Barrier identification and problem solving (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Pelletier et al., 2014; Warm's et al., 2004).
4. Use of follow up prompts (Arbour-Nicitopoulos et al., 2014; Kennedy et al., 2006; Pelletier et al., 2014; Thomas et al., 2011; Warm's et al., 2004).
5. Goal setting (behaviour) (Arbour-Nicitopoulos et al., 2014; Latimer et al., 2006; Thomas et al., 2011; Warm's et al., 2004).
6. Action planning (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Latimer et al., 2006; Warm's et al., 2004).
7. Providing instructions on how to perform the behaviour (e.g. educational materials, exercise guidelines, exercise dvds, etc.) (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Latimer et al., 2006; Thomas et al., 2011)..
8. Prompt review of behavioural goals (Arbour-Nicitopoulos et al., 2009; Latimer et al., 2006; Pelletier et al., 2014; Warm's et al., 2004)..

The BCTs used in the effective studies can also be found in Table 2.

## ***2.5. Identifying participants as intenders***

The final purpose of this systematic review was to identify how participants were described as intenders. Eight studies clearly defined their participants as intenders by either using the HAPA model or using the TTM (Arbour-Nicitopoulos et al., 2014; Cardinal et al., 2004; Kosma, Cardinal, & McCubbin, 2005; Martin Ginis et al., 2013; Perrier et al., 2012; Perrier et al., 2015; Thomas et al., 2011; Warm's et al., 2004). Another seven studies used intention, initiating exercise or readiness to change to define the intention stage of the included participants (Arbour-Nicitopoulos et al., 2009; Jaarsma et al., 2014; Jaarsma et al., 2014; Latimer et al., 2004; Latimer & Martin Ginis, 2005). Four studies described the inclusion criteria for participants by using statement such as 'exercise

schematics' or participants who were 'promptly engaged and persisted exercise for at least 6 weeks' (Gernigon, Pereira Dias, Riou, Briki, & Ninot, 2015; Kennedy et al., 2006; Pelletier et al., 2014; Saebu & Sorensen, 2011). Finally one study did not specifically describe participants as intenders, but did report that their research question focused on predicting physical activity/exercise participation for people with SCI (Keegan et al., 2012). They also reported that the findings from the study could help 'to design more effective health promotion behavioural interventions for people with SCI.' (Keegan et al., 2012)

### **3. Discussion**

#### ***3.1. Discussion based on results***

The first purpose of this original systematic review was to provide an overview of what psychosocial factors are related to physical activity participation for disabled people who are intenders. Positive associations with physical activity were self-efficacy, intention and weighing pros and cons, while experiencing barriers and the severity of the impairment were negatively associated.. However the majority of the studies that reported these results used a cross-sectional design in determining physical activity in disabled people who are intenders. A cross-sectional design can only provide information about physical activity at a specific time and cannot take into account whether changes in physical activity occur over time (Spata AV, 2003). Studies with cross-sectional designs cannot establish a cause-and-effect relationship. Longitudinal studies do allow detecting changes of an intervention over a longer period and determine the effect after introducing an independent variable (Berg & Latin, 2004). Given all this, researchers should consider also including variables as self-efficacy, outcome expectancies and intention in longitudinal studies, to see whether these variables indeed have a positive effect on physical activity, preferably by using a study design that includes both an experimental and a control group (e.g. RCT).

The second purpose of the paper was to determine which physical activity programs or BCTs of physical activity programs significantly improved regular physical activity of disabled people. Results of this systematic review reported the following BCTs to effectively help promoting physical activity, namely prompt self-monitoring of behaviour, barrier identification and problem solving, providing information on consequences of behaviour to the individual, using follow up prompts, goal setting, action planning, instructions on how to perform the behaviour and prompt review of behavioural goals. Unfortunately only 6 intervention studies met the inclusion criteria of effective studies and consequently we were only able to code the BCTs included in these six studies. This suggests that more intervention studies are needed in order to ensure a better overview of effective BCTs. Other identified BCTs included motivational interviewing and social support as effective

elements of physical activity interventions. Future research should therefore consider not only including the 8 effective BCTs that were identified in this systematic review, but also explore other BCTs to establish a more profound set of BCTs that are effective in promoting physical activity in intenders with disabilities.

An example of an effective BCT to include in future research is Motivational Interviewing (Rollnick, Miller, & Butler, 2008). Motivational Interviewing works by trying to activate people's own motivation to change and have people make their own decisions about behaviour change (Rollnick et al., 2008). Previous research has shown that participant involvement or a client-centred approach, like motivational interviewing, provides significant improvements in physical activity compared to the control group (Arbour-Nicitopoulos et al., 2014; Bombardier et al., 2008). The nature of BCTs of the included studies in these systematic review also suggest that participants and professionals should both be involved in making decisions about the physical activity program, rather than the professional suggesting which physical activity program the participant should follow. Future research should therefore considering adopting a more participant involved approach such as Motivational Interviewing in their programs to increase regular physical activity for intenders with disabilities.

The final purpose of the research was to identify how participants were described as intenders. All the included papers reviewed used definitions that capture the idea of participants as intenders, thereby allowing readers to deduce or infer that participants were intenders. That said, we cannot state with absolute certainty that all participants in each study were intenders as sometimes studies did not explicitly specify whether participants were pre-intenders, intenders or actors (or equivalents to these terms). Given the importance of identifying people's stage when designing interventions, as Williams, Ma, and Martin Ginis (2017) also suggested, future research should carefully consider describing their research sample more specifically by including the participant's stage of intention at the beginning of a physical activity program.

### **3.2. Recommendations**

In addition to the above points grounded in the results, the following recommendations based on conducting this systematic review are proposed to enhance future research.

#### **3.2.1 Implications for research**

First, researchers need to provide a clearer description of the content of the interventions in physical activity. For example, several included studies in our systematic review reported that multiple counselling sessions in their physical activity program had a positive effect on physical activity for

disabled people (Arbour-Nicitopoulos et al., 2014; Pelletier et al., 2014; Thomas et al., 2011; Warmes et al., 2004). However, researchers did not discuss in detail what these counselling sessions looked like, which limits the possibility of identifying BCTs that effectively improved physical activity (Michie et al., 2011). What was provided was a general description on duration and frequently of the counselling sessions, and that sessions focused on “problem-solving and renegotiating goals” (Warmes et al., 2004). A rare exception of a more detailed description of the content of a BCT is an action plan. In the study by Arbour-Nicitopoulos et al (2009) they describe that participants were asked to set up an action plan that included when, where and how often they were planning to participate in what types of physical activity. If we are to truly learn from research papers, use psychological interventions proposed correctly, and seek to replicate research, future research should therefore provide a detailed description of the content of all BCTs included in their intervention to increase possibilities of identifying effective BCTs for promoting physical activity in disabled people who are intenders.

Second, the individual’s stage of intention needs to be defined so that interventions can be tailored according to the stage of intention. Previous research has shown that interventions focusing on behaviour change are most effective when they are tailored to the individual’s stage of intention (Abraham, 2008; Ziegelmann, Luszczynska, Lippke, & Schwarzer, 2007). For instance interventions focusing on pre-intenders should focus on high risk perception, positive outcome expectancies and task self-efficacy (Arbour-Nicitopoulos et al., 2009; Martin Ginis et al., 2013). However these variables are unlikely to be effective for intenders, as interventions for intenders should focus on high maintenance self-efficacy and creating action and coping plans (Arbour-Nicitopoulos et al., 2009; Martin Ginis et al., 2013). Furthermore interventions including actors need to focus on maintenance and recovery self-efficacy as well as monitoring and meeting the requirements of the action and coping plans (Arbour-Nicitopoulos et al., 2009; Martin Ginis et al., 2013). Thus, as Williams et al. (2017) also suggest, implications for future research are that professionals should carefully define the participant’s stage of intention at the start of the intervention to allow the intervention to be matched with the current intention stage of the participants. Specifically, professionals need to ensure that participants are defined as intenders when physical activity programs are focusing on successfully increasing participation in regular physical activity.

Third, physical activity programs for intenders should take into account the heterogeneity of disabled people. For example given the differences across disability groups in terms of physical impairment and the resulting different restrictions of activity that can follow, programs need to consider such diversity when promoting physical activity. At the same time, there are also differences within disability groups. For example, a SCI where only the person’s legs are affected

(paraplegic) or a SCI where both arms and legs are affected (tetraplegic) will result in very different functional abilities, which can result in fewer physical activity possibilities for people with tetraplegia. Thus, not only should programs and interventions be tailored in terms of differences across groups. Differences within groups also need serious consideration. Consequently, implications for future research focusing on physical activity programs for disabled people should take into account both differences between and within disability groups and consider a tailor-made physical activity program for disabled people. Which interventions work best for what disability group.

### *3.2.1 Practical implications*

Apart from implications for research there are also practical implications for researchers to consider. First, in recent years community based research has been advocated (Schinke & Blodgett, 2016). Reasons for this include the belief that the community themselves are the experts of their needs and should therefore co-create and direct what research is done by, for example, identifying what needs studying. Following that recommendation, this research was driven by members of disabled community who themselves directed the research by identifying the purposes. Thus, whilst the review focused on intenders, the scope of the work expands to a large group of people within the community who would like to become physically active (i.e. intenders) and user-led disability organisations (at least in the UK) who have identified an urgent need to focus on both intenders and a wide range impairments. When conducting future projects researchers should consider working together with the community and co-creating research together, which will help to better meet the demands from the community and participants, but can also help with implementation of successful implementation.

Finally, we need to develop physical activity interventions that can both avoid common errors as well as help us move forward. Drawing on Kelly and Barker (2016) and contextualising their points within physical activity, common errors include assuming becoming physically active is just common sense, thinking that changing physical activity levels is a simple matter of getting the message across, expecting knowledge and information to be the drive for becoming physically active, assuming that people act either rationally or irrationally all the time, trying to predict individual behaviour and accurately predict how becoming physical activity will result from a single specific stimulus. To better understand behaviour change such as physical activity and develop stronger interventions researchers might decide to not focus only on predictive causal models but also consider regressive models to understand preceding conditions (Kelly & Barker, 2016). Such a regressive inference approach would explain how events are developed and executed as well as how they relate to other practices over time. In other words it will start with event B (or C or D), tries to



determine what happened before B (or C or D) and links these prior events to the behaviour (Kelly & Barker, 2016). This approach is different from predictive models, like the TPB and the HAPA model, that start with A and try to predict what B, C and D will be. Understanding preceding events by using a regressive approach can help determining patterns and practices to change behaviour (Michie et al., 2011). Furthermore, researchers should take into account that changing human behaviour, such as becoming physical activity, consists of processes that are embedded in social life and are not single independent events. Current behaviour is also often integrated in people's everyday lives based on their habits, routines and automatic responses to stimuli from the environment. In order to successfully change behaviour interventions should take the complexity of behaviour change into account and not treat behaviour as a single event that can be triggered by providing information or messages (Kelly & Barker, 2016). Additionally, interventions should consider including affect (Ekkekakis & Zenko, 2016) with a focus on how emotions like pleasure or unpleasant feelings are not simply embodied and felt pre-discursively but also created through relationships and narratives that circulate in culture (Phoenix & Orr, 2014; Tamminen & Bennett, 2017). Moreover, the concept of social practice that sees behaviour as an interaction between people that share a similar practice, rather than individuals behaving isolated from each other. Social practice has previously been used for smoking cessation, where people only changed their behaviour once smoking was defined as a health problem and it was considered as socially unacceptable (e.g. no longer allowed in public areas) (Kelly & Barker, 2016). With changes in conditions or practices for smoking the behaviour of people also changed. Even though the decrease in smoking behaviour was not an easy and quick process, a similar extensive process will be needed to change physical activity behaviour.

To conclude, it is hoped this systematic review not only captures various empirical evidence to help with the promotion of physical activity among disabled people. We hope also that it provides a springboard to enhance our research with disabled people so that more meaningful behaviour change interventions are developed in the future.

## **Acknowledgements**

This work was supported by the English Federation of Disability Sport and the National Disability Sport Organisations under Grant number 16-0403.

## References

- Abraham, C. (2008). Beyond stages of change: Multi-determinant continuum models of action readiness and menu-based interventions. *Applied Psychology: An International Review*, 57(1), 30-41. doi:10.1111/j.1464-0597.2007.00320.x
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179 – 211.
- Arbour-Nicitopoulos, K. P., Martin Ginis, K. A., & Latimer, A. E. (2009). Planning, leisure-time physical activity, and coping self-efficacy in persons with spinal cord injury: A randomized controlled trial. *Archives of Physical Medicine & Rehabilitation*, 90(12), 2003-2011 9p. doi:10.1016/j.apmr.2009.06.019
- Arbour-Nicitopoulos, K. P., Tomasone, J. R., Latimer-Cheung, A. E., & Martin Ginis, K. A. (2014). Get in motion: An evaluation of the reach and effectiveness of a physical activity telephone counseling service for Canadians living with spinal cord injury. *PM & R : The Journal of Injury, Function, and Rehabilitation*, 6(12), 1088-1096. doi:10.1016/j.pmrj.2014.05.018 [doi]
- Berg, K. E., & Latin, R. W. (2004). Non-experimental research and cause-and-effect relationships. *Essentials of research methods in health, physical education, exercise science, and recreation* (2nd ed., pp. 198-199) Lippincott Williams & Wilkins.
- Bombardier, C. H., Cuniffe, M., Wadhwani, R., Gibbons, L. E., Blake, K. D., & Kraft, G. H. (2008). The efficacy of telephone counseling for health promotion in people with multiple sclerosis: A randomized controlled trial. *Archives of Physical Medicine and Rehabilitation*, 89(10), 1849-1856. doi:10.1016/j.apmr.2008.03.021 [doi]
- Britten, N., Campbell, R., Pope, C., Donovan, J., Morgan, M., & Pill, R. (2002). Using meta ethnography to synthesise qualitative research: A worked example. *Journal of Health Services Research & Policy*, 7(4), 209-215. doi:10.1258/135581902320432732 [doi]
- Buffart, L. M., Westendorp, T., van den Berg-Emons, R. J., Stam, H. J., & Roebroek, M. E. (2009). Perceived barriers to and facilitators of physical activity in young adults with childhood-onset physical disabilities. *Journal of Rehabilitation Medicine : Official Journal of the UEMS European Board of Physical and Rehabilitation Medicine*, 41(11), 881-885. doi:10.2340/16501977-0420
- Cardinal, B. J., Kosma, M., & McCubbin, J. A. (2004). Factors influencing the exercise behavior of adults with physical disabilities. *Medicine and Science in Sports and Exercise*, 36(5), 868-875.
- Carroll, D. D., Courtney-Long, E. A., Stevens, A. C., Sloan, M. L., Lullo, C., Visser, S. N., . . . Centers for Disease Control and Prevention (CDC). (2014). Vital signs: Disability and physical activity--United states, 2009-2012. *MMWR.Morbidity and Mortality Weekly Report*, 63(18), 407-413. doi:mm6318a5 [pii]
- Durstine, J. L., Painter, P., Franklin, B. A., Morgan, D., Pitetti, K. H., & Roberts, S. O. (2000). Physical activity for the chronically ill and disabled. *Sports Medicine (Auckland, N.Z.)*, 30(3), 207-219.
- Ekkekakis, P., & Zenko, Z. (2016). Escape from cognitivism: Exercise as hedonic experience. In M. Raab, P. Wylleman, R. Seiler, A. Elbe & A. Hatzigeorgiadis (Eds.), *Sport and exercise psychology*

- 571        *research: From theory to practice* (First edition ed., pp. 389). London, United Kingdom:  
572        Academic Press.
- 573        Gernigon, C., Pereira Dias, C., Riou, F., Briki, W., & Ninot, G. (2015). Reference system of competence  
574        and engagement in adapted physical activities of people with recent spinal cord injury.  
575        *Disability & Rehabilitation*, 37(23), 2192-2196.
- 576        Hagger, M. S., Chatzisarantis, N. L., & Biddle, S. J. (2002). The influence of autonomous and  
577        controlling motives on physical activity intentions within the theory of planned behaviour.  
578        *British Journal of Health Psychology*, 7(Part 3), 283-297. doi:10.1348/135910702760213689  
579        [doi]
- 580        Healthy people 2020. (2010). Chapter 33: Physical activity (PA). Retrieved from  
581        <https://www.cdc.gov/nchs/data/hpdata2020/HP2020MCR-C33-PA.pdf>
- 582        Heath, G. W., & Fentem, P. H. (1997). Physical activity among persons with disabilities - a public  
583        health perspective. *Exercise and Sport Science Reviews*, 25, 195-234.
- 584        Hicks, A. L., Martin, K. A., Ditor, D. S., Latimer, A. E., Craven, C., Bugaresti, J., & McCartney, N. (2003).  
585        Long-term exercise training in persons with spinal cord injury: Effects on strength, arm  
586        ergometry performance and psychological well-being. *Spinal Cord*, 41(1), 34-43.  
587        doi:10.1038/sj.sc.3101389 [doi]
- 588        Hynynen, S. T., van Stralen, M. M., Sniehotta, F. F., Araujo-Soares, V., Hardeman, W., Chinapaw, M.  
589        J., . . . Hankonen, N. (2016). A systematic review of school-based interventions targeting  
590        physical activity and sedentary behaviour among older adolescents. *International Review of*  
591        *Sport and Exercise Psychology*, 9(1), 22-44. doi:10.1080/1750984X.2015.1081706 [doi]
- 592        Jaarsma, E. A., Dekker, R., Koopmans, S. A., Dijkstra, P. U., & Geertzen, J. H. (2014). Barriers to and  
593        facilitators of sports participation in people with visual impairments. *Adapted Physical Activity*  
594        *Quarterly : APAQ*, 31(3), 240-264. doi:10.1123/2013-0119 [doi]
- 595        Jaarsma, E. A., Dijkstra, P. U., Geertzen, J. H., & Dekker, R. (2014). Barriers to and facilitators of  
596        sports participation for people with physical disabilities: A systematic review. *Scandinavian*  
597        *Journal of Medicine & Science in Sports*, doi:10.1111/sms.12218 [doi]
- 598        Jaarsma, E. A., Geertzen, J. H., de Jong, R., Dijkstra, P. U., & Dekker, R. (2014). Barriers and  
599        facilitators of sports in dutch paralympic athletes: An explorative study. *Scandinavian Journal of*  
600        *Medicine & Science in Sports*, 24(5), 830-836. doi:10.1111/sms.12071 [doi]
- 601        Keegan, J. P., Chan, F., Ditchman, N., & Chiu, C. (2012). Predictive ability of pender's health  
602        promotion model for physical activity and exercise in people with spinal cord injuries: A  
603        hierarchical regression analysis. *Rehabilitation Counseling Bulletin*, 56(1), 34-47.  
604        doi:<http://dx.doi.org/10.1177/0034355212440732>
- 605        Kelly, M. P., & Barker, M. (2016). Why is changing health-related behaviour so difficult? *Public*  
606        *Health*, 136, 109-116. doi:doi:10.1016/j.puhe.2016.03.030
- 607        Kennedy, P., Taylor, N., & Hindson, L. (2006). A pilot investigation of a psychosocial activity course  
608        for people with spinal cord injuries. *Psychology, Health & Medicine*, 11(1), 91-99.  
609        doi:T3H713Q223011L76 [pii]

- 610 Kinne, S., Patrick, D. L., & Doyle, D. L. (2004). Prevalence of secondary conditions among people with  
611 disabilities. *American Journal of Public Health*, 94(3), 443-445.
- 612 Kooijmans, H., Post, M. W. M., van der Woude, L. H. V, de Groot, S., Stam, H. J., & Bussmann, J. B. J.  
613 (2013). Randomized controlled trial of a self-management intervention in persons with spinal  
614 cord injury: Design of the HABITS (healthy active behavioural Intervention in SCI) study.  
615 *Disability and Rehabilitation: An International, Multidisciplinary Journal*, 35(13), 1111-1118.  
616 doi:<http://dx.doi.org/10.3109/09638288.2012.718406>
- 617 Korologou, S., Barkoukis, V., Lazuras, L., & Tsorbatzoudis, H. (2015). Application of the  
618 transtheoretical model to physical activity in deaf individuals. *Adapted Physical Activity*  
619 *Quarterly*, 32(3), 223-240.
- 620 Kosma, M., Cardinal, B. J., & McCubbin, J. (2004). Psychosocial influences of physical activity stage  
621 patterns among inactive adults with physical disabilities. (abstract). *Research Quarterly for*  
622 *Exercise & Sport*, 75(1), A-108-a-109.
- 623 Kosma, M., Cardinal, B. J., & McCubbin, J. A. (2005). A pilot study of a web-based physical activity  
624 motivational program for adults with physical disabilities. *Disability & Rehabilitation*, 27(23),  
625 1435-1442.
- 626 Latimer, A. E., Martin Ginis, K. A., & Arbour, K. P. (2006). The efficacy of an implementation intention  
627 intervention for promoting physical activity among individuals with spinal cord injury: A  
628 randomized controlled trial. *Rehabilitation Psychology*, 51(4), 273-280.  
629 doi:<http://dx.doi.org/10.1037/0090-5550.51.4.273>
- 630 Latimer, A. E., & Martin Ginis, K. A. (2005). The theory of planned behavior in prediction of leisure  
631 time physical activity among individuals with spinal cord injury. *Rehabilitation Psychology*,  
632 50(4), 389-396 8p.
- 633 Latimer, A. E., Martin Ginis, K. A., & Craven, B. C. (2004). Psychosocial predictors and exercise  
634 intentions and behavior among individuals with spinal cord injury. *Adapted Physical Activity*  
635 *Quarterly*, 21(1), 71-85 15p.
- 636 Latimer-Cheung, A. E., Arbour-Nicitopoulos, K. P., Brawley, L. R., Gray, C., Justine Wilson, A.,  
637 Prapavessis, H., . . . Martin Ginis, K. A. (2013). Developing physical activity interventions for  
638 adults with spinal cord injury. part 2: Motivational counseling and peer-mediated interventions  
639 for people intending to be active. *Rehabilitation Psychology*, 58(3), 307-315.  
640 doi:10.1037/a0032816 [doi]
- 641 Marshall, S. J., & Biddle, S. J. (2001). The transtheoretical model of behavior change: A meta-analysis  
642 of applications to physical activity and exercise. *Annals of Behavioral Medicine : A Publication of*  
643 *the Society of Behavioral Medicine*, 23(4), 229-246.
- 644 Martin Ginis, K. A., Ma, J. K., Latimer-Cheung, A. E., & Rimmer, J. H. (2016). A systematic review of  
645 review articles addressing factors related to physical activity participation among children and  
646 adults with physical disabilities. *Health Psychology Review*, 10(4), 478-494.  
647 doi:10.1080/17437199.2016.1198240 [doi]
- 648 Martin Ginis, K. A., Tomasone, J. R., Latimer-Cheung, A. E., Arbour-Nicitopoulos, K. P., Bassett-  
649 Gunter, R. L., & Wolfe, D. L. (2013). Developing physical activity interventions for adults with

650 spinal cord injury. part 1: A comparison of social cognitions across actors, intenders, and  
651 nonintenders. *Rehabilitation Psychology*, 58(3), 299-306. doi:10.1037/a0032815 [doi]

652 Michie, S., Ashford, S., Sniehotta, F. F., Dombrowski, S. U., Bishop, A., & French, D. P. (2011). A  
653 refined taxonomy of behaviour change techniques to help people change their physical activity  
654 and healthy eating behaviours: The CALORE taxonomy. *Psychology & Health*, 26(11), 1479-  
655 1498. doi:<http://dx.doi.org/10.1080/08870446.2010.540664>

656 Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items  
657 for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7),  
658 e1000097. doi:10.1371/journal.pmed.1000097 [doi]

659 Molton, I. R., Jensen, M. P., Nielson, W., Cardenas, D., & Ehde, D. M. (2008). A preliminary evaluation  
660 of the motivational model of pain self-management in persons with spinal cord injury-related  
661 pain. *Journal of Pain*, 9(7), 606-612 7p.

662 Pelletier, C. A., Latimer-Cheung, A., Warburton, D. E., & Hicks, A. L. (2014). Direct referral and  
663 physical activity counselling upon discharge from spinal cord injury rehabilitation. *Spinal Cord*,  
664 52(5), 392-395 4p. doi:10.1038/sc.2014.16

665 Perrier, M. J., Shirazipour, C. H., & Latimer-Cheung, A. E. (2015). Sport participation among  
666 individuals with acquired physical disabilities: Group differences on demographic, disability, and  
667 health action process approach constructs. *Disability and Health Journal*, 8(2), 216-222.  
668 doi:10.1016/j.dhjo.2014.09.009 [doi]

669 Perrier, M. J., Sweet, S. N., Strachan, S. M., & Latimer-Cheung, A. E. (2012). I act, therefore I am:  
670 Athletic identity and the health action process approach predict sport participation among  
671 individuals with acquired physical disabilities. *Psychology of Sport and Exercise*, 13(6), 713-720.  
672 doi:<http://dx.doi.org/10.1016/j.psychsport.2012.04.011>

673 Petticrew, M., & Roberts, H. (2006). Chapter 1: Why do we need systematic reviews? *Systematic*  
674 *reviews in the social sciences: A practical guide* (1st ed., pp. 1). Oxford: Blackwell Publishing  
675 Ltd.

676 Phoenix, C., & Orr, N. (2014). Pleasure: A forgotten dimension of physical activity in older age. *Social*  
677 *Science & Medicine* (1982), 115, 94-102. doi:10.1016/j.socscimed.2014.06.013 [doi]

678 Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change.  
679 *American Journal of Health Promotion : AJHP*, 12(1), 38-48.

680 Rimmer, J. H., Riley, B., Wang, E., Rauworth, A., & Jurkowski, J. (2004). Physical activity participation  
681 among persons with disabilities: Barriers and facilitators. *American Journal of Preventive*  
682 *Medicine*, 26(5), 419-425. doi:10.1016/j.amepre.2004.02.002 [doi]

683 Rollnick, S., Miller, W. R., & Butler, C. C. (2008). *Motivational interviewing in health care: Helping*  
684 *patients change behavior*. New York, United States: The Guilford Press.

685 Saebu, M., & Sorensen, M. (2011). Factors associated with physical activity among young adults with  
686 a disability. *Scandinavian Journal of Medicine & Science in Sports*, 21(5), 730-738.  
687 doi:10.1111/j.1600-0838.2010.01097.x [doi]

- 688 Schinke, R. J., & Blodgett, A. T. (2016). Embarking on community based participatory action research:  
689 A methodology that emerges from (and in) communities. In B. Smith, & A. C. Sparks (Eds.),  
690 *Routledge handbook of qualitative research in sport and exercise* (First Edition ed., pp. 88-99).  
691 London: Routledge.
- 692 Schinke, R. J., Smith, B., & McGannon, K. R. (2013). Pathways for community research in sport and  
693 physical activity: Criteria for consideration . *Qualitative Research in Sport, Exercise and Health*,  
694 5(3), 460-468. doi:<http://dx.doi.org/10.1080/2159676X.2013.846274>
- 695 Schwarzer, R., Lippke, S., & Luszczynska, A. (2011). Mechanisms of health behavior change in persons  
696 with chronic illness or disability: The health action process approach (HAPA). *Rehabilitation*  
697 *Psychology*, 56(3), 161-170. doi:10.1037/a0024509 [doi]
- 698 Sheeran, P. (2002). Intention-behavior relations: A conceptual and empirical review. *European*  
699 *Review of Social Psychology*, 12(1), 1-36. doi:10.1080/14792772143000003
- 700 Sirriyeh, R., Lawton, R., Gardner, P., & Armitage, G. (2012). Reviewing studies with diverse designs:  
701 The development and evaluation of a new tool. *Journal of Evaluation in Clinical Practice*, 18(4),  
702 746-752. doi:10.1111/j.1365-2753.2011.01662.x [doi]
- 703 Smith, B., Bundon, A., & Best, M. (2016). Disability sport and activist identities: A qualitative study of  
704 narratives of activism among elite athletes' with impairment. *Psychology of Sport and Exercise*,  
705 26, 139-148. doi:<http://dx.doi.org/10.1016/j.psychsport.2016.07.003>
- 706 Smith, B., & McGannon, K. R. (2017). Developing rigor in qualitative research: Problems and  
707 opportunities within sport and exercise psychology. *International Review of Sport and Exercise*  
708 *Psychology*, doi:10.1080/1750984X.2017.1317357
- 709 Smith, B., & Sparkes, A. C. (2012). Narrative analysis in sport and physical culture. In K. Young, & M.  
710 Atkinson (Eds.), *Qualitative research on sport and physical culture* (First ed., pp. 81-101).  
711 Bingley, United Kingdom: Emerald Press.
- 712 Smith, B., Perrier, M. J., & Martin, J. J. (2016). Disability sport: A partial overview and some thoughts  
713 about the future. In R. Schinke, K. R. McGannon & B. Smith (Eds.), *Routledge international*  
714 *handbook of sport psychology* (pp. 296-303). London, United Kingdom: Routledge.
- 715 Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning,  
716 self-efficacy, and action control in the adoption and maintenance of physical exercise.  
717 *Psychology and Health*, 20(2), 143-160. doi:<http://dx.doi.org/10.1080/08870440512331317670>
- 718 Spata AV. (2003). Developmental research. *Research methods. science and diversity*. (pp. 231-237).  
719 New York, USA: John Wiley & Sons.
- 720 Sweet, S. N., Martin Ginis, K. A., & Latimer-Cheung, A. E. (2012). Examining physical activity  
721 trajectories for people with spinal cord injury. *Health Psychology : Official Journal of the*  
722 *Division of Health Psychology, American Psychological Association*, 31(6), 728-732.  
723 doi:10.1037/a0027795 [doi]
- 724 Tamminen, K. A., & Bennett, E. V. (2017). No emotion is an island: An overview of theoretical  
725 perspectives and narrative research on emotions in sport and physical activity. *Qualitative*  
726 *Research in Sport, Exercise and Health*, 9, 183-199. doi:10.1080/2159676X.2016.1254109

727 Thomas, K. J., Wise, H. H., Nietert, P. J., Brown, D. D., Sword, D. O., & Diehl, N. S. (2011). Interaction  
728 with a health care professional influences change in physical activity behaviors among  
729 individuals with a spinal cord injury. *Topics in Spinal Cord Injury Rehabilitation*, 17(1), 94-106  
730 13p. doi:10.1310/sci1701-94

731 Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: A literature review.  
732 *Journal of Advanced Nursing*, 50(2), 204-211. doi:JAN3380 [pii]

733 Warm, C. A., Belza, B. L., Whitney, J. D., Mitchell, P. H., & Stiens, S. A. (2004). Lifestyle physical  
734 activity for individuals with spinal cord injury: A pilot study. *American Journal of Health  
735 Promotion : AJHP*, 18(4), 288-291.

736 Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A  
737 meta-analysis of the experimental evidence. *Psychological Bulletin*, 132(2), 249-268. doi:2006-  
738 03023-004 [pii]

739 Williams, T. L., Smith, B., & Papathomas, A. (2014). The barriers, benefits and facilitators of leisure  
740 time physical activity among people with spinal cord injury: A meta-synthesis of qualitative  
741 findings. *Health Psychology Review*, 8(4), 404-425.  
742 doi:<http://dx.doi.org/10.1080/17437199.2014.898406>

743 Williams, T. L., Ma, J. K., & Martin Ginis, K. A. (2017). Participant experiences and perceptions of  
744 physical activity-enhancing interventions for people with physical impairments and mobility  
745 limitations: A meta-synthesis of qualitative research evidence. *Health Psychology Review*, 11(2),  
746 179-196. doi:10.1080/17437199.2017.1299027 [doi]

747 Ziegelmann, J. P., Luszczynska, A., Lippke, S., & Schwarzer, R. (2007). Are goal intentions or  
748 implementation intentions better predictors of health behavior? A longitudinal study in  
749 orthopedic rehabilitation. *Rehabilitation Psychology*, 52(1), 97-102. doi:10.1037/0090-  
750 5550.52.1.97

751  
752  
753

754 Fig 1. The model of the health action process approach (HAPA).

755

756 Fig 2. PRISMA Flow diagram.

757

758

759