

RESEARCH

The Development and Evaluation of a Participant Led Physical Activity Intervention for People with Disabilities Who Intend to Become More Active

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Objective: People with disabilities are amongst the most inactive people in the community. In addition their high levels of inactivity, their sedentary time is also rising. Previous research has acknowledged that intention to change their current behaviour is a key element to promote physical activity for inactive people with disabilities. The main purpose of this study was therefore to specifically develop and evaluate a 30 week participant-led physical activity programme for inactive people who intend to become physically active. The second purpose was to explore positive and negative experiences of people with disabilities during the process of becoming physically active.

Materials and Methods: We used a convergent parallel mixed method design. We used thematic analysis to analyse data from focus groups and Friedman tests to determine differences in physical activity, sedentary time and self-efficacy at baseline, week 12 and week 30. Post hoc tests were performed using Wilcoxon tests to determine any significant short- or long-term differences in physical activity, sedentary time and self-efficacy.

Results: 15 participants completed the programme, showing significant decreases in sedentary time as well as increases in physical activity levels and self-efficacy. Results from the focus groups indicated that maintaining regular physical activity is a complex process. Elements such as action planning and coping strategies helped participants to increase and maintain their activity levels.

Discussion: This study provides strong indications to promote physical activity for inactive people with disabilities by focusing on reducing sedentary time and promoting more activity throughout the day.

Keywords: Disability; Physical activity; Sedentary time; Community based research; Health Action Process Approach

Introduction

People with disabilities are amongst the most inactive people in the community. For example, In 2016, 51% of people in UK with disabilities participate physical activity less than 30 minutes per week compared to 21% of their peers without disabilities (Sport England, 2017). Despite this, research has shown that increased physical activity levels cannot only reduce people with disabilities' chances of cardiovascular diseases and obesity, but also reduce mental health related conditions such as depression and loneliness (Hicks et al., 2003; Kinne, Patrick & Doyle, 2004).

In addition to physical inactivity, the levels of sitting time or sedentary time are also rising in populations with disabilities (World Health Organisation, 2011). Sedentary time in this study is defined as 'any waking behaviour characterised by an energy expenditure ≤ 1.5 Metabolic Equivalents (METs) while sitting or reclining' (Sedentary Behaviour Research Network, 2012), such as time spent sitting at a desk, reading, or sitting or lying down to watch television (Craig et al., 2003). Prolonged sedentary time implies health risks, regardless of a person's level of physical activity. In other words, a person could be regularly physically active, but if they have an otherwise sedentary lifestyle their health could still be at risk. The World Health

Organisation has, therefore, made it an international public health priority to reduce sedentary time and increase physical activity levels (World Health Organisation, 2011).

One innovative way to promote physical activity and reduce sedentary time is to use a theoretical model to help understand which conditions are crucial to change behaviour (i.e. become physically active). For example, in a recent special section on Disability Research in Sport and Exercise, Martin Ginis and Smith (2018) highlighted the need for more theory-informed physical activity interventions. Some previous physical activity interventions on people with disabilities have used theoretical models, in particular the theory of planned behaviour (TPB; (Latimer, Martin Ginis & Arbour, 2006; Sweet, Martin Ginis & Latimer-Cheung, 2012) and the transtheoretical model (TTM; (Thomas et al., 2011; Warms et al., 2004). Both these models acknowledge that intention is a necessary and key element for behaviour change (Sheeran, 2002; Webb, Sheeran, 2006). Nonetheless, even when a person intends strongly to become physically active, this does not automatically result in an actual behaviour change (e.g. increase in physical activity levels). This observation is referred to as the 'intention-behaviour' gap (Sheeran, 2002). To bridge this intention-behaviour gap researchers have argued that behaviour change models such as TPB and TTM should be expanded by also including a volitional phase where people initiate, plan and maintain their new behaviour as well as overcoming any relapses (Sniehotta, Scholz & Schwarzer, 2005; Gollwitzer, Sheeran, 2006; Hagger, Luszczynska, 2014). This theoretical expansion would then create a distinction between a motivational phase; where people are motivated to change their current behaviour and a volitional phase; where people's intentions are actually implemented (Sniehotta et al., 2005). The Health Action Process Approach (HAPA) developed by Ralf Schwarzer is a theoretical model that includes both a motivational and a volitional phase (Schwarzer, Lippke & Luszczynska, 2011), and has previously been used in research on promoting physical activity for people with disabilities (Martin Ginis et al., 2013; Latimer et al., 2006; Arbour-Nicitopoulos, Martin Ginis & Latimer, 2009; Arbour-Nicitopoulos et al., 2014).

According to the HAPA model (**Figure 1**) people can be categorised in three stages of behaviour change, namely pre-intenders, intenders and actors (Schwarzer et al., 2011). Pre-intenders are people who are not physically active and need to develop intention to change their physical activity level by acknowledging the risks their current physical inactivity implies (*risk perception*), considering pros and cons (*outcome expectancies*) of becoming physically active and need to believe in their capacity to be able to become physically active (*task self-efficacy*) in order to be ready to change their current behaviour (Schwarzer et al., 2011). Intenders are people who are motivated to change but have not acted on this change. That is, their intention to become physically active needs to transform into an actual behavioural change. This may be

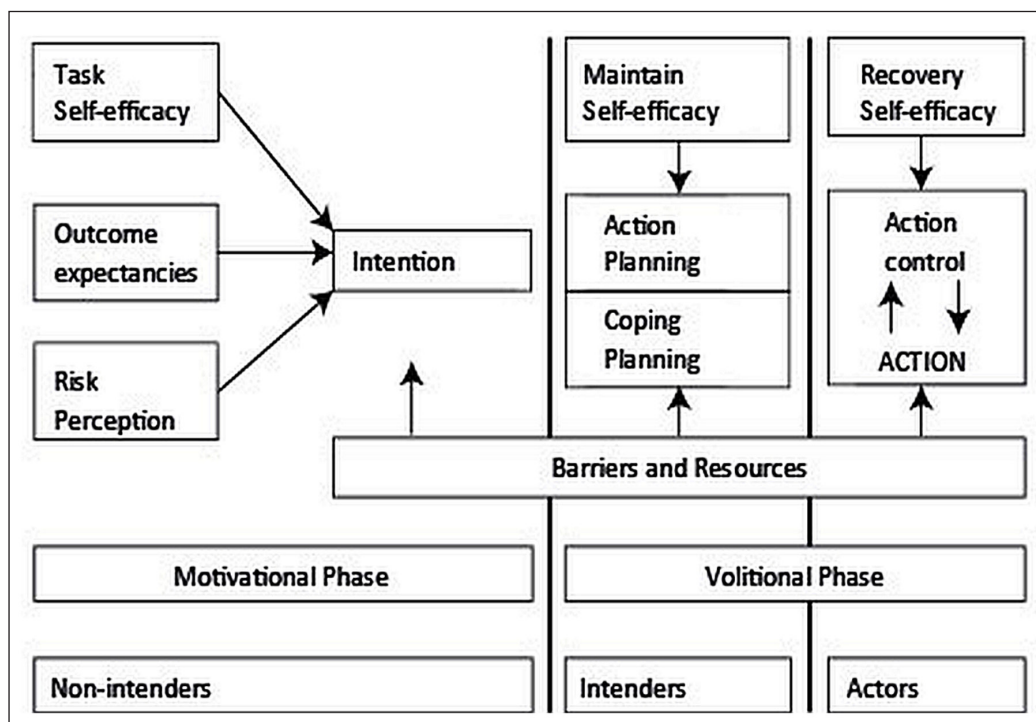


Figure 1: The model of the Health Action Process Approach (HAPA).

achieved by using self-regulatory skills and strategies, such as planning when, where and how they will become physically active (*action and coping planning*), as well as having the confidence that they are able to maintain the physical activity on a regular basis despite facing possible barriers (*maintenance self-efficacy*) (Schwarzer et al., 2011). Actors are considered as people who have transformed their intention into action. In order to maintain their new behaviour it is important that 'actors' remain confident of sustaining their physical activity levels and also overcoming any relapses that might jeopardize these physical activities (*maintenance and recovery self-efficacy*). Monitoring the prescribed physical activity plan and meeting its requirements (*action control*) are also important to maintain for actors (Schwarzer et al., 2011).

In this study we have specifically focused on intenders for several reasons. First, to successfully increase physical activity levels in people with disabilities it is crucial that people are highly intended to start the process of becoming physically active. For example, Smith et al. (2016) recommended that more attention should be given to identifying people as intenders and determining different possibilities to promote physical activity among those who are ready to become physically active (Smith, Perrier & Martin, 2016). Second, Latimer-Cheung et al. (2013) have emphasised that intenders are the ideal target for physical activity interventions because intenders are more ready to change their current physical activity level than pre-intenders (Latimer-Cheung et al., 2013). We therefore decided to develop a physical activity promotion program specifically for intenders with disabilities.

In a recent special section on Disability Research in Sport and Exercise, Martin Ginis and Smith (2018) have advocated for more community based research, as there is a need to work *with* people with disabilities rather than *on* them in physical activity research. Community based research suggests that the community (e.g. people with disabilities) themselves are the experts of their needs, which is why the people in the community should direct research by identifying relevant research topics or methods (Schinke, Smith & McGannon, 2013). Consequently community based research should be built on the needs, interests and living conditions of community members, rather than on the researcher's interests and conditions (Schinke et al., 2013). In line with community-based research principles we therefore worked with people with disabilities where the people with disabilities took the lead in making the decisions regarding the content of their tailor-made physical activity program.

To date, there have only been a few studies grounded in behaviour change theory using a community based research approach with people with disabilities who are categorised as intenders to become more physically active. These studies have focused on physical activity interventions to increase physical activity levels of intenders with disabilities and included elements such follow up meetings and questionnaires to monitor participants' progress (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Latimer et al., 2006; Warm's et al., 2004). Even though these interventions successfully improved physical activity levels of intenders with disabilities, the content of the interventions were more often based on experience rather than extensive scientific evidence. To ensure our physical activity program is evidence-based we therefore first conducted a systematic review focusing on elements or behaviour change techniques (BCTs) in previous interventions that successfully increased physical activity levels of intenders with disabilities, which is published elsewhere (Jaarsma, Smith, 2017). In this systematic review we included seven effective studies that reported effective BCTs such as self-monitoring of behaviour, providing information on the consequences of behaviour, barrier identification/problem solving, action planning and goal setting (Jaarsma, Smith, 2017). We adopted all effective BCTs identified in the systematic review to develop a physical activity promotion program for intenders with disabilities.

Against the abovementioned gap in behaviour change research, the main purpose of this study was to develop and evaluate a 30-week evidence-based participant-led physical activity programme for people with disabilities ready to become physically active. The second purpose of this study was to explore the positive and negative experiences of people with disabilities during the process of becoming physically active, i.e. moving from the intender to the actor stage.

Materials and methods

The physical activity promotion program received ethical approval from the Science, Technology, Engineering and Mathematics Ethical Review Committee of the University of Birmingham (ERN_16-0311).

Study design, participants and recruitment

In this study we have used a convergent parallel mixed method design where quantitative and qualitative data were collected in a similar timeframe. We used this design to be able to explain the quantitative findings with the help of qualitative data that were collected simultaneously (Creswell, 2015). Using a mixed method

design helped us to describe the outcomes of the programme to increase the confidence in our findings (Creswell, 2015). In addition the qualitative data also provided an insight in how people with disabilities experience the process of becoming physically active. Prior to the start of the program both authors have sufficient training and experience in conducting and analysing qualitative data as well as using a mixed method design.

Interested people contacted the first author via email to express their interest in taking part in the study. Potential participants then received a participation information sheet via email and additional questions to ensure they would meet the inclusion criteria for intenders. These questions included: 'Why would you like to take part in this study?'; 'Why would you like to become physically active now?'; 'Are you ready to become physically active in the next few weeks?'. When participants answered that they were ready to change their current behaviour as well as relevant reasons for the change (e.g. stay independent, need to increase strength, doctor's orders), they would be considered intenders and eligible for this study. The first author would then send them an email with a consent form and the request to complete and return it.

Participants were included in the intervention if they were: 18 years or older; identified themselves with at least one of the following disability groups: amputation, cerebral palsy, hearing impairment, learning disability, restricted growth, spinal cord injury or visual impairment; and were not physically active at the start of the program but were ready to become physically active. Inclusion criteria were developed in collaboration with Activity Alliance and seven National Disability Sports Organisations (NDSOs), namely British Blind Sport, CP sport, Dwarf Sport Association UK, Limb Power, Mencap, WheelPower and UKDeafSport. Potential participants were recruited through Activity Alliance and the NDSOs as well as through local disability organisations such as local councils or Centres of Independent Living.

Intervention

To develop an evidence-based physical activity promotion program we first conducted a systematic review focusing on effective behaviour change techniques (BCTs) of a physical activity program for people with disabilities, which we published elsewhere (Jaarsma, Smith, 2017). Effective BCTs identified in this systematic review included: self-monitoring change in behaviour (e.g. use questionnaires); identifying barriers and suggestions to solve problems; setting realistic goals; and using action plans. The complete results of this systematic review can be found elsewhere (Jaarsma, Smith, 2017). As part of the participant led approach for this study we also interviewed 14 people with disabilities (2 from each disability group) to discuss the BCTs found in the systematic review (Jaarsma, Smith, 2017). During these semi-structured interviews, people with disabilities were asked questions such as what their ideal physical activity program would look like and what would help them to become and stay motivated to participate in physical activity. The interviewees did not mention any new BCTs during the interviews, indicating the results of the systematic review matched the needs of potential participants. Based on these results we therefore developed the following 30 week intervention (also see **Figure 2**).

Baseline

Participants who agreed to take part in the study were divided into groups of 3 to 5 participants based on their location and were contacted to schedule the first workshop of the programme at a location convenient for the participants. They also completed questionnaires about their physical activity levels (i.e. International Physical Activity Questionnaire; Craig et al., 2003) and self-efficacy towards physical activity (Exercise Self-Efficacy Scale; Kroll et al., 2007).

Week 1

Workshops were delivered by the first author who had been trained in using motivational interviewing to lead workshops. The emphasis of the workshop in week 1 was on discussing reasons for becoming physically active and addressing potential barriers. As part of the participant-led approach in this study, participants also talked about what type of activity they would like to do. The workshop leader then provided physical activity possibilities for this activity in their area, either during the workshop or in the days following the workshop. During the last part of this workshop participants and the workshop leader worked together to co-create individual action plans for the next six weeks. Also in accordance with community based research, the participants decided when, where, how often, how long and with whom they would participate in physical activities which they wrote down in the action plan that was provided by the workshop leader. A template of the action plan can be found in Appendix 1.

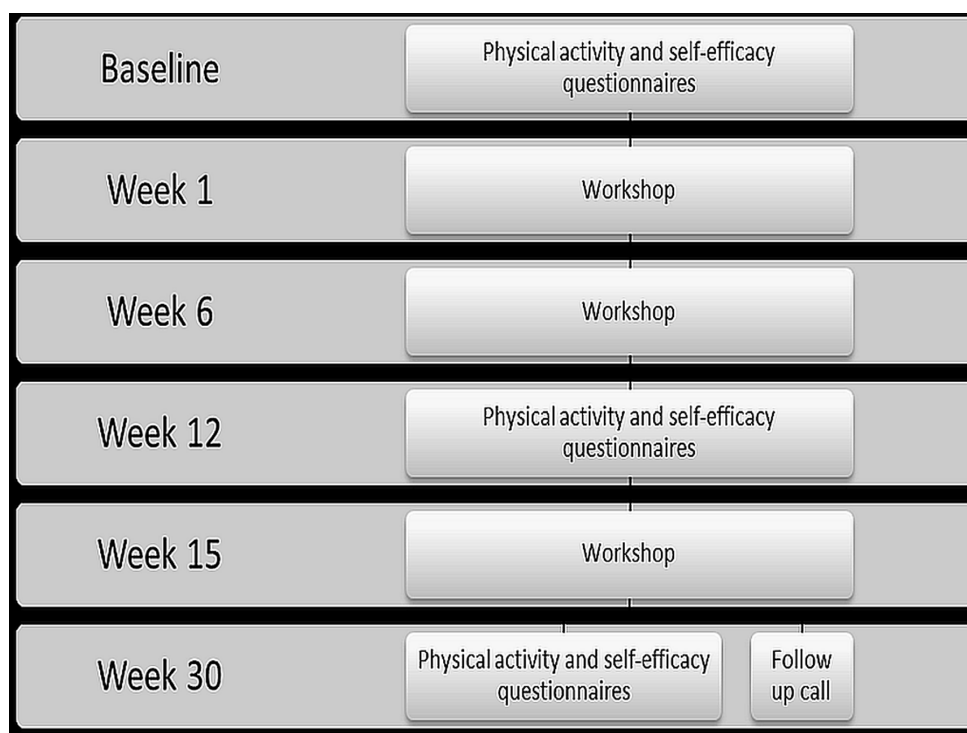


Figure 2: Outline of the physical activity program.

Week 6

During the workshop in week 6 participants met again to discuss their physical activity experiences in the last six weeks. They addressed positive experiences as well as possible setbacks that might have occurred in the past six weeks. Participants also revised their action plan and adjusted it if needed. Reasons for adjusting their action plans included not liking their current physical activity or not being able to exercise as often as they initially planned.

Week 12

In week 12 the participants were asked to complete questionnaires about their physical activity levels and self-efficacy they received via email or mail. These results were compared with the results from the questionnaires in week 1 to determine any short term effects.

Week 15

In week 15 the participants met again during another workshop to mark the halfway point of the program. During these workshops participants discussed their current physical activity routine as well as their experiences of becoming physically active in the last 15 weeks. If needed, the participants or workshop leader helped other participants to provide suggestions to cope with any issues that might have occurred in the last 15 weeks.

Week 30

In week 30 the participants completed questionnaires about their physical activity level and self-efficacy for the third and final time. During a follow up phone call with the first author participants discussed their current physical activity level, reflected on their participation in the programme and their journey of becoming physically active. Finally the workshop leader asked participants how the program could be improved.

Outcome variables

Physical activity levels including sedentary time

Physical activity levels and sedentary time were measured by using the short version of the International Physical Activity Questionnaire (IPAQ). This questionnaire has shown acceptable test-retest reliability and constructs validity in previous research (Craig et al., 2003) and has been previously used to determine physical activity levels of people with disabilities (Saebu, Sorensen, 2011; Keegan et al., 2012).

The IPAQ contained questions regarding minutes of vigorous activities, moderate activities, walking/wheeling and sedentary time in the last 7 days. We expanded the explanation for walking in this study to include both walking and wheeling: 'Think about the time you spent walking/wheeling in the last 7 days. This includes walking or wheeling at work and at home, to travel from place to place, and any other walking or wheeling that you have done solely for recreation, sport, exercise, or leisure'. This to ensure questions related to walking/wheeling were applicable to all disability groups. Minutes and hours per day of vigorous and moderate activity, walking and sedentary time were converted to METs per week according to the guidelines for processing and analysis the IPAQ scores (IPAQ group, 2010), to allow comparison between the different activities. The IPAQ was also provided in an easy read version tested prior to the start of the program by a test panel from Mencap, a UK charity that for people with a learning disabilities as well as their parents and carers.

Self-efficacy

Self-efficacy was measuring by the Exercise Self-Efficacy Scale (ESES). This scale was developed especially for people with spinal cord injuries and has demonstrated satisfactory reliability and validity in previous research (Kroll et al., 2007). Each of the 10 statements in the ESES could be scored from 1 (not at all true) to 4 (exactly true). The total score was the sum of the scores of the 10 statements. The minimum score was 10 and the maximum score was 40. A higher score indicated higher physical activity self-efficacy. In our study we made a small adjustment to the scale, namely replacing 'Spinal Cord Injury' with 'Disability' in statement 9, to make it applicable for different disability groups. Similar to the IPAQ, the ESES was also provided in an easy read version that was tested prior to the start of the program by a test panel from Mencap.

Positive and negative experiences of becoming physically active

To get an insight into the process becoming physically active and transferring from the intender to the actor stage, we recorded the discussions during the workshops in week 1, week 6 and week 15. In week 1, participants specifically discussed their physical activity history and reasons why they were no longer physically active. If they had not been previously active, they explained what had prevented them in the past from becoming physically active. In week 6 and week 15 participants discussed their experiences of becoming physically active. Both positive experiences and negative setbacks during the program were addressed. Participants also discussed how they could overcome any barriers or setbacks that were experienced. In week 30 the participants individually caught up with the first author during a follow up phone call to discuss their current physical activity level and experiences of taking part in the 30-week program. Participants could provide suggestions to improve the program.

Data Analysis

Demographics such as age, gender and living arrangements were collected as part of the baseline questionnaires. Friedman tests were used to compare the scores on the IPAQ and ESES between baseline, week 12 and week 30. A Wilcoxon rank test was used for any 'post-hoc' tests with a Bonferonni adjustment for alpha (i.e. alpha divided by the number of comparisons). Finally we calculated effect sizes (r) for significant or near significant differences between baseline, week 12 and week 30 for the IPAQ and ESES. Effect sizes of 0.1, 0.3 and 0.5 are considered small, medium and large respectively (Field, 2005). All analyses were conducted using SPSS statistical software (IBM Corp., Released 2016). The alpha level for statistical significance was set at 0.05 for all tests in this study, except post-hoc tests.

The qualitative data collected in week 1, week 6, week 15 and week 30 was analysed using a thematic analysis, influenced by Braun and Clarke's six-phase heuristic, to organise themes in the data (Braun, Clarke & Weate, 2016). In the first phase the first author would get familiarised with the data, after which they generated codes (i.e. second phase) and identified potential themes (third phase). During the fourth phase both authors adopted the role of critical friends by creating a space to challenge each other's construction of themes (Smith, McGannon, 2018). In the fifth phase both researchers continued the position of critical friends to further refine the themes, identified the essence of each theme and ensured each theme would fit into the purpose of this study. In the sixth and final stage both authors would work together to writing up the report (i.e. this paper; (Braun et al., 2016)).

Results

Descriptives

Twenty participants representing seven different disability groups were included in this study. Mean age (SD) was 42.42 (12.84) years and ranging from 21 to 60 years of age (also see **Table 1**). Most participants lived independently (60%) and 50% was male. Almost all participants had been physically active in the past, but

Table 1: Characteristics of the participants.

	<i>n</i>	%
Age (years)		
Mean	42.42	
SD	12.84	
Gender		
Male	10	50
Female	10	50
Disability group*		
Amputation	1	5
Cerebral Palsy	3	15
Hearing Impairment	5	25
Learning Disability	5	25
Restricted Growth	2	10
Spinal Cord Injury	3	15
Visual Impairment	5	25
Living arrangements**		
Independent alone	6	30
Independent, with spouse and/or children	6	30
Living at home (with parents)	5	25
Residential care	1	5
Other	2	10
PA history		
Yes	18	90

* Four participants had multiple disabilities.

** Other living arrangements were living with four housemates and living with a niece.

were not physically active at the start of the program. Fifteen participants completed the 30 week program, leaving 5 participants to drop out during the program. Reasons for dropping out were predominantly medical reasons such as illnesses or injuries (not related to physical activities) and deterioration of their disability or secondary conditions related to disability.

Purpose 1: Evaluation of a physical activity promotion program for intenders with disabilities

The following section describes the significant changes in physical activity levels and self-efficacy of the participants between baseline, week 12 and week 30 as well as comments to support these changes.

Physical activity

We conducted non-parametric Friedman test of differences among repeated measures to determine significant differences in physical activity levels between baseline, week 12 and week 30, which were not statistically significant ($\chi^2(2) = 4.345, p = 0.114$). We found no significant differences for vigorous activity at baselines and week 30 (Z-score = $-0.334, p = 0.731$) or between week 12 and week 30 (Z-score = $-1.428, p = 0.153$). However, there was a trend towards a significant increase in vigorous activity between baseline and week 12 (Z-score = $-1.826, p = 0.068$). Effect size for these differences between baseline and week 12 was small (0.28).

We found a significant difference in moderate activity between baseline, week 12 and week 30 ($\chi^2(2) = 6.095, p = 0.049$). Post hoc tests indicated no significant differences for week 12 vs week 30 (Z-score = $-0.550, p = 0.58$). However there was a trend towards a significant decrease in METs of moderate activity between baseline vs week 12 (Z-score = $-1.684, p = 0.092$) and near significant increase baseline vs week 30 (Z-score = $-1.824,$

$p = 0.068$). Effect sizes for baseline vs week 12 ($r = 0.32$) and baseline vs week 30 ($r = 0.34$) both demonstrated intermediate effects.

Levels of walking or wheeling did not indicate any differences between baselines, week 12 and week 30 ($\chi^2(2) = 1.442$, $p = 0.486$). All the differences over time can be seen in **Figure 3**.

These changes in vigorous and moderate physical activity levels were supported by the comments made by the participants during the workshops. The short term increase in physical activity levels could be explained by the fact that participants were highly motivated to become physically active and start the physical activity program. One participant with a visual impairment explained how they started becoming physically active by joining her friend: "My friend suggested joining a judo lesson. I never considered judo but I joined her and had a lot of fun. I'll definitely try it again!"

Also participants seemed to prefer including small amounts of vigorous activity in their day, which could explain why vigorous activity increased in the first 12 weeks, while moderate activity decreased. A participant with a Spinal Cord Injury explained how they were struggling to include physical activity in a work day:

It's just hard because of my job. When I'm working I forget time and at the end of the day I'm too tired to do exercise. I try to include bouts of at least 10 minutes of exercise [i.e. vigorous physical activity] during the day, but if a work issue comes up, then I'll have to deal with that first.

The biggest differences were found in participants' sedentary time, which significantly decreased throughout the intervention ($\chi^2(2) = 8.897$, $p = 0.012$). Post hoc analysis indicated that sedentary time significantly decreased between baseline and week 12 (Z score = -2.536 , $p = 0.011$). There was also a near significant decrease in sedentary time between baseline and week 30 (Z score = -2.253 , $p = 0.024$). Effect size for baseline vs week 12 was $r = 0.48$, whereas the effect size for the difference between baseline and week 30 was $r = 0.43$. Both were intermediate effects. **Figure 4** shows the results of the IPAQ including sedentary time.

These results were again supported by discussions between participants during the workshops. A participant with Cerebral Palsy explained that by the end of the program they realised that they were more active throughout the day, because they simply had more energy:

Before this program I would come home from work and sit on the couch all night. Now when I come home, I might do a quick wash, tidy up and go to the cinema with friends. I just feel a lot more energetic.

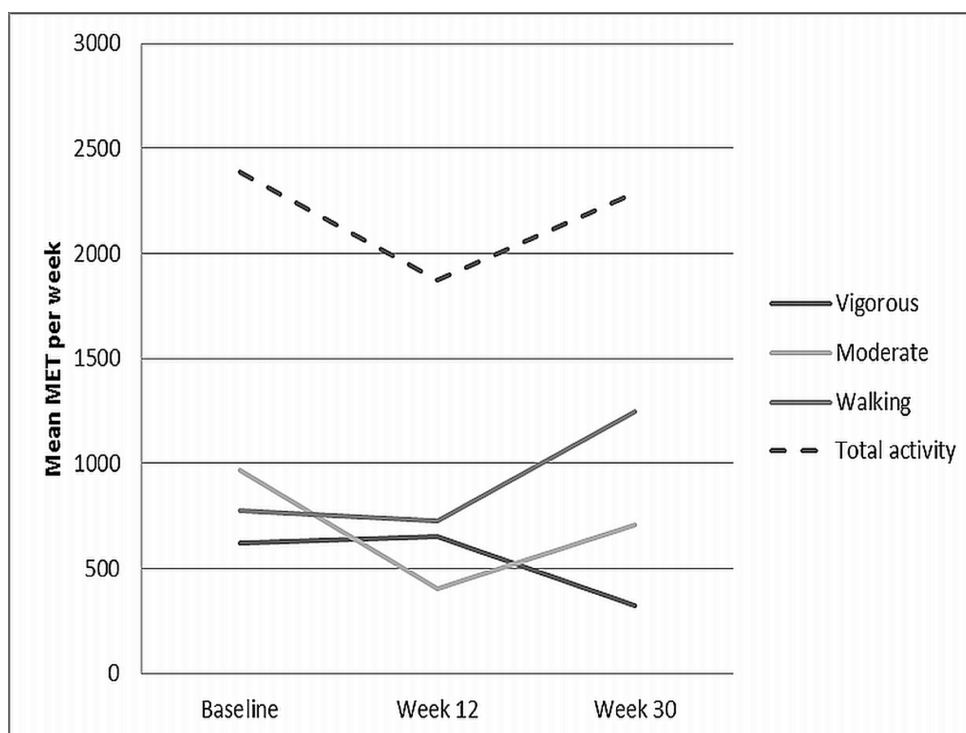


Figure 3: Mean METs per week per activity.

Other participants agreed and explained they needed to mentally be ready to become physically active and see the benefits. For example a participant with Cerebral Palsy mentioned: 'Now that I have that mental shift to get physically active, I see more and more ways to include physical activity in my day.'

Self-efficacy

A Friedman signed-ranked test showed a significant increase in self-efficacy between baseline, week 12 and week 30 ($\chi^2(2) = 22.082, p < 0.001$). Post hoc analysis using Wilcoxon tests showed a significant increase in ESES score for all stages of the program (**Figure 5**): baseline vs week 12: Z score $-2.552, p = 0.011$; baseline vs

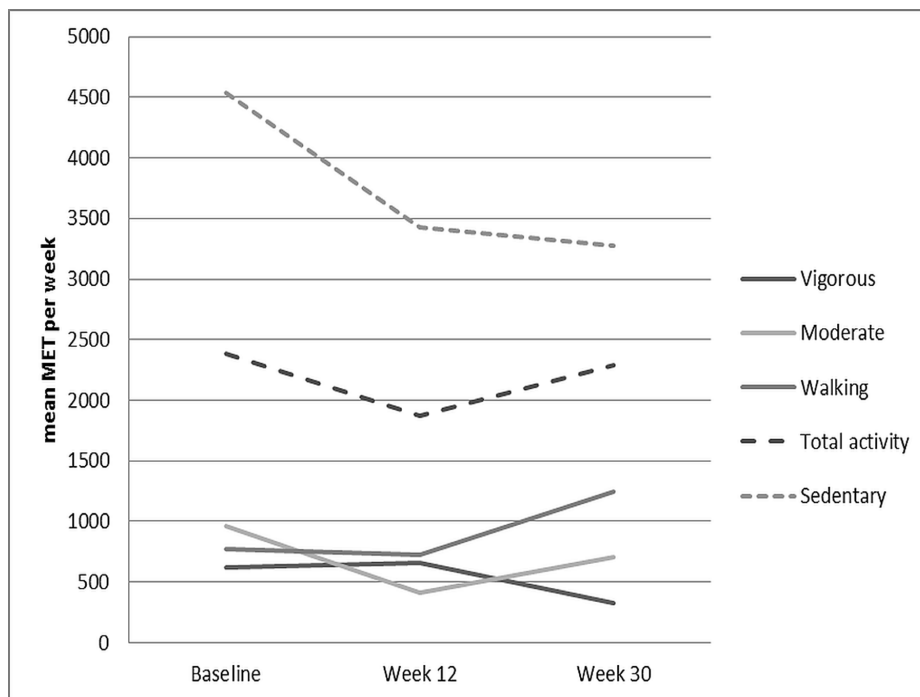


Figure 4: Mean METs per week per activity, including sedentary time.

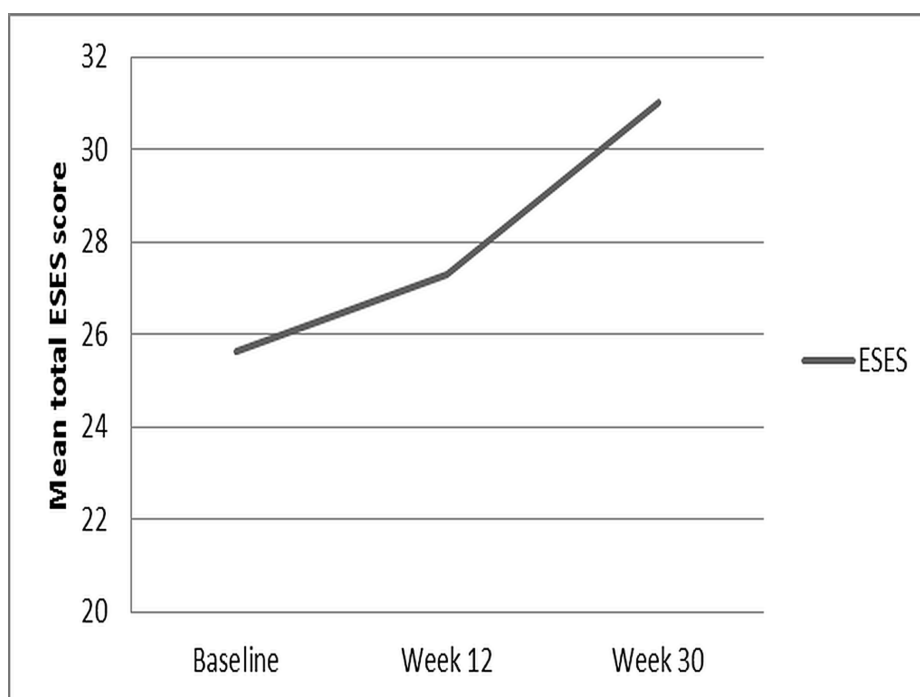


Figure 5: Mean total ESES scores for baseline, week 12 and week 30.

week 30: Z score -3.184 , $p = 0.001$; week 12 vs week 30: Z score -2.991 , $p = 0.003$. The corresponding effect sizes were 0.48, 0.60 and 0.57 respectively, which showed a large effect.

During the workshops participants explained how they felt becoming physically active. In the first few weeks a visual impaired participant explained they would sometimes feel insecure when taking part in physical activities:

I started with a Pilates class and enjoyed it more than I thought I would. Even though I was standing at the back of the class I was still able to do the exercise (i.e. despite my visual impairment) also because the trainer explained it well.

However, after 15 weeks participants had often developed a routine in being physically active which made it easier to stick to their physical activity plan. The same participant with a visual impairment now explained they felt more confident when exercising: "I realise it is actually easier than I thought" [i.e. to start exercising]. "First I wouldn't go without my friend, but now I feel confident enough to go by myself."

Discussing setbacks and how to overcome these difficulties also helped participants to stay motivated, even if they were not able to be active at that moment. A participant with a Spinal Cord Injury explained that: "despite my shoulder injury I try to fit in as much exercise as possible. I'm already setting new exercise goals, so hopefully I'll be able to use my shoulder again soon."

Looking back, the majority were happy that they decided to take part in this intervention and found it easier to become physically active than anticipated. A participant with a visual and hearing impairment explained it as followed:

Looking back it actually was a lot easier to start becoming active than I thought. I just needed that last push to get started and the program definitely helped with that. The action plan also helped to break up the exercise in small chunks so that it was quite easy to include it in my day.

Purpose 2: explore the positive and negative experiences of people with disabilities during the process of becoming physically active

The qualitative results provide insights into the process of becoming physically active or in other words how to move from the intender to the actor phase and develop a physical activity routine. This is why the participants' experiences of becoming physically active are presented in chronological order. The main qualitative results identified through a thematic analysis (including quotes from participants) within the different stages of becoming physically active are described below.

Week 1

Barriers to physical activity. In week 1, participants discussed their positive and negative experiences with physical activity in the past. Reasons for not being active before the start of the programme included difficulties with accessibility to facilities and equipment:

I went to the local gym for a while, but I could only access a few of the equipment that they had in there. There wasn't enough room to make the transfer from my chair to the equipment. I also couldn't fix my wheelchair properly which meant that I would tip over.

Another frequently experienced barrier was the high costs of exercising. For example, one participant explained the extra expenses they had to make for their carer to help with exercising:

If I want to swim I need a carer with me in the pool for safety reasons. But this means I have to pay two entrance fees as well as transport costs. Which means a 20 minute swim, which is all I can do, will cost me over 20 pounds. That's far too expensive to do every week.

Finally, participants also expressed difficulties with finding physical activity opportunities applicable for them. They would explain not knowing what kind of activities were available and where they would be able to find information about these activities.

I moved here about 6 months ago and would love to be active again. I know I need to be more active again. It's just that I have no idea what exercise I could do and what's out there in my area.

Reasons to become physically active. In addition to barriers, participants also noted several reasons why they wanted to become physically active now. All participants expressed they wanted to get active for health benefits. This could either be to improve their health (e.g. to lose weight or reduce their high blood pressure) or to avoid a decrease in their current physical condition:

With my condition (i.e. cerebral palsy) I can't really improve my physical fitness. However, I'd like to get active again to make sure I will keep up my current fitness level and I can stay independent. I mean I do my own transfers from my chair to my bed or a chair and I need my arms to stay strong so that I can keep doing that.

Another facilitator noted was social contacts and having fun with other people during exercise:

You know, it can get a bit lonely having a disability. I mean I got my family and my colleagues, but sometimes you want to meet other people. I remember from being in the rehab centre, I really enjoyed playing wheelchair basketball. I wasn't any good, but I had lots of fun and it was nice not having to explain my disability.

Many participants expressed the need for information in order to become physically active as one of the identified barriers that prevented them from taking part in physical activity: "I just have no idea what is out there and what I could do with my disability, so information about different taster sessions would definitely help me."

Some participants expressed the need to design and implement an action plan. Participants stated that having a physical exercise schedule would help motivate them to keep doing the exercise: "I'd really like it if you could give me an exercise schedule that I have to stick to. Especially if I know that we'll be meeting in a few weeks to discuss it, then I don't want to let you down."

Lastly participants also explained they would like to work together with the professional working to make a tailor made exercise plan. Several participants mentioned that a general exercise schedule provided by a GP or physiotherapist did not work for them. They preferred to choose their own an activity, something they liked, to ensure they would be able to stay active. They preferred to be in control by being able to make their own decision regarding the content of their physical active plan:

I'm not going to do exercise just because my physiotherapist tells me it's good for me. At the rehabilitation centre they gave me information about exercises I should do, but they're boring so I won't do them. In the end I'd like us to find something that I can do and really like.

Week 6

Benefits of becoming physically active. After 6 weeks when the participants met again and caught up about their physical activity experiences so far, the majority of them were engaged in physical activity. Some had found a physical activity they liked and could fit into their schedule and already started developing an exercise routine. Others merely attended different taster sessions but now had a better idea of activities they would like to continue participating in. Participants at this point began recognising the many benefits of being physically active:

I started with a Pilates class and enjoyed it more than I thought I would. Even though I was standing at the back of the class I was still able to do the exercise (i.e. despite my visual impairment) also because the trainer explained it well.

Another reason to stay motivated was to see the effects of becoming physically active, for example losing weight:

Since I've started with the project I'm going to the gym at work, doing the exercises and even started running. I haven't changed my diet but have cut down the portions, as my partner is usually very generous when plating. I now lost 2 inches of my waist and my pants are a size smaller! Even on weeks where I think "I didn't do that well" I still lost 2 pounds. So obviously I found a regime that works and it motivates me to keep me going.

Having a buddy such as a friend or a PA to exercise with was also a good motivation to stay physically active, as a participant with visual impairment explains: “My friend suggested joining a judo lesson. I never considered judo but I joined her and had a lot of fun. I’ll definitely try it again!”

Another participant also with a visual impairment confirms that having a buddy or in this case a personal assistant (PA) makes it easier to keep exercising:

I got a new PA just after I started this programme and she’s happy to come to the gym or the pool with me. So because she can drive me and help me at the leisure centre, I’ve now been able to go swimming 3 times a week.

Developing a physical activity routine. The action plan that the participants set up with the program leader was very useful as a clear schedule to when to exercise:

We (i.e. me and my partner) usually go for a coffee a few times a week in the early morning. Normally I would drink a cup of coffee but now I wheel around the shopping centre, which is a lap of about a mile. I started with barely making it through one lap but after 6 weeks I can now do 3 laps and keep improving my time. It’s not a burden on my schedule because instead of coffee I now do the exercise.

After taking part in the program for several weeks, participants were getting used to their new daily routine. They changed their attitude towards physical activity:

I think the main thing I got from this project so far is my mental shift to include physical activity in my daily routine. I’m much more aware at work that I need to take breaks and do some stretching or moving. Before this project I was just completely focused on my work, but I now realise it’s not too difficult to include at least a bit of physical activity in my day.

One participant also explained that exercise had become part of their day: “In the beginning the exercise felt more like a chore and a bit of a burden to go to. But now when it’s lunch time, I think: “ok, time to go to the gym” and looking forward to it.”

Barriers and setbacks. Unfortunately, participants also experienced barriers and setbacks that prevented them from being physically active. Reasons for were not being active were attributed largely to medical reasons. These included infections, surgery or a common cold. Despite not being active, several participants expressed the intention to become active again once they are able to following medical reasons. In other words, the intervention had been provided them with the resources to jump back on the exercise wagon after an illness.

I unfortunately had to have an operation which doesn’t allow me to be active at the moment. But hopefully I’ll be able to go out and about soon, and will at least start by walking around the park and in the area to get my fitness level up again.

Other reasons for not being active were having difficulty to include physical activity in the daily schedule. Because of work hours and/or commuting it was hard to structurally include physical activity into their daily routine:

It’s just hard because of my job. When I’m working I forget time and at the end of the day I’m too tired to do exercise. I try to include bouts of at least 10 minutes of exercise during the day, but if a work issue comes up, then I’ll have to deal with that first.

One participant explained that they had to get used to including physical activity in their daily routine:

It felt a bit unnatural in the first few weeks, because I was constantly thinking whether I was doing enough exercise. I also knew that we were meeting again after 6 weeks and didn’t want to let you down by not doing anything. So after a few weeks I settled into a rhythm and now it feels much more natural.

Despite being active at the moment, participants still experienced difficulties to maintain active:

I like being active again and want to keep doing it, but it takes a lot of preparation as I need a carer to come with me. I have to make sure that is all planned ahead, because if there's no carer available I won't be able to go to the gym or the pool.

The environment or other people also acted as an unintentional barrier on occasions:

I've been doing really well going to the gym and as they have a pool there as well I decided to also try swimming again. I felt really good after finishing my swim, even though I was a bit rusty. But when staff made rude comments (even though they thought they had good intentions) I felt really bad and haven't been back since.

Week 15

Having a physical activity routine in place. During the half way mark of the project, most participants found a physical activity routine that worked for them; they were developing physical activity habits. Despite going through times when they didn't exercise as often as they would like (e.g. because of injuries or holidays) they now felt their routine was sufficiently developed to get back to it once when needed. They also reflected on the last 15 weeks and how they felt about the process of becoming physically active so far.

Most participants expressed they now felt more confident towards exercising as a result of the intervention workshop: "I realised it is actually easier than I thought" [i.e. to start exercising]. "First I wouldn't go without my friend, but now I feel confident enough to go by myself."

As a result of developing a physical activity routine, the participants could also see more opportunities to include physical activity into their day: "Now that I have that mental shift to get physically active, I see more and more ways to include physical activity in my day." This was confirmed by another participant who explained: "Even though I'm already going to gym at least twice a week, I'm now also taking the bike out at weekends more frequently."

Coping strategies to stay physically active. Even though participants might have experienced injuries, this did not keep them from wanting to get back to their physical activity routine: "Despite my shoulder injury I try to fit in as much exercise as possible. I'm already setting new exercise goals, so hopefully I'll be able to use my shoulder again soon."

Other participants also mentioned that it was now relatively easy to get back into the exercise routine after coming back from a holiday: "I have been away a lot lately and exercise while away my activity has been limited to walking. After coming back from my holiday I was able to get back to my exercise routine fairly easy."

But despite having a favoured routine in place, people still experienced barriers, whether that was related to the facilities: "I have not been able to go trampolining lately because the time the centre is open doesn't match with the time when I have help to get there."

Or because the participants needed that final push or motivation to stay physically active: "I'm very lucky to have a great carer who wants to come with me to the gym and pushes me to go as well. If she wasn't there I'm not sure if I would be as active as I am now."

Week 30

Useful tools from the programme to become physically active. At the workshop in week 30 the participants would discuss their physical activity levels and their experiences with becoming physically active one last time. The majority of the participants established an exercise routine at the end of the physical activity program that would allow them to be regularly physically active. During this workshop we would ask them how the program helped them to become physically active as well as what their goals were in terms of physical activity.

The most helpful 'tools' that participants took from the program were help with planning physical activities and coping with setbacks. The participants found the action plan that was included in the program and made it easier to start and stick to the plan they set out.

Looking back it actually was a lot easier to start becoming active than I thought. I just needed that last push to get started and the program definitely helped with that. The action plan also helped to break up the exercise in small chunks so that it was quite easy to include it in my day.

The action plan also helped to structurally plan physical activities throughout the week:

The action plan definitely helped me. I actively had to think about how much physical activity I could include in a day. It also made me realise I have so much free time in a day, once I started looking at how I spent my time in detail. Before I would come back from work and would just sit on the couch, but now I realise I can do a lot of things during that 'couch' time.

Participants explained that the program not only helped them with started exercise but also helped them if they would experience any setbacks through illness or vacation. The action plan helped to motivate participants to get back into the physical activity routine:

Because I still had the action plan from week 1, I could just use that after I got sick to slowly start exercising again. I also knew that there was a workshop coming up in the next few weeks and I wouldn't let the group down, so that definitely motivated me to get into it [i.e. the exercise].

Meeting other participants during the workshops was also a motivator to stay physically active:

When I mentioned that I hadn't been as active in the past few weeks during the workshops, the others were very supportive and helped me to think of ways to get back into the habit. I really liked that during the workshops I could speak to other people with disabilities who dealt with the same things and understood that sometimes you just don't want to exercise. But on the other hand we would also talk about how I could start again, for example by reducing the frequency or duration, and put that in the action plan for the next weeks. I guess it made me look at physical activity in a different way as I now realise that any exercise is better than no exercise at all.

When asking participants what their physical activity goals were many participants answered they would like to at least maintain their current exercise level in the long run: "I would just like to keep doing as much as I can while I can. I don't think I can do any more at the moment as my health is not that well and keeps getting worse."

In addition to maintaining their physical activity level participants were now also enjoying exercising (again):

My goals are to keep up the level of exercise I am currently on and to increase it if I can. I really enjoy exercise now and I'm happy that the program helped me to get back into exercise again. I now am excited to try more new activities such as trampolining and horse riding.

Discussion

Fifteen participants completed a 30 week tailor-made and evidence-based physical activity programme. Results indicated participants significantly decreased their sedentary time while increasing their physical activity levels. Self-efficacy also significantly increased during the program. Elements such as action planning and coping strategies helped participants to become and maintain their activity levels. In the following section we will discuss the implications and suggestions for future research of these results according to the two purposes of this study as well as the strengths and limitations of this study.

Implications and future research

Purpose 1: Evaluation of a tailor-made and evidence-based physical activity promotion program

The main purpose of this study was to evaluate our evidence-based physical activity program. When asking participants about positive aspects of this program, many indicated that setting realistic goals in their action plan were particularly helpful in becoming physically active. Breaking up the physical activity in smaller realistic goals made the transition from inactive to becoming active much easier as they were in control of how much time they would spend on physical activities during their day. The action plan also provided a very clear overview of when, where, how long and with whom the participants were exercising that day. The action plan as well as the realistic goals also helped to stay active as participants felt confident they would be able to achieve the goals they set, which was both reflecting in the significant increase on the ESES as well as in qualitative results.

Both quantitative and qualitative results indicate that participants preferred the user-led and tailor made approach of the program. Participants felt very much in control of the program, because the project leader was listening to their needs, wishes and goals with regards to their physical activity levels. They were not instructed in what activities they should do but worked together with the project leader, who guided them or provided information when needed. This also is reflected in the fact a large majority of the participants

who started the program were still physically active at the end of the 30 weeks. At the start of the program many participants explained they had been physically active in the past, but often were not able to choose the activity, intensity and frequency. For example, one participant received an exercise schedule during their stay in the rehabilitation centre but soon felt very bored with the exercises that were prescribed by the health professional. Therefore in order to increase chances of people maintaining the program and maintaining physically active in the long term, participants should be in control of what activity they would like to do and find something that meets their needs and wishes. This strategy is supported by several studies that have previously used a user-led and tailor-made approach to successfully improving physical activity levels of people with disabilities (Arbour-Nicitopoulos et al., 2009; Arbour-Nicitopoulos et al., 2014; Latimer et al., 2006; Warms et al., 2004). Reflecting on their physical activity journey at the end of the program, several participants explained it was actually easier to start becoming more active once they received the final nudge by attending the workshop and working with the project leader. This was also illustrated by the fact that all participants were still active at the end of the program.

Participants also mentioned during workshops that they felt more active, not just by including physical activity in their day, but throughout the day. One participant explained:

Before I started with this program I would get home after work and spent the rest of my evening on the couch. Now I'm still running around getting chores done or going out with friends and I hardly spend an evening on the couch anymore.

These results suggest researchers might have to move away from focusing solely on promoting physical activity for inactive people, but rather considering a 'whole-of-day' approach to first reduce sedentary time (Manns et al., 2012). This approach not only focuses on increasing moderate and vigorous physical activity but also focuses on the 'nonexercise' part of activity, which is to reduce sedentary time and increase light intensity activities (Manns et al., 2012).

Several studies adopting this 'whole-of-day' approach suggested that it might be more beneficial for inactive groups such as people with disabilities to start by focusing on the 'nonexercise' part of activity to change their physical activity levels (Manns et al., 2012; Tremblay et al., 2010). Moreover the 'whole-of-day' approach could also help with reducing barriers that prevent people with disabilities from being physically active. For example, reducing sedentary time could be a successful approach for people who are not necessarily looking for organised or structured ways to be active, such as a gym membership or participating in a structured programme at a sports club (Tremblay et al., 2007). Being more active throughout the day, rather than for example going to the gym also reduces the financial or time requirements to become physically active, as people do not have to pay a gym membership or spend money to get to the facility. Finally, previous research has shown that people benefit most from that initial start of becoming physically active (Manns et al., 2012). In other words, an inactive person who would be able to include as little as 10 minutes of physical activity in their day will experience significant health benefits such as reduced mortality from this increased physical activity level. This suggests that intenders with disabilities would benefit more from a program using a 'whole-of-day' approach to become physically active, rather than a more traditional physical activity program.

However, if this whole-of-day approach is to be adopted, this would require large changes to the current physical activity recommendations for inactive people (with disabilities). Rather than 150 minutes of moderate to vigorous activity currently recommended for adults (Department of Health and Social Care, 2011), we would encourage an 'every minute counts' approach for inactive adults which will allow to first focus on reducing people's sedentary time. This would also imply different recommendations for active and inactive people to allow for more realistic goals to becoming physically active. Once inactive people have reduced their sedentary time and are more active throughout their day, more active recommendations referring to amount of minutes and intensity per week could be introduced. This also fits with the newly published evidence-based physical activity guidelines for people with disabilities, which suggests: 'even a little movement is better than nothing' (Smith et al., 2018).

Purpose 2: positive and negative experiences of becoming physically active

The second purpose of our user-led and tailor-made physical activity program was to explore the positive and negative experiences of people with disabilities during the process of becoming physically active. The experiences discussed by the participants have shown that becoming physically active is not a linear process, but has people dealing with ups and downs. For example, in the first few weeks several participants mentioned

difficulties of getting used to including more physical activity in their day and develop a physical activity routine. Also, once a physical activity routine was established participants would sometimes experience setbacks such as injuries or illness that would prevent them from being physically active. These examples illustrate that people need coping strategies to be able to overcome these difficulties to ensure they maintain their physical activity level. That is why our program would allow participants to discuss both positive and negative experiences of becoming physically active during the workshops. During these discussions other participants and the project leader would provide suggestions that could help a participant to overcome barriers or difficulties. Once participants learned several coping skills and strategies, they explained that they were able to use them at different stages of the program. As a result participants were able to return to their physical activity routine after a holiday, illness or injury and maintain their physical activity routine until the end of the program. Identifying possible barriers as well as ways to overcome them were determined as one of the effective elements to include in interventions to help people with disabilities becoming and staying physically active (Jaarsma, Smith, 2017). Therefore future research should not only include elements such as follow up meetings and action planning, but should also include discussing coping strategies to overcoming setbacks and difficulties during the process of becoming physically active.

Strengths and limitations of the study

Study limitations include the small sample size of the study. In total 15 participants completed the 30 week program, after 20 people initially completed the baseline questionnaires and attended the first workshop. As a result of the small sample size we have used a prospective pre-post design without a control group, which limits our possibilities of ensuring that changes over time are solely due to the intervention. Therefore we should be cautious when interpreting these quantitative results. However, because we used a mixed-method design which also included qualitative data, we were able to combine quantitative and qualitative results and in turn provide high quality and rich data. As the qualitative results support the quantitative results we feel confident that our conclusions are strong suggestions for future research focusing on effective interventions that reduce sedentary time and promote physical activity for intenders with disabilities. To add confidence to the suggestions, this research could be repeated with a larger sample size which would also allow a control group and examine the generalizability of qualitative results in terms of naturalistic generalizability, analytic generalizability, and/or transferability (Carminati, 2018; Smith, 2018).

Strengths of the study include the setup of the program. We chose to use a participant-led approach where we worked with the participants rather than on them. Being able to choose the activity, intensity and frequency of the activity was highlighted by the participants as one of the main positive aspects of this program. Participants also mentioned they really liked the fact that the program was tailor made to their specific situation, but still allowed interaction with other participants during the workshops. The peer support during the workshops was an element that was very much appreciated or as one participant explained: 'I'm so glad that I decided to sign up for this program. I already got so much tips from the other participants about physical activity that it was definitely worth coming here today [i.e. to the workshop]'. We have also tried to encourage interaction between participants in between workshops, but WhatsApp or Facebook groups created after the first workshop were only marginally used by the participants. One of the reasons given for not using the WhatsApp or Facebook groups was that they did not consider asking other participants about their experiences even though the workshops leader tried to encourage conversations amongst participants in between workshops. Future research could therefore consider expanding the peer support element, by looking at different possibilities of connecting participants outside the workshops.

Conclusion

This study provides strong indications for using a whole-of day approach to promote physical activity for inactive people with disabilities by focusing on reducing sedentary time and promoting more activity throughout the day. At the end of the program participants significantly reduced their sedentary time and were more physically active throughout their day. They also felt more confident towards taking part in physical activities. Results from this study suggested elements such as a participant-led approach, action planning and coping strategies to overcoming potential barriers were effective in motivating participants to become and maintain physically active. Researchers and health professionals should therefore consider moving away from the current physical activity guidelines focusing on increasing moderate to vigorous activity and adopt an 'every minute counts' strategy for inactive people interested in becoming more physically active.

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Competing Interests

The authors have no competing interests to declare.

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
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